ICCB 2011: Engaging Society in Conservation

Te Whenua, Te Moana, Te Papa Atawhai Whakamaua ki Tina

ABSTRACTS

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Congress Abstracts

Ordered by surname of first author.
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2011-12-08 18:30 Behavioural studies in conservation; Bridging theory and action in management of New Zealand's rarest ratite.

Abbott, R.*, *Victoria University of Wellington;* **Bell, B.,** *Victoria University of Wellington;* **Kay, D.,** *NZ Department of Conservation;*

There are often gaps between the theory of integrative approaches to conservation and management practice. This PhD thesis demonstrates the practical application of a behavioural study of great benefit to conservation management. The Department of Conservation employs a management practice for Kiwi (Apteryx spp.) called Operation Nest Egg (ONE). This involves removing eggs from the wild, hatching and rearing the young in captivity until they are large enough to no longer be at risk from stoats, and release back into the source population. Despite DOC recommendations within literature for the use of behavioural studies in Kiwi conservation, few have been undertaken. This thesis aims to bridge the behavioural study-conservation management gap by investigating the effects of ONE on kiwi behaviour, and whether the current practice results in maximum survival, recruitment and fitness. Experimental manipulation of release group demographics are being used to tests key hypotheses focusing on; release location, group size, sex ratio, conspesific familiarity and distance from resident kiwi, and subsequent success of reintroductions. Early results have shown that it is detrimental to survival and breeding success to release juvenile kiwi as individuals, rather than in groups. A more complete understanding of the behavioural effects of various release strategies will provide guidance for improving the effectiveness of future ONE reintroductions and kiwi conservation in general.

2011-12-09 15:45 Evaluation of awareness programmes towards wildlife conservation

Abi-Said, MR*, *President, Animal Encounter;* **Abi-Said Marrouche, D,** *American University of Beirut, Faculty of Agricultural and Food Sciences;* **Leader-Williams, N,** *Director of Conservation Leadership, University of Cambridge, Department of Geography;*

Resolving conflicts between people and large carnivores is vital for their future existence. The success of conservation programmes often depends on developing approaches adapted to particular and local cultural circumstances. Moreover, when such programmes are linked to education and awareness, their success can be further increased. The effectiveness of two awareness programmes towards striped hyaena conservation comprising running awareness seminars at different sites in Lebanon and a zoo education programme at Animal Encounter – Educational Center for Wildlife Conservation – was evaluated. Two approaches were used at the Animal Encounter programme: a passive (self-guided tour) and an active (guided tour) approach. The evaluation of both awareness programs was undertaken through a questionnaire interview. Both, the awareness seminars and the active approach have shown to be very effective at changing the views of respondents (>80% changed their attitudes) towards striped hyaena, and improved their support (>85%) for its conservation. Moreover, one key factor that affected the negative attitudes of respondents from among the wide Lebanese public was the number of stories or myths portraying striped hyaena negatively. Such results show the necessity for paying more attention to the need to raise awareness among respondents through different kinds of approaches.

2011-12-09 16:30 The Impact of Religious Bodies on Private Land Conservation

Abiala,A.A*, *University of Ibadan, Nigera;*

This paper examined the impact of religious bodies on conservation of private land. Although, there are mounting evidences that religious bodies conserve private land among Nigeria public. The study was designed to investigate the extent to which religious bodies were involved in protecting private land. A total of 500 religious leaders were purposively selected which consisted Christianity, Islam and Africa Traditional. A ten-item questionnaire was used for data collection, using frequency counts, percentages and pie chart for data analysis. The results indicated that a good number of religious leaders respect and preach on private land conservation. It was discovered that vast majority of religious bodies usually have clash which resulted into loss of natural resources, plants, human lives and valuable properties. Evidences from various respondents revealed that some religious bodies still perform rituals and sacrifices that are detrimental to nature and society. The findings were interpreted in terms of the need to be actively engaged in land conservation irrespective of denomination or religious body.

2011-12-07 16:45 Understanding the impacts of habitat degradation on Indo-Pacific coral reef sponge assemblages

Abigail L Powell*, *Victoria University of Wellington, New Zealand;* **James J Bell,** *Victoria University of Wellington, New Zealand;* **David J Smith,** *University of Essex, UK;*

Coral reefs across the globe are declining as a result of anthropogenic activities. Currently, much research focuses on investigating and mitigating the effects of these threats on scleractinian corals, while impacts on other important groups of reef organisms, particularly sponges, are often overlooked. Sponges are exceptionally diverse, globally distributed, possess useful bioactive compounds and perform essential functional roles on reefs. To predict how environmental degradation may influence sponges in the future we need to understand the abiotic and biotic factors currently driving their spatial variation. In 2010, we surveyed sponge assemblages in conjunction with a suite of environmental and biological variables, including sedimentation, temperature, salinity, chlorophyll-a, spongivorous fish densities and hard coral cover, at nine sites across a gradient of habitat quality in the Wakatobi Marine National Park (WMNP), Indonesia. Using multivariate techniques we found that sedimentation was strongly associated with differences in sponge assemblages. Our findings have important implications for reef conservation in the WMNP as increases in sedimentation and turbidity have been observed at numerous sites and are associated with mangrove clearance and coral mining.

2011-12-09 14:00 Mapping conservation priority areas for threatened species within a rapidly changing multi-use landscape in Sabah, Borneo

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Rapid palm oil expansion is jeopardising long-term distributions of threatened species in the Malaysian State of Sabah, Borneo. Ensuring their long-term persistence in this multi-use environment will involve adapting land management and policy and a first step in this process is to predict suitable areas for these threatened species. We used a maximum entropy approach (using MaxEnt and ArcGIS) that integrates presence location data with environmental information, and enhanced this method by incorporating key biological determinants into the models to increase performance. Recent data were used, models were integrated with land-use and habitat maps at a state wide and regional level, using LANDSAT and SPOT 5 images respectively and outputs were reviewed by a panel of experts. The models identified extensive areas with conservation value in Sabah but most priority sites lie outside protected areas and fall within private or production forest jurisdiction. As high revenue from palm oil drives forest conversion these areas are consequently vulnerable to future transformation. There is grave concern over the effects of such habitat loss and fragmentation on these priority areas and if Sabah's biodiversity is to be safeguarded, then sustainable land-use planning, policy and conservation derived revenue schemes are needed.

2011-12-06 11:45 Carbon and Biodiversity: SCB's Adaptive Management Experience in a South African Biodiversity Hotspot

Abrams, RW*, *Long Island University;* **Powell, M,** *Ecological Capital Restoration Pty;*

Since the 1970's anthropogenic impact assessments led to recognition

for a need to offset unavoidable ecological losses. In the US, tools arose to mitigate degradation of ecological resources (e.g. habitat restoration, wetland mitigation banking), and globally, the Kyoto protocol provided a pathway for addressing industrial atmospheric pollution. Mechanisms such as cap and trade combined with an age-old practice of tree farming have morphed into offsetting carbon dioxide in the atmosphere through ecological restoration and preservation. At the World Heritage site of the Baviaanskloof Nature Reserve, in South Africa, the SCB invested in restoration of Spekboom-rich Albany Thicket habitat to offset the carbon footprint of the 2007 ICCB. Field work teams were arranged and supplemented by government through a job creation program. Monitoring between 2008 and 2011 revealed planting survival at Baviaanskloof in the range of 50%, with some samples as high as 65% and some as low as 15%. These early results demonstrate how field practices can be adapted to optimize habitat recovery, and highlight critical land use challenges: how to manage herbivory and the broader biodiversity of the preserve areas. Evidence is shown that refining the site selection process can optimize carbon sequestration rates.

2011-12-09 14:30 Do stewardship payment programs work: designing monitoring programs to measure social and ecological impacts

Adams, VM*, *ARC Centre of Excellence for Coral Reef Studies, James Cook University;* **Pressey, RL,** *ef Studies, James Cook University;*

Stewardship programs are used increasingly to provide financial incentives for conservation on private lands. In the Daly River catchment, Northern Territory, there are several existing protected areas, however many species and ecosystems are inadequately protected and further reservation is unlikely. Therefore, to achieve conservation outcomes, a stewardship program that supports conservation management on private lands is being explored. The program would underwrite the cost difference between routine land management and additional requirements of conservation management, aiming to contribute to both biodiversity conservation and livelihoods. We initiated a pilot study to develop and test methods for documenting both the social and ecological impacts of conservation programs on private lands. With details of the program still being worked out, we used the pilot study to identify a baseline of biodiversity health without conservation management and social indicators across properties in the catchment. We discuss the social indicators measured and the potential implications for designing a matched comparison monitoring program to measure the outcomes on participating properties compared to similar non-participating properties.

2011-12-08 18:30 Bed habitat selection by wild boar (Sus scrofa) in Boroeeye wildlife sanctuary in Yazd province, Iran

Aghanajafi zadeh, S*, *Maybod branch, Islamic Azad University, Maybod, Iran;* **Naderi,G,** *Ardebil branch, Islamic Azad University,Ardebil, Iran;* **Heydari, F,** *Department of Environment, Khatam province, Yazd, Iran;*

Populations of wild boar present in semi-arid of central Iran. We studied features influencing bed site selection by this species in semi-arid central Iran. Habitat features of the detected bed site were compared with randomly selected by quantifying a number of habitat variables including cover percent and species of vegetation، height and vegetation patch in semi- arid area in Iran. The results revealed that was not any significant difference between presence and absence of animal (random site) in micro scale. This is the first ecological study of the wild boar in a wildlife Sanctuary of the semi Desert biome of Iran. Sustainability of wild boar populations in this area dependent to more study in macro scale and agriculture strategies. Key word: bed habitat selection, Wild boar (Sus scrofa), Iran

2011-12-06 12:00 Engaging society in the design of conservation programmes

Agni Boedhihartono*, *James Cook University;* **Jeffrey Sayer,** *James Cook University;*

Conservationists often seek to "engage society" in "our" biodiversity agenda. They assume that people will support conservation if they understand what is at stake. In this paper we will argue that there is no single best way of achieving biodiversity objectives and that one of the major challenges is to identify those conservation approaches that will have broad appeal to stakeholders. This means that we engage with society in setting the agenda and not just in advocating solutions. Examples will be given of the use of participatory techniques to work with local stakeholders in poor tropical developing countries to find conservation approaches that will be consistent with the development aspirations of the poorer sectors of rural society. We give examples from work with Baka Pygmy people in the Congo Basin, Dayaks in remote areas of Borneo and the people in remote areas of Indonesian Papua. Such approaches will not necessarily maximise the area of pristine forests but may optimise biodiversity values in multi-functional forest landscapes. We believe that these approaches will have a greater probability of success than conventional approaches. Field surveys indicate high levels of biodiversity in areas subject to these approaches.

2011-12-07 18:00 Use of websites for engaging society in conservation

Aguayo, Claudio*, *Waikato University;* **Otrel-Cass, Kathrin,** *Waikato University;* **Eames, Chris,** *Waikato University;*

Engaging society in conservation requires understanding of conservation issues from local communities, and action competence for effective participation. To achieve these, literature emphasizes the role of education and the importance of access to meaningful information. Evidence suggests that new media technologies and the Internet can assist the learning process related to conservation, and promote positive attitudes and critical participation. Here, a theoretical framework for the development of websites for community education is presented, and a case study example of its application in a real conservation context in central Chile is reviewed. Preliminary findings from Chile stress the importance of three key conditions for the design of effective educational websites: (1) networking with local community and organizations; (2) understanding and addressing the sociocultural characteristics and needs of the target audience; and (3) using Web 2.0 features (e.g. Twitter and Facebook) for prompting social networking and interaction. Follow-up data on the use of the developed website will allow the assessment of its impact on the level of engagement of the local community in conservation.

2011-12-06 16:34 Underwater acoustic pollution: lethal and behavioural effects. Examples of society driven regulations.

Aguilar, NA*, *La Laguna University. Spain/ Univ. Auckland, NZ;*

Ocean acoustic pollution is growing. The main sources are shipping, explosions (construction and military activities), pile driving (harbours, offshore structures), seismic hydrocarbon/geological explorations, echo sounders (including military sonar) and marine mammal deterrents used in fisheries/aquiculture. Some sources, such as shipping, increase the background noise and can mask signals driving vital functions in marine fauna (e.g. socializing, prey/predator detection, larvae orientation towards settlement habitats, navigation, etc). Other sources can produce a range of behavioural and physiological effects. Lethal effects have been recorded at short distances from some intense sources, and also at long ranges, probably due to behavioural reactions. E.g. mass strandings of beaked whales related to exercises using tactic sonar and explosives. Strandings acted as key events arising reactions from the public and NGOs, backed up by scientists. This resulted in moratorias to naval sonar in some areas and calls for mitigation. There is some scientific evidence for the impact of seismics on marine fauna and fisheries. The public appeal and protection status of marine mammals led to development of mitigation for seismic activities. Some fishing associations are strongly claiming losses in captures due to seismic exploration. All this exemplifies that joined public claims and scientific basis are an effective tool to foster developing of mitigation for the activities of powerful social entities such as the military and large industries, at least in some cases.

2011-12-08 15:30 Community and social actors involvement in conservation on Mexican islands

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A collective awareness about the value of the Mexican islands as national heritage has been unfolding during the past two decades. As a social construction, a collaborative approach between federal government agencies,

academic institutions, local communities and artisanal fishermen co-operatives, NGOs, as well as national and international donors has been the driving force. Mexican islands are seen as strategic territories for sovereignty, with a rich biodiversity, and as sites with potential for real sustainable development projects. Exercise of sovereignty is being strengthened through an increased presence of Mexican authorities on islands, and by legally protecting such territories. The presence of fishing co-operatives with long-term and exclusive fishing rights to valuable resources, such as abalone and lobster is also a way of exercising sovereignty. Artisanal fisheries around Mexican islands have been internationally recognized as successful examples of community-based governance and sustainable activities, achieving the first artisanal fisheries certification from the Marine Stewardship Council (MSC). Regarding biodiversity, 49 successful eradications of invasive mammals have been conducted on 30 islands, where native and endemic species are already improving. Restoration of seabirds by means of social attraction techniques are being actively supported by local communities. Social analysis using micro-sociology methodologies shows that actors' cohesiveness around island conservation and restoration activities and projects is getting stronger, adding strength to governance, formal policies and law enforcement. It is also possible to observe the advance of an articulate relationship between hands-on in the field conservation activities with the creation of new national strategies and overarching policy tools.

2011-12-09 14:45 Using citizen-reported data to predict invasive insect distributions

Ahrné, Karin , *Swedish University of Agricultural Sciences;* **Ahlbäck, Lina,** *Swedish University of Agricultural Sciences;* **Berggren, Åsa*,** *Swedish University of Agricultural Sciences;*

With ongoing climate change, insect species in many regions of the world are changing their distribution areas and may have significant impacts on the systems in which they establish (e.g. invasive species). Distribution models can project future scenarios and inform land managers as to where distributions are likely to be affected by climate change. However, the collection of species' distribution data over large areas is costly, so modelling methods that are able to use low-cost information such as citizen-reported data are potentially very useful. In this study we used the program Maxent to model the potential geographical distribution of two exotic insect species in Sweden, the butterfly Araschnia levana and the beetle Graphosoma lineatum. The data were citizen-reported presence-only open-access data in combination with climate and land cover data from national databases. Our models showed that the variables most important in predicting the presence for A. levana were winter temperature followed by land cover data; where habitats related to open and dry grasslands were the best predictors. For G. lineatum the variables that best predicted where the species could be found were summer temperature and land cover data; where open green areas, in both urban and country areas was important. Our findings fit well with previous ecological knowledge of the species and can be used by managers to estimate potential distributions of these insects and decide on management options. The study also shows the value of utilizing public reports in conservation science as a way of gathering species information over large areas.

2011-12-06 16:45 The Case of the Trumped-up Corella: How Do Human Values Bias Wildlife Conservation?

Ainsworth, GB*, *Charles Darwin University;* **Aslin, HJ,** *Charles Darwin University;* **Garnett, ST,** *Charles Darwin University;* **Weston, MA,** *Deakin University;*

With a population of around 50 individuals left in the wild, Australia's critically endangered Orange-bellied Parrot (Neophema crysogaster) is on the brink of extinction despite being the subject of considerable conservation efforts for over two decades. It has also been the subject of much controversy and public attention. In contrast, some threatened species may recover while remaining in relative obscurity. How are threatened birds such as the Orange-bellied Parrot valued by society and how do these values affect strategies to conserve them? Value ('relative worth, merit or importance') cannot be observed directly but only through expression in the form of attitudes and behaviours. Socio-psychological techniques can be used to measure attitudes and behaviours and link them to underlying aesthetic, utilitarian, intrinsic and other values. Using several Australian threatened birds as a case study, our research aims to identify which values are held for similar sorts of threatened birds that have received contrasting investment. We discuss whose values count in threatened bird conservation, how those values influence conservation success and the role of values in communicating conservation to the broader community.

2011-12-06 10:30 Propagation of Tetrapleura tetraptera (Schum. & Thonn.) Taub. Using Tissue Culture

Akinyele, A.O.*, *University of Ibadan, Nigeria;* **Maradesa, B.O.,** *University of Ibadan, Nigeria;*

Protocol was developed for regeneration of Tetrapleura tetraptera in vitro. T. tetraptera is a lowland tree of tropical Africa belonging to the family Mimosaceae. It serves as a dietary supplement rich in vitamins and used in pharmaceutical industries and as spice in food. The germplasm of this tree is under intense pressure leading to threat to their continued availability. This study was carried out to determine the appropriate combination of growth regulators for in vitro propagation of Tetrapleura tetraptera. Excised embryos from mature seeds were cultured on Murashige Skoog (MS) and Woody plant medium (WPM) supplemented with Indole-3-Butyric Acid (0.1mg/l IBA), Kinetin (0.1-0.5mg/l KIN) and Benzyl amino purine (0.1-0.5mg/l BAP). The experiment consists of 10 treatment combinations with control (no treatment). After 3 weeks, the regenerated plantlets were subcultured on the same combinations of MS and WPM medium as used before. WPM supplemented with 0.1 IBA + 0.2 KIN had shoot height of 7.6cm and highest number of nodes, 7 while MS supplemented with 0.1 IBA + 0.4 KIN had shoot length of 7.9cm and number of nodes 6. WPM is the most appropriate growth medium for regeneration of plantlets of T. tetraptera in vitro using embryo culture.

2011-12-08 18:30 Factors affecting the local occurrence of the near-threatened bitterling (Tanakia lanceolata): strong attachment to its potential host mussels

Akira Terui*, *Dept of Ecosystem Studies, Graduate School of Agricultural and Life Sciences, Univ. of Tokyo;* **Shinichiro S Matsuzaki,** *National Institute for Environmental Studies;* **Kohji Kodama,** *Fukui Prefectural Fisheries Experimental Station;* **Masamitsu Tada,** *Fukui Prefectural Coastal Nature Center;* **Izumi Washitani,** *Dept of Ecosystem Studies, Graduate School of Agricultural and Life Sciences, Univ. of Tokyo;*

Ecologically specialized species may be more susceptible to anthropogenic impacts than generalist species. Japan's native bitterlings (subfamily Acheilognathinae), which are specialized to spawn on the gills of certain freshwater mussels, have been declining dramatically during the last few decades. To identify factors affecting the local occurrence of the threatened bitterling species Tanakia lanceolata, we measured its presence and absence, along with several environmental factors, at 68 sites within agricultural canal networks in the Lake Mikata basin, Fukui Prefecture, Japan. Based on the theoretical information approach of Akaike's information criterion, generalized linear mixed models were constructed. These revealed that the species' occurrence is strongly affected by five major factors: the presence of freshwater mussels Anodonta sp., water depth, floating plants coverage, the presence of bullfrogs, and submerged plants coverage. The probability of the presence of T. lanceolata was higher at shallower sites with lower floating plants coverage, located within channels containing mussel beds. These results suggest that mussel-containing channel systems are high-priority conservation zones for T. lanceolata.

2011-12-08 18:30 The Liben Plain: Bird and Mammal Diversity

Alazar Daka *, *Addis Ababa University;* **Samson Zelleke,** *Addis Ababa University;* **Bruktawit Abdu,** *Addis Ababa University;*

The Liben plain, located in southeast Ethiopia, was well known for being one of the most productive pastures in Africa. It is the only home for the Liben Lark which is currently critically endangered mainly due to bush encroachment, permanent settlement and agricultural expansion. The project intends to quantify the biological value of the plains using birds and large mammals. Education programs were conducted in schools to help raise awareness and discussion grounds were facilitated to assist the restoration and sustainable use of the rangelands. Distance sampling was used in surveying the bird richness and abundance and questionnaires to know about the current and historical large mammal diversity. More

than 45 species of birds were identified on the plain with the common ones being the Somali Short-toed Lark and the White-crowned Starling. The questionnaires indicated about 20 large mammal species to be found on the plain and around five to have become extinct. Discussion grounds were set up to help decision making and awareness was raised among the school children as well as for two peasant association communities while conducting questionnaires.

2011-12-07 11:00 Developing a Collaborative Approach: Lessons from Managing Integrated R&D Initiatives

Allen, WJ*, *Learning for Sustainability - http://learningforsustainability.net;*

Achieving biodiversity conservation in an urban setting increasingly requires the use of integrated research and development (R&D) initiatives. These are characterised by requiring specialist staff to link across disciplines and/or agency departments, and encouraging the ongoing participation and collaboration of different stakeholder groups. However, this integration can be difficult to achieve in practice because such initiatives often fail to engender the required productive conversations between different groups, each with their own language and culture. Drawing on lessons from New Zealand initiatives I suggest a framework for use in integrated R&D programmes that recognizes the need for different conversations to be supported depending on the type of engagement required. This framework will be illustrated using a continuum of research approaches ranging from disciplinary through multi-, inter- and trans-disciplinary. The broad lessons that emerge can be applied to a range of collaborative urban biodiversity initiatives. They indicate the need to take time to build the capacity of participants — in science, organisations and communities. The importance of supporting both formal and informal conversations within engagement efforts is highlighted. The need for specialist facilitation skills, particularly to manage the overall direction of such efforts, is also explained.

2011-12-09 16:45 Gender differences in local residents' relationships with protected areas in Asia

Allendorf, TD*, *University of Wisconsin-Madison;* **Allendorf, K,** *University of Illinois-Urbana Champaign ;*

Although participation and inclusion are considered critical to successful conservation of protected areas, women are often underrepresented in park-people studies. In this paper, we examine differences between women and men's attitudes and perceptions toward protected areas in Nepal, Myanmar, and China. In Myanmar, men are more likely to like their local protected area than women and there are significant differences by gender in all but one of the perceptions of protected areas, with men more likely to report extraction and management problems and more likely to perceive conservation, extraction, and management benefits. In Nepal, women and men are equally likely to like the park. However, when we adjust for socio-economic characteristics and perceptions and knowledge of the park, women are significantly more likely to like the park than men. Recent results from China will also be presented. These contrasting examples demonstrate the need to explicitly recognize and analyze gender in park-people relationships so that lessons can be drawn for more gender-sensitive approaches to protected area conservation and approaches developed for how to engage women in conservation.

2011-12-08 14:45 Larval dispersal, population connectivity and customary tenure in coral reef fisheries: are ecological and social spatial scales compatible?

Almany, GR*, *ARC Centre of Excellence for Coral Reef Studies, James Cook University, Australia;* **Hamilton, RJ,** *The Nature Conservancy, Indo-Pacific Resource Centre, Australia;* **Matawai, M,** *The Nature Conservancy, Manus Field Office, Papua New Guinea;* **Potuku, T,** *The Nature Conservancy, Kavieng Field Office, Papua New Guinea;* **Berumen, ML,** *Red Sea Research Center, King Abdullah University of Science and Technology, Kingdom of Saudi Arabia;* **Planes, S,** *USR 3278 CNRS EPHE, Center de Recherches Insulaires et Observatoire de l'Environnement (CRIOBE), French Polynesia;*

Fish have a planktonic larval phase lasting days to weeks, and the spatial scale of larval dispersal influences juvenile recruitment to fished populations, how resilient populations are to fishing and disturbance, and sets the ecologically relevant spatial scale for management and conservation. However, in many parts of the Indo-Pacific, local communities have customary ownership of reefs (customary marine tenure [CMT]), which establishes user-rights boundaries between communities, thereby providing the politically relevant spatial scale for management and conservation. A key unanswered question is whether these two spatial scales are compatible, and thus whether local management action results in local recruitment benefits, or whether those benefits are exported to other communities. Using genetic parentage analysis, we measured larval dispersal from a spawning aggregation of an important, threatened fishery species (coral trout: Plectropomus areolatus) on the south coast of Manus, Papua New Guinea. We sampled juveniles from a 60km stretch of coastline centered on the aggregation and spanning the CMT boundaries of five subsistence communities. Approximately 40% of juveniles were produced by the spawning aggregation, and many larvae recruited to the CMT estate containing the aggregation. This suggests that ecological and social spatial scales are compatible and that local management can lead to local benefits; a powerful argument for community-based management.

2011-12-08 18:30 When science is heard: ecological researches on an endemic and endangered bird, supporting the creation of a state protected area in Southeastern Brazil.

Alves, MAS*, *Universidade do Estado do Rio de Janeiro;* **Chaves, FG,** *Universidade do Estado do Rio de Janeiro;* **Vecchi, MB,** *Universidade do Estado do Rio de Janeiro;*

Habitat loss is one of the most important causes for species extinction. Brazil is one of the countries with a greatest number of conservation units, although many are not effective such as Environmental Protection Area (EPA). One of the most globally endangered species is The Restinga Antwren (Formicivora littoralis), endemic to restinga (coastal ecosystem associated to the Atlantic forest) with a very restricted area of occupancy (148 Km2). This bird described around two decades ago had almost no basic information until our studies started, and no effective area of protection apart from EPAs. Here we present how important research activities were to awareness local community, and to subsidize the decision makers to officially create a conservation unit. A State Park (Parque Estadual da Costa do Sol) was recently officially created under collaboration with researchers, NGOs, Governmental Agencies, and local community. This park covers most of the areas where the Restinga Antwren occurs. Important actions for that included an Action Plan (ICMBio and SAVE Brasil/BirdLife International orgs., published in Dec/2010), environmental education activities, scientific production and dissemination of information for the general public on the threats to the species and its habitat. Support: SAVE Brasil, INEA, ICMBio, UERJ, Movimento Ambiental Pingo D´água, Instituto Biomas.

2011-12-08 14:00 Representing macroinvertebrate dynamics for instream flow assessments

Anderson, KE*, *Department of Biology, University of California, Riverside;* **Harrison, LR,** *Bren School of Environmental Science and Management, University of California, Santa Barbara;*

Instream flow assessment methods for creating explicit links between changes in physical habitat, the availability of macroinvertebrates that comprise fish diets, and viability of target fish species, are generally lacking. We used a two dimensional hydraulic model of a restored section of the Merced River in California, USA, to describe the transport of macroinvertebrates that comprise the major food source of threatened Chinook salmon. We found that the trajectories of simulated invertebrates were dominated by a high velocity core under the full range of examined discharge conditions. We collapsed the 2D flow field into a 1D representation that allowed its use in population dynamic models for benthic invertebrates, in effect extrapolating the dynamics observed in the 2D model to broader spatial and temporal scales with minimum computational effort. Simulations incorporating the 1D flow representation yielded distributions of invertebrates that showed a strong inverse relationship with flow velocity, especially between pools and riffles. The strength of the relationship was set by other parameters, namely the rate at which drift dispersal is initiated and the rate at which dispersers settle to the benthos. Surprisingly, these parameters had minimal effects on benthic distributions over a range of parameters drawn from the empirical literature. We will discuss ongoing parameterization efforts and link predicted outcomes to a salmon bioenergetic and population dynamic model.

2011-12-08 14:00 Marginal Mortality: Elevated Vertebrate Road Kill Along Ecotones, Borders, and Transitions

Anderson, SA*, *CSU Channel Islands;*

Roads and vehicles can have profound impacts on the abundance and distribution of vertebrates, with direct mortality (i.e. "road kill") the most obvious such effect. I have been examining road kill across the globe (eastern Turkey, coastal Gulf of Mexico, and coastal California) since 2007. While the individual species killed varies, overall mortality is most consistently seen in transitional regions (ecotones) or edges. Patterns are clearest within my most intensively-sampled region of southern California (more than 3,100 observed kills during more than 3,175 individual surveys amounting to a total of 43,000 km driven over the past 5 years). Many factors such as landuse, roadside barriers, maximum speed limit, and vehicle traffic are correlated with kill rates, but the best overall predictor appears to be the gross positioning of the particular road segment within transition zones (wildland-urban interface, etc.). For example, in the Santa Monica Mountains (a coastal range ~50x10 km bisected by 282 km of arterial roads) 4,601 ± 781 (mean ± se) animals are killed annually, spanning abundant (e.g. 98 coyote kills), common (e.g. 9 owl kills), and rare (e.g. 3 badger kills) species of concern. Kill rate along the range's perimeter exceeds that within its core. Despite such persistent mortality, protected area and ecological restoration efforts rarely adequately appreciate or manage for this threat.

2011-12-08 15:15 An integreated risk assessement for climate change: analysing the vulnerability of sharks and rays on the Great Barrier Reef

Andrew Chin*, *James Cook University;* **Peter Kyne,** *Charles Darwin University;* **Terrence I Walker,** *Melbourne University;* **Rory B McAuley,** *Department of Fisheries Western Australia;*

We developed an Integrated Risk Assessment for Climate Change (IRACC) and applied it to assess the vulnerability of sharks and rays on Australia's Great Barrier Reef (GBR) to climate change. The IRACC merges traditional climate change vulnerability frameworks with approaches from fisheries ecological risk assessments. The resulting assessment accommodates uncertainty and can be applied at different spatial and temporal scales. It allows managers to; identify exposure factors and at-risk species; the biological and ecological attributes that confer vulnerability; critical habitats and ecological processes; and major knowledge gaps. The assessment indicated that freshwater/estuarine and reef sharks and rays are the most vulnerable groups, and that vulnerability is driven by case-specific interactions of multiple factors and species attributes. Changes in temperature, freshwater input and ocean circulation have the most widespread effects. Although only 30 of the 133 species were assessed as vulnerable, synergies with other factors increased vulnerability. Reducing the impacts of climate change on the GBR's sharks and rays requires steps to mitigate climate change, and to address habitat degradation and fisheries issues. Species specific conservation actions (conservation and recovery plans, protected status) may also be required for high risk species (the freshwater whipray, porcupine ray, speartooth shark and sawfishes).

2011-12-07 10:42 Securing Coral Reef Ecosystem of Karimunjawa, Indonesia

Anggoro Aji Wahyu*, *Indonesian Biodiversity Research Center;*

Corals in Karimunjawa National Park are threatened by destructive fisheries, tourism activities and temperature rise due to global environmental changes. Project aims to deliver awareness and provide awareness facilities to fishermen, boat operators and tourists in the marine protected area (MPA) and densely coral reef associated sites. We deployed eighteen floating buoys and seven sign boards in frequently visited coral reef sites and beaches, twenty-five standing banners in local homestays and hundreds of poster showing area of conservation in Karimunjawa. Meetings with the stake-holders were performed prior the deployment, this is to assure that the project gained a local support and the facility built maximally used to gain a significant impact to coral reef conservation. Pre and post ecological monitoring were also executed to measure the impact of awareness activities to coral reef ecosystem. The meeting was also used as awareness raising activities to increase knowledge on MPA locations and climate change impacts within the MPA. This will help tourists understand appropriate rules and regulation of the MPA and help the fishers acknowledge MPA location and learn innovative adaptation measures which can protect Karimunjawa coral reef ecosystems from threats.

2011-12-08 18:30 Can Acoustic Technology Help Monitor Threatened Grouper Spawning Aggregations?

Appeldoorn, R.S.*, *Department of Marine Sciences, University of Puerto Rico, Mayagüez;* **Schärer,M.T.,** *Department of Marine Sciences, University of Puerto Rico, Mayagüez;* **Rowell, T.J.,** *Department of Marine Sciences, University of Puerto Rico, Mayagüez;* **Nemeth, M.,** *Department of Marine Sciences, University of Puerto Rico, Mayagüez;* **Mann, D.A.,** *College of Marine Science, University of South Florida;*

Worldwide, grouper populations are threatened by extensive fishing on spawning aggregations. Yet, the same factors that promote overfishing, the concentration of populations at known locations and times, can also serve to focus monitoring activities on both fish and fishers. The problems facing managing agencies with limited manpower are that there can be multiple sites, and they are often at unknown locations and difficult to get to under winter sea conditions. Passive acoustics, using hydrophones to listen for sounds emitted by aggregating groupers, or fishing boats, offers a potential solution to these problems. We have used boat-based hydrophones to map spawning aggregations of red hind (Epinephelus guttatus) and deployed bottom hydrophones to monitor multiple spawning aggregation sites over the course of the spawning seasons for both red hind and yellowfin grouper (Mycteroperca venenosa). Hydrophones were installed well before the spawning season and recovered after, spreading the effort over time and eliminating the problem of weather dependence. Calibration against diver surveys indicate that noise levels track abundance over the course of the season. Initial attempts using computerized signal recognition show promise for automating monitoring and potentially conducting it remotely in real time. Practical application still requires research to record additional species specific sounds and how they vary with abundance over a greater range of aggregation sizes.

2011-12-08 14:30 Molecular vibration of hairs: a rapid and noninvasive identification of species and sex in primates

ARANIBAR-ROJAS, Nestor Hugo*, *Mamaco Program, Asociación Armonía, La Paz, Bolivia;* **Rodríguez-Fernández , Jaime Ivan,** *Department of Biochemistry and Molecular Biology, Federal University of Paraná, Brazil;* **Ingberman, Bianca,** *Department of Zoology, Federal University of Paraná, Brazil;*

Successful conservation and wildlife management projects depend on reliable data on taxonomy and population structure, thus it is important to implement methods that minimize the time and cost of these studies. Here, we identify the sex and species from hair samples of 90 individuals of five different primate species (Alouatta belzebul, A. seniculus, A. caraya, A. fusca and Homo sapiens) by near-infrared spectroscopy. The method is non-invasive and rapid (less than one minute per sample) and reconstructed the characteristics of the metabolom of each individual from the differential absorbance of infrared light from molecules present in each hair. The absorbance results were analyzed through discriminant analysis, partial least squares, random forest, boosting trees and neural networks. The last statistical method was the most effective, generating models with 100% accuracy on withheld validation samples, for both species and sex. Regarding costs, the infrared spectroscopy method is considerably cheaper than standard DNA sequencing methods. We also emphasize that it environmentally friendly as it doesn't generate waste-products. Thus, near-infrared spectroscopy should be considered a promising tool in nature conservation in terms of analysis accuracy, economy and environmental impact.

2011-12-08 18:30 Metabolomic fingerprint of Caiman yacare scales for the determination of geographic distribution and morpho-metric characters

ARANIBAR-ROJAS, Nestor Hugo*, *Mamaco Program, Asociación Armonía, La Paz, Bolivia;* **Rodirguéz-Fernadéz, Jaime Ivan,** *Department of Biochemistry and Molecular Biology, Federal University of Paraná, Brazil;*

Rapid methods of identification and evaluation of the geographic origin and the analysis of morphometric characters (weight and size) are important for the management and conservation of the crocodile Caiman yacare, as well to control the illegal skin trade. To this end, we evaluated the detectable

metabolom from scales of 46 individual crocodiles through near-red espectroscopy. The individuals came from two different sampling locations. Near-red espectroscopy spectra represent a molecular fingerprint of the environmental and evolutionary life-history of each individual. The spectra were analysed through Random Forest, Discriminant Analysis, Boosting Trees, Neural Networks and Partial Least Squares (PLS). Independent validation samples analyzed by all methods showed high discrimination capacity between geographic locality (83-100%), between lighter and heavier individuals (93-100%) and between length of individuals (83-93%). Only the results from PLS were unsatisfactory. Obtaining data for near-red spectroscopy analysis takes less than one minute per sample, does not require chemical pre-treatments and does not destroy or modify the sample. Thus, near-red spectroscopy could be considered a very promising tool to identify the geographic origin of harvested skins, as well as to reconstruct morphometric characteristics to discriminate if harvested and marketed skins comply with the limits established by CITES or local institutions.

2011-12-08 12:15 Examining the Gridlock of Tiger Conservation: Results of a Grounded Theory Inquiry into the Social Factors that Affect Tiger Conservation in India.

Archi Rastogi*, *Department of Natural Resource Sciences, McGill University, Canada ;* **Gordon M Hickey,** *Department of Natural Resource Sciences, McGill University, Canada;* **Ruchi Badola,** *Wildlife Institute of India, Dehradun, India;* **S A Hussain,** *Wildlife Institute of India, Dehradun, India;*

The tiger is a potentially-dangerous predator, found in parts of the world with some of the most dense and poorest human populations. In these contexts, conserving the tiger through Protected Areas can become a difficult political challenge. Specifically, this dilemma represents a gridlock in tiger conservation: tiger conservation needs strict Protected Areas; Protected Areas depend on local support, but the very establishment of these Protected Areas can antagonize local communities. To minimize conservation-related conflict and to better implement conservation programs, decision-makers need to better understand the social factors that affect tiger conservation outcomes. Through this case study in Corbett Tiger Reserve (India), we applied grounded theory to analyze stakeholder interactions related to tiger conservation. Building on our past research, we were able to update the list of stakeholders, and generate substantive theory on stakeholder interactions at a local level. Our research outlines the social processes driving the human-wildlife conflict as a political issue. Our analysis also shows that stronger village institutions may provide better safeguards against conservation-related conflict, and can help effective tiger conservation. These findings are lilely applicable to conservation-related challenges in a variety of contexts.

2011-12-09 14:56 Reading between the Stripes: Results of a Content Analysis of Media Resources for Tiger Conservation

Archi Rastogi*, *Department of Natural Resource Sciences, McGill University, Canada ;* **Gordon M Hickey,** *Department of Natural Resource Sciences, McGill University, Canada;* **Ruchi Badola,** *Wildlife Institute of India, Dehradun, India;* **S A Hussain,** *Wildlife Institute of India, Dehradun, India;*

Tiger conservation involves an inherent political challenge: it requires the conservation of a dangerous predator in the ecosystems which are used by local communities for everyday subsistence. If these communities turn antagonistic, it can be fatal for conservation schemes, as exemplified by the local extinction of tiger from certain protected areas in India. Through our study, we aimed to understand the social factors that influence tiger conservation outcomes in India. We used media content analysis to provide an account of the societal discourse on tiger conservation.. Our results underline the key gaps and congruencies between societal and scientific discourse on tiger conservation. Our results include key findings for the policy and science of conservation across contexts.

2011-12-07 10:45 Field Estimates and Modelling of the Tonle Sap Lake Floodplain Vegetation Biomass and Production

Arias, ME*, *University of Canterbury;* **Cochrane, TA,** *University of Canterbury;* **Killeen, T,** *Conservation International ;*

The Tonle Sap Lake Floodplain extends over 15,000 km2 covered with distinct habitats that flood up to 8 meters seasonally. Significant hydrological changes will occur in the near future in the contributing Mekong River Basin as a result of water resources development and climate change; hence, the distribution of the floodplain vegetation cover is likely to change. The objective of this study was to quantify field parameters of the Tonle Sap terrestrial vegetation related to the flood pulse hydrology. A total of 120 plots were surveyed throughout the floodplain, extending from the edge of the permanent lake to 7 km up the elevation gradient. Forested areas, flooded 8-9 months of the year, had the largest standing biomass, height, and canopy cover. Areas of tall shrub, flooded 5-6 months annually, had the largest basal area, but decreased in height due to low soil moisture content during the dry season. Evidence of fire was prominent in grasslands occurring between the forest and shrublands. Rice paddies covered the outer ring of the floodplain, but their presence is restricted to areas that flood less than 2 months annually. A numerical model has been developed to predict vegetation characteristics (cover type, standing biomass, height, coverage, production, and species) as a function of flooding, soils, and human disturbance. This model is being used to predict the changes in the Tonle Sap vegetation production as a result of anthropogenic-induced alterations to the flood pulse hydrology.

2011-12-08 18:30 Estimation of carbon pools in primary and secondary rainforests indicate climate change mitigation schemes are viable for Papua New Guinea

Arihafa, Arison *, *Wildlife Conservation Society, Papua New Guinea Programme;* **Clements, Tom,** *Wildlife Conservation Society, Papua New Guinea Programme;* **Sinclair, J Ross,** *Wildlife Conservation Society, Papua New Guinea Programme;*

The government of Papua New Guinea (PNG) has identified the developing Reduced Emissions from Deforestation and forest Degradation (REDD+) mechanism as an important low carbon development option for the country. In order to undertake these activities, accurate inventories and monitoring of biomass and carbon stocks are required. Very few results of such work have been reported recently for PNG. In this study, we used randomly located nested-plots to measure biomass of aboveground live and dead wood for stems > 5 cm diameter in primary and secondary lowland rainforest at three sites in PNG, and we used regional allometric equations for such forest types to calculate carbon stocks. There were no significant differences in values among sites for primary or secondary forest. Aboveground live-wood carbon for primary and secondary forests at all sites were 177.2 ± 9.2 t C/ha and 133.6 ± 10.1 t C/ha, respectively, with values for dead-wood 4.4 ± 0.9 t C/ha and 5.1 ± 1.7 t C/ha (mean ± SE). Carbon dioxide equivalent for primary forests was 676.8 ± 7.6 t CO2e/ha and secondary forest 512.0 ± 82.8 t CO2e/ha (mean ± SE). The values we report are consistent with other studies in PNG and high compared to international studies. The carbon stored in lowland forests and the differences we report between habit types, suggests sufficient emissions can be avoided by changes in land use in PNG for REDD+ or other mitigation schemes to be viable.

2011-12-08 18:30 Indigeneous knowledge over distribution, threats and conservation of manatee in the douala-edea and lake ossa wildlife reserve

Aristide, Kamla Takoukam*, *student;* **Theodore, Mayaka,** *supervisor;* **Caryn, Self-Sullivan,** *mentor;*

Manatees are still presents in the lower reaches of River Sanaga and River Nyong, Lake Ossa, Lake Tissongo and the coastal area of Yoyo and Youme and Mbiako. They are more abundant in dry season in lakes and estuaries and feed mainly on grass species (mainly Phragmite sp) and sometime on fishes. Manatees are most abundant in Sanaga mouth and Lake Ossa. Manatee mortality is highest at lower Sanaga, the meat is highly coveted there. Threats on manatee include mainly hunting, net strangulation and fishermen/manatee conflicts, however many fishermen do believe that manatee are not threaten according to them; they reproduce at a high rate and are they are victims of manatees that tears their nets. Sanctuary should be created to ameliorate the condition of manatee and the local population, a manatee sanctuary should be created and compensation should be done to fishermen whose net are torn by manatee.

2011-12-07 11:00 Decision making in Reintroduction and Assisted Colonisation

Armstrong, DP*, *Massey University;* **Rout, T.M.,** *University of Melbourne;* **Parlato, EH,** *Massey University;*

There has recently been extensive heated debate about the merits of "assisted colonisation" in response to climate change. The different perspectives reflect differences in values, confidence in ecological understanding, and attitudes toward uncertainty. It is therefore useful to create logical and transparent decision frameworks that allow optimal decisions to be made based on current knowledge and values. However, this is extremely challenging due to a complex range of uncertainties from multiple areas of research as well as the range of attitudes among the many stakeholders. In contrast, with many reintroductions the objectives are much clearer and we are also able to make much clearer predictions. In the most favourable situations, we already have data for several previous reintroductions of the same species, and are able to use Bayesian inference to create fairly precise prior distributions of outcomes for any proposed reintroduction. However, the principles of structured decision making remain the same for these contrasting situations, and here we attempt to create a unified framework that can be applied to the full spectrum of conservation translocations.

2011-12-07 14:32 Spatial conservation prioritization for multiple administrative regions

Arponen, A*, *University of Helsinki;* **Cabeza, M,** *University of Helsinki;* **Moilanen, M,** *University of Helsinki;*

Spatial conservation prioritization typically takes place in areas delimited by administrative boundaries. Planning across all regions is more cost-effective than planning for each region separately, but may not be politically acceptable. There may also be other reasons to protect locally threatened species, even though they would not be at risk of extinction at the global scale. Moreover, biodiversity patterns and processes, such as connectivity, do not obey such man made boundaries. Therefore compromise solutions between purely local vs. global prioritization are needed. We describe how it is possible to account for conservation priorities that vary between administrative sub-regions in conservation prioritization. Connectivity effects also extend across borders in the prioritization. The method is implemented in the Zonation v3 software. We show with European species data how assumptions about selection methods and feature weights can significantly influence the outcome mapping of conservation priority. Our method provides a range of options for finding reasonable trade-offs between global cost-effectiveness and local conservation goals. The method should prove useful for practical planning problems, as typically the planning regions are biologically arbitrary, administrative areas.

2011-12-08 18:30 Changing Climate and Ecosystem of the Trans-Himalaya in Nepal

Aryal, A*, *Massey University, NZ;* **David Raubenheimer ,** *Massey University, NZ;* **Dianne Brunton,** *Massey University, NZ;* **Weihong JI ,** *Massey University, NZ;*

The Trans-Himalayas boast an immense biodiversity, provide habitat for several threatened wildlife species, and support the livelihood of local human populations. Blue sheep (Pseuduois nayaur) are main prey species of snow leopard (Panthera uncia) and distributed throughout the Trans-Himalayas of Nepal. A total of 839 blue sheep were counted in upper mustang (0.43-0.99 blue sheep/Km2). There were 2-5 snow leopards distributed per 100 km2. Diet analysis of snow leopards showed that 76% diet covered by natural prey and 23% of domestic livestock including Yak, goat, horse which created conflict between human-leopards. In the upper mustang region, the average annual maximum temperature of 0.140C was found to be increasing. A combination of rising temperatures and diminished snowfall led to a depleted water resource and to unusable land, in terms of agriculture, with the most serious issues occurring in Samjung village (at 4100m altitude) and in Dye village (3900m), of Upper Mustang, where villagers were forced to relocate to an area of better water availability. Grasses and shrubs were no longer found in abundance at higher elevations due to climate change, therefore blue sheep must forage on these foods as well as on crops found at lower elevations, drawing snow leopards down from their higher elevation habitat. The shift in blue sheep foraging ecology has resulted in an increase in the number of depredations as well as human-snow leopard conflicts, impacting the livelihood of local people. Therefore, changing climate in the Trans-Himalayas induces changes in the ecosystem and in the livelihood of both wildlife and the local people.

2011-12-08 11:30 Disentangling time and traffic volume effects on road genetic differentiation

Ascensão, Fernando*, *Centre for Environmental Biology, FCUL, Portugal / Western Transportation Institute, Montana State University, USA.;* **Ruiz-Capillas, Pablo,** *Obrascón Huarte Lain, S.A. Research, Development and Innovation (R&D) Service, Madrid, Spain.;* **Mullins, Jacinta,** *Centre for Environmental Biology, FCUL, Portugal.;* **Fernandes, Carlos,** *Centre for Environmental Biology, FCUL, Portugal.;* **Clevenger, Anthony,** *Western Transportation Institute, Montana State University, USA.;* **Malo, Juan E. ,** *Terrestrial Ecology Group-TEG, Departamento Ecologia, Universidad Autonoma de Madrid, Spain.;* **Santos-Reis, Margarida,** *Centre for Environmental Biology, FCUL, Portugal.;* **Mata, Cristina,** *Terrestrial Ecology Group-TEG, Departamento Ecologia, Universidad Autonoma de Madrid, Spain.*

Roads may cause population genetic differentiation in several taxa, although little is known for Mediterranean species. In this study we quantified the relative importance of traffic volume and time since the natural population was divided (road age) in genetic differentiation emergence, using the wood mouse (Apodemus sylvaticus) as model species. We consider this vital information to prioritize where to invest mitigation measures: if we detect a significant effect of traffic, those roads with higher traffic volumes, despite its age, should be improved with passages that allow movements between road sides. Conversely, if traffic has a minor effect then mitigation actions should be firstly implemented in older roads. We sampled 3 highways in Portugal and Spain with different ages and traffic volumes: one older and with higher traffic volume, AP6 (built in 1976 with a MDT of 28,000 vehicles); and two with similar age but very different traffic volumes, A2 (1997, MDT 18,000) and AP51 (2002, MDT 8,000). For each highway we set 2 sampling replicates and trapped wood mice in both road sides up to 50 m from pavement. To date 345 samples were collected, whilst the field work for second replicate of AP6 is still ongoing. Preliminary results revealed a significant genetic differentiation between road sides in AP6 which demonstrate that highways may hamper the gene flow between populations living in both road sides, despite the small distance separating them.

2011-12-09 10:45 Evaluating the potential of non-native mutualists to rescue native species from extinction

Aslan, CE*, *Department of Environmental Studies, University of California-Santa Cruz;*

Mutualism disruption stemming from species extinctions can create widow species lacking mutualist partners. Conservative estimates suggest that almost 10% of angiosperm species may be at risk of widowhood, and that widows are likely to experience reproductive declines of 20-50%. Researchers in some systems propose taxon substitution, the deliberate introduction of non-native mutualists, as a conservation strategy to reestablish mutualist functions and rescue widows from extinction. To evaluate the likely effectiveness of substitute mutualists, I performed a meta-analysis of known cases of pollination and seed dispersal mutualisms between native plants and non-native animal species. A total of 48 studies and 90 introduced species-study combinations were included in the analysis. Meta-analysis results indicated that non-native mutualists are generally less effective partners than are native mutualists of the same plants. When native mutualists have been extirpated, however, plant reproductive success is higher in the presence of non-native mutualists than in complete mutualist absence. My analysis suggests that conservation of native mutualists should have high priority, but that taxon substitution may be warranted if all native mutualists have become extinct. Management measures as drastic as taxon substitution require rigorous guidelines and acceptability standards and should therefore be debated among the full conservation community.

2011-12-09 11:30 Illegal wildlife trade between South America and the United States

Asmüssen, M. V*, *Centro de Ecología, Instituto Venezolano de Investigaciones Científicas (IVIC). EcoHealth Alliance, New York, United States of America.;* **Ferrer-Paris, J.R. ,** *Centro de Ecología, Instituto Venezolano de Investigaciones Científicas;* **Zambrana-Torrelio, C.,** *EcoHealth Alliance, New York, United States of*

America; **Rodriguez-Clark, K. M. ,** *Centro de Ecología, Instituto Venezolano de Investigaciones Científicas (IVIC);* **Rodríguez, J.P. ,** *Centro de Ecología, Instituto Venezolano de Investigaciones Científicas (IVIC);*

Illegal wildlife trade is one of the greatest threats to biodiversity. In a previous analysis, we estimated that 13 million birds, mammals and reptiles were extracted per year from the wild, causing a mean decrease of 60-70% of their populations, and placing the US as the largest importer. The current study focuses at the regional scale, using the U.S. Fish and Wildlife Service import registry (1994 to 2010) between South America and the US, with additional data collected in Venezuela (2008-2009) from a database of governmental seizures, and systematic surveys at roads, pet stores, markets and the Internet. At the regional level, legal and illegal exports came primarily from the same countries. Legal trade was dominated by fish (88%), reptiles (6%) and amphibians (2%), while illegal trade was biased towards reptiles (60%), fish (21%) and insects (16%). Species traded in large numbers were found to have lower market value than rarer species, so groups such as mammals and birds, though traded in lower volumes, may be under pressure due their higher economic value. In Venezuela we estimated 1-10 million individuals/year traded illegally with a big impact on local economies, because profits were greater than those from other activities, such as tourism and aquaculture. This detailed analysis suggests that current international records may significantly underestimate the scope of illegal trade, because the volume of a single country is similar to totals reported worldwide.

2011-12-07 11:15 Evolution of tolerance to avian malaria in Hawaiian forest birds

Atkinson, CT*, *U.S. Geological Survey, Pacific Island Ecosystems Research Center;*

The introduction of mosquito-borne avian diseases to the Hawaiian Islands is an iconic example of the devastating impacts of exotic diseases on naïve wildlife populations. Hawaii's endemic honeycreepers (Drepanididae) are particularly susceptible to avian malaria (Plasmodium relictum) and have persisted into this century because high elevation native forests on Kauai, Maui and Hawaii Islands are cool enough to limit both mosquito numbers and extrinsic development of the parasite within the vector. The long-term stability of these refugia is increasingly threatened by climate change, and there is evidence that expanding disease transmission may be responsible for recent population declines on the Alakai Plateau on Kauai. Few options are available for sustainable vector control over remote, rugged terrain where most native birds still persist and the last, best hope for surviving species may be development of tolerance to introduced diseases through processes of natural selection. The recent emergence of expanding low-elevation populations of Hawaii Amakihi (Hemignathus virens) in spite of high prevalence of infection with Plasmodium indicate that selection for tolerance to malaria is taking place in this relatively common honeycreeper. With loss of remaining high elevation refugia likely, our greatest challenge may be management of critically endangered species that have lost both the numbers and genetic diversity to accomplish this on their own.

2011-12-08 18:30 Territory size and habitat selection of a tropical passerine cinnamon-breasted rock bunting Emberiza tahapisi in Nigeria

Atuo, F. A*, *.P. Leventis Ornithological Research institute, University of Jos, Nigeria;* **Manu, S. A,** *.P. Leventis Ornithological Research institute, University of Jos, Nigeria;*

Most of our understanding of territorial behaviour in birds comes from studies of temperate bird species. Territoriality and factors influencing territory size of tropical bird are still poorly studied. In this study, eleven territories of Cinnamon-breasted Rock Buntings (Emberiza tahapisi) were measured in the Amurum Forest Reserve, Jos, Central Nigeria and adjoining farmlands. Factors influencing the habitat choice of this bird species were also studied. Territory sizes ranged from 0.1 – 0.3ha with a mean territory size of 0.19 ± 0.1ha. Territories decreased in size with increase in food abundance and increased as tree height and number of wildlings increased. The birds did not show signs of territoriality in farmlands but flocked together in little groups (mean group size: 6.88 ± 0.89). Flock size also increased with increase in the number of seeds (food) within farmlands. In the Amurum Forest Reserve, the birds showed a preference for rocky outcrops, whereas in farmlands, they appeared to prefer open and newly cultivated farms with little or no ground cover.

2011-12-06 14:04 Saving the last population of the globally threatened Grey-necked Picathartes Picathartes oreas in West Africa

Atuo, F. A*, *A. P. Leventis Ornithological Research Institute,;* **Ivande, S. T,** *A. P. Leventis Ornithological Research Institute,;* **Wala, Z. J,** *A. P. Leventis Ornithological Research Institute,;*

The Grey-necked Picathartes Picathartes oreas is one of the many globally threatened bird species in Africa with a wild population of less than 10,000 individuals. The West African population, which has been poorly studied, is restricted to the forest of Cross River in Nigeria, with an estimated size of 500-1000 individuals. This project revisited the 91 breeding sites identified during the first and only survey of the species in Nigeria in 1987. Extensive searches were carried out between August 2010 and February 2011 to assess human impacts and locate possible new breeding sites. A breeding population of 116 individuals was recorded across 84 breeding colonies. Only 72 breeding sites were found in the localities where 91 had been registered in 1987, with 13 (18%) sites no longer active and showing evidence of human disturbance. Human threats included farming, wire snares, egg and juvenile removal, bush burning and hunter's camps. Hunter's camps constituted the most severe threat and were recorded in 31% of the colonies found. Grey-necked Picathartes conservation enlightenment meetings were held and 2000 conservation bills were distributed in all 28 communities visited to increase awareness about the species, relevant for the protection of this species and its endangered habitat.

2011-12-07 16:30 Multiple introductions, high gene flow and intraspecific hybridization during Invasion of Lantana camara into India

AVIK RAY*, *National Centre for Biological Sciences;* **Uma Ramakrishnan,** *National Centre for Biological Sciences;* **Suhel Quader,** *National Centre for Biological Sciences;*

Invasive species threaten native biological diversity in various ways, including reducing species diversity. Lantana camara L., one of the worst invaders, is native of Central and South America. It was brought to India during early 19th century as an ornamental plant and then gradually invaded almost all types of ecosystems. In this study we are addressing questions: how many times Lantana camara was introduced into India, singly or in multiple events? Whether populations are still isolated or admixed? We have extracted DNA from 204 plants sampled across India. The individuals were genotyped for seven microsatellite loci. Genetic analysis has been done to find out F statistics, different genetic diversity indices and presence of genetic population structure. There is very little structure as revealed by microsatellite loci (FST: 0.08). This suggests that the Lantana population across India may be partly admixed due to gene flow. Microsatellte data have also shown high allelic richness and considerable number of private alleles in each subpopulation. Moreover, clustering analysis can identify multiple genetic groups and point out many admixed individuals. We conclude high gene flow caused intraspecific hybridization and tended to erase, at least partly, signatures of multiple introductions of Lantana camara into India.

2011-12-06 14:45 Incorporating zone effectiveness into marine zoning in Fiji

Azusa Makino*, *Australian Research Centre of Excellence for Environmental Decisions, School of Biological Sciences, University of Queensland, Australia;* **Carissa J. Klein,** *Australian Research Centre of Excellence for Environmental Decisions, School of Biological Sciences, University of Queensland, Australia;* **Maria Beger,** *Australian Research Centre of Excellence for Environmental Decisions, School of Biological Sciences, University of Queensland, Australia;* **Stacy Jupiter,** *Wildlife Conservation Society, Fiji Country Program ;* **Hugh P. Possingham,** *Australian Research Centre of Excellence for Environmental Decisions, School of Biological Sciences, University of Queensland, Australia;*

There are many types of zones in a marine protected area (MPA), each with different regulations. The effectiveness of different MPA zones (zone effectiveness) at protecting biodiversity varies. For example, a well-managed no-take MPA zone will be more effective than an MPA zone that allows certain types of fishing. Here, we combined the idea of zone effectiveness with a more traditional framework of efficiently representing a comprehensive sample of biodiversity to identify spatial priorities in the Vatu-i-Ra seascape, Fiji. We planned for five types of zones and six different

major habitat types. The effectiveness of each zone to protect different parts of the coral reef ecosystem was determined through an expert based workshop. We compared potential priority areas for several different scenarios, each with different zone effectiveness values and number of zones. We found that the area required for MPAs differs between scenarios. If zone effectiveness is ignored we would overestimate the ability of MPAs to achieve conservation goals. Also, considering the contribution of nation-wide fishing restriction towards meeting conservation goals could lead to an overly optimistic assessment. Our results also support to step by step MPA planning, starting with simple designs. Our results will be shared with stakeholders from across the four provinces of the Vatu-i-Ra seascape to discuss the viability of such a management scheme as part of the Fiji National Coastal Plan.

2011-12-08 18:30 Responses in soil chemistry and vegetation to soil perturbation implemented as a restoration measure in decalcified sandy grassland

Ödman, AM*, *Department of Biology, Lund University;* **Mårtensson LM,** *Department of Biology, Lund University;* **Sjöholm C,** *Department of Biology, Lund University;* **Olsson PA,** *Department of Biology, Lund University;*

The species-rich communities of xeric sand calcareous grassland are gradually disappearing due to land use changes. Experimental soil perturbations (deep and shallow) were performed in degenerated sandy grassland and the hypothesis that soil perturbation decrease nutrient availability, increase calcium levels and selects for desirable species was tested. An additional study of the seed bank and seed rain of target species was performed, which revealed that most species were lacking from the seed bank and spread their seeds only short distances. Increased pH and calcium concentration, and decreased nitrogen and phosphorus availability, showed that deep perturbation was successful in restoring the soil chemistry to levels similar to those of the target habitat. The vegetation did not yet show much of a positive response, which could be attributed to the lack of seed bank and seed rain from target species. In conclusion, deep perturbation may be a successful method of reversing acidification and nutrient enrichment in calcareous grasslands but it must either be combined with seeding, or one will have to wait many years before the seed rain may introduce the target species.

2011-12-07 10:30 Turkey's globally important biodiversity in crisis

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Turkey (Türkiye in Turkish) is the only country in the world mostly covered by three biodiversity hotspots (Caucasus, Irano-Anatolian, Mediterranean). Turkey's position at the nexus of Europe, the Middle East, Central Asia and Africa, its mountains and its encirclement by three seas have resulted in high terrestrial, fresh water, and marine biodiversity. However, our scientific knowledge of Turkey's biodiversity and associated conservation challenges is insufficient, mainly due to limited research and language barriers. Addressing this gap is especially relevant today because the important biodiversity of Turkey is facing severe and growing threats, especially from business interests and the government. Turkey ranks 140th out of 163 countries in biodiversity and habitat conservation. As one of the earliest loci of human civilization, Turkey has experienced millennia of human activities that have degraded the original ecosystems on land and sea. Although Turkey's total forest area increased by 5.9% since 1973, other important habitats such as endemic-rich Mediterranean chapparal, grasslands, coastal areas, wetlands, and rivers are disappearing, and rampant erosion is degrading steppes and rangelands. Current development-focused policies, particularly regarding water use, threaten to eliminate much of what remains. Development, dam construction, draining wetlands, and irrigation are the most widespread threats. The first goal of this paper is to broadly survey what is known about Turkey's biodiversity, and identify the areas where more research is needed. Our second goal is to identify the conservation challenges that Turkey is facing today and highlight the potential to preserve Turkey's remaining biodiversity. Achieving this potential requires immediate action, international attention, and greater support for Turkey's developing conservation capacity, and the expansion of a nascent Turkish conservation ethic.

2011-12-09 15:15 Managing gene flow in species with fragmented distributions

Ballou, J*, *Smithsonian Conservation Biology Institute, Washington, DC, USA;*

The genetic consequences of population fragmentation continues to be one of the most significant challenges in conservation genetics. Fragmented populations experience loss of genetic diversity, accumulation of inbreeding, genetic divergence and evolution through genetic drift as opposed to natural selection, thereby reducing these populations' evolutionary potential. It is well recognized that alleviating these adverse genetic effects requires re-establishing gene flow between fragments. Yet how this is best accomplished, particularly in populations with multiple fragments, is a complex issue requiring answers to many questions such as: Which individuals to migrate? How many individuals? How often? Between which fragments? When should gene flow begin? When it should be ceased? One approach to answering some of these questions is to model changes in the genetic structure of the population over its fragmentation history. These models can provide estimates of the relative degrees of inbreeding in the fragments, and genetic divergence between fragments, which can then be used to develop plans for maximizing the benefits of gene flow. Here we use this approach to propose gene flow strategies for two species: the tule elk (Cervus elaphus nannodes) in California, and the golden lion tamarin (Leontopithecus rosalia) in Brazil.

2011-12-06 14:00 A framework, methods and tools for integrating social considerations in marine spatial planning

Ban, NC*, *James Cook University;*

Recent marine planning and conservation literature emphasizes the importance of social considerations to improve success of implementation and long-term outcomes. In general, the rationale for integrating social considerations is that resulting plans and management actions are more likely to achieve their goals through improved compliance when stakeholders, including planners and scientists, are engaged in the planning process, and when management actions reflect more nuanced understandings of human behaviour and decision-making. Several bodies of knowledge outside of marine planning focus on the intricate links between ecosystems and people, rejecting the premise that they can be usefully viewed in complete isolation from one another. In particular, the social-ecological systems framework provides a lens for examining social considerations in marine spatial planning. Linking the social-ecological systems framework with a systematic approach to marine spatial planning promises to allow for more complete integration of social considerations in planning. It also opens the door to a vast array of relevant methods and tools from the social sciences that can improve how social considerations, including meaningful participation of actors, are addressed.

2011-12-06 15:15 Bayesian decision networks applied to management of multiple stressors in coral reefs

Ban, S*, *ARC Centre of Excellence for Coral Reef Studies;*

Bayesian decision networks are an emerging tool in the management of complex, multi-stakeholder planning processes. They enable decision makers to solicit input and preferences from experts and non-experts alike through the use of subjective or qualitative knowledge and preferences about costs, threats, and values. Beyond weighting network/model parameters, stakeholder input may also drive the structure of the model itself. Decision networks also facilitate the evaluation of alternative scenarios based on factors such as stakeholder preferences and uncertainty about ecosystem responses. The management of coral reef ecosystems provides an ideal opportunity to employ Bayesian decision networks, particularly given the complexity and uncertainty associated with multiple stressor interactions, and the requirement to incorporate both terrestrial and marine management and stakeholder components. Here I provide an example of

how this approach could be used in the context of the Great Barrier Reef in the face of climate change and the associated possibility of growing threats to ecosystem health, services, and functioning.

2011-12-08 18:30 Reintroduction of an Endangered Hawaiian Forest Bird and Prospects for Its Recovery

Banko, PC*, *U.S. Geological Survey, Pacific Island Ecosystems Research Center;* **Farmer, C,** *American Bird Conservancy;* **Brinck, KW,** *Hawai'i Cooperative Studies Unit, Pacific Aquaculture and Coastal Resources Center, University of Hawai'i at Hilo;* **Leonard, DL,** *Hawai'i Department of Land and Natural Resources, Division of Forestry and Wildlife;* **Stephens, RM,** *Pacific Cooperative Studies Unit, University of Hawai'i at Mānoa;*

The palila (Loxioides bailleui) is a critically endangered Hawaiian forest bird species that has garnered widespread public attention through decades of landmark legal rulings and management controversy. Restricted now to 5% of its historical range, due mainly to habitat destruction by introduced ungulates, the population has declined 79% since 2003 as habitat conditions have deteriorated from drought and continued browsing. As part of the recovery process, palila were reintroduced to former range on the northern slope of Mauna Kea Volcano by translocating 188 wild birds from the western slope in six trials (1997-9, 2004-6) and releasing captive-bred birds in four trials (Zoological Society of San Diego; 2003-5, 2009). At least 12% of translocated palila remained in the reintroduction area for a year, and 18 (10%) birds bred successfully, founding a colony with F1 and F2 generations. Breeding has occurred annually, but without adding supplemental birds and without management to improve carrying capacity, the colony declined to low numbers. Feral cat control is underway to reduce predation, and native vegetation is being restored in select areas with public participation and outreach. The combination of increased awareness, funding from national organizations, and local volunteer efforts may make the difference in achieving conservation goals that historically have been elusive - but, will they be in time to save the palila?

2011-12-07 14:00 Predicting Habitat Loss Driven Changes In Community Composition: From Simulated Matrices To Birds Of The Atlantic Forest

Banks-Leite, C*, *Imperial College London;* **Ewers, RM,** *Imperial College London;* **Metzger, JP,** *Universidade de Sao Paulo;*

Island biogeography created a simple and highly predictive tool widely used in conservation biology: the species-area relationship (SAR). Despite its advantages, the SAR predicts species richness only, which is a quite uninformative metric of communities, particularly in diverse biomes where habitat loss often leads to large changes to species composition as well as species loss. Predicting variation in community composition would be much more informative, so we attempted to generate SAR-based predictions of community change. We created 100-million species by sites matrices to represent possible communities structured by the species-area relationship, each matrix being built with one particular combination of z-values (magnitude of SAR) applied to landscapes and forest patches at different spatial scales, and composed with different proportions of specialist and generalist species. We used ordination to assess changes in community composition and compared these ordination scores to those obtained from 7000 birds from 140 species captured in 65 sites the Atlantic Forest of Brazil. Results showed that the observed changes in bird community composition due to habitat loss in the Atlantic Forest can be predicted from the SAR, as long as species specialisation is incorporated. Our results also give evidence to corroborate the fragmentation-threshold hypothesis.

2011-12-08 18:30 Impact of disturbed areas in tadpoles of Bokermannohyla saxicola (Bokermann, 1964) from Minas Gerais, Brazil, through the index of fluctuating asymmetry.

BAR, LFF*, *PUC Minas;* **ETEROVICK, PC,** *PUC Minas;*

Amphibians declines are occurring worldwide, however in Latin America little is known about this. Predictive techniques, as monitoring the developmental instability (DI) can enable the detection of problems suffered by the population before it presents decline evidences, since individuals that suffer more stress may have higher levels of DI. This study intended to investigate the occurrence of fluctuant asymmetry (FA) significant variation among populations of Bokermannohyla saxicola (BOKERMANN, 1964) in areas with different levels of conservation and use of soil. Another purpose was to develop an important conservation tool, main for Brazilian species that we know little about history. Counts were made according to a protocol proposed by Alford et al. (1999), in the oral disk of 104 B.saxicola tadpoles of 10 places in Minas Gerais, Brazil. After this the asymmetry index was related with the level of the anthropic impact in all areas. Statistics analyses were made following Palmer & Strobeck (2003). After all analyses there was no significant correlation between anthropic use of soil and FA index existent. Tadpoles have a small life area in nature, so we must assess impacts in microhabitat level to get the real causes of asymmetry, evaluating pH, conductivity and dissolved oxygen for example. In the case of this study B. saxicola cannot be used as an indicator of environmental quality, and genetics factors must be investigated to learn more of this asymmetry founded.

2011-12-07 14:30 Using knowledge networks to build conservation capacity: Population time series in protected areas.

Barnes, MB*, *The University of Queensland;* **Hockings, M,** *The University of Queensland;*

Protected areas are critical to global strategies to conserve biodiversity and maintain healthy ecosystems and represent a significant investment of conservation capital. Recent evidence suggests they may be underperforming in some cases. Literature highlights both successes and failures. Over the past decade we have made great advances in understanding issues of protected area management effectiveness. However, we still have surprisingly little data at a global level on long-term biodiversity conservation outcomes from protected areas. Over the last decade, sophisticated approaches have been developed to address this question at the habitat level, but very little work has been undertaken in assessing protected area outcomes at population and species levels. Working with the IUCN taskforce on Biodiversity and Protected Areas, we are seeking to address this deficit. We use population time series data to evaluate species conservation outcomes in protected areas and where possible relate outcomes to explanatory variables. We are compiling a large dataset including data from institutions and agencies such as: Parks Canada, QPWS, SANParks and the Living Planet Index, ensuring that we build on previous work to advance conservation understanding. Log-linear chain methods and generalised additive modeling is applied to calculate rates of inter-annual population change following methods developed by the LPI. By focusing on successful outcomes it is possible recommend policy and management adaptations likely to redress shortfalls in conservation outcomes. Outcomes of this study are likely to lead to more successful biodiversity conservation action in the immediate future.

2011-12-08 14:45 Integrating New Wildlife Disease Information into Conservation Management through Disease Risk Assessment.

Barraclough, RK*, *Massey University, Albany Campus;*

Recent research into wildlife disease has led to the discovery of new blood parasites within the endemic, native and introduced species of New Zealand. These include apicomplexan parasites (Plasmodium spp., Lankesterella spp.), Rickettsia-like organisms, and erythrocytic viruses, identified through microscopy and/or molecular sequencing. However each new discovery presents a new set of issues that need to be addressed by conservation managers and community groups undertaking species translocation. This is due to questions such as; 1. Whether to shift infected animals, or 2. Whether relocated animals will be vulnerable to disease at destination locations. Disease risk assessment is essential. However, this must often be conducted with incomplete knowledge of the geographical and host distribution of these blood parasites, or regarding the impact that they may have upon infected hosts in the wild. Furthermore, the difficulties implicit in field-based experimental investigation into disease impact and the time involved in the detection and identification of new parasites and pathogens mean that such information is slow to accumulate. This talk will illustrate the application of disease risk assessment and decision-making using these newly discovered avian, reptilian, and amphibian blood parasite examples.

2011-12-06 15:30 Subjective decisions and uncertainty in species distribution models

Baumgartner, JB*, *School of Botany, The University of Melbourne;* **Regan, TJ,** *School of Botany, The University of Melbourne;* **Wintle, BA,** *School of Botany, The University of Melbourne;* **Elith, J,** *School of Botany, The University of Melbourne;*

Species distribution models (SDMs) are commonly used for making predictions about the impacts of threatening processes, such as climate change, on species' distributions. These models are typically correlative, identifying determinants of species occurrence by finding statistical associations between occurrence localities and environmental characteristics. However, although practical and widely adopted, this approach suffers from a range of uncertainties that emerge from subjective judgements made throughout the modelling process. Two key sources of subjective uncertainty lie in the choice of relevant environmental covariates, and in the treatment of habitat components critical to the species' persistence (e.g. geological features). The present research investigates the consequences of these subjective decisions on the outcomes of species distribution modelling through a case study of an alpine specialist, the endangered Australian mountain pygmy-possum, Burramys parvus. The Maxent algorithm was used to develop a range of SDMs for this species, each of which incorporated a unique subset of ecologically-relevant environmental correlates for habitat suitability, as well as alternative methods for representing the influence of boulderfields on the suitability of habitat for pygmy-possums. This study highlights the uncertainties arising from subjective modelling choices when predicting the impacts of climate change on biodiversity.

2011-12-07 14:30 Cost-effective habitat management strategies for White-backed Woodpecker recovery in Sweden

Baxter, PWJ*, *The University of Queensland;* **Possingham, HP,** *The University of Queensland;* **Gren, I-M,** *Swedish Agricultural University;* **McCarthy, MA,** *The University of Melbourne;* **Mikusiński, G,** *Swedish Agricultural University;*

The White-backed Woodpecker (WBW; Dendrocopos leucotos) is widespread in Eurasia but critically endangered in Sweden, rapidly declining in numbers throughout the last century. The resultant concern has led to considerable planning and investment in its recovery. Managers involved in the WBW Action Plan have identified sites with the greatest potential for woodpecker habitat restoration. These include areas that are largely protected and already provide suitable habitat, and managed forests likely to provide such habitat in future. We modelled woodpecker-oriented management of these forest areas and the resultant WBW population, using an optimisation approach to identify cost-effective strategies that attain a sustainable WBW population by 2070. Sites selected by managers differ in their contribution to WBW habitat and recovery, however, and therefore different approaches to site identification and management can further reduce costs. Further analyses at coarser and finer spatial scales highlight the effect of spatial resolution on identifying efficient conservation strategies.

2011-12-06 12:15 Mechanisms of Accelerated Human Population Growth at Protected Area Edges

Bean, WT, *University of California, Berkeley;* **Burton, AC,** *Alberta Biodiversity Monitoring Institute;* **Brashares, JS*,** *University of California, Berkeley;* **Wittemyer, G,** *Colorado State University;*

For more than a century, protected areas (PAs) have served as the default mechanism for conservation. However, commentators have long argued that the costs of PA creation are borne disproportionately by disenfranchised local communities. Recent work has suggested that, despite potential costs of living on the edge of PAs, rural human population growth in Africa and Latin America has occurred disproportionately along the edges of PAs. Mechanisms for this growth have been disputed. In this talk, we present a broad approach for identifying potential mechanisms for accelerated human population growth at PA edges before and after PA establishment. We found that a majority of PAs in Africa and Latin America experienced higher human population growth along their edges after establishment, while less than 15% of PAs analyzed appeared to repulse human populations. As many as 1/3 of PAs appear to have undergone accelerated population growth due to an expanding rural frontier rather than PA establishment. Our results suggest that PAs in Africa and Latin America are attracting humans to their edges. The causes and consequences of such a result must be determined at a more local scale and through case studies. To that end, we also present a list of the 201 PAs analyzed and the mechanisms associated with their growth.

2011-12-08 15:30 Connectivity in coral reef conservation planning: Dealing with future challenges

Beger, M*, *The University of Queensland;*

In this talk I discuss approaches and benefits to incorporate connections into systematic conservation planning. Connectivity between land and seascapes, as well as dispersal connectivity in the sea are a frontier in conservation science and practice. Technical challenges with obtaining meaningful data and utilizing them in transparent systematic approaches have largely prevented the consideration of connectivity in conservation decision processes. I highlight these challenges, and provide solutions to some, based on case studies that include: (1) using thermal stress and freshwater inundation risk to prioritise Great Barrier Reefs (GBR) for conservation, (2) planning marine reserve networks with asymmetric connectivity on the GBR, and (3) planning with multi-species connectivity in the Coral Triangle. With these examples, I present a framework of incorporating the spatial, temporal and species-specific variability of connectivity that is underpinned by the newly developed capability of the decision support system MARXAN to incorporate connectivity.

2011-12-06 10:30 Mini-keynote: The science behind large landscape connectivity initiatives

Beier, Paul*, *Northern Arizona University;*

Connectivity analyses – including least-cost modeling, circuit theory, graph-theory, & individual-based movement models – depend crucially on estimates of the "resistance" of land covers, topographic features, and human-created landscape features. In this symposium, Spear explains how resistance quantifies relationships between landscape features and gene flow. Resistance values are usually based on expert opinion or inferred from habitat use. Empirical procedures provide better estimates, especially if based on patterns of genetic relatedness. Three speakers (Cushman, Wang, & Graves) describe alternative ways to identify the set of resistance values most consistent with observed genetic patterns. In each case, empirical resistance estimates differed from subjective assignments in a way that led to different strategies for species and landscapes of conservation concern. The last 2 speakers explore different aspects of resistance. Because climate change may render species-conservation plans moot, Beier advocates planning for connectivity of land facets (coarse-filter units representing unique combinations of soil & topography) and describes how to estimate resistance for these units. McKelvey describes how to use resistance estimates to characterize connectivity across an entire landscape, independent of putative starting points. Implementing these approaches to support conservation on 4 continents is explored in tomorrow's continuation of this symposium as SY18.

2011-12-08 15:00 A Century of Trophic Change: Retrospective Analysis of Fishing and Oceanographic Variability on Seabird Diets

Beissinger, S.R.*, *U.C. Berkeley;* **Becker, B.H.,** *Point Reyes National Seashore;* **Moody, A.,** *U.C. Berkeley;* **Semmens, B.,** *Northwest Fisheries Lab, NOAA;* **Ward, E.,** *Northwest Fisheries Lab, NOAA;* **de Valpine, P.,** *U.C. Berkeley;*

Overfishing has changed marine community structure, species dominance and ecosystem characteristics. Subsequently, trophic interactions observed today might be artifacts of recent structural changes to marine communities. However, the relative impacts of overfishing are often difficult to distinguish from natural variability in fish stocks due in part to fluctuations in ocean climate that affects community composition. We investigate how the trophic level of five marine avian predators (Cassin's Auklet, Common Murre, Marbled Murrelet, Pelagic Cormorant and Tufted Puffin), which differ in contemporary food habits (from planktivorous to piscivorous to omnivorous), has varied over the past century in the California Current by reconstructing their diets from changes in their stable isotopic signatures, and whether diet variation can be attributed to the overfishing of prey or cyclic changes in ocean temperature. Trophic-level declines (i.e., ,15 N) occurred in all 5 seabirds examined. No diets exhibited an increase in trophic level. The magnitude of decline ranged from 0.43 o/oo to 2.10 o/oo, representing a decline of 1/7 to 2/3rds of a marine trophic level (3.1 o/oo). Declines differed by season and no species declined in both seasons. Linear declines were most common, making identification of the onset of decline unclear. Both bottom-up effects of changing ocean climate (regional and local) and top-down effects of fish hauls were related to trophic variation.

2011-12-06 14:00 Historical Resurveys: Challenges in Revisiting the Past to Quantify Ecological Change and Project the Future

Beissinger, SR*, *Museum of Vertebrate Zoology, UC Berkeley;* **Thorne, JH,** *UC Davis;* **Santos, MJ,** *UC Berkeley;* **Morelli,** *TL;*

Historical resurveys - where biodiversity surveys from the past are resampled - provided important opportunities to understand the influence of past environmental change on biodiversity, establish new benchmarks to understand future change, test the accuracy of range change predicted by bioclimatic models, and quantify past phenotypic, genotypic or trophic changes by comparing historic and modern specimens. Potential sources of historic datasets include field notes, correspondences, specimens, reports and images. Three main challenges must be overcome when using historic data: (1) Data quality varies greatly due to nonstandard protocols and imprecise locations for historic surveys; (2) Historic surveys are often limited to detection and nondetection data, which necessitates the use of occupancy modeling to obtain unbiased estimates of presence-absence; and (3) Ascribing causation to observed changes is often difficult because measures of change of external drivers are often uncertain. We illustrate these points through two exemplar projects: (1) the Grinnell Resurvey Project, where birds and mammals were sampled from 1911-1929 throughout the Sierra Nevada Mountains in California, USA, and recently resurveyed; and (2) the Wieslander Dataset, where vegetation over 40,000 km2 were mapped in the 1930s along a 300 km front of the Sierra Nevada and were recently remapped.

2011-12-06 11:00 Integration of behavioural and conservation biology – the New Zealand experience

Bell, BD*, *Director & Associate Professor;*

Because of the precarious status of much of its biodiversity, New Zealand has become a global leader in conservation management, and has had many successes in integrating behavioural biology and conservation. Collaboration between behavioural biologists and wildlife managers has contributed to the development of innovative solutions in species conservation. Advanced through adaptive management, behavioural research has been critical to the recovery of threatened New Zealand species, with the conservation behaviour approach being incorporated into the recovery plans for many of them. Recent reviews of the literature have shown that animal behaviour research is a dynamic and developing field in New Zealand, with a growth in research publications addressing behavioural questions applied to conservation. Case studies are reviewed within the behavioural framework of Tinbergen's four questions to illustrate the importance of the conservation behaviour approach in the successful recovery of threatened species in New Zealand.

2011-12-08 18:30 Subsidiary Impacts of Stream Restoration: Bottom-up Effects of Aquatic Prey on Terrestrial Predators

Bell, D*, *Swedish University of Agricultural Sciences;*

In Sweden, many streams and channels have been channelized for timber floating, but degraded streams and riparian habitats are now being restored. Restoration success is often based on fish recovery although it is widely recognized that restoration has wider implications for stream as well as riparian ecosystems, e.g. both aquatic and terrestrial predators rely on allochthonous prey. Aquatic insects can have strong bottom-up effects on terrestrial predators, yet subsidiary impacts of channel reconfiguration remain largely unexplored. To evaluate restoration outcome for terrestrial predators, bottom-up effects of emerging insects were measured at different distances from channelized and restored streams in Västerbotten County. It was hypothesized that channel reconfiguration would affect invertebrate emergence via changes in stream width, current velocity and ecotone length. Terrestrial spiders and predatory beetles were expected to respond numerically to an increase in prey items per stream following restoration. Emerging insects were sampled with sticky traps and window traps. Predatory beetles and spiders were collected in pitfall traps and in suction samples. Stable isotopes were used to reveal dietary differences among terrestrial predators of different spatial localities. Many species besides salmonids are likely to be affected by stream restoration, and subsidy impacts on land might influence terrestrial resilience.

2011-12-09 17:06 Climate change and Invasions: The "Green cancer" opportunities to invade the world

Bellard, C.*, *University Paris XI;* **Courchamp, F.,** *University Paris XI;*

Understanding how species and ecosystems will be threatened by global changes has become a major focus of ecology. Climate change and biological invasions represent two key processes affecting global biodiversity. Moreover, climate change is expected to exacerbate the invasive species menace, because the thermic barrier that currently protect habitats against cold-intolerant species will be shifted, allowing the establishment of invasive species. Therefore, there is an urgent need to conduct predictive studies on the future suitable range of invading species. In this context, we assessed the current and future ranges of climatic suitability worldwide of one of the most spectacular and catastrophic introduced plants, Miconia calvescens, one of the "100 of the worst", also known as the « green cancer ». We apply different bioclimatic models implemented in BIOMOD and examine the potential impact of climate change on its range distribution for the next decades. First, we present for the first time the worryingly large worldwide distribution of its suitable climate habitat. Second, we show that the impact of climate change on its potential exotic distribution will be both significant and complex, with simultaneously new potential invaded areas and range contractions. Predicting the regions suitable for invasion by Miconia is of considerable importance for early warning systems for the management of many sensitive ecosystems.

2011-12-09 11:30 Genetics of Devil Facial Tumour Disease

Belov, K*, *University of Sydney;*

The Tasmanian devil faces extinction in the wild due to the emergence of a new infectious disease. Devil Facial Tumour Disease (DFTD) is a contagious cancer that is spread as an allograft during biting. The disease emerged and has spread due to a lack of genetic diversity in Tasmanian devil populations at a key region of the genome known as the Major Histocompatibility Complex (MHC). The recent discovery of MHC-disparate animals in northwestern Tasmania has raised hopes that some of these animals may be able to mount an immune response against DFTD. However, the emergence of new strains of DFTD adds to the complexity to the picture. Are DFTD strains evolving randomly or are the tumours and hosts co-evolving? The evolutionary trajectory of the tumour will have direct impacts on management of devil populations in the wild. Without a more comprehensive understanding of tumour and host co-evolution proposed genetic rescue programs are not feasible. It is hoped that sequencing of the Tasmanian devil genome and DFTD transcriptomes will help answer some of these questions.

2011-12-06 10:45 Integrating animal behavior and conservation biology: a conceptual framework

Berger-Tal, O*, *Mitrani Department of Desert Ecology, Ben-Gurion University of the Negev, Midreshet Ben-Gurion 84990, Israel;* **Saltz, D,** *Mitrani Department of Desert Ecology, Ben-Gurion University of the Negev, Midreshet Ben-Gurion 84990, Israel;*

Although the disciplines of animal behavior and conservation biology are already conceptually intertwined, no unifying framework exists for this interdisciplinary field. While numerous studies demonstrated that behavior is relevant to conservation biology, the integration of animal behavior into mainstream conservation efforts is slow and subject to debate. Here we propose a conceptual model that identifies the key linkages between animal behavior and conservation biology. The model is a simply structured, hierarchical, and parsimonious framework that will help bridge the gap between the two disciplines and establish a common ground on which the field of conservation behavior can evolve and from which hypotheses can be generated and paradigms formulated.

2011-12-07 11:15 From extinction processes to conservation management: a new perspective in freshwater ecosystems

Bergerot, B*, *Cemagref;* **Hugueny, B,** *IRD;* **Belliard, J,** *Cemagref;*

In the context of future evolutions of environmental conditions and human activities, predicting which species are likely to go extinct is perhaps one of the most fundamental yet challenging tasks for conservation biology. It is particularly true in freshwater ecosystems which tend to have the highest proportion of species threatened with extinction. In this context and based

on a large data set provided by the French National Agency for Water and Aquatic Environment (598 sites sampled at least 8 consecutive years and distributed across France), we (1) quantified extinction and colonization rates for French river fish species at a local scale, (2) modelled independently the habitat suitability for fish species from local to large hydrological units and (3) tested if extinction/colonization rates for fish species could be predicted by the habitat suitability at various spatial scales. Results show that extinction and colonization rates depend on habitat suitability at local scale but also at the drainage basin scale. In terms of management, we show that habitat suitability quantification allows the evaluation of species extinction/colonization processes and our results reinforce the belief that the preservation of habitats at the local scale but also at the drainage basin scale enables the decrease of extinction risks of freshwater fish species.

2011-12-07 11:00 Restoring Los Angeles's Last Coastal Wetland: Ballona Wetlands Restoration Planning

Bergquist, Sean*, *Santa Monica Bay Restoration Commission;*

In 2004, the State of California took title to 600-acres of the former Ballona Wetlands in Los Angeles, and began the complicated process of restoration the last remaining coastal wetland in one the largest cities in America. The complex process, involving multiple owners, funders, regulatory and resource agencies, as well as infrastructure and the large group of public stakeholders, is based on a scientific understanding of wetland processes and restoration needs. Restoration planning has involved extensive public meetings and design charretes, research and feasibility studies with review and recommendations from a Science Advisory Committee. The agencies and stakeholders have established restoration goals, which include: 1) Restore and enhance salt-water influenced wetland habitats to benefit Endangered and Threatened species, migratory shorebirds, waterfowl, seabirds, and coastal fish and aquatic species. Restoration of seasonal ponds, riparian and freshwater wetlands, and upland habitats will be considered where beneficial to other project goals or biological and habitat diversity; 2) Provide for wildlife-dependent public access and recreation opportunities compatible with the habitats, fish and wildlife conservation; 3) Identify and implement a cost-effective, ecologically beneficial, and sustainable (low maintenance) habitat restoration alternative. In addition to restoration goals, guiding principles for the restoration planning process have been established, and include: The planning process will, 1) Be based on the best available science, developed with technical and scientific expertise; 2) Be transparent and will allow all stakeholders input; 3) Respect the decision-making bodies of each of the State Agencies.

2011-12-09 14:45 Partnerships and Institutional Linkages for Biocultural Conservation

Berkes, F*, *University of Manitoba;*

Conservation of biological and cultural diversity tends to occur in parallel, each with its own programs. At best, this model is ineffective because biological and cultural diversity are strongly linked. What are some of the alternative conservation pathways embracing a biocultural approach? How can such an approach be adopted and what policy mechanisms be used? And what are some of the challenges? I use biocultural conservation examples from Canada (James Bay Quebec and NW Ontario) and Mexico (Oaxaca) to explore these questions based on ongoing participatory projects with indigenous groups. These examples show that conservation planning is beginning (a) to deal with multifunctional and/or cultural landscapes; (b) to accommodate multiple objectives of the local people (political, cultural, environmental) and their livelihoods; and (c) to address multi-level governance needs. Policy mechanisms include (1) flexibility under IUCN Category V; (2) recognition of Indigenous and Community Conserved areas (ICCAs); and (3) recognition of local and indigenous knowledge and ways to combine such knowledge with science. Conservation in a rapidly changing complex world requires collaborative approaches with partnerships, social/institutional learning and adaptive governance to design fine-grained conservation, and stewardship ethics with cultural connections to the land.

2011-12-07 14:15 Building Community Resilience for Local Conservation

Berkes, F*, *University of Manitoba;*

From the point of view of conservation, resilience may be described as the ability for coping and adapting in a changing world. To "engage society in conservation", we need to build resilient communities that are effective conservation partners. How do we build community resilience, and will that lead to more effective conservation? I approached these questions through a study of ten conservation-development cases from the UNDP Equator Initiative that link conservation and poverty reduction. By examining their objectives, I analyzed incentives to engage in conservation. Each case showed a mix of economic, political, and social/cultural objectives; empowerment was almost always a key objective. Since it was impossible to predict community priorities, a blueprint solution could not be designed. With indigenous groups in particular, the political objectives of control of traditional territories and resources were of prime importance because such control was seen as the first step to development. Building community resilience does not necessarily lead to effective conservation but may be seen as a precondition for long-term success by (1) providing a foundation for conservation incentives; (2) developing adaptive capacity to deal with change; and (3) fostering stewardship by reconnecting social and ecological systems.

2011-12-06 14:00 Invasive ants drive ecosystem responses to fire in New Caledonia, an international Biodiversity Hotspot

Berman, M*, *CSIRO-CES, Charles Darwin University, University of Montpellier 2;* **Andersen, AN,** *CSIRO-CES;* **Austin, CM,** *Charles Darwin University;* **Gaucherel, C,** *Institut Francais de Pondichery;*

Invasive ants and anthropogenic fires are the major conservation threats in New Caledonia, which is recognized internationally for its exceptional biodiversity values. Fire has converted a large proportion of the island's subtropical rainforests, which consist mostly of endemic species, to savannas dominated by introduced species, including invasive ants such as Wasmannia auropunctata and Anoplolepis gracilipes. New Caledonian forests harbor a highly significant fauna of native ants, and we are using them as indicators of ecosystem responses to fire. By comparing recently burnt vs unburnt plots, we show that fire impact is far greater for forests adjacent to areas dominated by invasive species. We also show that, in rainforests that recolonize long-unburnt savannas, recovery patterns of native ant richness and functional composition are driven by the presence of W. auropunctata. These results highlight the interactive effects of key threatening processes, with fire-induced habitat degradation facilitating invasion by exotic ants, which in turn severely retard ecological recovery. This interaction results in an "all or nothing" system in terms of the integrity of native ant communities.

2011-12-08 18:30 Biodiversity conservation as a local activity: participation in endangered species/community integration

Bernacchi, LA*, *Texas A&M University;* **Ragland, CJ,** *Texas A&M University;* **Peterson, TR,** *Swedish Agricultural University;*

Since the institutionalization of public participation in natural resource management, integration of public opinion at varied scales, degrees and methods have produced mixed results. This study focused on the ways endangered species management may provide opportunities for conservation of local habitat and create pathways for collaboration among communities. We conducted a case study of a coastal Texas, USA community that is part of the federally-endangered Whooping Crane's (Grus americana) wintering habitat. Our study is based on results of 36 semi-structured interviews which were qualitatively coded, using a codebook developed through grounded theory, 80 survey responses analyzed through factor analysis, media and historical records, and a public meeting. Our results indicate that public participation in biodiversity conservation is more likely to be successful at the localized scale. This is not necessarily a problem, given the limited range of many endangered species. We also suggest that collaboration at larger scales, instigated by individuals as much as institutions, might be integrated throughout the process of decision-making but not in scoping; and that legal constraints ought to be considered periodically, but should not constrain the entire process. Public participation is an essential tool to conservation and is most effective when employed as an adaptive, transparent and creative process.

2011-12-07 14:45 Predicting ant invasion risks on islands worldwide

Bertelsmeier, Cleo*, *University Paris-Sud XI;* **Luque, Gloria M.,** *University Paris-Sud XI;* **Courchamp, Franck,** *University Paris-Sud XI;*

Biological invasions are a huge threat to biodiversity on islands worldwide and it is predicted to be exacerbated by global climate change. In particular, poikilotherms, like ants, may benefit from rising temperatures that could remove thermal barriers and allow them to colonize higher latitudes. For example, ant species have been shown to displace numerous native species, alter communities and disrupt crucial ecosystem functions, especially on islands, but unsuitable climate currently limits their invasion range. It is crucial to assess how climate change and biological invasions interact, and whether the climate change will amplify ant invasions on islands. We focus here on the critical issue of the invasiveness of islands worldwide by the 15 most problematic invasive ant species. We use ecological niche models to (1) assess their current potential distributions and (2) make predictions about invasion risks following climate change. In order to produce distribution maps for 2020, 2050 and 2080, we use ensemble forecasts, combining 5 modelling techniques, 3 Global Circulation Models (climatic forecasts) and 2 climate change scenarios (optimistic and pessimistic). We find that many islands currently present very favourable climatic conditions for the majority of these invasive species. However, the results concerning future suitability are very counter-intuitive and unexpectedly challenge the predominant idea that climate change will exacerbate biological invasions.

2011-12-08 18:30 Current status and distribution of the giant freshwater stingray, Himantura chaophraya, in Thailand

Bhummakasikara, T*, *Department of Biology, Faculty of Science, Mahidol University, Thailand;* **Chanse, N,** *Department of Veterinary Medicine, Faculty of Veterinary Science, Chulalongkorn University, Thailand;* **Siripunkaw, C,** *Mahidol University at Nakorn Sawan, Thailand;* **Khudamrongsawat, J,** *Department of Biology, Faculty of Science, Mahidol University, Thailand;*

The giant freshwater stingray (Himantura chaophraya) is the largest freshwater fish and critically endangered species. This species is endemic to the Indo-Pacific region and found in many rivers in Thailand. However, during the past 20 years, constructions e.g. accommodation and industrial factories, the waste runoff from factories, and the use of pesticides and fertilizers along the riverside have been increasing. These human activities were hypothesized to affect the suitable habitats for H. chaophraya, but there was no evidence to support this hypothesis. Literature search on the distribution of H. chaophraya since its first recognition in 1983 in Thailand, together with field survey and interview with local people, was conducted, and the past distribution was compared with the distribution after 2000. The results showed a negative correlation between the expansion of human communities and distribution of H. chaophraya. Current reports of capturing of H. chaophraya became less frequent than previous reports. It is possible that the population of H. chaophara in Thailand has been declining. Therefore, engaging society for conservation of this species would allow the better prevention of this largest freshwater fish from extinction.

2011-12-08 18:30 Can social marketing techniques improve compliance to marine protected area regulations? A case study from Velondriake Madagascar

Bianchessi, Annalisa*, *Rare;* **DeWan, Amielle,** *Rare;* **Andriamalala, Gildas,** *Blue Ventures;* **Peabody, Shawn,** *Blue Ventures;* **Harris, Alasdair,** *Blue Ventures;*

Southwest Madagascar exhibits one of the largest and most biologically diverse coral reef systems in the western Indian Ocean. Reefs not only provide critical biodiversity habitats but are also essential to the survival of the semi-nomadic Vezo communities. Despite the establishment of a community led Marine Protected Area (MPA) in 2006 and the prohibition of destructive fishing techniques, the frequent use of poison fishing and beach seine netting continue to threaten the reefs and fishing livelihood. Social marketing techniques were used to devise and implement an advocacy campaign fostering community buy in and compliance to the local fishing laws. Qualitative and quantitative research techniques were used to identify target audiences, develop a behavior change strategy and key messages, select strategic channels and trusted sources for the campaign. Impact and results were measured through a pre- and post-campaign Knowledge, Attitude and Practice (KAP) survey (target population 7500; sampled at 5%CI and 95%CL, March 2009, Oct 2010). Our research indicates a significant change in knowledge and attitude of fishers and local leaders towards the MPA regulations and significant changes in their behavior to stop destructive fishing practices. Results suggest that social marketing techniques can be an effective way to improve compliance to MPA regulations.

2011-12-08 18:30 Relative loss of allelic varaition due to the founding event and subsequent drift in reintroduce carnivore populations

Bickersmith, SA, *Central Michigan University;* **Swanson, BJ*,** *Central Michigan University;*

Reintroduced populations lose genetic diversity due to the founding event and the genetic drift experienced while the population is increasing. We evaluated the loss of genetic variation due to the founding even and subsequent genetic drift in two reintroduced populations of American marten (Martes americana), in the Lower Peninsula (LP) of Michigan, USA. Between 1985-1986, 85 marten were reintroduced into two locations (n=49; n=36) in the LP but they have not increased in numbers as quickly as a reintroduction into the Upper Peninsula of Michigan. We analyzed 10 microsatellite loci from the two populations (n=26; n=21). Both populations show significant heterozygosity excess, indicative of a recent bottleneck and have significantly fewer alleles than the source population. We used resampling methodology to estimate the number of alleles likely lost during the founding event compared to the source population. This was then compared to the number of alleles currently found in each population to estimate loss since the founding. We found that the average number of alleles lost due to the initial founding event (A=3; A=4) was significantly greater (p=0.012) than the number lost due to drift (A= 11; A=6) since the founding of the population. Our results suggest that either subsequent reintroductions or promoting more rapid population growth will reduce the impact of reintroductions more than increasing the number of individuals released during the initial reintroduction.

2011-12-07 11:30 Strategic approaches at the regional scale: the Pacific

Bird JP*, *Pacific Marine IBA Co-ordinator, BirdLife International Pacific Secretariat;*

Invasive Alien Species (IAS) are the greatest threat to terrestrial biodiversity on islands of the tropical Pacific having precipitated a swathe of historic extinctions and extirpations in the region and threatening many more. In attempting to rank which islands are the highest priorities for IAS eradication presence of threatened species and globally significant seabird colonies, and presence of IAS were coded against islands. Variables associated with restoration potential, likelihood of reinvasion, cost and feasibility were then recorded against the same islands to generate a database that can be queried with different outcomes in mind. With examples from Fiji and French Polynesia we illustrate how these factors interplay to influence national prioritisation of IAS eradications. In the long-term a strategy that seeks to secure multiple populations of threatened species on IAS-free islands is optimal; whether through the eradication of IAS from islands where threatened species remain extant, or through the restoration/re-population of islands from where threatened species have been extirpated by IAS in the past. Owing to advances in facilitating threatened species to recolonise islands from which IAS have been eradicated, and because social/political considerations in the region are paramount, the highest priority islands for IAS eradication may be determined by feasibility and restoration potential as well as simply by current biodiversity value.

2011-12-08 12:45 Identifying marine Important Bird Areas as key sites for conservation in the tropical Pacific

Bird JP*, *BirdLife International Pacific Secretariat;*

BirdLife International's Important Bird Area (IBA) programme has developed and applied standardised criteria to identify priority terrestrial sites for conservation (especially of birds) worldwide. This approach is now being extended to the marine realm with a view to making the results available for effective marine spatial planning. Data on species' foraging ecologies and at-sea distribution, and ecological models are being used to identify four types of marine IBA: seaward extensions from breeding colonies, pelagic sites, non-breeding coastal congregations and migration bottlenecks. As part of an ongoing process 110 marine IBAs have been

identified to date within 23 Pacific Island Countries, Territories and States (PICTS), but the process is hampered by data availability in the region. Preliminary analysis of overlap with Key Biodiversity Areas (KBAs) identified for other taxonomic groups using the same criteria suggests that marine IBAs encompass significant populations of other taxa in addition to internationally significant bird populations. Currently only 2% of the area within marine IBAs in the tropical Pacific lies inside Marine Protected Area (MPA) boundaries. Challenges for the next phase of this programme are to plug existing information gaps to improve coverage of the marine IBA network, and to increase the level of national and international protection that these priority sites receive.

2011-12-06 15:30 Advances in Species Recognition and Small Animal Monitoring

Blackie, H.M.*, *Centre of Wildlife Management and Conservation, Lincoln University;* **Woodhead, I. ,** *Lincoln Ventures Limited;* **Diegel, O. ,** *Creative Industries Research Institute, Auckland University of Technology;* **MacMorran, D.,** *Connovation Ltd;* **Eason, C. ,** *Centre of Wildlife Management and Conservation and Connovation Ltd;*

Monitoring animal populations is an important aspect of wildlife management and conservation. Species monitoring provides a vital source of information on the population status of species of conservation concern, and plays a significant role in determining conservation action priorities. Furthermore, when attempting eradication of pest species determining whether any targeted individuals remain is a critical factor, as terminating control programmes too early means failure to eradicate, whilst continuing for too long adds considerable expense. In situations such as these, a reliable and efficient monitoring technique which can distinguish between different species is invaluable. However, conventional methods of monitoring small animal populations are labour intensive, costly, have limited operational timeframes, require a high level of user expertise and are restricted in terms of their scientific robustness. This presentation describes a newly developed device which uses a specially designed electronic surface to examine animal footprint analysis, shape and weight characteristics to distinguish between species and monitor animal abundance over long timeframes. This device provides a new, improved monitoring technique which is not only more efficient but also significantly more cost-effective. The type of information which these devices can provide will be outlined, as well as their suitability for different species types and their application (with examples) for wildlife management or control purposes.

2011-12-06 14:30 Lessons from the Mississippi River Twin Cities Landbird Monitoring Program: Using citizen scientists to further migration research in an urban flyway.

Blair, RB*, *University of Minnesota;* **Homayoun, TZ,** *University of Minnesota;*

The Mississippi River Twin Cities Important Bird Area (IBA) covers over 14,000 ha of residential, commercial, and open space along a 50 km urban stretch of the Mississippi River in Minnesota. It is an IBA based on three criteria: habitat hosting waterfowl during migration and waterbirds during breeding; habitat for species of conservation concern; and site with research value and diversity in an urban area. While state agencies regularly surveyed the waterfowl populations in the IBA, little was known about the landbirds that used the flyway. In fact, as of 2005, most reserves in the IBA did not have species lists. Consequently, we created the Mississippi River Twin Cities Landbird Monitoring Program as a citizen-science project to engage local birders. The main goals of the project were to (1) inventory landbirds that use the area, (2) determine seasonal patterns of occupancy, (3) estimate landbird abundance, and (4) evaluate long-term trends. Between 2007 and 2010, citizen scientists surveyed during both the spring migration and breeding seasons at eight sites in the IBA. From their data, we found that species richness, diversity, evenness, and native migrant landbird densities responded negatively to increased impervious cover. Additionally, the response in community measures was more pronounced during the breeding season than during migration, suggesting that sites non-optimal breeding habitat should not be overlooked as vital migratory stopover habitat.

2011-12-09 12:15 Stewardship Credit Program Pilot—A new Grassbanking tool for Canada

Blouin, D.*, *Nature Conservancy of Canada;*

The Nature Conservancy of Canada's Stewardship Credit Program is being piloted on the Foothills Fescue grasslands of southern Canada to maintain Natural Capital and create a new conservation tool for use on the agricultural landscapes of Canada. Grassbanking is a recent approach to landscape-scale conservation whereby land is leased to livestock ranchers at a reduced rate in exchange for ranchers completing conservation projects on their private lands. The agreement enables ranchers to reduce their production costs, increase the quality of their beef with healthy forage and rest their private land to increase forage production in the long-term. This pilot project is being conducted on a 1,659 ha ranch in southern Alberta owned by the Nature Conservancy of Canada and partners. Five neighbouring cattle ranchers have been involved in the development of the program and have access to graze the pilot property. In return, credits are assigned to them on an annual basis for maintaining the range and riparian health on their private property and implementing stewardship tools to further increase that health. Credits are assigned to the ranchers following a specific methodology on an annual basis for maintaining their Natural Capital (1credit =$1). Upon the completion of the pilot program the Nature Conservancy of Canada will positively influence 3,640 ha of Foothills Fescue grassland and provide the background to develop and implement a new conservation tool for Canada.

2011-12-06 17:15 Measuring habitat loss for conservation research: A multi-scale comparison of global land cover products and a framework for the future

Bogich, TLB*, *Princeton University;* **Zambrana-Torrelio, C,** *EcoHealth Alliance;* **Ramunkutty, N.,** *McGill University;* **Balmford, AP,** *Cambridge University;*

The human population is growing at an unprecedented rate, and with that growth comes continued change in land use to suit human needs – the conversion of forests to agricultural fields and urban development, for example. As conservation biologists and ecologists, we must quantify this global loss of habitat in order to accurately assess extinction risk. The development of global land cover maps is advancing and the use of these maps in conservation and ecological research is also growing, however, it is not always clear which data set to employ given the analysis scale and study question at hand. We follow the IUCN Ecosystem Red List criteria to assess the decline in distribution of terrestrial habitats, focusing on the specific issue of how the different data sets compare when measuring the proportion of land converted from natural habitats to human land uses. We found significant, and non-uniform disagreement in the classification of habitat as converted or not converted between the maps and across scales. There is a need for biologically relevant land cover maps at the global scale. While global land cover products exist, we found that they do not necessarily agree on the variation being captured, making the decision of which map to implement nontrivial. Based on our assessment of the construction, features, and intent of each of the five data sets, we present recommendations for the selection of a global land cover data set when assessing threatened ecosystems.

2011-12-07 15:00 Ecological meltdown on an oceanic island: Management of the invasive yellow crazy ant Anoplolepis gracilipes on Christmas Island

Boland, C., *Parks Australia;* **Andersen, A.*,** *CSIRO Ecosystem Sciences;*

The yellow crazy ant has infested thousands of hectares of rainforest habitat on Australia's Christmas Island in the Indian Ocean, with disastrous ecological consequences. Crazy ant infestation has led directly to the death of millions of iconic red land crabs and indirectly to significant tree mortality, with cascading effects on ecosystem structure and function. We will provide an overview of a 10-year management programme aimed at controlling crazy ant infestation. Control efforts have featured two highly successful aerial baiting campaigns that decimated crazy ant populations with minimal non-target impacts. The management programme incorporates extensive research and monitoring, including regular island-wide surveys at nearly 900 fixed waypoints, as well as studies of non-target impacts and the relative efficacy of different baits. Ongoing research is

focussing on the development of biocontrol options that target the massive outbreaks of introduced scale insects whose honeydew is fuelling crazy ant infestation. Christmas Island's crazy ant management programme is supported by a long-term management plan with committed funding, and is guided by a dedicated scientific advisory panel. We believe that it represents a successful model for managing invasive ant infestations in areas of high conservation value

2011-12-08 14:15 Performance of Catch Share Management in United States Fisheries

Bonzon, Kate*, *Environmental Defense Fund;*

Despite increasing evidence of the decline of fish stocks and ocean ecosystem health worldwide, there are growing success stories of management that improves fishery health and fishermen's profits. Research is mounting that catch shares, a management system that allocates secure shares of the stock to participants, consistently outperform traditional management approaches. There are nearly 300 catch share programs worldwide, used by over 20% of coastal countries, including New Zealand, Australia, Chile, Norway and Namibia. A new study of all major United States federal catch share fisheries and associated shared stock fisheries in British Columbia, shows that catch shares result in clear gains in environmental conditions, major economic improvements, and a mixture of changes in social conditions relative to the race for fish under traditional management. Environmentally, compliance with total allowable catch increases, and discards decrease. Economically, vessel yields rise, total revenues grow, and long-term stock increases are encouraged. Socially, safety is improved, modest consolidation occurs, and full-time employment is increased. New innovations in catch share design help catch shares meet the needs of fisheries with a variety of unique characteristics and goals.

2011-12-06 16:30 Acoustic activity as an index of relative abundance at seabird colonies: a low-cost and scalable tool for measuring conservation outcomes.

Borker, AL*, *University of California Santa Cruz;* **McKown, MW,** *University of California Santa Cruz;* **Ackerman, JT,** *U.S. Geological Survey, Western Ecological Research Center;* **Eagles-Smith, CA,** *U.S. Geological Survey, Western Ecological Research Center;* **Croll, DA,** *University of California Santa Cruz;* **Tershy, BR,** *University of California Santa Cruz;*

Globally, 30% of seabirds are threatened with extinction. Conservation actions are underway to prevent extinctions, but knowing where and how to intervene is hampered by the global scale of threats to seabirds, the remoteness and inaccessibility of seabird colonies and the dearth of data on the effectiveness of available techniques. Passive acoustic sensors could provide managers with a low-cost, low-impact method for monitoring seabird population trends and measuring conservation outcomes at scale. We tested a key assumption of the technique, that measures of acoustic activity are correlated with the relative abundance of seabirds at breeding sites. Automated acoustic sensors recorded at seven Forster's Tern (Sterna forsteri) colonies in San Francisco Bay over two breeding seasons. Tern calls were detected and counted from each site using an automated technique (spectrogram cross-correlation). Traditional nest counts were also conducted at all colonies throughout each breeding season. Our results show that acoustic activity (calls/min) indicated colony size within years, and was a powerful index of change in colony size between years (r2=.92 n=5 p=.005). Quantifying the relationship between acoustic activity and relative abundance is a fundamental step in designing effective acoustic monitoring programs for seabirds and other wildlife. Acoustic monitoring promises to be a low-cost, scalable technique for monitoring population trends and measuring responses to intervention.

2011-12-07 10:30 The Role of Incentives in Conserving Biodiversity

Bose, A. U. *, *University of Cambridge;*

Incentive-based approaches are topical in current debates on biodiversity conservation. Such models position themselves to bridge limitations inherent in the two dominant paradigms of 'conservation by restricted access' and 'community conservation'. Incentives are designed to offset local costs borne by natural-resource users and generate tangible economic benefits from conservation. In the Indian context, the application of incentives has largely focussed on providing indirect benefits. Experiments with direct incentives are a recent phenomenon. In particular, the lack of scholarly work on linkages between direct approaches and ecological outcomes make incentives an interesting focus of study. This study examines the viability of direct incentive approaches in the India and the impact of direct payments on human behaviour, decision-making and ecology of the landscape. This is done first from a national perspective and subsequently through a detailed case study in Maharashtra, India. Using an interdisciplinary approach of qualitative interviews, questionnaire and ecological surveys, this study identifies key factors that motivate natural-resource users to participate in environment projects. Findings highlight the diverging perspectives with which natural-resource users and conservation organisations view the value of forest resources.

2011-12-09 14:16 Large Dams on Brahmaputra: Threat to Eco-system Services and Indigenous and Tribal Communities in Arunchal Pradesh and Assam

Bose, Devashis*, *Department of Economics, DDR College (govt. of Assam), Chabua (Assam-India);*

River Brahmaputra (Tsangpo in China that flows to India going through Bangladesh as Jamuna) is one of the largest rivers of the world. Brahmaputra supports large eco system services, life and livelihoods of the people of Arunachal Pradesh and Assam in the north east of India. The governments in China and India are constructing a series of big dams to meet the power needs of the national economies. However, these dams are likely to affect the vast eco-system services, life and livelihoods of the local indigenous and tribal communities adversely. The environmental pressure groups, biological conservationists, and local communities are up in arms against the ongoing and proposed big dams. The governments have over played the economic benefits of the dams that are likely to flow on to the already privileged regions of the respective nations. This paper is based on primary data sourced from field surveys and secondary data, and comes to the conclusion that construction, commissioning and execution of the large dams will threaten, the hot spot of biodiversity in Arunachal and the eco-system services in Assam. Moreover the local people, specially the poorer sections will loose livelihoods, land, home and their tribal and indigenous customs and traditions may almost be wiped out. The study proposes an international debate and resistance in collaboration with the social pressure groups of north east India, and possibly those of China and Bangladesh. Moreover wide ranging quantitative and qualitative studies should be taken up to alternate solution to the power needs of the respective nations.

2011-12-08 11:15 Does recovery planning improve the status of threatened species?

Bottrill, M.C.*, *University of Queensland;* **Walsh, J.C.,** *University of Queensland;* **Watson, J.E.M.,** *Wildlife Conservation Society;* **Joseph, L.N.,** *Wildlife Conservation Society;* **Ortega-Argueta, A.,** *Instituto de Ecologica;* **Possingham, H.P.,** *University of Queensland;*

Recovery planning is a key component of government-funded initiatives to address declining populations of threatened species. To date, there has been limited evaluation on the impact of recovery plans. There is increasing interest in evaluating recovery planning motivated by demands for greater accountability and a shift away from single-species focused strategies to multi-species, landscape and ecosystem-based plans. In the context of threatened species management in Australia, we investigate whether listed species with recovery plans are more likely to have improved their status compared to listed species without recovery plans. In this study, we applied a novel econometric matching analysis to reduce biases associated with the non-random selection of species for listing and recovery planning. We found that the presence or absence of a recovery plan did not have an effect on whether a species' status was improving, stable or declining. The result suggests that recovery plans may not be useful in the short term and uncertainty persists about whether or not they make a long term contribution to species recovery. In this presentation, we highlight a series of recommendations for improving the reporting and evaluation of recovery planning efforts.

2011-12-07 15:15 Measuring ecological benefits provided by a community conservation project in the Mongolian Gobi region

Boucher, TM*, *The Nature Conservancy;* **Leisher, C,** *The Nature Conservancy;*

The GTZ Program undertook a project in the Mongolian Gobi region to improve the conservation of the Gobi Gurvan Saikhan National Park by promoting community-based sustainable use of the region's natural resources. Our research measured the ecological benefits to the grasslands in the area covered by the project. Using satellite data that measures photosynthetic activity, we compared the natural grassland condition of the 40 community-managed grazing sites included in the project to 40 ecologically similar sites, also used for grazing. We analyzed conditions over two time periods – a short-term analysis from 2000 to 2009 and a longer-term analysis from 1982 to 2006. In the 1980s and 1990s, there was no statistically significant difference in overall plant growth between what would later become the managed and non-managed sites. Over the shorter term, the community-managed areas had, on average, a longer growing season, with earlier and faster green-up in the spring and a higher peak summer growth. Over the grassland growth season (May to September), community members had 15 percent more biomass available on their lands than was available on the pastures used by those who did not participate in the project. The long-term analysis also showed that after the conservation and management program started, managed sites had 14% more forage during drought years as compared to the non-managed sites.

2011-12-08 18:30 The return of a large carnivore: can Lynx and humans cohabit peacefully?

Bouyer, Yaëlle*, *Royal Belgian Institute of Natural Sciences,, Belgium; Norwegian Institute for Nature Research, Norway; University of Liège, Belgium;* **Linnell, John,** *Norwegian Institute for Nature Research, Norway;* **Beudels-Jamar, Roseline,** *Royal Belgian Institute of Natural Sciences, Belgium;*

In the last forty years, tolerance of anthropic environment has allowed large carnivores to recolonize and expand their distribution in Western Europe. To assess the full potential and consequences of this return, habitat use and landscape modeling are particularly useful tools that allow conservationists to come up with reliable prediction, and policy makers to anticipate management planning. The considerable power of dispersal and important space requirements of these species necessitate large-scale modeling, but it is essential to work in parallel at very fine scale, as carnivores' impact on human societies is mostly felt at local level. Management of large carnivores must therefore be multi-scalar, with different decisions taken at multiple levels. With the return of the Eurasian Lynx (Lynx lynx) to lowland Western Europe, in regions of relatively high human densities, conservation-planning decisions must be knowledge based. Different approaches will be followed to analyze data at finer and larger scales. These include differential distribution and tolerance of lynx to fragmentation and anthropization, influence of landscape on lynx predation and the development of a conceptual model aiming at responding efficiently to conflicts with human populations. Results will permit the development of a lowland Western Europe habitat model, and to propose conservation measures adapted to the return of this emblematic carnivore. Results will permit the development of a lowland Western Europe habitat model, and to propose conservation measures adapted to the return of this emblematic carnivore.

2011-12-08 13:15 The origins of tropical marine biodiversity: a phylogeographic perspective

Bowen, BW*, *University of Hawaii;* **Rocha, LA,** *California Academy of Sciences;* **Eble, JA,** *University of Arizona;* **Bird, CE,** *University of Hawaii;* **Toonen, RJ,** *University of Hawaii;*

Two biogeographic theories can explain the high biodiversity in the Indo-Pacific coral triangle and Caribbean Sea. The Center of Origin theory maintains that successful species originate in the highly competitive biodiversity hotspots, and radiate to peripheral areas. The Center of Accumulation theory maintains that the coral triangle is a region of overlap between Indian and Pacific faunas, and that species originate in peripheral areas. Recent phylogeographic surveys provide evidence for both patterns. Most reef fauna in the Central Pacific have origins at or near the coral triangle. In contrast, species can also originate in the peripheral Central Pacific, and colonizing in towards the coral triangle. We propose that both processes are operating in concert. Successful species forged in the highly competitive coral triangle can radiate out to depauperate peripheral habitats, where they undergo ecological release and develop novel functions. These peripheral species can subsequently expand their range back into the center of biodiversity. A similar process is operating for the Caribbean biodiversity hotspot, which provides species to the South Atlantic. Brazilian species may subsequently develop novel traits and recolonize the Caribbean. Under this process of biodiversity feedback, both hotspots and peripheral areas contribute to the production of tropical marine biodiversity.

2011-12-08 18:30 The Predator's Dilemma: investigating the responses of central place foragers to changes in the abundance and distribution of their prey

Boyd, C*, *School of Aquatic and Fishery Sciences, University of Washington;*

Reduced food availability has been identified as a threat to a number of globally threatened or near-threatened marine species, especially central place foragers in regions where large commercial fisheries target forage fish that are also important for top predators. The design of effective conservation and management responses depends on our understanding of how changes in the abundance and distribution of food resources impact foraging. I will present a spatially-explicit individual-based foraging model (IBFM) designed to investigate how the structure and duration of foraging trips by central place foragers are affected by changes in the abundance and distribution of their prey. The model is informed by integrated analysis of GPS data on the movement patterns of Peruvian Boobies (Sula variegata) and acoustic survey data on Peruvian anchoveta (Engraulis ringens). The IBFM is designed to be a flexible and accessible tool that can be adapted to other central place foragers and address different questions. It could be used to investigate the effects of behavioral adaptations to changes in foraging conditions, compare the vulnerabilities of different species, and assess the potential effectiveness of strategies such as marine protected areas to address competition between central place foragers and fisheries.

2011-12-06 15:45 Using next-generation sequencing to investigate the diet of an endangered landsnail: a detective story

Boyer, S*, *Lincoln University, Ecology Department;* **Wratten, SD,** *Bio-Protection Research Centre, Lincoln University;* **Holyoake, A,** *Bio-Protection Research Centre, Lincoln University;* **Cruickshank, RH,** *Lincoln University, Ecology Department;* **Abdelkrim, J,** *University of Otago;*

As part of an opencast coalmine rehabilitation programme on the West Coast of New Zealand, population of an endemic carnivorous landsnail, Powelliphanta augusta, living within the proposed mine area, had to be relocated to undisturbed habitats. The success of these relocations depends on appropriate food availability in the release areas. However, feeding behaviour is difficult to observe for these small nocturnal animals and their highly endangered status does not permit sacrificing individuals for diet analysis. Therefore, molecular analyses were performed on 40 snail faeces to amplify prey DNA remaining after digestion. Because high numbers of earthworm chaetae were found in the snails' faeces, next-generation sequencing (454-pyrosequencing) was used to detect and identify all predated earthworm species. Species identification was performed using a DNA library of all earthworm species occurring in the snails' original distribution area. Our results highlight the capacity of P. augusta to feed on a wide range of earthworm species, which confirms the suitability of current relocation areas and facilitates the selection of future ones. The method developed here is appropriate for studying the diet of predators for which feeding behaviour is difficult to observe. It also has the advantage of being non-harmful and avoids the need to disturb the animals. Such a method is applicable to conservation programmes of many rare and endangered species, both vertebrate and invertebrate.

2011-12-09 10:30 Species Ability to Forestall Extinction (SAFE) index for IUCN Red Listed species

Bradshaw, CJA*, *The University of Adelaide;* **Clements, GR,** *James Cook University;* **Laurance, WF,** *James Cook University;* **Brook, BW,** *The University of Adelaide;*

The IUCN Red List is the gold standard measurement of relative species

threat, but its categories can be ambiguous, subjective, arbitrary, and do not necessarily convey the conservation status of species in relation to a minimum viable population target. While controversial, portraying a species' population estimate as a function of its taxon- or species-specific minimum viable population size indicates the 'distance' of a species from extinction while implicitly incorporating the element of population viability. We applied the Species Ability to Forestall Extinction (SAFE) index to thousands of Red-Listed mammals, birds, amphibians and reptiles for which abundance estimates were available to determine the congruence between Red List categories and relative extinction risk. We show that many lower-priority species (e.g., Vulnerable) currently have much higher extinction risks than implied by their Red List status based on their inherent extinction risk as implied by their SAFE index.

2011-12-08 10:30 Coping with a tattered safety net: Assessing household wildlife use before, during and after food supply and price shocks in Ghana and Tanzania

Brashares, JS*, *UC-Berkeley;* **Sam, MK,** *Ghana Wildlife Division;* **Okello, G,** *Bushmeat Monitoring Network;*

Food security and supply have long been recognized as fundamental to poverty alleviation, but their significance for biodiversity conservation is seldom addressed empirically. Here, we used a livelihoods approach to characterize the dynamics and drivers of wildlife use in more than 1000 households in rural Ghana and Tanzania over a three year period. We attempted to quantify the relevance of several forms of capital, but focused on the use of natural capital before, during and after major disruptions in agricultural production. Most of the households in our survey were engaged in smallholder agriculture, and we observed strong and consistent feedback between agricultural productivity and reliance on wildlife and other natural resources. Our results, like those of other studies, highlight inextricable links among poverty, natural resources, agriculture, public health, land-use and culture that must be viewed holistically if we are to maintain biodiversity in an era of unprecedented global change.

2011-12-07 14:45 Integrating cameras and tracking to examine wildlife road avoidance along a Mexican highway

Brichieri-Colombi, T.*, *PhD Candidate, University of Calgary;* **Alexander, S.M.,** *Associate Professor, University of Calgary;*

We used remotely-triggered cameras and track identification to examine wildlife road avoidance for multiple focal species along Highway 186, which traverses the Calakmul region of the Yucatan Peninsula, Mexico. We examined species' relative activity (RA) in the road-effect zone and contrasted data yielded from camera and track detection methods. Eight roads situated perpendicular to Highway 186 were surveyed with cameras placed at 50m, 750m and 2000m from the highway. Track data were collected simultaneously. RA was calculated for cameras as the number of photos/number of camera functional days, and for tracking as the number of tracks per zone/days since road last surveyed. Analysis was conducted at the guild level, and tested for differences within the road effect zone and across methods. RA was significantly different for all guilds between 50m-750m (Mann-Whitney U test, $p \leq 0.001$) and between 50m-2000m (Mann-Whitney U test, $p \leq 0.008$). Camera and track data detected significantly different RA for sensitive carnivores, sensitive herbivores and non-sensitive carnivores at all distances from the highway (Mann-Whitney U test, $p \leq 0.045$). We suggest combinatorial approaches are superior to single detection methods for measuring wildlife road avoidance.

2011-12-08 18:30 Investigating predatory behaviour of ship rats toward house mice

Bridgman, LJ*, *Department of Biological Sciences, University of Waikato, Private Bag 3105, Hamilton 3240, New Zealand;* **King, CM,** *Department of Biological Sciences, University of Waikato, Private Bag 3105, Hamilton 3240, New Zealand;* **Innes, J,** *Landcare Research, Private Bag 3127, Hamilton 3240, New Zealand;* **Gillies, C,** *Research & Development Group, Department of Conservation, PO Box 516, Hamilton 3240, New Zealand;*

Ship rats (Rattus rattus) and house mice (Mus musculus) are amongst the most damaging introduced species for their impacts on native biodiversity, particularly when island or mammal-depauperate ecosystems are invaded. Managing these species for conservation is complicated by interaction between them where they coexist. A better understanding of the mechanism under-pinning the relationship is required. Competition for food is possible. Evidence also suggests that rats prey on mice though direct observations are practically and ethically difficult to obtain. We aimed to determine if rats are aggressive toward mice, and if so, whether the behaviour is predatory and related to feeding or more comparable with intra-specific aggression. We observed the response of captive rats to close, but not direct, contact with a live mouse and a live conspecific. We also observed direct contact with a euthanased mouse moved on a line ('zombie mouse'). We found that intra-specific and inter-specific aggression was dissimilar. 75% of rats interacted with zombie mice. Chasing, biting and restraining behaviours were exhibited and feeding on mice often began immediately. Our results support predatory behaviour of rats toward mice. Along with implications for management of these species, the ship rat-house mouse relationship may act as a model for ship rat interactions with other mouse-like small mammals.

2011-12-09 11:45 Analysis of transient population dynamics of the endangered Penstemon haydenii

Brigitte Tenhumberg*, *University of Nebraska Lincoln;* **Richard Rebarber,** *University of Nebraska Lincoln;* **Kay Kottas,** *University of Nebraska Lincoln;*

In many organisms dispersal is restricted to specific life history stages, thus the stage distributions of founder populations are not stable and we expect significant transient deviations from long-term dynamics. The transient population growth rate following a dispersal event is a critical component for the establishment success because propagules typically arrive in new patches in small numbers and small populations inherently have a high extinction risk as a result of Allee effects or demographic stochasticity. The population growth rate after arrival determines how long populations remain in the state of "dangerously low numbers". A high colonization success is especially important for organisms exploiting ephemeral resources, such as pioneer plant species. In this paper we use density dependent integral projection models on the endangered pioneer species, Penstemon haydenii to explore the role of transient dynamics in population establishment. We used Monte Carlo analysis and Partial Rank Correlation Coefficients to evaluate the relative importance of model parameters for transient and asymptotic dynamics. Our models predict large spatial variation in long and short term population dynamics. Furthermore, our models suggest that transient dynamics play a key role in colonization success. Transient dynamics can cause colonizing (seedling) populations to crash to very low numbers and it may take > 40 years to reach numbers that are close to the predicted asymptotic population size.

2011-12-08 18:30 The scientific and conservation value of a small protected area : the case of Muir ecological reserve, Canada.

Brisson, Jacques*, *University of Montreal;*

There are several reasons to favor large-size reserves over smaller ones : larger populations of species, more diversity, varied habitats, better resistance to invasive species, etc. One can even question whether very small forest fragments are worth saving. The Muir Ecological Reserve is an 11-hectare old growth forest remnant in a highly deforested and cultivated region of southern Quebec (Canada). In spite of its small size, this reserve has provided numerous novel insights on disturbance dynamics, phytopathology, animal ecology, and community ecology over the last 25 years. It has been used as a standard for forest integrity in the region and it has helped challenged conventional views on forest dynamics. The reserve hosts a distinctive biodiversity and some insect and fungi species previously unknown to science were found there. These results show that, while large-size reserves are preferable, smaller protected areas should not be ignored as they may be of high scientific and conservation value.

2011-12-08 11:15 The importance of understanding landowner preferences in designing and promoting conservation initiatives

Broch, Stine Wamberg, *Faculty of Life Sciences, University of Copenhagen;* **Jacobsen, Jette Bredahl,** *Faculty of Life Sciences, University of Copenhagen;* **Wilson, Kerrie Ann,** *The Ecology Centre, School of Integrative Biology, The University of Queensland, St. Lucia, 4072, Australia;* **Knight, Andrew Thomas,** *Department of*

Conservation Ecology & Entomology, Stellenbosch University, Private Bag X1, Matieland 7602,South Africa; **Strange, Niels*,** *Faculty of Life Sciences, University of Copenhagen;*

To ensure effective conservation initiatives there is a need for understanding how landowners' willingness-to-participate in these initiatives vary in space, and with characteristics of the landowner, the contractual instrument, as well as the type of public good the conservation initiative is intending to provide. Such information is potentially important when policy-makers are designing and mainstreaming conservation initiatives. However, little attention has been given to these relationships with farmers' preferences. In this study, farmers' preferences are investigated using a choice experiment of preferences for nature restoration (afforestation) contracts with the purpose of providing groundwater protection, biodiversity conservation and recreation. We employed a random parameter logit model to analyse the relationship between farmers' preferences and the spatial variables of groundwater interests, species richness, human population density, forest cover and recreational hunting. The results show that farmers willingness-to-participate increases when the conservation initiative is targeted towards biodiversity and groundwater protection, and that farmer willingness-to-participate is substantially lower when the aim of the project was to promote recreational options for the public. Introducing flexibility and options for farmers to cancel restoration contracts may not increase the security of public good provision, but may increase the number of farmers' willing-to-participate. The random parameter logit model also shows a significant and positive effect of game hunted and farmers' willingness to enter the scheme. The study demonstrates that spatial heterogeneity of landowner characteristics should be considered when designing conservation initiatives. Such knowledge could potentially be used by public authorities and stewardship staff for social marketing the afforestation scheme, increasing the initiatives cost-effectiveness and the number of farmers participating, as well as the welfare of farmers and society.

2011-12-08 18:30 Combining Social Marketing with Improved Enforcement to protect Indochinese tigers in Lao PDR

Brooke Sadowsky, *Rare;* **Annalisa Bianchessi,** *Rare;* **Amielle DeWan*,** *Rare;* **Santi Saypanya,** *Wildlife Conservation Society - Lao;* **Troy Hansel,** *Wildlife Conservation Society - Lao;*

Since February 2009, the Wildlife Conservation Society (WCS) and Rare have partnered to run a social marketing campaign in Nam Et-Phou Louey (NEPL) National Protected Area (NPA) in Lao PDR. This site was chosen since NEPL NPA is the largest NPA in the country, covering nearly 600,000ha of forest, and supports a tiger population of international importance, as well as at least 17 other key large mammal species of conservation concern. The primary conservation goal of the campaign is to increase the Indochinese tiger population at NEPL NPA through protecting and increasing the number of key tiger prey species (by 15% by 2015) from the threat of illegal hunting by local hunters. The campaign used proven marketing techniques to motivate local hunters to follow 5 critical hunting rules while also facing social pressures from villagers who were encouraged to report infractions, and through development and strengthening of a local enforcement system that would be ready to act on reports. Results after first two years of the campaign showed positive shifts among knowledge, attitudes, practices, and increases in enforcement results, which includes 250 phone calls within a 5-month period to a newly created hotline number, 82 of which related to illegal hunting and trade activities that resulted in 22 cases penalized and closed. This campaign has continued to run and is currently being expanded to another site further north to reach other important target audiences.

2011-12-06 12:00 Use of land facets to design linkages for climate change

Brost, BM, *Northern Arizona University;* **Beier, P*,** *Northern Arizona University;*

Least-cost modeling for focal species is widely used to design conservation linkages. But these linkages are based on today's species' distributions and land cover, both of which will change as climate changes. To accommodate species' shifting distributions as climate changes, we suggest designing linkages for the continuity and interspersion of land facets (recurring landscape units of relatively homogeneous topography and soils). The rationale is that linkage strands with high continuity of individual land facets will facilitate movement of species associated with each facet today and in the future. We demonstrate how land facets can be defined in an adaptable way using these steps: (a) In each landscape, use fuzzy c-means cluster analysis to define > 10 land facets based on topographic and soil variables; (b) For each land facet, calculate resistance as a pixel's multivariate dissimilarity (Mahalanobis distance) from the focal facet type; (c) Design one corridor per land facet using least-cost modeling; and (d) Create the final linkage design by joining all least-cost corridors (one for each facet type and one for high facet diversity). For each of 3 landscapes in Arizona, USA, linkage designs based on land facets served almost all focal species well (evidence: short interpatch distances and low resistance), but focal species linkages provided poor connectivity for many land facets.

2011-12-08 11:26 Incorporating the influence of uncertainty into biodiversity credits systems

Bruggeman, DJ*, *Michigan State University;* **Wiegand, T,** *Helmholtz Centre for Environmental Research;*

A general theory useful for predicting changes in biodiversity in a dynamic landscape is still missing from ecology. Spatially-structured, process-based models are often needed such as individual-based, spatially-explicit population models (IB-SEPMs). This study demonstrates how IB-SEPMs can be used to value tradable credits for habitat protection given uncertainty in species' dispersal behaviors. Pattern Oriented Modeling was used to test the ability of alternative dispersal models to reproduce patterns of abundance and genetic diversity observed in nature. The suite of models that most faithfully reproduced observed patterns were then used to evaluate habitat trading scenarios. To incorporate the effects of habitat loss versus fragmentation into the conservation value of trades, Landscape Equivalency Analysis was used to estimate the credits and debits generated by each scenario and putative dispersal model. Landscape Equivalency Analysis is an extension of the resource-based compensation approach applied to a landscape-scale. The equivalency of two habitat patches is estimated by their contribution to abundance and genetic diversity measured at the landscape scale. Decision Analysis was then used to determine the most cost-effective trades that minimized the effects of habitat loss and fragmentation given uncertainty in dispersal.

2011-12-07 10:34 Engaging the Next Generation of Pastoralists and Leaders in Community-Based Conservation in Samburu, Kenya

Bruyere, Brett*, *Colorado State University;*

Samburu is located in a rural and rugged region of northern Kenya. Its tradition and history is rooted in pastoralism and subsistence living. While changes to some parts of the region are clearly happening, upward mobility and moving away from home is relatively uncommon; many of its young people today will be tomorrow's pastoralists, and the ones who will also potentially be seeking fuelwood and clean water for their families. The school curriculum in Kenya is established nationally and strictly followed by most teachers. Although scientific and ecological topics are included, the curriculum leaves minimal room for youth to learn about ecosystems, wildlife or vegetation in their own backyards. Instead they learn about the generic characteristics of the environment. In this study we applied a place-based approach to teaching youth about local vegetation and wildlife populations through experiential activities that included vegetation sampling and wildlife counts. In many cases, participants had never entered the protected areas visited during this study that border their community. Five months following the activities, our outcomes indicated that youth retained some knowledge about various aspects of their local ecosystem (e.g., plant names, wildlife behaviors) but a stronger outcome was the affective impact; youth recalled the field trips as being novel, memorable and enlightening. While the long-term impact of the strong affective and modest knowledge gain outcomes are uncertain, this study helps make the case that field-based experiences can have at least short-term positive impacts.

2011-12-08 18:30 Conservation of Fungi - threat status of fungi in New Zealand and globally

Buchanan, PK*, *Landcare Research, Auckland, New Zealand;* **Johnston, PR,** *Landcare Research, Auckland, New Zealand;*

Fungi have been included in threat status assessments of New Zealand's biota since 2002. Assessments have mainly addressed macrofungi, as well

as obligate species of fungi on threatened plants. The initial inclusion of fungi, and subsequent need for reassessment of threat status, has generated new research initiatives and raised awareness of fungal conservation. Aspects of fungal biology such as ephemeral reproductive stages add difficulty to threat status assessments. Examples are presented of fungal species listed in the highest (Nationally Critical) and other threat categories. Over 1,000 species of fungi are listed as Data Deficient due to inadequate distribution data. Fungi have been included in a prioritization exercise spanning all New Zealand's threatened taxa that are in decline, to evaluate methodology, feasibility, and cost of long-term recovery plans. Using molecular techniques, new records of ectomycorrhizal fungi listed as Data Deficient have been discovered by comparing environmental sampling of ectomycorrhizas with DNA sourced from herbarium specimens. Responding to increasing global awareness of the need for fungal conservation, the International Society for Conservation of Fungi was formed in 2010, and five Fungal Specialist Groups have been established under IUCN.

2011-12-08 18:30 Brazil´s Amazon Region Protected Areas Programme (ARPA): A success story of society´s involvement in biodiversity conservation

Bueno, M.A.F.*, *ARPA, Departmento de Areas Protegidas, Ministerio do Meio Ambiente, Brasilia, Brazil, 70730-542;* **Quinhoes, T.,** *ARPA, Departmento de Areas Protegidas, Ministerio do Meio Ambiente, Brasilia, Brazil, 70730-542;* **Pinto, R.,** *ARPA, Departmento de Areas Protegidas, Ministerio do Meio Ambiente, Brasilia, Brazil, 70730-542;* **Martins, E.,** *IBAMA, Brazil;* **Barata, T.,** *Consultant;*

Brazil´s Amazon Region Protected Areas Programme (ARPA) is the largest worldwide initiative in tropical forest conservation, aiming to protect 600,000 km² of biologically priority areas between 2003 and 2016 through the establishment and permanent financial sustainability of parks and reserves. We present here the major results of ARPA in its first phase (2003-2009): almost 30% of all protected areas (PA) in Brazilian Amazon today are supported by ARPA (64 PA covering 320,000 km²); half of ARPA PA (extractive reserves and sustainable development reserves) directly benefit local human communities; ARPA PA hold decreased deforestation rates as compared to other PA in Amazon; ARPA protection holds the potential to avoid 5 billion tons of carbon emissions; increased efficiency in PA implementation; increased society´s engagement in PA councils. ARPA has been innovative in developing decision support tools to manage effectiveness and prioritize investments in PA, in developing financial mechanisms to allow PA to be sustainable in the long term and in engaging a wide range of stakeholders (local human communities, governments at all levels, non-governmental organisations and the private sector) in its decision-making processes, proving to be a promising model of participatory PA management and biodiversity conservation.

2011-12-07 18:00 Impacts of Supplementation on Wild Chinook Salmon Productivity: Lessons from Long-Term Monitoring

Buhle, ER*, *NOAA Fisheries Service;* **Scheuerell, MD,** *NOAA Fisheries Service;* **Ford, MJ,** *NOAA Fisheries Service;* **Cooney, T,** *NOAA Fisheries Service;* **Carmichael, RW,** *Oregon Department of Fish and Wildlife;*

Captive breeding is a widely used strategy for buffering declining populations against short-term extinction risk. For salmonids and other fishes, captive breeding in the form of hatchery supplementation aims to increase abundance while minimizing adverse genetic and ecological effects. Much uncertainty remains, however, about the effectiveness and impacts of supplementation on wild populations. To address this, we analyzed time series of adult density from 23 populations of spring/summer Chinook salmon (Oncorhynchus tshawytscha) in the Snake River basin, USA, which have had a range of supplementation levels. We fit population-dynamic models that compared the relative performance of naturally spawning wild- and hatchery-reared fish with respect to two key parameters: productivity at low density and carrying capacity. We found evidence that average carrying capacity was lower for hatchery fish than for wild fish, but relative intrinsic productivity was poorly defined by the data. These results point to ecological differences between wild and hatchery-reared salmon, despite efforts to minimize such divergence. Supplementation may reduce natural productivity, suggesting a trade-off between short-term increases in abundance and long-term potential for rebuilding. However, the uncertainty in key parameters suggests that even extensive monitoring may be insufficient to clearly identify the impacts of supplementation, and highlights the need for adaptive management.

2011-12-07 14:16 Overcoming problems with the use of Biodiversity Offset schemes to protect the Saiga antelope

Bull, Joe*, *Department of Biology, Imperial College London;*

Biodiversity Offsets are designed to compensate for the residual impacts of development, and achieve 'no net loss' of biodiversity overall. Biodiversity Offsets are being considered in Uzbekistan as a mechanism to compensate for the ecological impacts of further developments in the Oil and Gas sector. One proposed Offset includes the designation and funding of a protected area primarily to benefit the Saiga antelope, a migratory species along the border with Kazakhstan. This raises numerous ecological, social, industrial, commercial, political and legal questions; many of which apply to the Offset approach in general. A bespoke computer simulation model was created to test the objectives of the proposed Offset scheme; incorporating data on vegetation, climate, Saiga, industrial activities, socio-economic development, and poaching. The results suggest that, while implementation of such a protected area may help protect the Saiga antelope, it would not necessarily achieve 'no net loss' of biodiversity overall. I discuss potential trade-offs between single-species and biodiversity targets in Offset schemes, and challenges surrounding the use of 'umbrella' species as measures of offset efficacy.

2011-12-08 12:00 Is Australia ready for assisted colonisation? Policy changes required to facilitate translocations under climate change

Burbidge, AA*, *Floreat, WA 6014;* **Byrne, M,** *Science Division, Department of Environment and Conservation, Western Australia;* **Coates, D,** *Science Division, Department of Environment and Conservation, Western Australia;* **Garnett, ST,** *Research Institute for Environment and Livelihoods, Charles Darwin University, ;* **Harris, S,** *Department of Primary Industries, Parks, Water and Environment, Tasmania;* **Hayward, MW,** *Australian Wildlife Conservancy;* **Martin, TG,** *Climate Adaptation Flagship, CSIRO Ecosystem Sciences;* **McDonald-Madden, E,** *Climate Adaptation Flagship, CSIRO Ecosystem Sciences;* **Mitchell, NJ**, *The University of Western Australia*; **Nally, S**, *Department of Sustainability, Canberra Australia*; **Setterfield, SA**, *Charles Darwin University*

Assisted colonisation (AC) has been proposed as one method of aiding species to adapt to the impacts of climate change. AC is a form of translocation and translocation protocols for threatened species, mostly for reintroduction, are well established in Australia. We evaluate the information available from implementation of translocations to understand how existing policies and guidelines should be varied to plan, review and regulate AC. While the risks associated with AC are potentially greater than those of reintroductions, AC is likely to be the only available method, other than germplasm storage and establishment of captive populations, of conserving many taxa under future climate change. AC may also be necessary to maintain ecosystem services, particularly where keystone species are affected. Current policies and procedures for the preparation of Translocation Proposals will require modification and expansion to deal with AC, particularly in relation to risk management, genetic management, success criteria, moving associated species and community consultation. Further development of risk assessment processes, particularly for invasiveness, and guidelines for genetic management to maintain evolutionary potential are particularly important in the context of changing climate. Success criteria will need to respond to population establishment in the context of new and evolving ecosystems, and to reflect requirements for any co-establishment of interdependent species. Translocation Proposals should always be subjected to independent peer review before being considered by regulators. We conclude that consistent approaches by regulators and multilateral agreements between jurisdictions are required to minimise duplication, to ensure the risk of AC is adequately assessed and to ensure the potential benefits of AC are realised.

2011-12-06 11:30 Linking raptors and biodiversity as a potential tool for conservation

Burgas, D*, *Bird Ecology Unit, Department of Biosciences, University of Helsinki. P.O. Box 65, FI-00014 Helsinki, Finland;* **Byholm, P,** *Bird Ecology Unit, Department of Biosciences, University of Helsinki. P.O. Box 65, FI-00014 Helsinki, Finland;*

The reduction in biodiversity is intended to slow down by means of efficient methods which help to decide where and when to locate the limited resources available. However, conservation planning is often based on landscape models that intend to integrate some of the taxa distributions but almost always omit interactions between other species. At the same time, the information of some apparent and well studied species is omitted due to the missing link between those and the overall biodiversity. One clear example of this are raptor species, which have been traditionally monitored worldwide. Although there are strong theoretical foundations that highlight raptors as predictors of biodiversity, there is very scarce empirical information on their utility as indicators of biodiversity. We use two boreal raptor species (northern goshawk and Ural owl) to show how forest avian predators genuinely associate to locations of high biodiversity. Simultaneously, both single raptor species and the interaction between predators can have a key role on distribution and abundance of other species of conservation interest. As success of conservation action directly depends on the information available we suggest the inclusion of knowledge on predators especially when this is easily available.

2011-12-07 12:00 Eradicating invasives: where next?

Butchart, S. H. M*, *BirdLife International;*

Invasive Alien Species (IAS) are a major threat to biodiversity. Multiple efforts are now underway at national, regional and global scales to mobilize relevant data in order to set priorities for controlling or eradicating alien vertebrates. Ensuring that these efforts progress in a complementary, synergistic and/or collaborative manner is a high priority, as is the need to make databases interoperable, sustainable for future updating, and accessible to all relevant parties. Key further developments include: (1). The need to expand prioritization beyond vertebrates, to encompass priorities for eradicating or controlling plant and invertebrate IAS. (2) The need to build robust datasets on the practical realities for each priority island/site, including the presence/absence/size of human populations and the political opportunities/obstacles. (3) The need to incorporate priorities for eradication/control of IAS at islands/sites where the target threatened species was present historically and was extirpated, but would likely recolonize if IAS were removed. (4) The need to incorporate trade-offs with the costs of preventing colonization or recolonization of islands/sites by IAS, and hence develop a set of the highest priorities for controlling pathways for IAS introductions. (5) The need to consider synergies with climate change that will likely radically change the threats from IAS in the coming decades. Finally, of course, we need to mobilize the resources and political will to turn these prioritization exercises into action on the ground, to turn back the growing wave of biodiversity loss driven by IAS.

2011-12-08 18:30 Factors influencing colonization rates of native and invasive plant species on green roofs

Butcher, CL*, *Central Michigan University;* **Dannenhoffer, JM,** *Central Michigan University;* **Swanson, BJ,** *Central Michigan University;*

Urbanization has led to habitat loss, some of which may be replaced by green roofs. We evaluated colonization rates of plants on green roofs to test two hypotheses: 1) colonization rates of green roofs are independent of roof area, soil depth, and initial plant density and 2) native and invasive plants colonize green roofs at equal rates. We studied 9 green roofs in the summer of 2010. Soil depth and initial density measurements were taken in May, colonizing plants were collected through August, and the total colonization rates for native and invasive plants were calculated for each roof. We found a positive linear relationship between invasive species colonization rates and roof area (R2=0.58, t=3.1, P=0.02) and between combined (native and invasive) colonization rates and roof area (R2=0.48, t=2.6, P=0.04). Native species, invasive species, and combined colonization rates showed an inverse linear relationship with soil depth (R2=0.59, t=2.9, P=0.03; R2=0.53, t=2.6, P=0.04; R2=0.60, t=3.0 P=0.02 respectively). We found no difference between native (47.8%) and invasive (52.2%) species colonization rates (t=-0.28, P=0.780) or between native (30.4%) and invasive (69.6%) individual colonization rates (W=84.0, P=0.929). Our results suggest that green roofs could act as conservation areas for native plant species to preserve habitat in urbanized areas. However, we suggest initial selective weeding of invasive species to facilitate native species establishment and persistence.

2011-12-08 18:30 Measurement uncertainty in tree census carried out by volunteers and its effect on above-ground carbon stock estimates

Butt, N*, *University of Oxford;* **Riutta, T,** *University of Oxford;* **Malhi, Y,** *University of Oxford;* **Morecroft, M,** *Natural England;*

A typical way to quantify above-ground carbon stocks in forest is to use diameter measurements and species-specific allometric equations to estimate tree biomass and carbon stock. The aim of this study was to evaluate the quality of measurement carried out by volunteers and to estimate how sensitive the carbon stock estimates are to measurement errors. In total, 8355 stems (≥ 5 cm diameter at 1.3 m height) in seven 1ha plots were identified and measured by 200 volunteers from the HSBC Climate Partnership programme in Wytham Woods, Oxfordshire, UK. Approximately 10% of the stems were remeasured to quantify the measurement uncertainty. Data entry error rate was also estimated. Tree species was misidentified in 5% of the cases and 6% of the records had data entry errors. Errors in diameter measurements were divided into two categories: clear mistakes and measurement uncertainty. Data entry errors accounted for 37% of the clear mistakes. Excluding the errors > 1.5cm, the measurement uncertainty was ±1.6 mm (RMSE) and two thirds of the repeated measurements fell within ±3.0mm of each other. The uncertainty in diameter had only a minor effect on the biomass estimates of the plots: an error of ±3mm translated into ±2.5% change in the biomass estimates. The study showed that in general the tree census carried out by volunteers provides good quality data for forest biomass calculations.

2011-12-09 12:45 Potential impacts of climate change on the environmental services of humid tropical alpine regions.

Buytaert, W, *Wouter Buytaert;* **Cuesta, FC*,** *Consortium for the Sustainable Development of the Andean Ecoregion CONDESAN, Quito, Ecuador;* **Tobón, C,** *Universidad Nacional de Colombia con sede Medellin, Medellín, Colombia ;*

: Humid tropical alpine environments are crucial ecosystems that sustain biodiversity, carbon storage and surface water provision. They are identified as one of the terrestrial ecosystems most vulnerable to global environmental change. This paper reviews the state of knowledge about tropical alpine environments, and provides an integrated assessment of the potential threats of global climate change on the major ecosystem processes. Climate change will displace ecosystem boundaries and strongly reduce the total area of tropical alpine regions. Displacement and increased isolation of the remaining patches will induce species extinction and biodiversity loss. Drier and warmer soil conditions will cause a faster organic carbon turnover, decreasing the below-ground organic carbon storage. Since most of the organic carbon is currently stored in the soils, it is unlikely that an increase in above-ground biomass will be able to offset soil carbon loss at an ecosystem level. Changes in precipitation patterns, increased evapotranspiration and alterations of the soil properties will have a major impact on water supply. Yet, the magnitude and the trend of most of these effects depend strongly on local climatic, hydrological and ecological conditions.

2011-12-09 10:30 Conservation of wild yak for the benefits of hybridization with domestic yak on the Tibetan plateau, China

Buzzard, PJ*, *China Exploration & Research Society;*

Wild yaks were once seen in herds of thousands, but due to over-hunting they are now endangered. Many protected areas with wild yak are also inhabited by domestic yak herders. In some areas herders have traditionally conserved wild yak to improve the fitness of domestic yak, a unique situation for a wild relative of domestics. In Apr 2010 I investigated this conservation approach with herders in Sanjiangyuan Nature Reserve, Qinghai to evaluate the impact on wild yak. I interviewed 60 herders about attitudes toward wild yak and conducted in-depth interviews with four herders about six wild/domestic hybrids. Herders had positive attitudes toward wild yak and noted the high performance of hybrids especially a bull that has sired

many calves. To facilitate conservation seven families had moved out of wild yak areas which herders regularly patrol. I joined a patrol and saw 20 wild bulls where winter herds >100 are seen. I also saw 50 bulls in bordering areas indicating the opportunity for expansion of this approach, and there is interest from a local NGO in selling hybrid bulls. Loss of domestic yak cows into wild herds can be a problem, and herders lose about one cow every five years. Wild yaks in the area are still black, however, suggesting that the wild bloodlines are pure. Wild relatives of domestics are important genetic resources for future threats e.g. climate change and disease, and this research shows a promising way to add value to and promote wild yak conservation.

2011-12-06 17:15 Assessing patterns of genetic diversity: essential data for implementing plant reintroduction strategies

Byrne, M*, *Science Division, Department of Environment and Conservation;* **Coates, DJ,** *Science Division, Department of Environment and Conservation;* **Millar, MA,** *Science Division, Department of Environment and Conservation;*

Assessing patterns of genetic diversity and understanding causal factors such as reproductive biology, historical isolation and contemporary gene flow can be critical for designing strategies for threatened plant species reintroductions. One strategy might be to increase genetic diversity by combining germplasm from different populations to maximise evolutionary potential under environmental change. Another could be to keep historically divergent lineages within a species as separate reintroductions with local adaptation a key goal. These are ends of a spectrum of possibilities when considering how to establish new populations to ensure species persistence, and require an understanding of genetic structure and the breeding system of the target species. Here we present data from studies on the molecular ecology of three animal pollinated woody shrubs in the Proteaceae that highlight different approaches required for effective reintroduction programs in these species. We demonstrate how understanding evolutionary relationships among populations is critically important for implementing reintroduction strategies that maximise persistence and evolutionary potential of species.

2011-12-08 18:30 Do Rainforest Mammals Exhibit Micro-scale Avoidance Behaviour to Roads?

Byrnes, P.J.*, *James Cook University;*

Road avoidance is typically indicated in the literature by changes in species abundance, density or diversity over reasonably large distances, comparing spatially distant sites or following these factors along transects perpendicular to the road. Very few studies have examined small-scale avoidance effects. Three species of tropical rainforest mammal (Hypsiprymnodon moschatus, Uromys caudimaculatus and Perameles nasuta) showed no preference for forest interior over habitat adjacent to a highway or dirt road through rainforest in northeast Queensland, Australia. Do these broad-scale observations reflect what is occurring within the road edge habitat? Do animals active within the edge zone exhibit micro-scale avoidance behaviour? Animals were trapped adjacent to roads and tracked using spool-and-line tracking techniques, with tracks analysed in 1 metre segments after omitting post-release flight. None of the species showed a preference for that part of their home range further from the road compared with near the road. Additionally, the probability of animals moving away from roads was not significantly different to their probability of moving towards it, while their direction of turning and mean angle of movement was also unaffected. The study species did not avoid either highway or dirt road at the micro-scale and we conclude that roadside habitat may represent a favourable environment that overrides any natural responses to disturbance and threats posed by the road.

2011-12-08 10:30 Rodent dynamics in Serengeti National Park, Tanzania: implications of climate and land use change for East African savanna ecosystems

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Little is known about the dynamics of rodents in Serengeti. We investigated this lesser-known component of the ecosystem by combining scattered data collected over four decades (1968–2010) with intensive trapping data 1999–2010. Rodents reached high numbers every 3-5yr ('outbreaks'), driven by short-season rainfall. Small mammalian carnivores and birds of prey peaked in abundance after rodents. Rodent outbreaks may benefit conservation of carnivores and birds of prey because rodents provide pulses of food (prey) at critical times. To the west and north of Serengeti National Park are agricultural villages. The area is undergoing unprecendented development and intensification of land use. Rodent outbreaks cause economic losses because they damage crops and stored grain. In outbreak years they also transmit diseases directly to humans, or to domestic dogs and cats, which transmit diseases back to wild carnivores. In human-impacted areas rodents are therefore regarded as a pest. Climate change projections for East Africa suggest that the amount and variability of rainfall will decrease over the next two decades, resulting in fewer rodent outbreaks. This is good news for managing rodents in agricultural areas, and may reduce disease outbreaks in wildlife and humans. Conversely, rodents are a vital part of the natural savanna ecosystem because they provide food for threatened carnivores. This sets up a complex conflict between natural and human-dominated ecosystems in East Africa.

2011-12-06 14:30 A framework for assessing the vulnerability of Australia's elapid snakes to climate change

Cabrelli, AL*, *Macquarie University;* **Hughes, L,** *Macquarie University;*

In view of the accelerating rate of climate change, there is an imperative to assess which species are likely to be most vulnerable to its impacts so that conservation priorities can be set. To date, vulnerability assessments have largely been based on projected changes in range size derived from the output of Environmental Niche Models (ENMs). However, the major limitation of these models as risk assessment tools is that many traits that are important contributors to the vulnerability of species are not explicitly incorporated into the modelling process. We developed a novel, point-scoring framework for ranking species according to their climate change vulnerability that combines the output of ENMs with information on species' traits. We applied this system to Australia's elapid snakes, a taxonomic group that has been little studied in relation to future vulnerability. We found that species' scores varied widely, ranging from 5.3 (least vulnerable) to 45.0 (most vulnerable) out of a possible 56. Using the list of ranked species we identified two ecoregions within Australia, the Brigalow tropical savannah and the Mitchell grass downs, which are particularly rich in vulnerable species. By providing a more comprehensive and rigorous method for assessing vulnerability than those based solely on ENMs, this framework provides more objective justification for resource allocation, and can help guide decisions regarding the most appropriate adaptation strategies.

2011-12-08 14:30 Coral recruitment at Lord Howe Island – closed or open populations?

Cameron, KA*, *Marine Ecology Research Centre, Southern Cross University;* **Harrison, PL,** *Marine Ecology Research Centre, Southern Cross University;*

Scleractinian corals are the foundation species of coral reefs worldwide. Coral recruitment is a critically important process in the maintenance of coral reefs, especially in the recovery and replenishment of reefs following disturbance. The proportion of coral recruits derived from dispersed larvae of broadcast spawning corals versus localised recruitment from corals that brood larvae changes with latitude. Broadcasting corals dominate recruitment at lower latitude tropical reefs, with brooding corals tending to dominate at higher latitude subtropical reefs. Lord Howe Island lies off eastern Australia and has the most southerly true fringing lagoonal coral reef in the world. Initial work to explore recruitment patterns in the early 1990s found that brooding coral recruits were dominant at Lord Howe

Island. The methodology for studying coral recruitment has been refined since this time. New surveys conducted at Lord Howe Island over 2011 are currently quantifying the distribution and abundance of scleractinian corals by examining settlement on replicate recruitment tiles at five sites, comparing recruitment patterns between sites and within sites over three seasons. This will enable assessment of whether coral recruitment patterns have changed over the last two decades in response to changing climate. It will also assist in quantifying the likely period required for the recovery of coral communities damaged by an extensive coral bleaching event at Lord Howe Island in 2010.

2011-12-06 14:00 Coffee habitat complexity influences black-throated blue warbler use of Jamaican coffee farms: implications for an ecosystem service

Campos, BR*, *Humboldt State University;* **Johnson, MD,** *Humboldt State University;*

Ecosystem services provisioned by mobile organisms are delivered as a function of the movements of those organisms – movements that are influenced by the availability of the habitats selected by those organisms. On Jamaica's coffee farms, birds serve as agents of biological control of the coffee berry borer (Hypothenemus hampei), coffee's most devastating pest worldwide. Using radio-telemetry we investigated the habitat selection, home ranges, and coffee habitat use of black-throated blue warblers (Dendroica caerulescens), likely the foremost predator of coffee berry borer, on two coffee farms of differing vegetative complexity in western Jamaica. We developed population-based models of habitat selection of four coffee habitat variables. Birds demonstrated strong and consistent selection of home range placement in areas of increasing canopy cover and coffee crop cover, and at intermediate distances from uncultivated habitat on both farms. Home range size decreased with increasing use of coffee habitat at the farm with high vegetation complexity, whereas this trend reversed on the other farm. Home range size also decreased with increasing canopy cover within the home range on both farms. As expected, birds at the farm with higher vegetation complexity spent significantly more time in coffee habitat. We conclude that knowledge of birds' selection for vegetation complexity can enable farm managers to promote bird-provisioned ecosystem services in Jamaica's coffee landscapes.

2011-12-06 12:00 Conservation status of three primate species (Callicebus ornatus, Saimiri sciureus albigena and Aotus brumbackii) at Colombian Llanos

Carretero-Pinzón, X.*, *Departamento de Biología, Facultad de Ciencias, Pontificia Universidad Javeriana, Bogotá, Colombia ;* **Ruíz-García, M.,** *Departamento de Biología, Facultad de Ciencias, Pontificia Universidad Javeriana, Bogotá, Colombia ;*

Three primate species (Callicebus ornatus, Saimiri sciureus albigena and Aotus brumbackii) are threatened in Colombian Llanos by an increment in habitat loss, fragmentation, palm oil plantations and livestock activities. We made an assessment in the conservation status of these species based on different sorts of data, including habitat availability, population information from some areas of their distribution and several genetics results. Reduction in at least 40 % of their distribution area and variable density estimated values (C. ornatus ranges 0.18 x 10-2 – 57.94 ind/ km2, S.s. albigena ranged 7.69 – 167.62 ind/ km2 and A. brumbacki ranged 4.35 – 15.24 ind/ km2) shows problems for such species and their respective populations as crowded populations in small fragments, higher predation risk during dispersion events and low census numbers that can lead them to local population extinction and higher threatened status. Some genetics statistics showed relatively low gene diversity for S.s. albigena and A. brumbackii compared with other taxa of these genera in areas with less anthropogenic alterations. Use of fence rows of different heights and covertures, education programs and joint work with livestock farmers and palm oil plantations can reduce the population isolation, disturbance and local extinction of these Colombian endemic primate species.

2011-12-07 15:00 Googling wildlife connectivity: how new tools for analysis of the structure of the internet can help map habitat linkages

Carroll, C*, *KCCR;* **McRae, B,** *The Nature Conservancy;*

Natural areas that are linked into networks are often more effective than isolated areas at preserving biodiversity. However, existing tools for mapping habitat connectivity poorly reflect complex patterns of animal movement. Methods for analysis of large graphs such as the structure of the internet can also be applied to habitat linkage mapping and landscape-level centrality analysis. Centrality refers to a group of landscape metrics that rank the importance of sites as gatekeepers for flow across a network, to determine which areas, across the landscape as a whole, would be priorities for measures to facilitate connectivity. These methods can also be applied to the more common question of mapping habitat linkages between a pair of source and a target patches, and to analyzing connectivity across time as habitat shifts under changing climates. Centrality analysis can be applied in single species and multi-species planning efforts, at a range of scales from local watersheds to large regions. Recent examples include projects to identify key linkages for Northern Spotted Owl in the Pacific Northwest, for gray wolf in western North America, and for a suite of focal species in British Columbia. Although corridor mapping functions have long been available in GIS, connectivity conservation planning will increasingly involve comparison of a variety of diverse metrics, include those described here, and validation with genetic data that records the effects of past dispersal movements.

2011-12-07 17:15 Impact of regulatory fragmentation on the ability of species to adapt to climate change

Carroll, Jennifer*, *University of Notre Dame;* **McLachlan, Jason,** *University of Notre Dame;* **Camacho, Alejandro,** *University of California, Irvine;* **Johnson, Dylan,** *University of Notre Dame;* **Dalby, Christopher,** *University of California, Irvine;*

As the climate changes, species are expected to shift their home ranges; however, overlaying this movement is a fragmented regulatory landscape, resulting in few landscapes subject to a single management authority. To investigate how regulatory fragmentation will impact the survival of species already struggling with climate change, we selected Coachella Valley in California as a case study. We categorized the relevant federal, state and local regulations and polices according to their effect on species movement. We then used a maximum entropy algorithm to produce climate envelope projections under the IPCC A2a scenario for a set of species from a range of taxa and conservation statuses. We next used Circuitscape to determine how a fragmented regulatory landscape will impact the path and ability of species to move. The challenges posed by climate change will expose the limitations of static fragmented resource management to address emerging conservation issues. Although innovations such as the Multiple Species Habitat Conservation Plan in Coachella Valley improve on conventional management by attempting to link management of parcels within a landscape, they nonetheless fail to account for new challenges such as the shift in community composition. Interagency information sharing and an adaptive governance framework that requires agencies to monitor and adapt their decisions and programs will help mitigate the regulatory barriers to climate change adaptation.

2011-12-08 18:30 Implications of behavioral plasticity for conservation of New Zealand tuatara

Carter, Anna L.*, *Victoria University of Wellington School of Biological Sciences, Allan Wilson Centre for Molecular Ecology and Evolution;* **Nelson, Nicola J.,** *Victoria University of Wellington School of Biological Sciences, Allan Wilson Centre for Molecular Ecology and Evolutio;*

Plasticity in life-history traits is an important mechanism by which populations respond to environmental change and, consequently, either survive or become extinct. Particularly for species with temperature-dependent sex determination (TSD), individual variations in reproductive behaviors have crucial implications for both offspring fitness and population demographics, as increasing temperatures will likely lead to biased sex ratios. The New Zealand endemic tuatara (Sphenodon punctatus), a long-lived, slowly reproducing reptile with TSD, provides an opportunity to examine if plasticity in reproductive behavior influences survival of a threatened species with low evolutionary potential. We investigate latitudinal variations in climate, enclosure effects (for captive populations), and maternal effects of laying date and nest site selection (e.g. shade, nest depth, temperature) for tuatara throughout New Zealand sourced from a

single, mid-latitude founder population. Using random regression analyses of maternal behavioral reaction norms, we show variations in the timing of nesting behaviors and nest site characteristics within and among populations at different latitudes, suggesting that behavioral plasticity could play a role in maintaining viable population sex ratios. These findings are relevant not only for modern conservation efforts but also for our understanding of how species with TSD have survived rapid environmental change throughout ecological history.

2011-12-06 16:30 Impacts of community-based natural resource management on large vertebrate habitat with implications on landscape scale conservation in Nepal.

Carter, Neil*, *Michigan State University;* **Shrestha, Binoj,** *Institute for Social and Environmental Research - Nepal;* **Dangol, Dharma,** *Institute for Social and Environmental Research - Nepal;* **Campa III, Henry,** *Michigan State University;* **Liu, Jianguo,** *Michigan State University;*

Decentralizing natural resource management to local communities is viewed by stakeholders as a means to facilitate landscape scale wildlife conservation and meet natural resource demands of local people. Our objectives were to 1) evaluate tiger (Panthera tigris) habitat suitability in Chitwan National Park in Nepal, a top 25 global biodiversity hotspot, and in community forests (CF) adjacent to the Park, and 2) evaluate spatiotemporal changes in tiger habitat with respect to CF management. To achieve these objectives, we integrated remotely sensed data, ecological field data, and questionnaire data from 16 CFs. Our results indicated that tigers were significantly more active at night in the comparatively human-dominated CFs, suggesting a temporal offset with human activities. Tiger prey species abundance (main determinant of tiger presence) was significantly associated with several factors including vegetation biomass and the composition and orientation of grassland/forest patches in the landscape. These factors varied across space and time (1989 to 2009) with respect to management priorities of each CF (e.g., provision of grass vs. wood to users) outside the Park. Since the impact of CFs on tiger habitat outside the Park is neither uniform nor random, engaging the CF user group committees to incorporate practices which improve habitat conditions of large vertebrates, including tigers, may increase the likelihood of success for landscape scale conservation.

2011-12-09 15:45 Agriculture, timing and climate: interactions reduce breeding success in a threatened tropical forest bird

Cartwright, SJ*, *Centre for Agri-Environmental Research, School of Agriculture, Policy and Development, University of Reading, Reading, RG6 6AR, UK;* **Nicoll, MAC,** *Centre for Agri-Environmental Research, School of Agriculture, Policy and Development, University of Reading, Reading, RG6 6AR, UK;* **Norris, K,** *Centre for Agri-Environmental Research, School of Agriculture, Policy and Development, University of Reading, Reading, RG6 6AR, UK;*

In landscapes where agricultural habitat is encroaching on forest, understanding how both climate and habitat change interact to affect fitness traits of forest specialists is vital to inform predictive population models and target management. However, there is a knowledge gap where tropical forest specialists are concerned. Using a long-term detailed dataset for the reintroduced Mauritius kestrel (Falco punctatus) we investigate the effect of agriculture and climate on a key fitness component: breeding success. We also identify a mechanism underpinning the agriculture effect by examining changes in prey delivered to nests. The Mauritius kestrel is a restricted-range forest specialist occupying a forest landscape, but appears able to exploit surrounding agricultural land. Using mixed-effects models, we found that agriculture in the breeding territory reduces breeding success. Furthermore, it modifies the existing seasonal decline in breeding success, such that late nests have lower breeding success than earlier nests, but in agricultural territories this trend is exaggerated. Simultaneously, rainfall modifies the seasonal decline, with a steeper decline in years with severe monsoon rains. The different prey present in agricultural habitats partly explains the agriculture effect but not the temporal interaction. This study demonstrates that threats to tropical forest specialists persisting in modified landscapes may arise from multiple interacting spatio-temporal mechanisms.

2011-12-06 14:15 The impact of urbanization on pathogens of North American wild felids

Carver, S*, *Colorado State University;* **Bevins, SN,** *Colorado State University;* **Lappin, MR,** *Colorado State University;* **Crooks, KR,** *Colorado State University;* **VandeWoude, S,** *Colorado State University;*

Urban expansion and habitat fragmentation are critical threats to biodiversity. One mechanism by which wildlife are impacted by increased proximity to urban areas is the transmission of infectious diseases. Wildlife may share pathogens with domestic animals, humans or other animals around developed areas. The extent to which this cross-species transmission occurs is a function of host traits (particularly the nature and frequency of interspecific contacts) and pathogen traits (particularly host specificity, mode of transmission and duration of infection). Utilizing geographic land-use information and an unprecedented dataset of pathogens of mountain lions (Puma concolor), bobcats (Lynx rufus) and feral/semi-feral domestic cats (Felis catus), we evaluated how proximity of wild felids to urban areas influences pathogen exposure and cross-species transmission with domestic felids. This investigation was undertaken at sites in California, Colorado and Florida and included evaluation of a suite of pathogens with different modes of transmission (direct, vector-borne and environmental) and durations of infection (acute, chronic and recrudescent). We find compelling evidence that wild felids acquire pathogens from contact with urban areas and that pathogen acquisition is influenced by pathogen traits. Findings from this investigation contribute valuable insight about mechanisms by which urbanization affects wildlife and have important implications for conservation of wild felids.

2011-12-08 11:45 Understanding the genetic history of the endangered Iberian lynx

Casas-Marce, M*, *Estación Biológica de Doñana - CSIC;* **Revilla, E,** *Estación Biológica de Doñana - CSIC;* **Godoy, JA,** *Estación Biológica de Doñana - CSIC;*

The Iberian lynx is currently restricted to two populations in the south of the Iberian Peninsula, Doñana and Andújar, which have approximately 50 and 150 individuals, respectively. We analyzed the genetic diversity and structure of historical and modern lynx populations to understand how they have changed over time. We observed a significant loss of genetic diversity through time; the analysis of population structure showed that contemporary populations are genetically distinct from each other and from a more homogenous pool of historical populations. Individuals that lived in Doñana up to about 100 years ago were already similar to the contemporary ones. In contrast the oldest individuals from Andújar clustered with individuals from other historical populations. Coalescent simulations and an ABC approach allowed us to estimate the divergence times of Doñana and Andújar from the historical Iberian population to be 200 and 55 years ago, respectively. Our results indicate recent isolation followed by genetic drift in the Andújar population. In contrast, the early divergence of the Doñana population was unexpected since the area was presumed to have been connected to other populations until about 50 years ago, and suggests that other mechanisms may have contributed to its early genetic isolation. The strong genetic drift acting in recent times in the two remaining Iberian lynx populations calls for urgent management strategies to avoid inbreeding and maximize genetic diversity.

2011-12-06 11:15 Managing the risks of vertebrate pest incursions in Australia

CASSEY, P*, *University of Adelaide;* **BOMFORD, M,** *Invasive Animals Cooperative Research Centre;* **HENDERSON, W,** *Invasive Animals Cooperative Research Centre;*

Biological invasions are a profound contribution to human induced environmental change. Although intentional introductions of vertebrate species have largely declined, global transport networks continue to increase. As a consequence, the type of species being transported has changed, as well as the associated risks. We compiled vertebrate pest data for the last decade from pre- and post-border biosecurity agencies in Australia. We present detection records for 137 identified species (more than 1250 individual animals) of exotic terrestrial vertebrates that are not currently established in Australia. The majority of species detected were reported from illegal keeping. Individual species risk assessments revealed that reptiles were more likely to be of greater risk for future establishment than birds, mammals,

or amphibians. Controlling for taxonomy, high risk species were not involved in larger (i.e. number of individuals) incidents than lower risk species. Across years the number of novel exotic vertebrate species detected 'at large' in Australia has significantly increased. We strongly recommend a nationally coordinated framework for data collection, and data sharing among agencies. We present a minimum framework, for the future collection of inter-agency data, necessary to monitor the ongoing risk of pest incursions and that is applicable to any region within a transport hub.

2011-12-08 18:30 Variations in insect communities along a conservation area- agricultural gradient in Swaziland

Catanach, T.A.*, *Texas A&M University;* **McCleery, R.A.,** *University of Florida;* **Silvy, N.J.,** *Texas A&M University;*

We examined changes in insect communities along a gradient in 4 transects in areas under intensive sugarcane production in Swaziland. Three transects started at the interface between a conservation area and extended 375m into the sugarcane while the last transect originated at the interface between sugarcane and a small town. Insects were collected at 5 points (0, 75, 150, 225, 375m) along the gradient using light traps and yellow pan traps, then identified to lowest taxonomic unit. These were grouped into 3 classes- beneficial (parasitoids, predators), pests (groups that transmit plant diseases or cause damage), and neither based on life history. We examined community composition of insects across site and gradient and found community composition was different across the gradient. Beneficial insects were lowest at the 375m point, while the other classes were site dependant. Insects were most abundant at the site bordering the most degraded conservation area. Conservation areas have effects on bordering agricultural systems and understanding these effects on invertebrate communities can allow producers to make more informed decisions about pest management in these regions. Determining these communities, their response to the gradient, and differences between types of conservation areas is the first step in this process.

2011-12-07 17:15 Odours of mass deception – reducing the impact of alien predators using chemical camouflage

Catherine J Price*, *University of NSW;* **Peter B Banks,** *University of Sydney;*

Mammalian predators that have established alien populations pose a persistent threat to global biodiversity, particularly predatory rodents and mustelids. To find prey, mammalian predators primarily use olfaction, which provides contextual information on relative prey abundance and quality within natural environments. Yet despite the importance for predicting and manipulating prey vulnerability, olfactory-driven behaviours of alien predators are not well understood. To address this gap, we used 'chemical camouflage' techniques to investigate the influence of spatial and temporal variation in prey odour cues on foraging behaviours of three alien predators in order to understand how odours might be manipulated to alter predator success. Wild caught house mice Mus musculus showed rapid improvements in foraging success when searching for high value prey regardless of the odour background, but were unable to improve when searching for lower value prey against a uniform odour background. For stoats Mustela erminea, we show that decisions to switch to alternate prey was affected by olfactory search costs, and their foraging motivation was sensitive to the ease with which alternate prey were found. For free living populations of black rats Rattus rattus we found that prey survival was significantly enhanced by exposing rats to prey odour cues such that they ignored formerly conspicuous prey odour cues even when prey was present. In combination, the results demonstrate that the olfactory conspicuousness and relative quality significantly influence prey vulnerability, but that manipulating the background of prey odour cues offers novel opportunities to protect native species from alien predators.

2011-12-08 14:04 The consequences of interactions between scales of movement and grains of fragmentation for dispersal success

Cattarino, L.*, *University of Queensland;* **Rhodes, J.R.,** *University of Queensland;* **McAlpine, C.,** *University of Queensland;*

Understanding the impact of habitat loss and fragmentation on animal movements is critical for conserving species in fragmented landscapes. We know that the impact of habitat fragmentation on movements is influenced by the grain of the fragmentation pattern and the scale of individual movement. However, how the grain of habitat fragmentation and the scale of movement interact to affect movement, when the effect of habitat amount is controlled for, has been largely ignored. We aimed to understand how the impact of habitat amount, degree of fragmentation and scale of movement on species dispersal varies with the grain of fragmentation. We addressed this issue by applying a spatially-explicit simulation approach, whereby individuals capable of moving at different scales disperse on binary landscapes, where amount of habitat, degree and grain of fragmentation vary independently. We show that the effect of the amount of habitat and the scale of movement on dispersal success depend on the grain of habitat fragmentation. We also show that the impact of fragmentation on dispersal success is a function of how different grains of fragmentation interact together. This has major consequences for how we should manage species with different life-history characteristics in hierarchically structured landscapes.

2011-12-07 11:15 Conservation of the prairie dog ecosystem in Mexico

Ceballos, G.*, *Universidad Nacional Autonoma de Mexico;* **Pacheco, J.,** *Universidad Nacional Autonoma de Mexico;* **List, R.,** *Universidad Nacional Autonoma de Mexico;*

Grassland ecosystems worldwide are critically imperiled due to land conversion, desertification, and the loss of native populations and species. The Janos region of northwestern Mexico maintains one of the largest remaining black-tailed prairie dog colony complexes in North America, supports a high diversity of threatened and endangered species, and provides environmental services. The rapid deterioration of the Janos grassland ecosystem has led us to propose a half million hectare biosphere reserve as the basis to protect the prairie dog grassland ecosystem and the regional biodiversity, making compatible human economic activities, especially grazing and agriculture, with conservation. We succeeded in establishing the Janos Biosphere Reserve by a presidential decree on in 2009. The decree was the culmination of more than two decades of grassroots scientific research and conservation work in the. We are now working on a new paradigm for the Janos region that couples the human dimension and ecological system. As conservation scientists, this is one of the most critical challenges of our time.

2011-12-09 15:15 Investigating the decline of the Kaikoura red billed gulls population: phenotypic and population dynamics perspectives

Celine Teplitsky*, *Natural History Museum;* **Alexandre Robert,** *Natural History Museum;* **John Yarrall,** *Work and Write;* **James A. Mills,** *Independent researcher;* **Juha Merilä,** *University of Helsinki;*

Anthropogenic activities are expected to affect phenotypic expression and population dynamics, but consequences of their interplay is rarely investigated. The Red billed gull population at Kaikoura (New Zealand) has been intensively monitored since 1958, birds being individually marked and followed throughout their lifetime. The population was reduced by > 50% between 1994 and 2003. The average size of the individuals in the populations has declined over the same period, and a strong female bias in adult sex-ratio has developed. We investigated whether these concomitant changes in body size, population size and sex-ratio can be attributed to the same cause by examining the effects of food availability and climatic factors on size, sex-specific survival and fecundity rates. Although body size in Red billed gulls declined over time as a function increasing ambient temperatures, this decline in body size was not an adaptation to climate change: we observed no selection for smaller body size or changes in the genetic composition of the population. On the contrary, reduced size decreased the probability of breeding, and smaller females also had lower breeding success. Hence, size decline and associated reduction in fecundity and population growth rate seems to reflect a response to some yet unidentified factor that may be anthropogenically induced. Using projection models, we examine how the observed changes in body size and fecundity translate to changes in population dynamics.

2011-12-07 14:36 General rules for managing and surveying networks of pests, diseases, and endangered species

Chades, I*, *CSIRO Ecosystem Sciences;* **Martin, TG,** *CSIRO Ecosystem Sciences;* **Nicol, S,** *University of Alaska;* **Burgman, MA,** *University of Melbourne;* **Possingham, HP,** *University of Queensland;* **Buckley, YM,** *University of Queensland and CSIRO Ecosystem Sciences;*

The efficient management of diseases, pests, or endangered species is an important global issue faced by agencies constrained by limited resources. The challenge is even greater when organisms are difficult to detect. We show how to prioritize management and survey effort across time and space for networks of susceptible–infected–susceptible subpopulations. We present simple and robust rules for protecting desirable, or eradicating undesirable, subpopulations connected in typical network patterns (motifs). We further demonstrate that these rules can be generalized to larger networks when motifs are combined in more complex formations. Results show that the best location to manage or survey a pest or a disease on a network is also the best location to protect or survey an endangered species. The optimal starting point in a network is the fastest motif to manage, where line, star, island, and cluster motifs range from fast to slow. Managing the most connected node at the right time and maintaining the same management direction provide advantages over previously recommended outside–in strategies. When a species is not detected and our belief in persistence decreases, our results recommend shifting resources toward management or surveillance of the most connected nodes. Our rules account for management success, dispersal, cost, and imperfect detection and offer managers a practical basis for managing networks relevant to many significant environmental and biosecurity issues.

2011-12-08 13:30 POMDPs: a solution for modelling adaptive management problems in conservation biology

Chades, I.*, *CSIRO Ecosystem Sciences;* **Jalladeau, L.,** *CSIRO Ecosystem Sciences;* **Carwardine, J.,** *CSIRO Ecosystem Sciences;* **Martin, T.G.,** *CSIRO Ecosystem Sciences;* **Nicol, S.,** *University of Alaska;* **Buffet, O.,** *INRIA, France;*

Adaptive management is the principle tool for conserving endangered species under global change, yet adaptive management problems suffer from a poor suite of solution methods. The common approach used to solve an adaptive management problem is to assume the system state is known and the system dynamics can be one of a set of pre-defined models. The solution method used is unsatisfactory, employing value iteration on a discretized belief MDP which restricts the study to very small problems. We show how to overcome this limitation by modelling an adaptive management problem as a special case of Partially Observable Markov Decision Process (POMDP) called a Mixed Observability MDP (MOMDP). We illustrate the use of our adaptive MOMDP to manage a population of the threatened Gouldian finch, a bird species endemic to Northern Australia.

2011-12-08 14:45 Monitoring marine fauna in a changing climate: working with citizen scientists

Chambers, LE*, *Centre for Australian Weather and Climate Research;*

Climatic variation and change influence marine fauna, for example, changes in range, success and timing of breeding. However, many species and regions have limited information on their responses to environmental change making generalisations about climatic impacts and adaptive capacity difficult. Assessment of climate change impacts requires good quality historical information (e.g. breeding records, distributional data), which can come from variety of sources, including government databases, universities, the literature or private records. Australian experiences highlight that long-term biological data is often difficult to locate or access and can have irregular coverage, both in time and space. Given the size of the problem, it is critical that past monitoring programs are reinvigorated and new ones initiated. Engaging the community is one way of achieving this and is the focus of this paper. The Birds Australia atlas and the Penguin Study Group of Phillip Island are two Australian examples that engage citizens in long-term data collection to achieve conservation goals. Recent initiatives that engage society and support the work of biologists, natural resource managers and policy makers are RedMap (http://www.redmap.org.au) and ClimateWatch (http://www.climatewatch.org.au). ClimateWatch is unique, using citizen scientists to detect change in both phenology and distribution; the first Southern Hemisphere network of its type.

2011-12-09 11:45 Cultural Ecosystem Services Require Special Treatment, and Most Ecosystem Services are Cultural

Chan, KMA*, *University of British Columbia;* **Satterfield, T,** *University of British Columbia;* **Goldstein, J,** *Colorado State University;*

Ecosystem service approaches have become a prominent basis for conservation planning and management. Cultural and non-use (intangible) services are included in all major typologies and present some of the most compelling reasons for conserving ecosystems, though many barriers exist to considering them in decision-making. The values that conform least well to economic assumptions—variously lumped together with/as cultural services—have proven elusive in part because valuation is complicated by the properties of intangibility and incommensurability, which has in turn led to their exclusion from economic valuation. In order to integrate these heretofore underrepresented but crucial perspectives into the ecosystem services framework, researchers must account for the full suite of values pertaining to ecosystems. We address this challenge here by (1) distinguishing eight dimensions of values, which have implications for appropriate valuation; (2) identifying major categories of benefits and of cultural services; (3) discussing the implications of these propositions for ecosystem-services research theory and methods; and (4) outlining briefly a research agenda to enable decision-making that is ecologically appropriate and socially just. One critical conclusion of (1) and (2) is that many ecosystem services are associated with benefits that might be considered 'cultural', such that the complexities of the valuation of non-material benefits applies broadly.

2011-12-09 14:45 The effect of senescence on population dynamic of Griffon Vulture

Chantepie,S*, *Museum National d'Histoire Naturelle, CERSP (UMR 7204) ;* **Robert, A,** *Museum National d'Histoire Naturelle, CERSP (UMR 7204) ;* **Teplitsky, C,** *Museum National d'Histoire Naturelle, CERSP (UMR 7204) ;* **Sarrazin, F,** *Museum National d'Histoire Naturelle, CERSP (UMR 7204) ;*

Senescence corresponds to the age-related decrease of survival and/or reproduction due to a progressive deterioration of the physiological state of individuals. Although an increasing number of studies have recently demonstrated the existence of such process in wild populations, the effect of senescence on population dynamics has never been demonstrated. Based on a 29 year capture-recapture monitoring of a reintroduced population of Griffon vulture, a long-lived raptor, we propose to (i) quantify the reduction in survival with age; (ii) link this pattern of senescence with population density and food availability; (iii) integrate these results on a population dynamics model to assess the effect of senescence on short and middle term extinction risk of the Griffon vulture; and (iv) generalize our findings to species with other life history strategies. We showed that senescence on survival does occur in our study population, in interaction with intraspecific competition. Using our generic population dynamic model we further showed that the effect of senescence on extinction risk depends on (i) the species' life cycle considered, (ii) whether senescence is "soft" (i.e., is mediated through intraspecific competition), or "hard" (i.e.,results in absolute reductions of vital rates, independently of competition). The senescence of demographic parameters should no longer be neglected in viability analysis assessments.

2011-12-07 17:15 Genetic changes in captive breeding: adaptation versus drift in a supportive breeding of Houbara Bustard

Charge, R.*, *MNHN;* **Sorci, G.,** *CNRS;* **Saint Jalme, M.,** *MNHN;* **Loic Lesobre,** *ECWP;* **Teplitsky, C.,** *CNRS;*

Captive breeding is sometimes the last resort to prevent extinction of threatened species. Such programs aim to maintain genetic diversity by equalizing the representation of founders and minimise inbreeding. However relaxation of selection in captivity may generate undesirable effects such as an increased genetic drift and/or an adaptation to captivity. It is therefore essential to assess genetic changes over years and generations in captive programs to prevent any genetic burden in both captive and wild populations when the last is reinforced with captive-bred individuals. This is particularly true during the early stage of any breeding program in which demographic aspects prevail over genetic stakes. We assessed prevalence of unintentional selection on traits that are potentially linked to fitness in a captive breeding of Houbara Bustard, an endangered bird species. Data about male display rate,

male semen quality and female number of eggs were available from more than 5200 breeding individuals over a 10 years period which represents c.a. 4 generations. We show that despite a carefully designed breeding program, there was strong adaptation to captivity involving genetic changes in fitness traits higher than what could be expected by genetic drift alone. Finally, unintentional selection has decreased in intensity with time thanks to the use of the genetic management strategy, emphasising the need for assessing both dynamics and genetics issues when designing breeding programs.

2011-12-09 11:00 Connectivity conservation across landscape and across nations for life's sake

Chassot, O*, *Tropical Science Center / World Commission on Protected Areas, International Union for Conservation of Nature;* **Howling, G,** *Office of Environment and Heritage, Department of Premier and Cabinet;* **Worboys, G,** *Jagumba Consulting Pty Ltd / World Commission on Protected Areas (Mountains Biome and Connectivity Conservation), International Union for Conservation of Nature;*

Connectivity conservation extends the concepts of biodiversity and biological corridors to the landscape scale. A revised conservation science consensus is beginning to emerge in response to the limitations of conservation efforts to date and the enormity of the challenge, especially in the face of the impacts of climate change on ecosystems and the fundamental services they provide to humanity. A connectivity conservation approach recognizes that conservation management is needed on the lands around formal protected areas to buffer them from threatening processes originating off-reserve and to care for biodiversity assets found on other land tenures. Case studies from the Great Eastern Range Corridor (Australia) and the El Castillo-San Juan-La Selva Biological Corridor (Nicaragua-Costa Rica) illustrate the conservation challenges that protected areas face in the landscape at different geographical scales. These and other relevant participatory connectivity conservation initiatives focus on geographically extensive areas that are at least supra-regional in scale, and can extend to continental and intercontinental scales. Achieving conservation outcomes across the landscape matrix involves active management, policy support and conservation outcomes in an integrated way across a range of land tenures. Carefully designed science-sound connectivity conservation initiatives that link significant protected areas network allowing species to move and interact as part of ecological processes are a natural solution to climate change recognized by the CBD targets and part of IUCN policy as they serve as critical and cost-effective actions in mitigating and adapting to climate change.

2011-12-08 18:30 Unintended consequences of conservation actions: managing disease in complex ecosystems

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Infectious diseases are increasingly recognised to be a major threat to livestock production and biodiversity. Disease management tools such as control of animal movements and vaccination can be used to mitigate the impact and spread of diseases in targeted species. They can reduce the risk of epidemics and in turn the risks of population decline and extinction. However, all species are embedded in communities and interactions between species can be complex, hence increasing the chance of survival of one species can have repercussions on the whole community structure. Here we use an example from the Serengeti ecosystem in Tanzania to show that a vaccination campaign against Canine Distemper Virus targeted at conserving the African lion (Panthera leo), could put the viability of a coexisting threatened species, the cheetah (Acinonyx jubatus), at risk. Simulations show that vaccination interventions could almost double the probability of extinction of the cheetah population over the next 60 years. Our results suggest that this vaccination programme risks destabilising the simple two-species system considered. This study illustrates the need to carefully consider linkages between human-intervention, species viability and community structure when planning species-based conservation actions.

2011-12-09 14:00 Does supplemental feeding affect the viability of translocated populations? The example of the hihi (Notiomystis cincta)

CHAUVENET, ALIENOR*, *Institute of Zoology, ZSL, London NW1 4RY, UK;* **Ewen, John G.,** *Institute of Zoology, ZSL, London NW1 4RY, UK;* **Armstrong, Doug P.,** *Wildlife Ecology Group, Institute of Natural Resources, Massey University, Private Bag 11222, Palmerston North, New Zealand;* **Coulson, Tim,** *Division of Biology, Imperial College London, Silwood Park Campus, Ascot, Berkshire SL5 7PY, UK;* **Blackburn, Tim M.,** *Institute of Zoology, ZSL, London NW1 4RY, UK;* **Pettorelli, Nathalie,** *Institute of Zoology, ZSL, London NW1 4RY, UK;*

Translocations are commonly-used conservation actions that aim at establishing new self-sustainable populations of threatened species. However, many translocated populations are not self-sustainable and managed through supplemental feeding from the onset. Often the decision to start managing is ad hoc but managers will eventually have to make future management decisions, e.g., stop intervening, continue as is or change the quantity of food provided. Such a decision requires managers to quantify the importance of supplemental feeding in determining the performance and population dynamics of translocated populations, information which is rarely available in the published literature. Using the hihi as a case study, we examined the importance of supplemental feeding for the viability of a translocated population in New Zealand. We found that supplemental feeding significantly affected survival and abundance of translocated hihi. We could not detect any significant relationship between management and the yearly average number of recruits but found evidence of density-dependence on recruitment. By taking into account the positive effect of supplemental feeding on survival, the observed bias in sex ratio and the negative relationship between the yearly average number of recruits and abundance, we were able to explain 88.9% of the variability in population size. Our results illustrate how important long-term targeted monitoring is for robust decision-making about adaptive management.

2011-12-07 17:45 Avian responses to reduced-impact logging in the Southwestern Brazilian Amazon

CHAVES, W*, *University of Florida;* **Sieving, KE,** *University of Florida;*

Reduced-impact logging (RIL) has been proposed as a sustainable form of timber extraction. In Acre State, Southwestern Brazilian Amazon, RIL is being implemented and deliberately assessed for its effectiveness (ecological and economic). Because of its commitment to evaluating RIL, forest policy of Acre State has become a reference within the region and, thus, has broader implications for forest management in Amazonia. We assessed the effects of RIL on both habitat structure and several avian indicator species in a comparative study of logged and unlogged areas in Acre. We performed 456 point-count surveys of bird species and estimated occupancy of avian species using a removal model that accounts for probability of detection. We found that RIL affected occupancy of seven of the nine avian species that we could evaluate statistically, but logging effects depended on the percentage of bamboo present. Bird occupancy increased with bamboo, and logging effects on birds were also more detectable where percent of bamboo was higher. Bamboo dominance did not differ between logged and unlogged areas, despite the general expectation that bamboo should benefit from disturbance. This suggests that logging activities may selectively avoid high bamboo areas which, in turn, may be serving as a refuge for species negatively affected by logging. Future studies should investigate the role of bamboo when evaluating the effects of logging on wildlife and forest structure.

2011-12-08 18:30 ECOLOGY AND CONSERVATION OF AN ANDEAN SALAMANDER (Bolitoglossa aff. pandi) IN THE EASTERN ANDES OF COLOMBIA.

Chaves-Portilla G. *, *Fundación Ecodiversidad Colombia;*

According to the Global Amphibian Assessment, Colombia is the second-highest country in amphibian diversity, in which there are reports of 22 species of salamanders, three of which are scheduled with some degree of threat. The knowledge about diverse aspects that involving the ecology and natural history of these amphibians is still insufficient, it has not

allowed designing and implement effective conservation programs directed to safeguard the salamanders' populations in Colombia. This study was conducted in the Supatá municipality, which is located in the western slope of the eastern Andes of Colombia. During 5 months was estimated the relative abundances of Bolitoglossa aff. pandi getting a catch rate of 1.42 individuals per hour/man for sampling. At ages structure, the population showed a predominance of juveniles with 49.30% of the 71 individuals registered, followed by adults with 35.21% and fewer neonates with 15.49%. Also the microhabitat preferences of this amphibian were determined, obtaining preferences for three microhabitats, where the leaf litter recorded the highest number of individuals (67 individuals). The registration of two egg clutches within the leaf litter allowed following the progress of the eggs and of which only 38.7% of them completed their development in 5 months. This ecological information will be useful and is the baseline for conservation action plan for this population of salamanders.

Date 14:30 Taking MSE to terrestrial wildlife management: linking modelling, monitoring and management

Chee, YE*, *University of Melbourne;* **Wintle, BA,** *University of Melbourne;*

Overabundant wildlife can cause economic and ecological damage. Therefore population control typically seeks to maintain species' abundance within desired control limits. Efficient control requires targets, methods for estimating population size before and after control, and for the next management cycle. Demographic, environmental and model uncertainties complicate these tasks. Monitoring provides critical feedback in the control process, yet examples of integrated monitoring and management are scarce. Using the tenets of MSE, we designed a control framework within which management objectives can be achieved (population maintained within control limits), performance can be demonstrated with adequate precision, and monitoring data obtained in the process used to inform future management. Simulation testing of our integrated monitoring and management algorithm demonstrates that it provides a coherent, flexible, efficient and robust basis for managing population control. Links between management objectives, models and operating rules are explicit and logically integrated, and management objectives can be freely varied. It is also cost and operationally efficient because: (i) it avoids the need for an expensive, dedicated sampling process to estimate population size prior to culling; (ii) a relatively small number of culls produces reasonable population size estimates and (iii) the estimation by removal process enables direct assessment of whether control has been achieved. Lastly, it is robust because even when there is substantial uncertainty about system state and dynamics, the algorithm performs well at keeping the population under control over the duration of the management horizon.

2011-12-08 18:30 Causations of Faunal Succession of Groun-dwelling Vertebrates in Sichuan, China: Earthquake or Climate Change?

Cheng Li*, *Chengdu Institute of Biology, Chinese Academy of Science;* **Dajun Wang,** *School of Life Sciences, Peking University, China;* **Yuanbin Zhang,** *Chengdu Institute of Biology, Chinese Academy of Science;* **Chunping Liang,** *Wanglang National Nature Reserve, China;* **Xi Liu,** *School of Life Sciences, Peking University, China;*

What is the end of earthquake for animal ? The monitoring programs was initiated in Wanglang nature reserve, Sichuan for biodiversity monitoring to evaluate the conservation management in 2006, straight-line drift-fences and pitfall traps is the method for amphibian species monitor and it turned out some data of reptiles and small mammals also available by this method.. During 2007-2010, we kept collecting data followed the same protocol at four times every year, and it span the Wenchuan earthquake. Some species presents patterns changed in all these kinds of species during the period of monitoring. According to the record of climate data we collected in the same period of time, we found some biodiversity drifting may correlated with the change of temperature and rainfall dynamics in spring. Also the earthquake happened in May 2008 is also a big causation of this changes, faunal succession showed the trend of a relative decline in the proportions of anural and a relative increase in the proportions of insectivore. Based on field observation, we presume to suggest that faunal diversity comeback that of before the earthquake is the end sign of earthquake affection. Due to the serious risks facing of groun-dwelling vertebrates, more result needs further monitoring data.

2011-12-07 11:30 Environmental Saviors? The effectiveness of nonprofit organizations in greater Yellowstone

Cherney, DN*, *University of Colorado at Boulder;*

Over the last ten years, environmentalists have levied serious critiques regarding environmental nonprofits—specifically that environmental groups are struggling to make an impact. Critiques include accusations of dubious behavior on the part of environmental groups in developing countries, charges that the environmental elite are more interested in maintaining an affluent lifestyle than achieving organizational goals, and allegations that environmental nonprofits lack the strategies necessary to meet their purposes. This paper uses the Greater Yellowstone Ecosystem as a case study to answer the question: How can environmental nonprofits do better? Greater Yellowstone is home to 183 conservation nonprofits that command a combined annual budget of $150 million, have 500 employees, and are overseen by 700 board members. Despite these resources, the status quo performance of Greater Yellowstone's environmental nonprofits falls short in many ways. To understand why performance is lacking, this analysis first looks to experienced conservation practitioners. The resulting four explanatory factors are called 'the holy trinity (plus one) of environmental nonprofit failure.' While useful in explaining some failures to achieve conservation goals, conventional wisdom is insufficient to leverage greater performance alone. Six alternative explanations are presented by analyzing the role of nonprofits in bison, elk, grizzly bear, pronghorn migration, snowmobile, and wolf management. The paper concludes that environmental nonprofits artificially and unnecessarily restrict the scope of choices available to them, and in this process miss important opportunities to achieve their current and future goals.

2011-12-07 17:30 Elevational distribution pattern and conservation of amphibians in the eastern Himalaya, India

Chettri, Basundhara, *Sikkim Government College, Tadong;* **ACHARYA, BK*,** *Sikkim Government College, Tadong;*

Eastern Himalaya harbors diversity of habitats resulting in diverse life forms with high endemicity. Recently, these habitats have experienced various anthropogenic pressures posing serious threat to biodiversity. Here we examine elevational distribution pattern of amphibians to identify high diverse areas along elevation gradient (300-4800 m) in Sikkim, Eastern Himalaya, India. We also evaluate threats to amphibians and suggest measures for conservation. We used Visual Encounter and Night Stream Survey methods for data on amphibian population, and field surveys, home visits and interviews for data on threats. Amphibian species richness depicted mid-elevation peak showing maximum richness at 1500-2000 m with a four-fold decline from middle to the highest elevation. Upcoming hydro power projects possess major threat to amphibian habitat along the river valleys. Rampant extraction of amphibians by local communities for food and medicine caused population decline. As conservation measures, we extensively raised awareness at various levels on role of amphibians in ecosystems and their conservation need. We conclude that river valleys all along the elevation, more importantly mid-elevation, are crucial for amphibian conservation in the eastern Himalaya and needs immediate conservation attention. Empowerment of panchayat members (governance at village level) for taking legal action at local level is suggested so that collection of amphibians and habitat destruction is reduced.

2011-12-07 18:00 A paradigm shift: revisiting Noss (1990) for a comprehensive framework for biodiversity-assessment

Chivers, SJ*, *University of New England, NSW, Australia;* **Oliver, I,** *NSW Department of Environment, Climate Change, and Water, Australia;* **Gross, CL,** *University of New England, NSW, Australia;*

Human impacts on the environment result in the loss of biodiversity processes and patterns, and not only species, from the landscape. Therefore a necessary response of conservation scientists should be the development of a scientifically rigorous biodiversity-assessment framework which is comprehensive in evaluating the multi-faceted nature of biodiversity losses. Ensuring such a framework would remain practicable for biodiversity regulation and management agencies could be problematic as the term biodiversity now circumscribes a complex omniscience merging scientific concepts with socio-economic demands. However based on a review of the current major paradigms relevant to biodiversity-assessment (ecosystem health, ecological integrity, and various species-level approaches), we

suggest that a return to a more scientifically rigorous approach is now warranted. We therefore suggest a paradigm-shift by revisiting but also further developing a three-component approach to biodiversity-assessment originally put forward more than two decades ago by Noss (1990, Conserv. Biol. 4(4):355-364). This reworked framework comprehensively evaluates three components of biodiversity (function, structure, and composition; or biodiversity processes, patterns, and species, respectively) and remains scientifically rigorous by accounting for the ecological and biophysical mechanisms that drive the status of components and by targeting specific biodiversity processes and patterns.

2011-12-08 18:30 Co-Management Approach for Pygmy Seahorse Conservation: A Case Study for Recreational Diving Industry in Semporna, Malaysia

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Two species of pygmy seahorses (Hippocampus bargibanti and H. denise) were popular attractions among divers in the Semporna waters, Sabah. However, a consultation workshop involving multiple stakeholders (dive guides, dive center managers, professional underwater photographer, resource managers, NGOs and researchers) revealed that intense photography flashlight, direct physical disturbance to, and relocation of, pygmy seahorses and seafan hosts, had threatened the populations. Through an iterative process of selection, the stakeholders developed management protocols for pygmy seahorses by identifying threats to pygmy seahorses and suggested the corresponding management options. Nine management protocols were established following an open discussion on the tangibility of implementation strategy. These are: 1) improved education and awareness among divers, 2) prohibition on touching pygmy seahorse and seafan, 3) prohibition of novice divers from visiting pygmy seahorse site, 4) prohibition on the use of octopus as a searching technique, 5) improved enforcement, 6) imposing quota on the number of divers, 7) minimizing the use of flashlight and reducing flashlight intensity, 8) using magnifying glass as a viewing tool, and 9) facilitate coordination among dive centers through self-regulatory practice. The management protocols were subsequently translated into poster materials distributed at each dive centers. An assessment of the effectiveness of the developed protocols is necessary and should be supplemented by adaptive management plans.

2011-12-09 12:00 Accounting for constraints in optimal resource allocation for mitigating multiple threats

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Finding cost-effective management strategies for the recovery of species declining due to multiple threats is a major challenge for decision makers with the limited resources available. Although the implications of costs among multiple conservation actions were reasonably well understood, the consequences of multiple constraints and opportunities are unknown. By integrating the population growth rate with return on investment curves that take into account of multiple constraints in a decision theory framework, we examine how these constraints affect the optimal allocation of resources among various conservation actions. We demonstrated this using a rapidly declining koala (Phascolarctos cinereus) population in eastern Australia that is threatened by habitat loss, vehicle collisions, dog attacks and disease. The results show that constraints limit the ability of achieving a certain target population growth rate. However, the overall management strategy for investing in various management actions remains the same. For low target population growth rate, the optimal strategy is to invest predominantly in reducing vehicle collisions and dog attacks. For high target population growth rate, a substantial investment in habitat restoration is required. This framework is important in planning the recovery of declining species exposed to multiple threats that is becoming critically important for many species.

2011-12-08 18:30 Habitat selection of the endangered Hawaiian goose: a multi-scale approach

Christina Cornett*, *Tropical Conservation Biology & Environmental Science, University of Hawai`i, Hilo;* **Steven C. Hess,** *Pacific Island Ecosystems Research Center, U.S. Geological Survey, Kīlauea Field Station, Hawai`i National Park, HI;*

While much is known about the endangered Hawaiian goose or Nēnē (Branta sandvicensis) during the breeding season, very little is understood about movements and habitat use in the non-breeding season. This habitat selection study identifies preferred Nēnē habitats and how preference shifts seasonally. Because habitat selection modeling may yield different results when measured at different scales, we measured habitat characteristics at both broad and fine scales. In 2009-2010, we outfitted eight Nēnē ganders on Hawai`i Island with 40-45 gram satellite transmitters. Nēnē accepted the transmitters and provided us with over 3,500 GPS locations in near real-time. Broad scale habitat modeling revealed that Nēnē prefer human-modified landscapes during the breeding season and higher elevation locations dominated by native shrubland during the non-breeding season. Despite the lack of natural sources of standing water on Hawai`i Island and the terrestrial nature of Nēnē, all of our subjects have centered clusters of locations seasonally around water features, reflecting the notes of early naturalists. Two subjects revealed roosting areas within a subalpine shrubland known as Kīpuka Nēnē surrounded by rugged a`ā lava flows, where Nēnē had not been observed since 1949. Hawai`i Island Nēnē appear to be recovering some traditional movement patterns lost during their severe population reduction of the 20th century.

2011-12-06 16:45 Interacting effects between climate change and habitat loss on biodiversity: a systematic review and meta-analysis

Chrystal S. Mantyka-Pringle*, *University of Queensland, Centre for Spatial Environmental Research, School of Geography, Planning and Environmental Management, Brisbane, Qld 4072, Australia; University of Queensland, Australian Research Council Centre of Excellence for Environmental De;* **Tara G. Martin,** *University of Queensland, Australian Research Council Centre of Excellence for Environmental Decisions, Brisbane, Qld 4072, Australia; CSIRO Ecosystem Sciences, Brisbane, Qld 4102, Australia;* **Jonathan R. Rhodes,** *University of Queensland, Centre for Spatial Environmental Research, School of Geography, Planning and Environmental Management, Brisbane, Qld 4072, Australia; University of Queensland, Australian Research Council Centre of Excellence for Environmental De;*

One of the most pressing questions of the twenty-first-century in ecology and conservation is how do multiple stressors interact and cumulatively impact ecosystems and their biodiversity. In this paper we present a meta-analysis of studies that quantify the effect of habitat loss on biological populations and examine whether the magnitude of these effects depends on current climatic conditions and historical rates of climate change. The main findings are first, that climate change exacerbates the negative effects of habitat loss on species density and/or diversity. Second, the most important determinant of habitat loss and fragmentation effects, averaged across species and geographic regions, was max temperature, with mean precipitation change over the last 100 years of secondary importance. Fragmentation effects were greatest in areas with high temperatures. Conversely, fragmentation effects were lowest in areas where average rainfall has increased over time. This is the first study to conduct a global analysis of existing data to quantify and test for interacting effects between climate and habitat loss on biological populations. Thus, our results

provide a significant advance in our ability to quantify interactions between climate change and other threatening processes and incorporate them into biodiversity conservation.

2011-12-08 15:45 Habitat use by nonnative feral goats in Hawaiian dryland montane landscapes

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Large populations of nonnative, feral goats (Capra hircus) are present on five of the eight main Hawaiian Islands where they have been notable components of the landscape for over a century. To effectively manage the goats and the plant communities that they inhabit, more information is needed on their spatial and temporal patterns of habitat use. We deployed Lotek Wireless GPS satellite collars (n = 12, evenly split by sex) to track movement patterns of feral goats every two hours for one year in one of the last remaining native-dominated montane dry forest habitats on the Island of Hawaii. Movement data from collars were combined with land cover data and remotely sensed imagery (NASA's MODIS sensor; Carnegie Airborne Observatory LiDAR) to quantify how movement patterns are correlated with plant community composition and seasonal changes in vegetation dynamics. Data were analyzed using Euclidean distance-based and compositional analyses. Results indicate that feral goats did not use habitat uniformly, but rather showed preference for native-dominated shrublands during the day and barren lava at night. Mean (± SE) annual home ranges of males (23.5 ± 8.1 sq. km.) were generally larger than females (19.8 ± 4.2 sq. km.). Ultimately, the results of this study can be used in the context of both the conservation and restoration of native Hawaiian dry forests, arguably the most degraded ecosystem in the Hawaiian Islands.

2011-12-08 12:15 Using Acoustic Enrichment to Improve Reproductive Success in Small Populations of Colonial Species

Clark, JA*, *Fordham University;* **Haseley, A,** *Fordham University;* **Van Genderen, G,** *Fordham University;* **Frink, J,** *Fort Valley State University;* **Clum, N,** *Wildlife Conservation Society/Bronx Zoo;* **Hofling, M,** *Wildlife Conservation Society/Bronx Zoo;* **Pokorny, Y,** *Wildlife Conservation Society/Bronx Zoo;* **Gonzalez, N,** *Wildlife Conservation Society/Bronx Zoo*

Managers responsible for recovering populations of colonial species should consider acoustic enrichment, a relatively inexpensive technique that employs social facilitation theory to improve reproductive success. In colonial species, some behaviors are socially-facilitated, i.e., the frequency or intensity of such behaviors is increased by exposure to conspecifics performing the same behavior. Social facilitation is an important component of nesting colonially. We hypothesized that, through acoustic enrichment, the social environment of colonial species could be manipulated to increase the reproductive readiness of breeders in a colony, stimulate reproductive behavior, and, ultimately, increase population growth. We tested this approach on captive populations of three colonial bird species: critically-endangered Northern Bald Ibis, Chilean Flamingos, and American Flamingos. We provided social breeding cues by presenting acoustic enrichment in the form of conspecific breeding vocalization playbacks. Following playbacks, Northern Bald Ibis produced eggs for the first time in several years, Chilean Flamingos bred an entire month earlier and produced substantially more eggs than in any previous year, and American Flamingos bred several weeks earlier. The acoustic enrichment techniques we employed may encourage earlier or increased breeding activity in captive populations of colonial species as well as in wild colonies with small populations.

2011-12-09 15:15 Exploring the impacts of protected area and PES policies on local poverty in the Northern Plains of Cambodia

Clements, T.J.*, *WCS, University of Cambridge;*

The impacts of forest conservation policies on local poverty – both negative and positive – have been widely debated. Significant differences in opinion exist regarding whether the objective of policy should be to achieve conservation, or poverty reduction, or both. Few projects use evaluation methods, based on comparisons between the outcomes of interventions and counterfactuals, to assess impacts. Since 2002, WCS has been supporting the Royal Government of Cambodia to implement conservation and development policies across a large forested landscape with established human settlements. The principle interventions were PA management, village land-use planning, and payments for ecosystem services (PES). Twenty villages were chosen for the evaluation, ten inside the PAs, six receiving payments, and ten matched control villages outside the PAs. Control villages were selected using propensity score matching based on key variables such as market access and habitat type. Quantitative and qualitative methods were used to assess social impacts, for a randomly selected sample of 871 households in 2008, repeated in 2011. Results indicated there was no difference in poverty status between households within PAs and controls. Households receiving payments were richer. The results support the basic hypothesis that conservation interventions have marginal effects on local poverty, which may be far more effected by national economic factors, such as food inflation, employment and fuel prices.

2011-12-06 11:45 Changes in village bushmeat hunting: a case study from rural Gabon

Coad, L, *University of Oxford;* **Schleicher, J*,** *University of Cambridge;* **Marthews, T.,** *University of Oxford;* **Milner-Gulland, E.J.,** *Imperial College London;* **Manica, A.,** *University of Cambridge;* **Balmford, A.,** *University of Cambridge;* **Abernathy, K.A.,** *University of Stirling;*

Bushmeat hunting is a crucial issue for both wildlife conservation and human well-being. Hunting is currently thought to be the most significant immediate threat to wildlife in many African and Asian countries, with national extraction rates often well above estimated sustainable levels. However, few long-term datasets exist with which to determine hunting impacts over time. We present data collected in 2000, 2004 and 2010 on village demography and hunting offtakes in two rural village communities, Central Gabon. In 2004 and 2010 data on hunting offtakes were collected at the individual trap level, recording trap positions, characteristics and offtakes, and thereby standardising for hunting effort. Our results show that the size of both villages had halved since 2000, with a corresponding decline in the number of hunters, and a shift from trap to gun hunting. Total hunting offtakes between 2004 and 2010 were similar, as were the species compositions of the catch. However, traps were located further from the village in 2010 than in 2004, and analysis of individual trap offtakes, controlling for distance and other trapping variables, suggests that offtakes per trap had declined. We suggest that declines in offtake may not always be detected due to increases in hunter effort. Hunter interviews indicated that the largest declines may have happened before the study period, highlighting the need for historical data in interpreting changes in hunting sustainability.

2011-12-09 14:30 Augmented gene flow for plant population persistence in a highly fragmented landscape

Coates, D J*, *Dept Environment and Conservation Western Australia;* **Byrne, M,** *Dept Environment and Conservation Western Australia;* **Brown, A,** *Dept Environment and Conservation Western Australia;*

A significant proportion of the plant species of south west Australia now persist in a highly fragmented landscape in small isolated vegetation remnants. Analyses of rare and threatened flora databases indicate that 109 species currently occur in a few isolated populations of less than 100 individuals and all populations are in decline. Regardless of other threats we estimate that loss of genetic diversity and inbreeding effects are likely to be major contributors to population extinction within the next few generations. Our studies on gene flow and reproductive output on plant species in this landscape indicate that augmented gene flow, either by increasing population size or by enhancing pollen movement across the landscape, will be needed if these species are to persist. A significant challenge for implementation of augmented gene flow is to determine target population sizes and levels of pollen dispersal required to maintain population persistence. These issues are being investigated in a major reintroduction program covering 57 threatened plant species in this region.

2011-12-08 11:00 New Zealand Aquaculture Development, Spatial Conflict and Ecological Outcomes

Collins, Meghan*, *Victoria University of Wellington;*

The Blue Revolution is upon us, as aquaculture increasingly supplements seafood products in the world market. Conflict over use of space has occurred in regions of the globe where aquaculture has intensified, and a salient theme in global aquaculture growth is the challenge of reconciling development with spatial conflict. New Zealand follows the pattern of global growth in aquaculture. This research is qualitative and uses documentary analysis and interviews with key informants to explore the strengths and weaknesses of the New Zealand science-policy system to address ecological outcomes in spatial conflict. Two case studies are explored, one of user-user conflict (water quality) and one of user-ecosystem conflict (benthic habitat). Four models for science are identified within the NZ science-policy system: the expert-based science model, the commercialised model, the civic model, and the traditional ecological knowledge model. These are used to create a conceptual framework from which documentary analysis and interview data is analysed. Results treat the degree to which each model for science considers water quality and benthic habitat, and identifies the strengths and weaknesses of each model for doing so. Discussion draws upon the implications of using science in agenda-driven decision-making, what constitutes the "best possible science" for use in policy, and the possibility of scientists as stakeholders in aquaculture development. Recommendations are made as to policy mechanisms and economic incentives to reinforce the strengths of each model for science. This study offers valuable insight into achieving workable social and ecological improvements by linking experts with stakeholders in decision-making.

2011-12-08 11:10 Recovery After a Disturbance of Litter Fauna Communities in a Temperate and a Boreal Forest

Comor, V.*, *Wageningen University;* **van Langevelde, F.,** *Wageningen University;* **Berg, M.,** *VU University Amsterdam;* **Prins, H.,** *Wageningen University;* **de Bie, S.,** *Wageningen University;*

The effects of anthropogenic disturbances and their recovery play a major role in biodiversity conservation, but predictive theory about both the recovery and the effects of environmental conditions on this recovery is still lacking. To compare the effects of disturbance on litter fauna communities and the effect of environmental conditions, we sprayed diesel fuel on 100 m2 plots in a temperate and a boreal forest, and collected arthropods two weeks before, two days, six months and one year after the disturbance with pitfall traps. The impact of the disturbance was much greater in the boreal forest, where there was no litter layer. Surprisingly, high species richness and abundance did not act as insurance for the communities in this biome; they were in fact even more impacted, since the richness and abundance of all the communities were equally low after the disturbance. Animal's body mass had no significant effect on the impact or the recovery, and dispersal capabilities had a significant effect for the impact only. Functional groups based on diet were unevenly affected by the disturbance in the two biomes, but all recovered. Some groups (scavengers, coprophagous) have been favored in one of the two biomes. Our study shows that the same disturbance can have different effects depending on environmental conditions. Thus, knowing the characteristics of the environment would help predicting and explaining the consequences of a disturbance and hence, adapting conservation plans.

2011-12-06 13:15 What 20 Years of Science & Management Can Tell Us About Dolphin-Watch Tourism: The Bay of Islands as a Case Study

Constantine, R.*, *University of Auckland;*

Dolphin-watch tours started in the Bay of Islands in the early 1990s with a single 6m vessel. In 1993, there were concerns that this activity may affect the behaviour and distribution of these wild dolphins, therefore a research project was initiated later that year by the University of Auckland. Initial research focused on common and bottlenose dolphins but it was shown that, as the industry was growing, the bottlenose were the most vulnerable of the two species. There were differences in dolphin behaviour around tour-vessels and dolphin response to swim-with dolphin activities differed by swimmer placement. These short-term response studies are common in this field as they often fulfill the time-frame required by conservation managers. With long-lived, slow-breeding species, like whales and dolphins, long-term studies are required to understand the population level effects of human disturbance. With this in mind a detailed study focusing on the bottlenose dolphin population size, habitat use and responses to vessels and swimmers continued from 1996-2000 and we found considerable changes in dolphin behaviour, specifically around tour-vessels and when vessel number increased. We found the dolphins had become sensitised to swimmer placement and would not rest when dolphin-watch vessels were present; this was of concern as the industry had developed rapidly since tourism impact research started in 1994. Changes were made to the operators\' permits allowing only the least invasive swimmer placement, limiting the amount of time spent with dolphins and a break during the day when boats were not allowed to interact with dolphins. In addition a moratorium was put in place to stop further development of the industry. But further research found the number of bottlenose dolphins frequenting the Bay had declined and they had drastically changed their habitat use within the Bay meaning new exclusion zones were ineffective. The cause of this decline and change in habitat use is currently unknown, but with long-term impacts showing displacement and decline in reproductive success in other populations, these possibilities cannot be ignored. There are considerable challenges for scientists studying the effects of tourism on already impacted populations, especially with dynamic marine species such as dolphins. The requirement to protect the animals, gather reliable data on the population and still protect the interests of industry provides challenges for managers. In the Bay of Islands, they have tried to manage all these needs with varying success. Our experience suggests other regions considering the development of dolphin-watch tourism should make sure pre-tourism data are collected and then the decision as to whether this form of tourism be allowed should be made after understanding the population. This will minimise conflicting needs and protect the animals' welfare, which should be foremost for all nature-based tourism activities.

2011-12-07 17:15 Conservation in rural-amenity landscapes: social-ecological interactions shaping private land conservation practice

Cooke, BR*, *RMIT University;*

Rural landscapes in many parts of the world are becoming increasingly multifunctional through lifestyle-orientated migration into regions once the domain of productive agriculture. While research has highlighted the increasing heterogeneity of rural land use, little is known about the conservation management actions (or absence of action) of new rural landholders. Insights into landholder actions in this context are critical, given efforts to address ecosystem fragmentation. This research explored the conservation practices of landholders in the hinterland regions of Melbourne, Australia, through an ethnographic methodology of in-depth interviews and participant observation. Land management practice proved intimately bound up with personal landscape interactions. Trial and error practices and observations of ecosystem function proved pivotal in informing either active or passive management philosophies. The legacy of past agricultural uses also framed notions of ecosystem resilience or fragility. Social networks of shared practice were less likely to be 'across the fence' relationships with neighbours observed in productive landscapes. A desire to own rural 'space' bounded conservation knowledge and action at the property scale, yet practices were sporadically shared through social networks. Conceptualising new rural landscapes as a social-ecological mosaic of property-scale practices may assist government efforts to engage landholders and achieve landscape scale objectives.

2011-12-06 17:00 Conservation genetics of Malleefowl (Leipoa ocellata)

Cope, T.M*, *University of Melbourne;* **Mulder, R,** *University of Melbourne;* **Dunn, P,** *University of Wisconsin, Milwaukee;* **Donnellan, S,** *South Australian Museum;*

Extensive land clearance in Australia over the past 100 years has led to wide scale fragmentation of mallee habitat. The Malleefowl is an Australian endemic Megapode which has suffered up to 50% reduction in range over the past 25 years. It is considered threatened or endangered in each occurring state in Australia. This study aimed to document genetic variation in Malleefowl and to determine appropriate management actions. Results of genetic variation across the range of Malleefowl show a very shallow haplotype network, suggesting recent range expansion from a historical bottleneck. In addition, we found no population structure or isolation by distance throughout the entire continent of Australia. This suggests that insufficient time since rapid population expansion has resulted in absence

of genetic structure across the range. We conclude that Malleefowl exist in one Evolutionary Significant Unit, however finer scale levels of gene flow between populations will be presented in context of landscape heterogeneity with management implications.

2011-12-08 18:30 Range shifting by North American passerines in response to climate change

Coristine, L*, *University of Ottawa;* **Kerr, J. T.,** *University of Ottawa;*

Between 1970 and 2006, annual temperatures across most regions of North America increased by 1 to 4.75 degrees Celsius. Range shifting at northern boundaries, in response to climate change has been similarly precipitous. In the past 25 years, breeding range extents for passerine bird species demonstrate substantial northern range margin extensions, which exceed the global average. Nearly one quarter of species shifting at rates of over 100 km/decade fail to adequately track climate. Furthermore, species with greater breeding range shifts are more likely to demonstrate declining abundance at the northern boundary. Of species that have not shifted north, 35 % are from the family Emberizidae, indicating that responsiveness to climate change may have a phylogenetic basis. We conclude that North American passerine species face increasing difficulty with tracking climate, generating the potential for widespread disruption of biotic interactions.

2011-12-08 18:30 Artificial bare patches increase oviposition habitat for the endangered Ohlone tiger beetle (Cicindela ohlone)

Cornelisse, Tara M.*, *Environmental Studies Department, University of California Santa Cruz;* **Vasey, Michael C.,** *Environmental Studies Department, University of California Santa Cruz;* **Holl, Karen D.,** *Environmental Studies Department, University of California Santa Cruz;* **Arnold, Richard A.,** *Entomological Consulting Services, Ltd, Pleasant Hill, CA;* **Letourneau, Deborah K.,** *Environmental Studies Department, University of California Santa Cruz;*

Loss of natural disturbances that create vital habitat can result in species extinctions. Thus, habitat must be actively managed to restore these natural processes and disturbances. In many cases, the recovery and management of rare species relies on direct anthropogenic habitat alteration or creation. We tested habitat creation as a potential conservation management strategy with the goal of increasing availability and range of oviposition sites for the endangered Ohlone tiger beetle (Cicindela ohlone). Cicindela ohlone adults and larvae are dependent on bare ground areas to encounter mates, oviposit, and find prey. Cicindela ohlone is endemic to coastal terrace grasslands in Santa Cruz County, California where it is found in only five remnant habitat patches. Exotic annual grasses and forbs now dominate these grasslands, covering the bare ground and degrading C. ohlone habitat. We experimentally created three different bare ground treatment plots by scraping off surface vegetation, ripping, and compacting the plots. We also tested whether bare ground creation expands C. ohlone range within a habitat patch by scraping plots at increasing distances from the core habitat. We tested whether C. ohlone oviposited in the plots compared to unscraped controls. Cicindela ohlone significantly oviposited in artificial bare ground plots compared to controls at each site and treatment type one and two years after the scrapes were created. Scrapes at increasing distances had significantly more burrows compared to controls in all sites and at all distances the second year after scrape creation. The number of larval burrows was significantly correlated with the percentage of bare ground in all plots. Results show that creation of artificial bare ground areas is an important tool to increase both the quantity and range of C. ohlone oviposition habitat.

2011-12-08 13:00 Advancing databases for global biodiversity assessments

Costello, M J, *University of Auckland;* **Pagad, S*,** *University of Auckland;*

Biodiversity databases now contain significant amounts of data (e.g. Global Biodiversity Information Facility, FishBase) and some engage hundreds of scientists in creating and quality controlling their content (e.g. World Register of Marine Species, Global Invasive Species Database). However, with a few exceptions, their use in research and services to policy makers have not yet been well-developed. Individually, some databases can support new analyses producing new research papers of relevance to conservation. Others primarily provide information to readers. A workshop in association with ICCB 2011 reviewed the needs of policy makers (e.g. Convention on Biological Diversity, Millenium Assessment, Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services), and discussed opportunities for the databases to work together to provide new combinations of content, more comprehensive data for analyses, and metrics of biodiversity knowledge to support international and national policy needs. This talk summarises the workshop findings on how to significantly advance global biodiversity databases, especially those on alien, invasive, and marine species, so as to provide better services for researchers and policy maker's users, and make the database a core part of biodiversity science, including both research and management.

2011-12-08 18:30 Analysis of 65,000 species distributions maps 30 biogeographic realms in the ocean

Costello, M J*, *University of Auckland;* **Tsai, P,** *University of Auckland;* **Wong, P S,** *University of Auckland;* **Cheung, A,** *University of Auckland;*

Biodiversity science and conservation is not helped by widespread beliefs that (1) taxonomic expertise is declining, (2) there are tens to hundreds of millions of species awaiting discovery, and (3) half or more of all species may go extinct this century before many are even named. Thus, some scientists suggest that attempting to name all species is futile if most will go extinct. However, recent data show that the first two of these beliefs are untrue, and the third may not occur. In fact, there have never been so many people describing new species in both marine and terrestrial environments, indicating that global taxonomic effort has been increasing. Our recent analyses of species discovery rates predict that there may be 2 million species on Earth of which 0.3 million are marine species, and of which 1.5 million have already been named. Even if this is half the actual number, it is far less some hyper-estimates, and it seems unlikely that there will be more than 10 million eukaryote species on Earth. Thus, at the present rate of discovery (around 18,000 species per year), most species could be described within the present century. Predicted extinction rates have not materialised because of conservation efforts, and exaggerated estimates of species diversity. Dispelling myths about taxonomic progress, improved taxonomic efficiencies in publication and global scale collaboration, and using online databases to track the discovery of new species and identify regions of high species discovery and endemicity, could ensure most species are discovered before they go extinct. There are a large number of species remaining to be discovered and taxonomic expertise has never been so urgently needed. Naming all species will enable their conservation because it is hard to protect unknown species.

2011-12-06 14:30 Most species could be discovered before they go extinct

Costello, M J*, *University of Auckland;* **Wilson, S J,** *Trinity College Dublin;* **Houlding, S,** *Trinity College Dublin;*

Biodiversity science and conservation is not helped by widespread beliefs that (1) taxonomic expertise is declining, (2) there are tens to hundreds of millions of species awaiting discovery, and (3) half or more of all species may go extinct this century before many are even named. Thus, some scientists suggest that attempting to name all species is futile if most will go extinct. However, recent data show that the first two of these beliefs are untrue, and the third may not occur. In fact, there have never been so many people describing new species in both marine and terrestrial environments, indicating that global taxonomic effort has been increasing. Our recent analyses of species discovery rates predict that there may be 2 million species on Earth of which 0.3 million are marine species, and of which 1.5 million have already been named. Even if this is half the actual number, it is far less some hyper-estimates, and it seems unlikely that there will be more than 10 million eukaryote species on Earth. Thus, at the present rate of discovery (around 18,000 species per year), most species could be described within the present century. Predicted extinction rates have not materialised because of conservation efforts, and exaggerated estimates of species diversity. Dispelling myths about taxonomic progress, improved taxonomic efficiencies in publication and global scale collaboration, and using online databases to track the discovery of new species and identify regions of high species discovery and endemicity, could ensure most species are discovered before they go extinct. There are a large number of species remaining to be discovered and taxonomic expertise has never been so urgently needed. Naming all species will enable their conservation because it is hard to protect

unknown species.

2011-12-08 18:30 Long Term Monitoring of Shorebirds in an Urban Setting: a community-based initiative

Coughlan, R., *Independent;* **Gallo-Cajiao, E.*,** *OceanWatch Australia;*

Monitoring of shorebirds in the East-Asian Australian Flyway is critical to inform conservation actions considering the multiple threats they currently face. Thus, a community-based ongoing monitoring project was set up at Long Reef, a rock platform in Sydney (Australia), with the aim to: understand the community ecology of shorebirds locally, contribute to a national monitoring program, and influence conservation actions. Trained volunteers have collected data monthly since 2007 until present. A total of 17 species have been recorded, 11 of which are vagrant most likely due to intrinsic habitat unsuitability. The remaining six species have been regular visitors with five of them being long-distant migrants and none listed under any threat category. Only one resident species was recorded, which is listed as Vulnerable in New South Wales. To date, no declines have been detected in any species. Despite this site is not of international significance, its conservation value within the Sydney metropolitan area is paramount as it contributes to the gamma diversity. The site has been declared a nature reserve and is currently proposed by multiple community groups to be managed by the NSW National Parks and Wildlife Service. This project demonstrates the potential of community engagement in conservation practice through citizen science.

2011-12-06 16:45 Shedding moonlight on the activity patterns of the members of the last-remaining intact large carnivore guild

COZZI, G, *Zurich University;* **Broekhuis, F*,** *Oxford University;* **McNutt, JW,** *Botswana Predator Conservation Trust;* **Turnbull, LA,** *Zurich University;* **Macdonald, DW,** *Oxford University;* **Schmid, B,** *Zurich University;*

Africa is home to the last-remaining intact large carnivore guild on Earth. With fewer than 5'000 wild dogs (Lycaon pictus) and 10'000 cheetahs (Acinonyx jubatus), however, even the African large carnivore guild is on the brink of collapse. Habitat loss and fragmentation are forcing guild members to occupy ever-smaller areas, increasing the frequency of antagonistic interactions thus potentially jeopardizing the survival of one or more guild members. To investigate temporal partitioning and temporal coexistence strategies between four species of the guild we fitted radio collars provided with motion sensors on 24 animals, six per species, in the Okavango Delta, Botswana. Our study revealed an unexpectedly-high degree of temporal overlap. For example, the night-time activity of wild dogs and cheetahs, believed to be day-active to limit interactions with the nocturnal lions (P. leo) and spotted hyenas (Crocuta crocuta), accounted for 30% of the overall activity budget and for a remarkable 50% during full moon nights. Our findings are not consistent with the hypothesis that wild dog and cheetah day-time habits have been mainly shaped by avoidance of lions and hyenas. Wild dog and cheetah activity patterns are perhaps more parsimoniously attributed to their hunting strategies. Our work emphasizes the urgent need for detailed analyses of daily activity patterns for a wider range of allegedly diurnal species if we want to understand temporal natural history traits and temporal partitioning between competing species, thus enhancing conservation strategies.

2011-12-09 10:30 Impact of artificial and natural barriers on space use and movements of four large African carnivore species: implications for spatial coexistence

Cozzi, G*, *Zurich University;* **BROEKHUIS, F,** *Oxford University;* **McNutt, JW,** *Botswana Predator Conservation Trust;* **Schmid, B,** *Zurich University;*

The effects of human-induced habitat modification on ecosystems and on species viability have become major topics in conservation biology. As human impact is steadily increasing, it is necessary to understand how human activities influence species' spatial behavior and spatial equilibrium among sympatric species. We compared the effects of an artificial (fence) with a natural (river) barrier on space use and movements of four African carnivore species. Long-term spatial data were obtained using GPS radio collars on lions (Panthera leo), spotted hyenas (Crocuta crocuta), African wild dogs (Lycaon pictus) and cheetahs (Acinonyx jubatus) in the Okavango Delta, Botswana. Our results showed that the fence restricted lions and cheetahs in their movements and space use, while hyenas and wild dogs were unaffected by the fence and repeatedly crossed it. In contrast, movements by these same species across the river were symmetrically inversed with the river being comparatively permeable to lions and cheetahs while representing an impermeable barrier to hyenas and wild dogs. We conclude that the permeability of a barrier is species-specific and barrier-specific. Within species, barriers may for example affect dispersal, gene flow, and ultimately population dynamics and viability. Furthermore, as different barriers affect species differently, artificial barriers such as fences may shift the spatial equilibrium between species, for example by excluding some species but not others, and ultimately their co-existence.

2011-12-08 18:30 Modeling Crayfish (Procambarus fallax) Population Growth Potential as a Function of Habitat

Craig van der Heiden*, *Florida Atlantic University;* **N. J. Dorn,** *Florida Atlantic University;* **E. G. Noonburg,** *Florida Atlantic University;*

Anthropogenic alterations to the Florida Everglades have resulted in a compartmentalized and hydrologically altered system. An extensive system of levees, pumping stations, spillways, and hundreds of kilometers of canals inhibits the sheet flow of water which historically drained the region southward from Lake Okeechobee to Florida Bay. The altered hydro-pattern, water quality, and landscape have changed several ecological functions of the Everglades ecosystem; for example, shifts in the composition of plant communities, marsh fish abundance, severe reductions in wading bird populations, and decreased production in crayfish. Crayfish are a functionally important part of the Everglades food web as they assimilate detritus into biomass and are efficient providers of energy to higher trophic levels. Considering that changes in hydroperiod induce alterations in wetland vegetation (i.e., potential habitat for aquatic animals), we consider how changes in vegetation might affect crayfish growth (biomass) potential. We conducted two empirical field studies measuring habitat specific growth and predation in two major Everglades wetland habitats, ridge and slough. We found growth rates and predation rates were highest in the sloughs during our study. Using these vital rates, we use a deterministic model to project changes in crayfish biomass over short time periods with variable amounts of ridge and slough habitat in a fixed landscape area. Knowing the habitat balance will allow wildlife managers to regulate water levels for optimal crayfish production, increasing standing stock of prey.

2011-12-06 16:50 Measuring Biodiversity Offsets: market funding for restoration

Craig, JL*, *University of Auckland;* **Mitchell, NM,** *University of Auckland;* **Ussher, G,** *Tonkin & Taylor;* **Ward, G,** *Department of Conservation;*

Conservation has largely been seen as an activity outside of the market and dependent on political and volunteer funding and action. Restoration provides conservation gains that if measurable can be traded in open markets to developers who need to offset biodiversity losses because of habitat destruction and other modification. Tahi is a private conservation initiative that is participating in New Zealand\'s Department of Conservation\'s Biodiversity Offset Program and the international BBOP measure of biodiversity gains and losses through development. This paper will briefly introduce Tahi and raise the advantages of achieving repeatable measures of biodiversity gains and losses to inform future offset trades.

2011-12-08 15:15 The effects of natural disasters and stochastic events on the management costs of protected areas

CRAIGIE, I. D.*, *ARC Centre of Excellence for Coral Reef Studies, James Cook University;* **Pressey, R. L.,** *ARC Centre of Excellence for Coral Reef Studies, James Cook University;* **Hockings, M.,** *The University of Queensland;*

It is widely acknowledged that funding of protected areas is often insufficient to meet stated management and biodiversity objectives. However, less well studied are the challenges posed by the varying demands placed on those limited funds caused by stochastic events. Here we use a new and detailed

dataset from a protected area management agency in Queensland, Australia covering over 100,000 km2 across 1000+ sites to examine this topic. We quantified the effect of stochastic events on management costs and examined the ways in which managers adapted to these challenges. Our results show that natural disasters such as cyclones and well publicised occurrences of human-wildlife conflict such as animal attacks were important drivers of resource allocation across the protected area network. Managers' main adaptations, given their largely static budgets, were to shift resources away from planned activities towards crisis management. Our results show that there is a mismatch between static protected area budgets and the highly variable demands placed on those budgets. This presents an additional challenge for protected area management agencies over and above those of chronic underfunding. We recommend that more flexible funding arrangements be put in place to allow agencies to respond to stochastic events without sacrificing their usual management activities to the detriment of biodiversity conservation.

2011-12-09 15:30 Disentangling the correlates of African protected area conservation performance

CRAIGIE, I. D.*, *University of Cambridge;* **Balmford, A.,** *University of Cambridge;* **Carbone, C.,** *Institute of Zoology, London;*

Protected areas (PAs) vary in their ability to maintain their biodiversity through time. The causes of this variation are poorly understood, but disentangling them may yield benefits for PA management and biodiversity conservation. Here we explored what best predicts the population trends of 586 large (>5kg) vertebrate populations in 81 African PAs. Population trends were calculated from population time series collated from published and unpublished sources. We evaluated the effect of a range of explanatory variables including: the characteristics of the PAs (such as their size, surrounding human population density and staffing levels) and the species traits of the vertebrates they contain. We followed an information theoretic approach using linear mixed models to account for non-independence of the variables, and built several different models to address unavoidable gaps in the data. Species trends were less negative in PAs with more staff per unit area, for larger bodied-species, and for more recent time series. The effect of PA size was complex, the results showed that larger PAs performed more poorly than small PAs with the likely cause being fewer staff per unit area in larger PAs. These results show that lack of resources can outweigh the expected benefits of larger PAs and that an increased level of resources is likely to lead to improved conservation performance of African PAs for large vertebrates.

2011-12-07 15:15 Gender and stress affect facilitation intensity in a widespread cushion plant

CRANSTON, B*, *University of Otago;* **Callaway, RM,** *University of Montana;* **Monks, A,** *Landcare Research;* **Dickinson, KJM,** *University of Otago;*

Facilitation allows plants to occupy environments otherwise uninhabitable, potentially leading to range expansions, shifts in realised niches, and/or increased rates of invasion. Gynodioecy provides good opportunities to explore the effects and costs of facilitation because females and hermaphrodites often differ in resource allocation patterns, stress tolerance, and the intensity of facilitation often varies along stress gradients. We investigated the role of gender and stress on the facilitative effects and costs for the gynodioecious alpine plant, Silene acaulis across two elevations (2317 m and 2560 m) in the Rocky Mountains of Montana, USA. Consistent with general theory for abiotic stress and facilitation, the positive effect of Silene on community richness and the abundance was greater at the high elevation site than the low. Furthermore, the proportional increase in cover of beneficiaries was greater at high elevation for female plants, but lower for hermaphrodites. This indicates that the intensity of facilitation increased with stress associated with elevation, but that this increase was greater for females. As the cover of beneficiaries in female Silene cushions increased, Silene flower production and leaf size decreased, indicating a significant cost of facilitation, but this effect was less for hermaphrodites. Intense facilitation by female Silene, coupled with higher costs suggests that females might be more easily displaced by beneficiaries than hermaphrodites.

2011-12-07 10:30 Invasive vertebrates on islands: scope of the problem, data needs, and approaches

Croll, DA*, *Coastal Conservation Action Laboratory, Ecology and Evolutionary Biology, University of California Santa Cruz;* **Tershy, BR,** *Coastal Conservation Action Laboratory, Ecology and Evolutionary Biology, University of California Santa Cruz;*

Sixty four percent of all extinct species recorded by the IUCN and 40% of all Critically Endangered species are endemic to the worlds' ~179,000 marine islands. Because islands are only 5% of earth's land area, the number of Extinct and Critically Endangered species / ha is an order of magnitude greater on islands than on continents. Invasive vertebrates are the leading cause extinction on islands and the second most important cause of endangerment on islands. Crude estimates suggest that invasive vertebrates occur on ~40% of all islands (~70,000) and, because larger islands are more likely to be invaded, ~80% of all island area (~75 million ha). Eradication of invasive vertebrates from islands can save species from extinction and the number, frequency and size of successful eradications have steadily increased. Still only ~1% of invaded islands have had one or more invasive vertebrates eradicated. To prevent future extinctions, conservation biologists need to: 1. Develop new methods to make eradication faster and less expensive 2. Determine which islands have both vulnerable endemic species and damaging invasive vertebrates 3. Develop prioritization models that integrate an insular species' risk of extinction, its vulnerability to a given invasive vertebrate and the cost of eradicating that invasive vertebrate from one or more islands

2011-12-06 14:00 Prioritising and Evaluating Biodiversity Projects

CULLEN, R*, *Lincoln University;* **WHITE, PA,** *University of York;*

Funds available for biodiversity projects are scarce. Choices must therefore be made on how to use limited resources most effectively, and such decisions should be based on clear and measurable objectives for achievement. Biodiversity projects should be evaluated to determine if the use of scarce resources has achieved the objective (effectiveness), and if the projects achieve the objective at lower cost than alternative uses of the resources (cost effectiveness). Project selection and evaluation methods are used patchily by biodiversity project providers and researchers. We provide an introduction to project selection and evaluation; point to the range of selection and evaluation methods available; ask where they are best applied; and focus attention on the need to overcome the hurdles to adoption and continuation of project selection and evaluation methods.

2011-12-09 15:15 Socioeconomic drivers of sea turtle interactions with artisanal fisheries in the western Indian Ocean islands

Cunningham, E*, *C3 Madagascar and Indian Ocean Islands Programme;* **Poonian, CNS,** *Community Centred Conservation (C3), 17 Northcliffe Drive, London, N20 8JX;* **Whitty, T,** *Scripps Institution of Oceanography, San Diego;*

Bycatch is a global threat to sea turtles with artisanal fisheries posing particular challenges in terms of data collection, monitoring and mitigation strategies. Due to the decentralized nature of artisanal fisheries, limited infrastructure for research and monitoring in developing countries, and logistical obstacles to establishing observer programs, collecting data on bycatch through interviews is recognized as a practical method for estimating the magnitude of bycatch in artisanal fisheries We conducted over 1000 rapid assessment surveys of sea turtle bycatch in artisanal fisheries of the Union of the Comoros, Mauritius and Madagascar in the Western Indian Ocean using semi-structured interviews of fishers. Bycatch was found to pose a serious threat to sea turtle populations. It was reported as a routine occurrence by fishers in Madagascar and Comoros in a variety of fishing gears, particularly gillnets in Madagascar and longlines in Comoros and Mauritius. Although turtles were often released alive, mortality was generally high and turtles were often killed and eaten or sold in Comoros and Madagascar. Various local traditions and taboos were also found to influence artisanal fishers' interactions with sea turtles at all study sites. The heterogeneity of gears used by artisanal fishers, and the potential for sea turtle bycatch in a variety of gear types indicated by this work suggests that mitigating turtle bycatch in artisanal fisheries in the western Indian Ocean requires close collaboration with fishing communities including capacity-building and awareness raising to ensure that management actions are implemented effectively. Addressing

the impacts of these fisheries on sea turtles will require examination of the potential for alternative livelihoods and locally- enforced regulations. These results demonstrate the deep human roots of fisheries interactions with sea turtles that must be understood for effective management and conservation.

2011-12-07 14:00 The Influence of Model Structure on Science-Based Advice for Species at Risk

Curtis, Janelle*, *Pacific Biological Station;* **Naujokaitis-Lewis, Ilona,** *University of Toronto;*

Distribution-based recovery targets are ideally informed with habitat-based spatially-explicit demographic models. In practice, recovery teams used occurrence (18%) or habitat suitability (63%) models to provide advice, while <20% considered demographic, dispersal or other spatial processes. We compared distribution targets produced from five approaches that vary in structure: (1) occurrence, (2) habitat suitability model, (3) stage-structured matrix model, (4) metapopulation model and (5) habitat-based spatially-explicit model. We used parameters of 12 habitat-based spatially-explicit models as the basis for estimating the number of habitat patches (Np) and optimal geographic distance (OptD) among them using all 5 methods. Matrix models that ignored spatial processes were more pessimistic (produced higher extinction probabilities) than metapopulation and habitat-based spatially-explicit models. Using the latter as references for comparison, metapopulation models produced estimates of Np that were on average 22% greater, while matrix models that ignored spatial processes produced targets 330% greater. By contrast, occupancy and habitat suitability methods produced estimates of Np that were 59% and 88% lower, respectively. All three approaches that ignored dispersal produced significantly lower estimates of OptD. The influence of model structure on advice should be considered when developing recovery strategies.

2011-12-06 11:00 Using telemetry and genetics to estimate functional resistance

Cushman, S.A*, *U.S. Forest Service;*

Understanding funcational connectivity in complex landscapes is necessary to effectively prioritize conservation actions to maximize benefit to populations. Mating and dispersal movements are the mechanisms through which gene flow operates in animal populations. Analyses using different data sources that produce consistent results provide strong support for the generality of the findings. Two ways that functional connectivity can be empirically assessed are individual-based landscape genetic analyses and spatial modeling of movement based on telemetry data. We predicted landscape resistance form American black bear (Ursus americanus) in the U.S. Rocky Mountains using both landscape genetics and path-level, conditional logistic regression analysis of telemetry data. We found consistent landscape factors influence genetic differentiation and movement path selection, with strong similarities between the predicted landscape resistance surfaces. Genetic differentiation in American black bear is driven by spring movement (mating and dispersal) in relation to residential development, roads, elevation and forest cover.

2011-12-09 15:30 Adaptive approach to marine conservation: Scaleup of a Philippine model

D'AGNES, LA*, *PATH Foundation Philippines Inc.;* **Castro, JR,** *PATH Foundation Philippines Inc.;*

Rapid population growth and excessive reliance on coastal resources has resulted in the near collapse of Philippine marine captured fisheries. Integration of population measures into fisheries and coastal resource management agendas offers potential for remediation. Integrated actions were measured before and after field implementation in three coastal areas of Palawan province; resulting data were used to evaluate the success of the integrated approach in relation to sectoral management strategies. Periodic behavioral monitoring surveys generated additional information used to adjust management actions over the six year duration of the study. From this process we learned that an adaptive approach to marine conservation that integrates human reproductive health management yields outcomes that surpass sectoral management – both in terms of ecosystem health and human wellbeing. Optimum levels of collaboration among governmental and nongovernmental organizations and local communities were realized when food security was established as the common goal of adaptive management. Efforts to replicate the integrated approach generated further learning about the cost efficiency of targeting key marine biodiversity areas with above-average rates of population growth and density. A subsequent government initiative that assimilated reproductive health as a maintenance mechanism for fisheries management enabled scale-up of the integrated approach in four Philippine bioregions.

2011-12-08 11:30 Traditional Ecological Belief Systems: Assessing the role of cultural filters in driving positive perceptions between fishers and dolphins

D'LIMA, C*, *James Cook University & Nature Conservation Foundation;* **Arthur, R,** *Nature Conservation Foundation;* **Sinha, A,** *National Institute of Advanced Studies;* **Hamann, M,** *James Cook University;* **Marsh, H,** *James Cook University;*

Local fishers and the endangered Irrawaddy dolphin (Orcaella brevirostris) in Orissa, India overlap in their use of space and resources, thereby posing a conservation challenge. Dolphins often feed near stake nets, thus interacting with fishers. To characterize the nature and drivers of this interaction, we conducted 299 attitudinal surveys with fishers in Chilika lagoon, observed dolphin foraging behavior at stake nets, and compared catch per unit effort (CPUE) and catch income of stake nets (n=81) in the presence and absence of foraging dolphins (2008-2010). We found that traditional fishers (fishers for several generations) who fished in areas frequented by dolphins were significantly more positive in their attitudes towards dolphins compared with non-traditional fishers (new entrant fishers), who were more neutral. These positive attitudes were linked to firmly held mythologies and beliefs that dolphin foraging augments fish catch. Our study indicated that dolphins spent ~30% of their activity budget barrier-foraging at stake nets, and the presence of foraging dolphins coincided with a significantly higher catch income (per unit effort), and with a higher CPUE of mullet (Liza sp.). Traditional and cultural beliefs had ecological and economic rationalities, and helped drive perceptions towards dolphins. Knowledge of traditional beliefs and their drivers is vital in building a broader constituency to conserve wild species, by capitalizing on positive community attitudes.

2011-12-09 10:54 Protecting Snow Leopard by maintaining the Traditional Tibetan Culture

Dajun Wang *, *School of Lfe Sciences, Peking University, China;* **Juan Li,** *School of Lfe Sciences, Peking University, China;* **Hang Yin,** *San Shui Conservation Center, Beijing, China;* **Sun Shan,** *San Shui Conservation Center, Beijing, China;*

China is the most important country for snow leopard (Panthera uncia) conservation, which occupied more than 60% of total nature habitat and wild population in the world. The habitat in the Qinghai-Tibet plateau is the center geographically of the whole distribution. We initiated a field study on endangered snow leopard in Sanjiangyuan area (the headwater of three big rivers in Asia) in 2008, collecting data of distribution and threaten of snow leopard by sign survey and local people interviewing, the total survey area counts for 150,000 km2. Comparing with the factors reported from other countries like Nepal, Pakistan and India, the survival situation of snow leopard in Sanjiangyuan is optimum, especially in terms of human-snow leopard conflict. The causations of this situation is the traditional Tibetan culture based on the Buddhism, with core of respecting to the all living creatures, and the ethic of human nature relationship. Snow leopard and other wildlife are benefit from this culture, but now the culture is threatened by the economic factors from outside. Helping to maintain the traditional culture is the key for the wildlife protection in the Tibetan area now.

2011-12-07 10:50 Participatory video: An appraisal technique which encourages community communication of local environmental issues

DAMERELL, PETER*, *Laboratorio Fauna Australis, Facultad de Agronomía e Ingeniería Forestal, Pontificia Universidad Católica de Chile;* **Márquez-García, Marcela,** *Outreach Program, Institute of Ecology and Biodiversity , Chile;* **Laker, Jerry,** *, Laboratorio Fauna Australis, Facultad de Agronomía e Ingeniería Forestal, Pontificia Universidad Católica de Chile;*

Rural appraisal techniques are useful when working with communities and developing an understanding of their relationships with the biosphere. We present a preliminary study of Participatory Video (PV); a collection

of methodologies that enable collaborative film production. We highlight its advantages over traditional appraisal techniques. Researchers could distance themselves from data collection because participants controlled of the filming process; this removes potential issues of bias, shyness and misinformation introduced by external researcher presence. We noted ownership of film production meant participants prioritised subjects of personal interest and buffered against accidental facilitator influence. Data from PV may therefore be of higher quality; indeed some environmental issues highlighted in the films were novel to local conservation scientists working extensively in the area. Participatory video encourages two-way, conservationist – community communication. It can be used to promote wider engagement with conservation activities or as a tool for community lead activism as visual media is be a powerful way for marginalised groups to "broadcast" their concerns to decision makers. This study finds that PV is an elegant solution to many challenges associated with working with diverse communities; can produce high quality data and potentially empower groups for pro-environmental action through vertical and horizontal communication of local issues.

2011-12-06 17:00 A quantitative demonstration of child orientated environmental educations ability to influence household behaviours

DAMERELL, PETER*, *Department of Life Sciences, Silwood Park, Imperial College London, SL5 7PY, UK;* **Howe, Caroline,** *Centre for Environmental Policy, Imperial College London, SW7 1NA, UK;* **Milner-Gulland, Eleanor Jane,** *Department of Life Sciences, Silwood Park, Imperial College London, SL5 7PY, UK, Centre for Environmental Policy, Imperial College London, SW7 1NA, UK;*

Environmental education (EE) is a key tool used by conservation practitioners in order to increase public engagement with their activities, including the promotion of sustainable practices and lifestyles. Increasing environmental knowledge is widely believed to influence attitudes and behavioural expression; very few studies have tested this assumption quantitatively. Children are common targets for EE initiatives; there are strong psychological and logistical reasons why. Yet in order to inspire the swift action environmental issues require EE should be aimed at those who can implement rapid change through modifying a households practices and demanding legislative changes. Children rarely meet these criteria. If children could influence parental knowledge they could theoretically influence household engagement with conservation activities. Conservation of wetlands and freshwater resources is an increasingly pertinent issue on the Seychelles. After controlling for confounding factors, we demonstrate improved adult knowledge towards wetlands when their child had undertaken education on wetland habitats. We also show that the child having received wetland education had a significant influence on reported household water management behaviour. Our study provides strong support for the first time that messages from EE and the engagement that they promote can be transferred between generations.

2011-12-08 18:30 Effects of Habitat Fragmentation on Monophagous Insects along an Altitudinal Gradient

Damken, C*, *School of Environment, University of Auckland;* **Beggs, JR,** *School of Biological Sciences, University of Auckland;* **Perry, GLW,** *School of Environment, University of Auckland;*

Climate change and landscape fragmentation are two major threats for global terrestrial biodiversity. In particular, habitat size, habitat quality and isolation are influenced by climate change and landscape fragmentation. Within the concept of meta-population biology, the survival of species in fragmented landscapes is mainly due to these three environmental factors. To cope with rising temperatures, stenotherm species such as mobile insects may migrate to higher and therefore cooler regions. However, at increasing altitudes, habitat quality can change. Spatial and temporal "bottlenecks" are a particular risk, especially for monophagous insects e.g. if the appropriate host plants are still restricted to lower altitudes. This project investigates whether changes in population dynamics along an altitudinal gradient will result in increased species requirements of habitat quality and habitat size. In Tongariro National Park, spatial distribution of broad-leaved Koromiko (mainly Hebe stricta) clusters (N=238), habitat quality and the abundance of two herbivore specialists, Trioza obscura (Homoptera: Psyllidae) and a hitherto undescribed gall midge (Diptera: Cecidomyiidae), were mapped on along a mountain stream in 2010 & 2011. In addition, to investigate plant-insect interactions under different climate scenarios, controlled growth chamber experiments are compared with in situ observations.

2011-12-08 15:30 Climate change and Little Penguins: predictions based on a long-term demographic study

Dann, P*, *Phillip Island Nature Parks;* **Sidhu, L,** *School of PEMS, University of NSW;* **Chambers, L,** *Centre for Australian Weather & Climate Research - Bureau of Meteorology ;* **Catchpole, E.,** *School of PEMS, University of NSW*

Climate has been shown to be related to various demographic parameters in many seabird species. In this study we review the effects of climate change on Little Penguins Eudyptula minor using a 40-year life-history dataset of penguins breeding on Phillip Island in south-eastern Australia. Sea-level rise is unlikely to have significant effects on breeding habitat at Phillip Island in the short-term. Increasing air temperatures may have limited effects on penguin attendance patterns ashore in the short-term but no effects on breeding success are predicted. The timing and success of breeding and juvenile survival are positively correlated with regional sea-surface temperatures. Decreased sea temperature gradients in Bass Strait are associated with increased mass of adults and earlier egg-laying. Opportunities for adaptation and mitigation are discussed.

2011-12-06 11:15 Behavioural responses of endangered North Island kokako to alien, local and mixed-dialect duets – implications for translocation success

David Bradley*, *Department of Biological Sciences, School of Science and Engineering, Univeristy of Waikato, New Zealand;* **Laura Molles,** *Department of Ecology, Faculty of Agriculture and Life Sciences, Lincoln Univeristy, New Zealand;* **Joseph Waas,** *Department of Biological Sciences, School of Science and Engineering, Univeristy of Waikato, New Zealand;*

Animals may face social penalties from local conspecifics following translocation involving culturally distinct populations, hindering translocation success. At two sites frequently chosen as source populations for translocation, we presented local territorial pairs of endangered North Island kokako (Callaeas wilsoni) with stereo duet playback to compare behavioural responses to: 1) local versus foreign dialect duets, and 2) duets composed of local male and foreign female song components, versus foreign male and local female components. Pairs reacted with a more rapid and persistent physical response combined with a stronger and more stereotyped vocal response to local duets compared to alien duets. Pair approach to mixed-dialect duets was more rapid when the local bird was male, and yet more persistent to mixed-dialect playback with local female components. Our results indicate that dialect familiarity influences strategies adopted during territorial defence, but that animals singing an alien dialect do not appear to incur immediate social penalties that would inhibit translocation success. Longer term costs associated with singing an alien dialect (e.g. an inability to engage in "song matching" while counter-singing with neighbours) should be investigated.

2011-12-07 11:15 Priorities for eradicating invasive mammals from New Zealand islands: an historical perspective

David Towns*, *Department of Conservation;* **Carol West,** *Department of Conservation*

In New Zealand, invasive or pest mammals have been removed from over 90 offshore islands covering a total area of about 35 000 ha. Three loosely linked work streams were involved: technical development, legislated obligations and overcoming threats to rare species, and assistance for community-led restoration projects. As a result, at least 150 populations of 15 species of mammalian pests have been removed; numerous species of native plants, invertebrates and more than 70 species of vertebrates are likely to recover; partnerships have been formed with Maori; and innovative projects developed with community groups. Eradications of pest mammals are aggressive conservation actions that can be controversial, technically demanding, and expensive. Priority setting requires multi-scale understanding of systems that demonstrate cause and effect (evidence of detrimental effects of pests); how species or ecosystem responses to pest

removal (biodiversity goals); and nuances in regional political and cultural environments (the roles of people).

2011-12-06 11:45 Global Conservation Agreements and a Political Ecology of Carbon Offshoring

Davidsen, C*, *University of Calgary;*

New global conservation models are on a desperate search for politically and economically effective approaches to carbon and conservation, cooperation, and an internalization of environmental costs on a global ecosystemic level. Ecuador's Yasuní-ITT Initiative in the Upper Amazon rainforest proposes a new type of international carbon-and-conservation cooperation model that offers to leave oil reserves in the Ecuadorian Amazon under the surface in exchange for international carbon investments which compensate the state for not accessing these oil fields. The paper uses a political ecology perspective to examine the politics and clashes of underlying conservation cooperation agendas and the effects of carbon offshoring on shifting power relationships between global investors and providers of carbon and conservation. The analysis identifies key governance challenges of global conservation cooperation in emerging multi-scale networks and implementing states of the Global North and Global South in general.

2011-12-08 15:45 Determinants of Global Extinction Risk in Marine Mammals

Davidson, AD*, *Institute of Ecology, National University of Mexico;* **Boyer, Alison G.,** *Department of Ecology and Evolutionary Biology, Yale University;* **Kim, Hwahwan,** *Computational Sciences and Engineering, Oak Ridge National Laboratory;* **Pompa-Mansilla, S,** *Institute of Ecology, National University of Mexico;* **Hamilton, MJ,** *Santa Fe Institute;* **Costa, DP,** *Department of Ecology and Evolutionary Biology, University of California, Santa Cruz;* **Ceballos, G,** *Institute of Ecology, National University of Mexico;* **Brown, JH,** *Department of Biology, University of New Mexico*

The world's oceans have undergone profound changes over the last century as a result of human activities. However, the consequences of escalating human impacts on marine mammal biodiversity remains poorly understood. Currently almost 40% of all marine mammals are considered data deficient by the IUCN Red List, and the potential impacts of climate change on marine mammals are only beginning to be understood. With the number and extent of human impacts on the marine environment expected to increase with projected human population growth in coming decades, a growing number of species will be subject to these threats. Predictive models of species at risk are key to informing present and future conservation needs, yet such models have not been explored for marine mammals. We developed predictive and spatially explicit models of marine mammal extinction risk using machine learning approaches coupled with spatial analyses of habitat productivity and human impacts, including climate change. We show that the speed of life history is overwhelmingly the most important predictor of extinction risk in marine mammals. In general, intrinsic traits are more important predictors of extinction risk than extrinsic variables for marine mammals, as they measure the intrinsic susceptibility of species to human impacts. We also show that 30% of all marine mammals, including many data deficient species, are predicted to be at risk of extinction, and identify 9 global hotspots of marine mammal risk.

2011-12-08 18:30 Poverty and provisioning ecosystem services in the Solomon Islands

DAVIES, T*, *St Andrews University;* **Fazey, I,** *St Andrews University;* **Pettorelli, N,** *Institute of Zoology, ZSL;*

There is geographical overlap between extreme poverty and areas of high biodiversity, resulting in competition between biodiversity and food provision. This project utilised a mixed-methods approach within a participatory framework to investigate relationships between poverty and provisioning ecosystem services in a remote and poorly studied region where people are highly dependent on natural resources for subsistence. This interdisciplinary approach ensured detailed local knowledge of the environment was accessed alongside improving local capacity. Six villages in the Kahua region of Makira-Ulawa Province, Solomon Islands were surveyed, with 12 focus groups (separate groups for men and women in each village) were held to identify indicators of poverty which was then incorporated into the household survey which was also used to collect data on a variety of provisioning ecosystem services used at the household level, including building materials, medicines and wild foods. A total of 108 households were surveyed. The local importance and dependence on provisioning ecosystem services was found to be high, and also under flux as communities switch to a monetary economy those with income from cash crops, such as cocoa were less dependent on wild foods. The use of medicines was variable, as was bushmeat where a variety of endemic species were found to be consumed (including the Prehensile-tailed skink (Corucia zebrata) and the Yellow-bibbed fruit dove (Ptilinopus solomonensis).

2011-12-06 14:30 The Chagos/BIOT MPA: A cautionary case study on marine spatial planning

Davies, TK*, *Imperial College London;*

In April 2010 the UK Government announced the creation of the world's largest no-take marine protected area within British Indian Ocean Territory (BIOT). This designation, which came about after a year-long process involving scientific review and public consultation, has been heralded a success by conservation groups. However the decision-making process leading to the designation has received wide criticism regarding how environmental, social and political viewpoints were represented and considered. Throughout the consultation process the impacts of the Chagos/BIOT MPA on regional (external) conservation and resource management objectives received little attention. In particular the reallocation of fishing effort from the MPA largely ignored, yet this can alter spatial and temporal patterns of exploitation and may prompt changes in the regional management of tuna and bycatch species. I outline the potential effects of fishing effort reallocation following the Chagos MPA designation, and the potential impacts both on tuna and bycatch species. This case study highlights important lessons regarding stakeholder participation in public consultation as well as the necessity to consider the indirect effects of designation via changes in resource user behaviour.

2011-12-08 14:00 An oily end? Can lowland forest birds persist in the palm oil plantations of New Britain, Papua New Guinea?

Davis, RA*, *School of Natural Sciences, Edith Cowan Universityh Cowan;*

The Island of New Britain lies in the Bismarck Archipelago to the immediate east of Papua New Guinea and is characterized by a high endemism, with at least 37 endemic or restricted-range bird species. Unfortunately, New Britain is classed as one of the most at risk islands in the world due to the rapid rate of deforestation, primarily driven by conversion of lowland forest to oil palm plantations. Consequently Birdlife International recently upgraded the number of threatened bird species on New Britain from 12 to 21, and there is an urgent need for ecological data on bird utilization of palm oil plantations. We undertook 97 standardised surveys in remnant lowland forest and 82 transects in palm oil plantations. A total of 61 species were recorded from lowland forest and 32 in palm oil. However, only 5 generalist species accounted for the vast majority of regular sightings in palm oil with most other species records being transitory. Over 55% of the lowland forest birds were never recorded in palm oil. Over 100 hours of surveys also failed to record a number of threatened endemic birds and these species are considered to now be extremely rare or locally extinct. I discuss these findings in result of generalist and specialist ecological attributes and the implications for conserving birds in Papua New Guinea's palm oil landscapes.

2011-12-08 14:12 Recent status of Ortolan Bunting Emberiza hortulana L., 1758 population in Ukraine

Davydenko I.*, *Biol. Dept., Shevchenko National University, Volodymyrska Str. 64, in Kiev, 01601;* **Serebryakov V.,** *Biol. Dept., Shevchenko National University, Volodymyrska Str. 64, in Kiev, 01601;*

According to the numerous available literature and personal data Ortolan Bunting should be considered as common migratory breeding species which is spread on the whole terrotiry of Ukraine but spatially. This species is not recorded in the highlands of the Crimea and Carpathian Mountains.

It is not numerous in the forest areas on the North and West of the country also. The birds are still rare and spatial in the breeding suitable biotopes during nowadays. Last time its breeding density in the most suitable sites is between 0.5 and 6 males/km of the rout (Knysh, 2001), though in 60-s of XX century it was 2.8-16 males/km in the same sites (Matviyenko, 2009). The main part of Ukrainian Ortolan Bunting population is concentrated in the Steppe and Southern part of the Forest-Steppe zones (South-Eastern part of Ukraine). In this area Ortolan Bunting is common and breeds in the field protective forest lands, steppe rare forests and orchards. Before the middle of XX century the species was common here, but later on probably due to changes in the natural tree stand and artificial plants it became too rare. Probably the global changes has made the impact on the ecology this species as well. It should be studied along the next years.

2011-12-07 10:58 Conservation Plan Implementation: Engaging People in Conservation Behaviors through Collaboration with Educators

Dayer, AA, *Cornell Lab of Ornithology;* **Ehrenberger, Kacie,** *Rocky Mountain Bird Observatory;* **Fergus, Rob*,** *Cornell Lab of Ornithology;*

Conservation planning processes consume conservation professionals; yet, surprisingly few plans are actually implemented. Conservation plans, written largely by biologists, identify threats and actions needed to meet species and habitat objectives. Because the actions typically aim to engage people in certain behaviors, effective education and communication efforts are essential to ensure conservation outcomes. Conservation educators intend to contribute to conservation but due to a disconnect with biologists and current biological information, often fall short of creating programs that adequately address priority issues, species and habitats. Linking education programming with prioritization and planning carried out by biologists benefits both groups, and more importantly, wildlife and habitat. We will introduce an initiative developed by the Bird Education Alliance for Conservation (BEAC) that aids educators in "unlocking" conservation plans and creating effective programs that can impact local conservation issues. Biologists and educators alike can use resources developed by BEAC to assist in guiding their effective collaboration towards conservation plan implementation. The effects of such an approach have been seen in the last two years with a tri-national (Canada, Mexico, and the United States of America) bird conservation plan that integrated educators in the conservation plan development, leading to successful implementation of the plan beginning with its release.

2011-12-08 18:30 HIV and Biodiversity in Sub-Saharan Africa: Identifying Target Zones for Public Health and Conservation Outreach Using MODIS, MAPA, and DHS Data

de Moor, E*, *University of California, Santa Barbara;*

HIV/AIDS alters resource use by changing household demographics and shifting livelihood strategies. Poor, HIV-stricken households struggle to earn an income and become more reliant on their immediate environment for firewood, hunted meat, edible plants, and ingredients for natural remedies. This issue is of particular importance in sub-Saharan Africa, home to 22.5 million people living with HIV. In developing regions where protected area boundary enforcement may be weak, the biodiversity of these areas can provide a 'poverty buffer' for such households by replacing lost income with local, time-flexible, and less work-intensive livelihood strategies. Biodiversity, however, may be adversely impacted by increasingly intensive local extraction. Using land-cover classification with MODIS satellite imagery, a literature review to identify 'biodiversity hotspots' in Africa, Demographic Health Survey (USAID) data, and MAPA Project protected area shape files, I produced a continental-scale map that highlights protected areas in sub-Saharan Africa that are located in regions of both high biodiversity and high local HIV-prevalence. Protected areas in South Africa, Kenya, Tanzania, Gabon and Cameroon are those most likely to be impacted by resource extraction from HIV-afflicted local communities living on their borders.

2011-12-08 10:45 Global change and species interactions: What will happen to the web of life?

De Sassi, C*, *University of Canterbury, New Zealand;* **Tylianakis, JM,** *University of Canterbury, New Zealand;*

Global environmental change (GEC) threatens biodiversity yet, its effects on of species interactions are largely unknown. Interaction networks have been shown to have emergent properties (e.g. resistance to perturbation) of critical importance and fragility that result from their overall architecture, properties that can only be identified by analyzing the structure of the community as a whole. The effects of any GEC driver on complex real-world food webs are largely unexplored. Moreover, the mounting evidence for complex, non additive interactions between GEC drivers such as warming and deposition of anthropogenically-fixed nitrogen, suggests that predictions of future ecosystem processes based solely on the effect of drivers in isolation may not reflect their synergistic effects in the real world. Our research combines field and controlled field experiments in subalpine grassland and its lepidopteran fauna, to test for the first time the effects of two global change drivers on food webs. Preliminary results indicate that both drivers produced a suite of direct and indirect effects at different trophic levels, triggering substantial changes in the network structure, such as reduced complexity and loss of parasitism. We are currently applying structural equation modelling techniques to unravel the underlying mechanisms. We believe that our results will offer advanced understanding about the forces governing the network structure and its response to disturbance, an understanding recognized of critical value for ecosystem functioning, stability and biodiversity conservation.

2011-12-07 12:15 Glitches in the matrix: To what extent does increased productivity in agricultural systems lead to ecosystem decay in adjacent natural habitats?

Deakin, L*, *University of Canterbury, Christchurch, New Zealand;* **Tylianakis, JM,** *University of Canterbury, Christchurch, New Zealand;* **Barker, GM,** *Landcare Research, Hamilton, New Zealand;* **Schipper, L,** *Waikato University, Hamilton, New Zealand;* **Didham, RK,** *University of Western Australia, Perth, Australia;*

To support the world's ever-increasing human population, there has been a significant increase in the area devoted to agriculture over the past century, which has caused natural habitats to become increasingly fragmented. Habitat loss and fragmentation are identified as major threats to biological diversity, as reduction of habitat size dramatically increases opportunities for species loss and changes in ecosystem functions. Moreover, habitats with large perimeter/area ratios (e.g. forest fragments) have higher relative exposure to external influences from the surrounding land-use matrix. It is now recognized that nutrients and other resources added to one system in the agricultural matrix may also move or 'spill-over' into adjacent natural systems. Our study aims to test changes in a range of community- and ecosystem-level response variables under varying land-use intensity. In a landscape scale experiment in the Waikato region of New Zealand, comprising 25 sites of varying agricultural production and forest fragmentation, metrics of invertebrate and plant communities (biomass, richness, community composition) and ecosystem function (decomposition and herbivory) have been measured along an edge gradient transect, running from pasture into adjacent forest. Determining the relationship between land-use intensification and biodiversity loss is essential for agricultural development in the future. Furthermore, application of more robust underlying ecological principles to conservation management practices aimed at mitigating biodiversity loss will have far-reaching consequences for the development of sustainable agriculture.

2011-12-08 18:30 Biodiversity and climate change: lessons from a regional study

deBlois, Sylvie*, *McGill University;*

Conservation planning in a rapidly warming climate requires forecasting changes in the distribution of species at a scale relevant to management. I present the results of a regional study in eastern North America in which biologists paired with climate modelers, naturalists, and biodiversity managers to assess recent and future changes in the distribution of species. As a first step to conservation planning, species distribution models were constructed for trees and wetland plants to relate occurrence or abundance data to climatic and abiotic variables and project future (2050-2080) distributions. Since temperature is rapidly increasing at northern latitudes, we also used historical forest surveys (1970-2000) to detect changes in tree occurrence patterns at northern range limits. Current occurrence patterns of trees and, more surprisingly, of wetland plants were modeled with generally high accuracy. Since climate was a strong predictor of occurrences, most species showed range shifts in response to warming. Information on abundance patterns is crucial for conservation, yet tree abundance was

poorly predicted by climate variables for 61% of the 105 trees examined. Predictions of stable occurrence patterns in time often masked potential decrease in tree abundance. These results are now being used in other regional conservation studies on adaptation to climate change. The partnerships with governmental and non-governmental organizations insured rapid transfer of knowledge.

2011-12-07 17:45 Impact of urbanization on flower visitors assessed with a country-wide monitoring program based on citizen science.

Deguines N*, *Museum national d'Histoire naturelle;* **Fontaine C,** *Museum national d'Histoire naturelle;* **Julliard R,** *Museum national d'Histoire naturelle;*

Pollinators play a key role in ecosystems functioning. Decline in both honey bee and wild pollinators have recently been documented and habitat loss coupled with agricultural intensification have been highlighted as important drivers of this pollination crisis. The effect of urbanization is less documented, and it has been proposed that due to high availability of floral resources and low pesticide level, urban areas may act as refuges for pollinators. We tested this hypothesis using data from a new monitoring program based on citizen science, where observers sample plant-insect interactions following a standardized protocol. By the end of 2010, about 13000 interactions have been sampled in 2200 localities distributed all across France. Our results indicate first that the majority of flower visitors are negatively affected by urbanization. Second, sensitivity to urbanization differs among insect orders, with hymenopterans appearing more tolerant than dipterans and lepidopterans. Third, within insect orders, urbanization's sensitivity seems to be related to the complexity of the insect life cycle, with for example, parasitic hymenopterans that appear to be more sensitive than non-parasitic ones. These results do not support the hypothesis that urban areas are refuges for pollinators. Citizen science seems an appropriate methodology to study pollinator's communities and their responses to large-scale environmental characteristics.

2011-12-07 14:44 Conservation management frameworks: the what, where and how of managing biodiversity

Deiner, K*, *UC Davis;* **Forrester, T,** *UC Davis;* **Grof-Tisza, P,** *UC Davis;* **Santos, MJ,** *UC Davis;* **Souza, L,** *UC Davis;* **Wilkerson, ML,** *UC Davis;* **Zylberberg, M,** *UC Davis;* **Schwartz, MW,** *UC Davis*

Conservation decision-making tools are being developed to manage the scientific, social, and logistical complexity of large-scale conservation programs. We provide an overview of similarities and differences among eight structured decision-making frameworks. We highlight both the common components for structured decision-making and their important differences. We identify challenges not fully resolved by the development of decision-making frameworks and suggest how to move past difficult challenges. The eight frameworks reviewed differ in approach and process, but converge into similar practices and protocols. Most frameworks embrace three attributes: they define measurable goals to evaluate success and failure of actions, define stakeholder involvement, and develop a robust monitoring structure. In each case, most frameworks encouraged explicit goals for these three attributes. No consensus was reached across frameworks with respect to defining assumptions behind management actions or explicitly defining the adaptive management process. Finally, all frameworks are challenged by four common issues: time and resources, distinguishing cause and effect as a consequence of actions, closing the gap between intent and action, and the implementation of monitoring. This review suggests that conservation management is becoming more transparent, despite the varied challenges, and frameworks are giving substance to formalized conservation action plans.

2011-12-07 11:45 Temperate and Boreal Rainforests of the World: the Forgotten Rainforests

DellaSala, D.A.*, *Geos Institute;*

Temperate and boreal rainforests are restricted geographically to just ten regions of the world where they make up about 2.5 percent of the planet's total forest cover. They occur primarily along coastlines and are biogeographically and climatically distinct from tropical rainforests, which are six times more numerous. Temperate and boreal rainforests represent some of the most carbon-dense ecosystems on the planet, contain the tallest and oldest trees on earth, have many unique and ancient species, and generally are highly productive due to the overlap of terrestrial, marine, and freshwater systems. Collectively, they store the equivalent of about six times humanity's annual carbon dioxide emissions yet they are not part of global accords to limit emissions from forest degradation and deforestation (e.g., REDD). Only 14 percent have been protected in legally enforced reserves and many areas (e.g., Europe, coastal redwoods, Pacific Coastal USA) are highly fragmented. In recognition of the UN declaration on the International Year of Forests, protection of all the world's rainforests should be greatly increased as part of sustainability efforts and for their biodiversity and ecosystem services, particularly long-term carbon storage and drinking water.

2011-12-07 14:30 Presidents Roundtable on International Year of Forests

DellaSala, Dominick A.*, *SCB North America Section;* **Dieterich, Martin,** *SCB Europe Section;* **Dovie Delali, Benjamin,** *SCB Africa Section;* **Majiluf, Patricia,** *SCB ANA Section;* **Nemtzov, Simon,** *SCB Asia Section;* **Watson, James,** *SCB Oceania Section;*

2011 marks the International Year of Forests. In recognition, SCB's Section Presidents have prepared a statement on the world's forests along with 12 recommendations for sustainable management that will be presented in this public forum. In general, SCB urges the UN and its member nations to: (1) acknowledge that additional net loss of quality or quantity of forests cannot occur without severe long-term loss of ecosystem services; (2) enhance the conservation of critical forest ecosystems and the services; (3) ensure protection of old-growth and intact forests; (4) establish a representative and functionally connected network of conservation areas with responsible management in the surroundings; (5) provide adequate resources for all nations to monitor and enforce protection of existing reserves; (6) increase funding and participation in global deforestation and forest degradation reduction; (7) adopt science-based carbon accounting methods; (8) ban trade in illegally harvested forest products; (9) monitor changes in forest quality; (10) encourage independent science-based assessments of certification schemes; (11) include in the protection and use of forest resources the rights of indigenous peoples; and (12) empower an Inter-Governmental Science-Policy Platform on Biodiversity and Ecosystem Services to foster better use of the best available science and improved forest management.

2011-12-07 14:45 Forests in the Spotlight: International Year of Forests

DellaSala, Dominick A.*, *Geos Institute;*

Forests cover about a third of the earth's terrestrial surface, support over 80 percent of its biodiversity, play a pivotal role in climate change mitigation, and provide countless other ecosystem benefits. In recognition of the need to sustainably manage forests and their services, the United Nations has declared 2011 "International Year of Forests." In addition, the Food and Agricultural Organization of the United Nations released its global forest resources assessment that includes country-specific forest metrics. This and other assessments indicate that while deforestation has slowed in the past decade, it remains alarming high in South America and Africa. Over half of the world's intact (no roads) forests are gone, and 40 million ha of primary forests were eliminated in the last decade. About 54 percent of the world's forests are in production and multiple use management while just 13% are strictly protected. Even countries that showed increases in broad measures of forest cover (e.g., the United States) suffered losses to old growth and intact forests. I present twelve recommendations that form the basis of a forest proclamation approved by SCB's regional sections, policy committee, and science and publications committee and was submitted to the UN and other forest policy entities.

2011-12-07 11:30 Effective conservation of an endangered newt species (Triturus cristatus): determinants from local to landscape scales

Denoel, M*, *University of Liege;* **Perez, A,** *University of Liege;* **Ficetola, GF,** *University of Milano;*

Despite numerous European and national action plans, the great crested newt continues to be one of the most declining amphibian species in Northern Europe (Habitat Annex II species). It is considered as a good

bioindicator of both aquatic and terrestrial environments but the respective influences of the varied ecological determinants of its occurrence are still not clear. Our aim was to determine its regional decline and abundance at varied scales. To this end, we surveyed ponds in a representative agricultural area that was affected by habitat change over the last decades (Pays de Herve). We used GLMs and an information-theoretic approach to identify habitat features allowing high abundance of newts. The great crested newt was positively associated with large and deep ponds, oligotrophic waters, abundant aquatic vegetation, low fish presence, and numerous wetlands and open landscapes (particularly orchards) at close range. Similarly to other European regions, all these environmental features are locally deteriorating. Loss of favorable habitat is likely the cause of the observed decline: 50% of populations disappeared in about 10 years in the studied area. To make effective the conservation of this endangered species, action plans should include preserving networks of ponds within the species dispersal ability, decrease the input of nutrients, manage pond structure to offer enough place and vegetation (shelter and egg laying place), and prevent alien fish introduction.

2011-12-09 10:45 A Novel Approach for Global Mammal Extinction Risk Reduction

Di Marco, M*, *Department of Biology and Biotechnology, Sapienza University of Rome, Viale dell'Università 32, 00185, Roma, Italy.;* **Cardillo, M,** *Centre for Macroevolution and Macroecology, Research School of Biology, Australian National University, ACT 0200, Canberra, Australia.;* **Possingham, HP,** *School of Biological Sciences, The University of Queensland, St. Lucia, 4072, Queensland, Australia.;* **Wilson, KA,** *School of Biological Sciences, The University of Queensland, St. Lucia, 4072, Queensland, Australia.;* **Blomberg, SP,** *School of Biological Sciences, The University of Queensland, St. Lucia, 4072, Queensland, Australia.;* **Boitani, L,** *Department of Biology and Biotechnology, Sapienza University of Rome, Viale dell'Università 32, 00185, Roma, Italy.;* **Rondinini, C,** *Department of Biology and Biotechnology, Sapienza University of Rome, Viale dell'Università 32, 00185, Roma, Italy.;*

With one fifth of the world's mammals being threatened with extinction and limited conservation budget to save them, adopting an efficient conservation strategy is crucial. Previous approaches at setting spatial conservation priorities at a global scale assumed all species to have an equal conservation value or they were focused on species with a high extinction risk, species that may be hard to save. We take a new approach and focus on species having the greatest opportunity for recovery using a new conservation benefit metric, the Extinction risk Reduction Opportunity (ERO). This metric considers both the current level of threat, and the potential for recovery of each species (related to its intrinsic risk of extinction). We found that 65-87% of all threatened and potentially recoverable species would be disregarded using other approaches. We also found that less than 10% of priority areas (mainly in South America and South-east Asia) for reducing mammal extinction risk according to ERO metric are currently protected. While spending money on the most threatened species could be an inefficient way of allocating limited conservation funds, ERO metric allows to identify threatened and potentially recoverable species. Optimizing extinction risk reduction provides a cost-efficient solution to minimise species losses.

2011-12-08 15:30 Real-world conservation planning: maximizing economic return to guarantee biodiversity persistence

Di Minin, E.*, *Durrell Institute of Conservation and Ecology (DICE), School of Anthropology and Conservation, University of Kent, Canterbury, UK;* **Slotow, R.,** *Amarula Elephant Research Programme, School of Biological and Conservation Sciences, Westville Campus, University of KwaZulu-Natal, Durban, RSA;* **MacMillan, D.C.,** *University of Kent, Canterbury, UK;*

Socio-economic and political factors affecting biodiversity persistence are rarely included into conservation planning. Furthermore, most conservation plans that consider economics largely frame their models in terms of cost-effectiveness of alternative plans, but this approach is not relevant to the real world where biodiversity conservation is increasingly determined by market forces rather than land purchase. The Maputaland-Pondoland-Albany hotspot plays a crucial role in the recovery of the critically endangered black rhino and the endangered African wild dog, as well as other biodiversity, but current protected area (PA) network was not developed to guarantee their long-term persistence. Local conservation authorities have limited financial resources and recognize the importance of involving private and communal landowners to expand the PA network. However, little information is available on most suitable areas for re-introduction and their financial viability from conservation operations compared to competing land uses. Species distribution models were first used in combination with metapopulation models to identify most suitable areas for the re-introduction of African wild dog, black rhino, cheetah, elephant, leopard and lion and to calculate the total number of individuals that could be supported by the same. A choice experiment approach was then used to evaluate tourists' preference for different big game species, including the Big Five, and develop best marketing strategies. Investment returns from a range of competing land uses (sugar cane, eucalyptus) were then compared to those from conservation (ecotourism and hunting) in order to select conservation areas with highest ecological and financial viability and set real-world conservation targets for the study species.

MSE in Fisheries: Broadening the scope from single species approaches

Dichmont, Cathy*, *CSIRO Marine and Atmospheric Research;*

Management Strategy Evaluation (MSE) in fisheries is reasonably well established. They have been used in many contexts, but progress can still be made in incorporating a wider range of components other than just target species, such as the effect of fishing on the seabed, species at risk to fishing, or the ecosystem itself. Furthermore, MSE is generally still technically "high-end" when data poor fisheries are common. In this paper, we use two case studies to demonstrate where MSE has made progress. The first example is one in which an MSE is undertaken that includes target species, economic and biological components, the effects of trawling on the seabed and species at risk to trawling. The results show that a target of Maximum Economic Yield actually benefits fishers, but also the environment. The resultant management strategies have been implemented so these strategies can be robust for management purposes. The second example uses a qualitative method with a series of stakeholder groups to develop social, biological, governance and economic objectives. The same group also developed different management strategies and assessed these semi-quantitatively. Analysis of this data clearly highlighted a management strategy that was rated by all stakeholders as producing the best outcomes. This example shows the power of using a stakeholder process to provide their combined knowledge into developing what is essentially a data poor MSE. These two examples show that MSE can be applied in many domains to develop broader management strategies that are still robust to management implementation.

2011-12-07 17:30 Identifying priority targets for conservation under climate change for amphibians and mammals: separating sensitivity from exposure in predicting risk

Dickinson, Maria G*, *Imperial College London; Grantham Institute for Climate Change;*

I will discuss a method to assess species extinction risk from climate change using separate indicators of: (i) the amount of climate change species will face, their "exposure"; and (ii) species' differing abilities to withstand change, their "sensitivity". Sensitivity is derived from the variability in climate species currently experience across their ranges; the magnitude of predicted climate change across each species' range is used to derive exposure. Species "at risk" are those with both high sensitivity and exposure. This method is a move away from the complexity of climate envelope models. It bridges a gap between the need for rigorous global assessments of climate change extinction risk and the current data-hungry methods for predicting that risk. Applying the method to amphibians and mammals reveals overlaps in sensitive species richness across groups, suggesting the potential for landscape-scale conservation targeting of cross-taxonomic sensitivity hotspots. However, these sensitivity hotspots are found in regions with low exposure to climate change. This emphasizes the need to examine sensitivity to climate change separately from exposure, rather than prioritizing areas or species predicted to undergo the greatest magnitude of climate change. Sensitivity hotspots were instead found to be located in areas of high projected habitat loss, showing the importance of incorporating the multiple threats that species will face when identifying priority conservation targets.

2011-12-08 14:00 Human community ecology: making connections for conservation

Dickman, CR*, *University of Sydney;*

Community ecologists routinely investigate interactions between organisms in local or regional areas, drawing arrows between species and assigning symbols to indicate whether they have positive, negative or neutral effects on each other. Similar webs can be constructed to show how scientists, land owners, community groups, politicians and other stakeholders interact with each other and how changing the 'values' of key resources can affect the interaction pathways. In this presentation, I will discuss two examples of large scale conservation projects and examine the interactions that have contributed to their success. In the first, the threat of water diversion for cotton growing in the north-eastern part of the Lake Eyre Basin in central Australia led to the formation of a coalition of land owners, scientists, resource economists and others who saw the cotton proposal defeated. In the second example, diverse threats arising from fragmentation of habitat, loss of biodiversity and climate change in Australia's Great Eastern Ranges have led to an initiative with 100+ partners that strives to maintain ecological connectivity along the length of the continent's eastern seaboard. In both examples interaction webs show how strong research-community collaborations were initiated largely by external forces and then maintained by common conservation values.

2011-12-07 10:30 Linking ecological research to policy and practice: bridging the gap for wildlife conservation on farmland

Dicks, LV*, *University of Cambridge;* **Sutherland, WJ,** *University of Cambridge;* **Hodge, ID,** *University of Cambridge;* **Peach, W,** *Royal Society for the Protection of Birds;* **Pretty, J,** *University of Essex;* **Scharlemann, J,** *UNEP-World Conservation Monitoring Centre;* **Siriwardena, G,** *British Trust for Ornithology;*

We have developed a framework for two-way communication between researchers and end-users of research. The process involves compiling scientific findings in a way that is accessible and relevant to conservation policy and practice. It should ultimately enable conservation to become consistently evidence-based. Here, we demonstrate the approach in an area of strong interest for European policymakers: biodiversity conservation on farmland. In Europe, farmland is an important wildlife habitat in which biodiversity is continuing to decline. We have built a comprehensive list of 119 interventions to benefit wildlife on temperate European farmland and summarised the scientific evidence for each. We invited over 300 farmers, farm advisers, conservationists, and national and regional policymakers with an interest in farmland wildlife to score the interventions according to importance in policy or practice. Relating their scores to a quantitative measure of the state of scientific knowledge allows us to set research priorities in areas of high importance to end users where there is little current knowledge. We have also assessed how knowledge relevant to conservation policy and practice accumulates with increasing research effort. For a subset of interventions appropriate to lowland arable farms, we have looked in more detail at patterns of knowledge, for example among different groups such as farmers and policymakers.

2011-12-07 15:15 Estimating the Occupancy of Northern Goshawk (Accipiter gentilis) to Inform Forest and Conservation Planning at Landscape and Regional Scales

Dickson, BG*, *Northern Arizona University;* **Sisk, TD,** *Northern Arizona University;* **Sesnie, SE,** *Northern Arizona University;* **Ray, C,** *Northern Arizona University;* **Rundall, JM,** *Northern Arizona University;*

The Northern Goshawk (Accipiter gentilis) is a common forest raptor with a circumpolar distribution. In the US, the species is designated as sensitive in six US Forest Service administrative regions, and is frequently the contentious subject of forest project debate and litigation in the Southwest. There remain uncertainties, however, about relationships among landscape-scale habitat features, management activities, and goshawk populations. We used an expert-based process to compile a database on 572 nest locations across 22,800-km2 in northern Arizona and derive high-resolution data related to forest structure and other habitat attributes. We used a hierarchical spatial modeling and information-theoretic approach to compete expert-defined hypotheses relating goshawk territory occupancy to these attributes. Our results indicated that high canopy-bulk density, intermediate canopy-base heights, and low variation in tree density were among the strongest predictors of occupancy. Model-averaged parameter estimates were used to map probability of occupancy across forested areas in the region and simulate the cumulative effects of management activities on occupancy. Predicted occupancy typically declined in response to simulated silvicultural activities designed to mitigate stand-replacing fire. Our modeling framework integrates across datasets, opinions, and jurisdictions, and is fostering improved collaboration among stakeholders in the conservation of goshawks and their habitat.

2011-12-06 11:45 How do we know its working? The importance of action effectiveness measures for adaptive management and an examination of how it's done within one NGO

Didier, K*, *Wildlife Conservation Society;* **Duda, L.,** *Wildlife Conservation Society;* **Strindberg, S,** *Wildlife Conservation Society;* **Johnson, A,** *Wildlife Conservation Society;* **Watson, J,** *Wildlife Conservation Society;*

Explicit measurement of the effectiveness of actions is the linchpin of adaptive management. Using a broad survey of staff and four case-studies, we evaluate how projects within the Wildlife Conservation Society (WCS) currently measure effectiveness of their actions. WCS is a global organization, with about 500 projects in 60 countries. While nearly 90% of respondents (n = 75) indicated that monitoring was "critical" or "very important", only 48% measure biodiversity (n=54), 43% measure threats (n=56), and 18% measure factors contributing to threats (n=55) in a "planned and consistent fashion". Less than 16% measure all three aspects in a "planned and consistent fashion". Our case studies, including a tropical forest in Lao PDR, a marine coral reef in Belize, a temperate grassland in Argentina, and a temperate grassland in Mongolia, demonstrate the range of situations in WCS, from advanced monitoring to projects that do not yet practice much explicit effectiveness monitoring. While some projects are advanced in their abilities to monitor biodiversity, and hence develop an overall sense of project effectiveness, very few design their monitoring to examine whether particular actions work or measure factors which contribute to threats. We also explore challenges that projects face in measuring effectiveness, including poor funding for monitoring and lack of training.

2011-12-09 11:00 Identifying priority areas for conserving biodiversity across 830,000 km2 of Patagonian steppe and monte, Argentina

Didier, K*, *Wildlife Conservation Society;* **Chehebar, C,** *Administración de Parques Nacionales ;* **Tammone, MN,** *Project "Identificación de áreas de alto valor para la biodiversidad en Patagonia Árida";* **Novaro, A,** *CONICET-INIBIOMA and WCS Patagonian and Andean Steppe Program;* **Ibañez, M,** *The Nature Conservancy, Southern Andes Program;* **Iglesias, G,** *The Nature Conservancy, Southern Andes Program;* **Walker, S,** *WCS Patagonian and Andean Steppe Program;* **Funes, M,** *WCS Patagonian and Andean Steppe Program*

Arid Patagonia encompasses steppe and monte ecosystems, which are grossly underrepresented in protected areas and have received very little attention from conservation organizations. We recognized a need for a conservation planning tool based on existing and future information on the distribution of biodiversity in arid Patagonia. Convening a workshop in 2008, we obtained the collaboration of 25 scientists from 12 institutions, as well as representatives from government natural resource agencies of all Patagonian provinces, to participate in the development of this tool. This diverse group of actors consensually chose relevant biodiversity targets, based on endemism, rarity, and level of threat, and set priorities among these targets within each taxon and desired levels of representation. We built an ArcGIS database of data provided by the collaborators on the distribution of 518 biodiversity targets, and used the program Marxan to identify a network of areas across the Patagonian steppe and monte that adequately represents the targets according to the established priorities and levels of representation. This database will be maintained by Argentine National Parks, and can be updated as needed. It can be used by government agencies, NGOs, and private companies or individuals to plan protected areas, implement conservation activities on lands between protected areas, or in environmental impact assessments, to help ensure the conservation of a wide range of Patagonian biodiversity.

2011-12-09 15:15 Water Producer: Enhancing The Decision Public Policy Component Based On Strategy Measures In A Brazilian Water Fund

DIEDERICHSEN, ANITA*, *The Nature Conservancy;* **Veiga Neto, Fernando,** *The Nature Conservancy;* **Guimarães, João,** *The Nature Conservancy;* **Petry, Paulo,** *The Nature Conservancy;* **Padovezi, Aurélio,** *The Nature Conservancy;* **Araujo, Albano,** *The Nature Conservancy;* **Benini, Rubens,** *The Nature Conservancy;* **Klemz, Cláudio,** *The Nature Conservancy*

The Water Producer Strategy financially compensates landowners who carry-out conservation and restoration activities in key areas of their properties such as along riparian areas, in headwater areas and on steep slopes, based on a payment for ecosystem service approach (PES). The Nature Conservancy's long-term objective is to create a reliable water-services-based revenue stream that will ensure forest conservation and restoration in Atlantic Forest and Cerrado Brazilian hotspots on a scale that will be meaningful for nature and people. It is expected 500,000 hectares until 2015 in these biomes under this strategy. Since we started our work in 2006 we have been improving our strategy measures and also the implementation of a framework to monitor the conservation and ecosystem services results, using field information and also modeling. Our assessment of the strategy´s measures have been supporting our decision making, especially in guiding the amount of effort and investment necessary to generate the expected results in each of the implementation steps. Based on the assessment that the PES Public Program delivers large scale results (mobilizing U$9 million/year), we learned that the strategy needs dedication to generate not only on the ground demonstration results but also a strong amount of investment in building policy and increasing the state execution capacity and on the development of financial mechanisms behind the payment of the ecosystem service scheme.

2011-12-07 16:45 Exploring the impacts of social and biological indicators on beliefs about local effects of climate change

Dietsch, AM*, *Graduate Research Assistant, Colorado State University;* **Manfredo, MJ,** *Professor & Department Chair, Colorado State University;* **Teel, TL,** *Associate Professor, Colorado State University; President of Social Science Working Group, Society for Conservation Biology;*

Recent studies reveal a decline in people's beliefs that climate change is real (e.g., Pew Research Center, 2009). Successful action to address climate change is linked to public acceptance, which raises questions about what factors affect people's thoughts on the subject. Would evidence of real environment change have an impact? How much influence do ideological variables have? In response to these questions, our study in the Western U.S. explored the extent to which beliefs about local impacts of climate change can be explained by biological (e.g., temperature variation) and social indicators (e.g., values). Results show that residents' beliefs about whether climate change is affecting their local environment were significantly related to their value orientations toward wildlife and nature and less related to recent precipitation and temperature differences from 30-year normals. For example, residents who characterized wildlife as capable of relationships of trust with humans and deserving of rights and caring were more likely than those with a utilitarian orientation toward wildlife to think that climate change is having local impacts. Findings suggest that understanding people's more fundamental values is critical to communicating with diverse publics and gaining support for solutions aimed at solving complex conservation problems such as climate change.

2011-12-06 15:00 Listening and learning: kiwi conservation through calls

Digby, AP*, *Victoria University of Wellington;* **Bell, BD,** *Victoria University of Wellington;* **Teal, PD,** *Victoria University of Wellington;*

Acoustic methods enable the study and monitoring of threatened species that are cryptic, difficult to capture or sensitive to disturbance. One example is the famous New Zealand endemic, the kiwi. We are developing acoustic techniques for little spotted kiwi that can be applied to the conservation of all kiwi species. Calls can be used to vocally identify individuals, and assess phenotypic variation in small, isolated populations. Autonomous recorders enable passive monitoring of remote or sparse populations over long time frames, and have many other diverse applications, such as monitoring breeding behaviour and success. Microphone arrays permit spatial monitoring, allowing assessment of territory and habitat use, and the study of social interactions. We demonstrate the use of these techniques to further understanding of kiwi ecology, and to assist in the conservation of kiwi and other similarly vocal threatened species.

2011-12-07 18:00 Success of Traditional Pastoralists in Enumerating a Low Density, Highly Persecuted Population of African Lions (Panthera leo)

Dolrenry, Stephanie*, *University of Wisconsin, Madison and Living with Lions;* **Hazzah, Leela,** *University of Wisconsin Madison and Living with Lions;* **Frank, Laurence,** *University of California Berkeley and Living with Lions;*

African lion populations are in steep decline, due largely to retaliatory killing by pastoralists and other livestock producers in response to depredation on livestock. As the human population expands, maintaining carnivore populations outside large protected areas increasingly depends upon improved methods for mitigating human-carnivore conflict and improved methods for monitoring carnivore populations. At the same time, pastoralists who are bearing the cost of living with carnivores, need a direct stake in preserving wildlife. We report on the success of a program outside Amboseli National Park in Kenya that employs 25 Maasai warriors, most of them prior lion killers, in enumerating a low density lion population over a 3500 km2 study area. Through traditional and radio tracking, weekly spoor counts, and identification of individually known lions, trained Maasai warriors called Lion Guardians, in collaboration with biologists, have confidently identified the region's population of lions. The warriors were 83% accurate in individual reports of lion numbers and gender, and approximately 90% correct in identifying individual lions. Since only a few unknown adult lions have been detected in the region since November 2009, we are confident that our count of 46 adults, 7 sub-adults, and 25 cubs represents virtually the entire lion population of the Amboseli ecosystem, a density of 1.5 adults and sub-adults per 100 km2. This study contributes to the growing adaptive management literature by demonstrating the efficacy and accuracy of traditional pastoralists in collecting key ecological data on a large carnivore population.

2011-12-06 12:45 Implementing the New Zealand Marine Protected Areas Policy – a case study from the South Island West Coast

Don Neale*, *Dept of Conservation;*

The West Coast Marine Protection Forum was established in 2005 to recommend marine areas for protection in the South Island West Coast inshore marine biogeographic region. The independent Forum comprised fourteen people who were representative of a range of stakeholders and users, including tangata whenua, commercial fishing, recreational fishing, environment and conservation, education, local community and local government. The Forum was advised and funded by New Zealand government agencies, the Department of Conservation and Ministry of Fisheries. The Forum was primarily guided by the New Zealand government's Marine Protected Area Policy and Implementation Plan, and its associated ecosystem classification and protection standards. Multiple users and diverse interests are a feature of mainland coasts such as the West Coast. Accordingly, the Forum had a strong focus on ensuring public and stakeholder input, and the use of the best available information. In accordance with the MPA Policy, the forum sought to recommend representative coverage of marine habitats within MPAs, while minimising adverse impacts on existing users. The Forum succeeded in recommending marine protected areas at four "primary sites" (each with two or three options) and five smaller "educational showcase sites". In September 2011, the Minister of Conservation directed the Department to proceed with applying for highly protected marine reserves at the five sites, including the four primary sites. The Ministry of Fisheries is to proceed with proposals to prohibit bottom-impacting fishing methods adjoining two of the primary sites. In total, these MPA proposals cover 27085 hectares or 2.1% of the marine environment of the biogeographic region. If approved, they will include three of the four largest marine reserves on the mainland New Zealand coast. It is expected that the necessary legal processes for these proposals under the Marine Reserves Act 1971 and Fisheries Act 1996 will proceed during 2012.

2011-12-07 11:45 Community involvement in the management of a threatened shorebird

Dowding, JE*, *DM Consultants;* **Bryant, S,** *Dept of Conservation;*

The Northern New Zealand dotterel (Charadrius obscurus aquilonius) is a threatened plover endemic to the North Island of New Zealand. The main threats to the taxon are predation by introduced mammals and disturbance during the breeding season caused by human recreational use of the coastline. Without management, the subspecies would decline. The Department of Conservation (DOC) has the statutory responsibility to protect and preserve the taxon, but does not have sufficient resources on its own to manage enough pairs to bring about population growth. Management of a significant portion of the population is now undertaken by individual volunteers, community groups, local government agencies, and a variety of partnerships. The most extensive of these programmes is on Coromandel Peninsula, where the activities of volunteers at 33 breeding sites are overseen by a single professional coordinator funded by a sponsorship agreement. A few sites are managed by DOC, and other sites are monitored. This joint programme currently monitors about 160 pairs of dotterels (about 20% of the estimated global population) at 48 sites. Management has been highly successful at increasing productivity to levels that result in local population growth. This model has obvious applicability in other areas and for other species. The advantages and disadvantages of this type of programme are outlined.

2011-12-07 14:00 Can biotic homogenization be stopped in low intensity agriculture on the large scale?

Doxa, A.*, *CEFE-CNRS;* **Paracchini, M-L.,** *IES-JRC;* **Philippe Pointereau ,** *SOLAGRO;* **Vincent Devictor,** *CNRS-UM2;* **Frédéric Jiguet,** *MNHN;*

Agriculture intensification is prone to drive biotic homogenization in agroecosystems but large scale spatial variations of the phenomenon are still unknown. Low intensity agriculture identified in Europe as High Nature Value farmlands are expected to support high levels of biological diversity and may be an interesting tool in preventing further farmland biodiversity loss. We examine how contemporary composition and dynamics of bird communities in France are related to past changes in HNV farmland within a 30-year period. We conducted a global analysis at the national level and separate analyses for 3 types of farmlands: (i) highly intensified agriculture areas, (ii) areas of relatively recent agriculture intensification and (iii) areas of low-intensity farming identified as HNV farmlands. We revealed that French farmland in its whole is currently subjected to biotic homogenisation processes. However, no such loss was observed in HNV farmland and we obtained indications that these areas are potentially not affected - or at least not at the same pace as elsewhere - by biotic homogenization. Time-lagged species responses to intensification may also explain present distributions in different farmland categories. We identify areas that should be given conservation priority as further biodiversity loss should be expected in some agro-ecosystems.

2011-12-07 18:15 Predicting introduced Pallas's squirrel (Callosciurus erythraeus) expansion in Southern France

Dozieres, A.*, *MNHN UPMC CNRS UMR 7204;* **Lorrilliere, R.,** *MNHN UPMC CNRS UMR 7204;* **Robert, A.,** *MNHN UPMC CNRS UMR 7204;* **Chapuis, J.L.,** *MNHN UPMC CNRS UMR 7204;*

Pallas's squirrel, Callosciurus erythraeus, a native species from Southeastern Asia, has become invasive in most countries where it has been introduced. Few individuals have been released at Cap d'Antibes (Alpes-Maritimes, Southern France) in the late 1960's and since then the population has grown, its range reaching about 1800 ha in 2010. The aim of this study is to compare different scenarios of expansion for this species, based on various scenarios of population management. For this purpose, we developed a spatially explicit individual-based model, which mimics dispersal at the landscape level. The model includes life-history parameters, habitat suitability and carrying capacity estimated in 2009 and 2010 from various methods, including trapping, transect count, and radio-tracking. Reliability of our model was evaluated against existing data on the colonization history of Pallas' squirrels. Projections are accurate and warn against the risk of invasion of this species in Mediterranean landscapes. Our results highlight the importance of such modeling tools in understanding colonization processes of introduced species, and emphasize the need to gather data on life history traits to infer realistic trajectories. Finally, our scenarios will provide management recommendations.

2011-12-06 16:38 Sustainable Forest Management through Community Participation in Rajasthan.

DR.PARUL GUPTA*, *BBD Government College, Chimanpura, Shapura, Jaipur,Rajasthan,INDIA*

In present times the conservation of earth's biodiversity has become more of a social challenge than a mere ecological science. Rajasthan in India is a state with people from different castes, classes and tribes at community level having varied nature and extent of dependence on forest. In the present study, survey was conducted to analyse the efficacy of the Joint Forest Management(JFM) systems in Rajasthan in which forest resources are being managed in collaborative ways. How well are the programs perceived by the local people and what challenges are being faced by such programs ? It was found that even this form of participatory forest management under JFM scheme suffers from some fundamental inadequacies. A range of social engineering tasks need to be undertaken to make such programs more participatory and successful. The same will be discussed in the paper.

2011-12-09 14:32 Approaches to Ungulate Control in New Zealand and United States National Parks

Dratch, PA*, *U.S. Fish & Wildlife Service;* **Hanson, B,** *New Zeland Department of Conservation;*

Control of cervids, both native and exotic, has been a problem in national parks for decades. The effects of elk (wapiti) and other deer species on native vegetation have been demonstrated, but reducing cervid numbers while still protecting the solitude of natural parks has presented unique challenges. Ground shooting and the use of helicopters, a technical advance developed in the remote areas of New Zealand, have successfully reduced or eliminated non-native populations, such as recently implemented at Point Reyes National Seashore. In the last five years, new management strategies have been developed for Fiordland National Park and Theodore Roosevelt National Park that involve members of the public. The Fiordland Wapiti Trust, working directly with the New Zealand Department of Conservation, reduces the red deer and stoat populations to preserve a trophy wapiti hunt and improve conservation values. Over a three month period ending in January 2011, Theodore Roosevelt National Park, working with the North Dakota Game and Fish Department, utilized 181 volunteers to remove 406 elk. This review of deer introductions and population reductions in the national parks of New Zealand and the United States examines the management methods and public involvement that show the most promise for the future.

2011-12-08 18:30 They fought the law and the law won: Impact of legislation on the anthropogenic spread of rusty crayfish

Dresser, CM*, *Central Michigan University;* **Swanson, BJ,** *Central Michigan University;*

Legal policies are often enacted to prevent anthropogenic introductions of invasive species, but it is difficult to prevent natural range expansion following introduction. We evaluated the impact of legislation on the spread of invasive rusty crayfish (Orconectes rusticus) in the United States. We found a significant relationship between the presence of regulations prohibiting the movement of aquatic invasives and the presence of rusty crayfish ($X2=8.6$, $p<0.01$). Of the 23 states with rusty crayfish, 12 have regulations prohibiting movement of live crayfish; however, in 10 of those states legislation was not passed until after crayfish were present. Based on this, legislation passed prior to the invasion has a significant deterrence effect ($X2=7.4$, $p<0.01$), with only 1 of the 12 states being invaded subsequent to legislation enactment. However, crayfish have significant dispersal capabilities (upstream—2 km/yr; downstream—18 km/yr) making it difficult to prevent invasion into new states through shared drainages. We identified 3 states at risk for invasion as early as 2018 through natural range expansion. While it is unlikely that legislation will be able to prevent invasion through shared drainages, regulations may minimize the likelihood of spread into other drainages. Based on our findings, legislation passed proactively is effective in preventing new introductions, but policies are often passed retroactively, limiting their effectiveness.

2011-12-08 18:30 Priorities in policy and management when existing biodiversity stressors interact with climate-change

Driscoll, DA*, *Fenner School of Environment and Society, Australian National University;* **Felton, A,** *Southern Swedish Forest Research Centre, Swedish University of Agricultural Sciences;* **Gibbons, P,** *Fenner School of Environment and Society, Australian National University;* **Felton, AM,** *Southern Swedish Forest Research Centre, Swedish University of Agricultural Sciences;* **Munro, NT,** *Fenner School of Environment and Society, Australian National University;* **Lindenmayer, DB,** *Fenner School of Environment and Society, Australian National University;*

There are three key drivers of the biodiversity crisis; well known existing threats to biodiversity, direct effects of climate-change, and interactions between these two. In this presentation we describe the policy and management responses that are needed to minimise the impacts of these interactions and to avoid perverse outcomes of misguided climate-change adaptation measures. Renewed management and policy action that address known threats to biodiversity are a priority. An appropriate response to climate-change will include a reduction of land clearing, increased habitat restoration using indigenous species, a reduction in the number of exotic species transported between continents or regions of endemism, and a reduction in the unsustainable use of natural resources. Achieving these measures requires substantial reform of international, national and regional policy, and the development of new or more effective alliances between scientists, government agencies, non-government organisations and land managers. Furthermore, new management practices and policies are needed that consider shifts in the geographic range of species, and that are responsive to new information acquired from improved research and monitoring programs. The interactions of climate-change with existing threats to biodiversity have the potential to drive many species to extinction, but there is much that can be done now to reduce that risk at all levels of government.

2011-12-08 14:30 Molecular resolution of model ecosystems for island restoration

Drummond, A., *Department of Computer Science, University of Auckland, Auckland, New Zealand;* **Nelson, N.,** *Allan Wilson Centre for Molecular Ecology and Evolution, School of Biological Sciences, Victoria University of Wellington, Wellington, New Zealand;* **Russell, J.*,** *School of Biological Sciences and Department of Statistics, University of Auckland, Auckland, New Zealand;* **Stevens, M.,** *South Australian Museum, Adelaide, South Australia, Australia;* **Newcomb, R.,** *Plant and Food Research, Mt Albert, Auckland, New Zealand;* **Buckley, T.,** *Landcare Research, Tamaki, Auckland, New Zealand.;*

Island ecosystems are complex, and most of their components, particularly cryptic, small and microbial, remain undiscovered. This presents substantial challenges when managers wish to set restoration targets and monitor whole-ecosystem recovery following conservation interventions. Advances in molecular tools, particularly next-generation sequencing, provide a powerful framework to characterise ecosystems and place their components simultaneously within a phylogeographic and species-abundance context. We demonstrate the utility of these methods in a pilot study characterising a 700 metre elevational gradient on Hauturu (Little Barrier Island), one of the first nature reserves in New Zealand, from which all introduced mammals have recently been eradicated. We show that the resolution of molecular tools is sufficient to distinguish high-levels of inter-plot variability and overall trends across all levels of biodiversity (birds, vascular plants, bryophytes, lichens, fungi, invertebrates, pathogens). On Hauturu we are able to monitor ecosystem recovery following introduced species removal, and also for potential impacts of climate change. These methods provide a suite of tools that reduce the need for costly and/or time consuming expert identification of diversity. We believe they will come to dominate ecosystem characterization in the 21st century, when used in concert with traditional ecological methods.

2011-12-09 12:00 The role of marine protected areas in mitigating climate change and providing ecosystem services

Dudley, Nigel*, *Equilibrium Research;*

The role of marine protected areas in mitigating climate change and providing ecosystem services Following the 10th Conference of Parties of the CBD, signatory governments committed to protect at least 10% of marine areas, a massive increase on the current 7.2% of coastal waters and 3.3% of high seas. Although aimed primarily at halting biodiversity decline, a network of marine protected areas (MPAs) would deliver many additional benefits. Understanding these could help ensure commitments were carried through and might influence the size, location, management and governance of MPAs. We summarise a ten year research project by WWF and the World Bank, which compiled information on wider benefits of the global protected area network. We look at the role of protection areas in securing carbon in mangroves, kelp and sea-grass beds and in open-water plankton; and at the role of coral reefs, marshes and mangroves in protecting against storms and ocean surges. We examine evidence that MPAs can maintain fisheries, by securing spawning and nursery grounds for fish. The recreational values of MPAs are assessed, along with their role in protecting important cultural and sacred natural sites. Some challenges are discussed, with respect to ensuring effectiveness and building and maintaining stakeholder support. We look at the implications of the IUCN protected area definition in a marine context. Finally we end with recommendations for developing a comprehensive and robust global network of marine protected areas, delivering multiple benefits.

2011-12-08 11:00 No Room in the Ark? Climate Change and Biodiversity in the Pacific Islands of Oceania

Duffy, D.C.*, *University of Hawai`i Manoa;*

The Pacific Islands of Oceania face unprecedented anthropogenic climate change within this century. Rising sea levels, increasing ocean acidification, warming land and sea temperatures, increasing droughts, and changes in the frequency and intensity of storms are likely to reorder or destroy ecosystems such as coral reefs, mangrove and montane forests, and coastal wetlands. For the developed nations, an array of measures could ameliorate these effects. Developing nations, whose economies may be significantly damaged by climate change, face major impacts on their citizens, consigning conservation of biodiversity to a backseat. Conservation in these countries may not succeed unless the rich nations are willing to pay for them or where preservation of biodiversity satisfies the needs of local communities, often through traditional management and land tenure systems in rural areas. These communities will need useable information, as well as technical advice on how to reduce stressors on changing ecosystems such as wetlands, mangrove forests and coral reefs if they are going to achieve conservation. The resulting process of conservation of biodiversity may appear inefficient, relative to international expectations, but will be more effective over a wide area if it involves local people.

2011-12-07 14:30 Australia's Great Eastern Ranges Initiative – Connecting People Connecting Nature

DUNN, ROB*, *Great Eastern Ranges Initiative;* **Howling, Gary,** *Office of Environment and Heritage, Department of Premier and Cabinet;* **Pulsford, Ian,** *Global Learning Pty. Limited;*

The Great Eastern Ranges encompass the Great Dividing Range and the Great Escarpment of eastern Australia, stretching over 3,400 km. from the Grampians in Victoria to far North Queensland. Over millions of years, the ranges have provided a refuge for species and ecosystems to survive and evolve due to a wide range of elevations and latitudes with varied landscape and climate zones. Today they contain two thirds of the threatened species in NSW and supply water to over 90% of the population of the eastern seaboard. The Great Eastern Ranges Initiative brings people and organisations together in long-term partnerships to conserve, connect, protect and rehabilitate land along the ranges. The Initiative is a strategic response to mitigate the potential impacts of climate change, land clearing and other environmental stresses along this mega-corridor. Since 2007 the focus has been in five regional areas, each with different partners, stakeholders and social dynamics. Progress has also been made at the continental scale with agencies, researchers and NGOs working together. The Initiative has recently moved from a NSW Government to a community led program and is expanding into Victoria and Queensland. This dual focus, changing leadership and expansion present several challenges, but also provide opportunities for participation and funding. In this context, collaboration is essential, if cross tenure and continental-scale conservation outcomes are to be achieved on a voluntary basis.

2011-12-06 14:15 Exploring benefits of interactions between vultures and famers through multi-agent modelling

Dupont, H*, *CNRS;* **Bobbe, S,** *Centre Edgar Morin;* **Sarrazin, F,** *CNRS;*

The vulture's conservation relies in part on the management of their trophic resources, which is, in Europe, largely linked to farming activities and constrained by sanitary regulations. Feeding vultures can be seen as a beneficial activity both preserving these flagship species and maintaining ecological carcass elimination. We conducted an interdisciplinary framework on carcass removal by vultures in an agro pastoral context, coupling social investigations and ecological data. We developed a multi-agent model in order to investigate the consequences of various local managements of carcass elimination on a population of vultures and on the benefits of such natural carcass removal. Our results underline the advantages of a carcass disposal system directly managed by farmers, called light feeding station. However, the persistence of the vulture population and the associated benefits depend on the utilization of the light feeding stations, relying on the farmers' perceptions of vultures. We will report on the relevance of interdisciplinary approaches and multi-agent modelling for applied research and management.

2011-12-06 15:15 Saving wide ranging species: cheetah and wild dog

Durant, SM*, *Zoological Society of London/Wildlife Conservation Society;* **Purchase, N,** *Zoological Society of London/Wildlife Conservation Society;* **Ogada, M,** *Zoological Society of London/ Wildlife Conservation Society;* **Woodroffe, R,** *Zoological Society of London/Wildlife Conservation Society;*

Cheetah and wild dog are the widest ranging large carnivores in Africa. With home ranges that can exceed 1000km2, these species need massive areas for their survival. Even the best protected areas harbour populations of cheetah and wild dog less than 10% of that of lions and their survival requires a new approach to conservation. This has led to the development of the range-wide conservation process for cheetah and wild dogs, combining the species as they have similar conservation needs, and two species rather than one increases leverage. The process has the ambitious aim of securing the survival of both species across their range in Africa, by engaging support at all levels, from local communities to governments, and establishing capacity for sustainable conservation. Regional strategies have been established for eastern and southern Africa, two regional co-ordinators are in place and 9 countries have developed national conservation action plans. Declines of cheetah and wild dog have been documented from much of their range: cheetah and wild dog are currently resident in less than 15% of their historical range. Here we describe this approach, and outline the current state of conservation for both species, and achievements made.

2011-12-08 18:30 Unexpected genetic population structure in the Kea (Nestor notabilis)

Dussex,N*, *University of Otago, Department of Zoology;* **Jamieson, I. G.,** *University of Otago, Department of Zoology;* **Robertson, B. C.,** *University of Otago, Department of Zoology;*

The Kea (Nestor notabilis) is an endemic alpine parrot of the South Island of New Zealand. After 150 years of persecution, it was fully protected in 1986, but the species is still declining over its whole range. Here I present data from twelve microsatellite markers for 400 Kea from nine populations along the length of the South Island. Kea are known to have considerable dispersal capabilities and are sometimes sighted far from their alpine habitat. It is therefore expected that such a potential for gene flow would make distant populations less genetically differentiated. However, we found a significant isolation by distance (IBD) pattern. Moreover, three distinct genetic clusters were identified with little areas of genetic admixture. Our data suggest that kea population may have been separated during the last glaciations. We discuss possible causes for this unexpected population structure, including social behaviour and call differences as a barrier to dispersal and the "beech-gap" hypothesis.

2011-12-08 11:30 Age matters: Adult and juvenile survival rates will respond differently to climate change

Dybala, Kristen*, *University of California, Davis;*

Established methods exist for identifying the impacts of environmental stressors on demographic processes, yet these methods have rarely been used to project the impacts of climate change. This study examined the effects of weather and density on adult and juvenile survival rates in a population of Song Sparrows (Melospiza melodia) in central coastal California. Thirty years of mark-recapture data (N=4,608) were analyzed to test hypothesized effects of weather on survival, and to calculate expected average adult and juvenile survival rates under several climate change scenarios. Adult survival rates were most strongly and negatively affected by summer precipitation, and secondarily by winter weather. Juvenile survival was also most sensitive to breeding season conditions, but indirectly, through the effects of the previous winter's weather on primary and secondary productivity. Under each of the climate change scenarios, the average adult survival rate is projected to increase, while the average juvenile survival rate is projected to decrease, due to warmer winter temperatures. This approach provides insight into the age group, time of year, and mechanisms that will drive the population's response to climate change, which may warrant further investigation, more detailed monitoring, or even management intervention.

2011-12-07 17:00 Genetic and demographic monitoring of southern right whales, Eubalaena australis, around New Zealand

E. Carroll*, *Laboratory of Molecular Ecology and Evolution, School of Biological Sciences, University of Auckland, Auckland 1010, New Zealand;* **S. Childerhouse,** *Australian Marine Mammal Centre, Australian Antarctic Division, DEWHA, Kingston, Tasmania, Australia;* **N. Patenaude,** *LGL Limited, Environmental Research Associates, King City, Ontario L7B 1A6;* **A. Alexander,** *Marine Mammal Institute and Department of Fisheries and Wildlife, Hatfield Marine Science Center, Oregon State University, Newport, OR 97365, USA;* **D. Steel,** *Marine Mammal Institute and Department of Fisheries and Wildlife, Hatfield Marine Science Center, Oregon State University, Newport, OR 97365, USA;* **R. Constantine,** *School of Biological Sciences, University of Auckland, Auckland 1010, New Zealand;* **S. Smith,** *New Zealand Department of Conservation, Aquatic & Threats Unit, Wellington 6143, New Zealand;* **C.S. Baker,** *Marine Mammal Institute and Department of Fisheries and Wildlife, Hatfield Marine Science Center, Oregon State University, Newport, OR 97365, USA*

In the aftermath of intensive pre-industrial whaling in the 19th century and illegal Soviet whaling in the 20th century, no southern right whale was seen around the coast of New Zealand for over 30 years. However, a remnant population persisted in the subantarctic Auckland Islands. To describe the genetic and demographic status of the Auckland Islands right whales we collected skin biopsy samples during annual winter surveys from 1995-1998 (n=354) and again from 2006-2009 (n=833). DNA profiles, including genetically identified sex, mtDNA haplotype and microsatellite genotype (13 loci) were used to identify individuals and to estimate abundance using genetic capture-recapture. The population was estimated to number 910 whales (95% CI 641, 1354) in 1998, representing <5% of the prewhaling abundance. Here we present an updated (2009) estimate of abundance and trend analyses for the Auckland Islands population across the previous decade.

2011-12-06 15:30 Striving for advances in stoat, feral cat and rodent control

Eason, CT*, *Lincoln University;* **Blackie, H,** *Lincoln University;* **MacMorran, D,** *Connovation Ltd;* **Shapiro, L,** *Connovation Ltd;* **Conole, D,** *University of Auckland;* **Rennison, D,** *University of Auckland;* **Brimble, M,** *University of Auckland;* **Murphy, E,** *Dept of Conservation*

Stoat (Mustela erminea) and feral cat (Felis catus) control is conducted in NZ to protect threatened species, including kiwi, from predation. In 2011 we completed research and registration of a new toxin PAPP (para-aminopropiophenone) for use in meat baits. The registration was underpinned by field trials in blocks of 1,500 hectares of native bush which achieved an 80% - 90% kill of stoats and a 90% kill of a population of 20 radio-collared cats. Experience is being gained with PAPP augmenting trapping to help in the suppression or local eradication of predator populations. Trials are being completed in 2011 with resettable, long-life, toxin delivery systems. These devices deliver a spray of paste to the abdomen

which is then licked and eaten. PAPP represents the first of a new class of active ingredients which have humaneness and low risk of bioaccumulation. PAPP is partially selective for cats and stoats but is not toxic to rats (Rattus Novegivus). Using PAPP as a lead compound, we have systematically designed novel chemistries, completed synthesis of >50 different compounds and tested their potential to be a PAPP-like rodenticide. To date we have identified one compound that comes close to meeting the performance criteria for a candidate rodenticide and further designs will be synthesized and tested to see if a more potent analogue can be developed for rodent control.

2011-12-09 14:15 Spatio-temporal changes in the landscape structure of old-growth forests in northern Sweden

Ecke, F, *Research Assistant;* **Magnusson, M*,** *Postgraduate Student;* **Hörnfeldt, B,** *Professor;*

Altered forest landscape structure has been suggested as a possible cause to the decline of several forest specialist species in Fennoscandia. For the first time, we present a detailed time series of landscape changes in 1954-2005 of 16 5x5 km landscapes in boreal Sweden, based on aerial photo interpretation. We divided the studied area into a western (inland) and an eastern (coastal) part based on different timing of landscape changes. Mean patch area of old-growth forest declined from a mean of about 90 ha in 1954 to 10 ha in 2005 in the inland and from 30 ha to ca. 5 ha in the coastal area. Forest types that are important for several forest specialist species have been fragmented and declined in for example mean patch size. For common vegetation types such as mesic and moist coniferous forest, similar changes in landscape structure occurred in all landscapes. In contrast, changes in the landscape structure of rare forest types such as dry, lichen rich coniferous forest and wet coniferous were restricted to particular 5x5km squares. In the coastal areas, clearcuts in 1954 made up ca. 10% of the whole landscape and today clearcuts cover more than 40%. In contrast and accordingly, old-growth forests covered about 60% of the total landscape in 1954, compared to about 28% in 2005. In future studies, our detailed landscape data can be used to verify if changes in the forest structure in northern Sweden are indeed the cause for the decline of several forest specialist species.

2011-12-09 14:36 Impact of landmines on the Environment and Biodiversity, the case of Tigray, Ethiopia

Edem eniang *, *university of uyo, Nigeria;* **Amleset Haile ,** *Mekelle University, Ethiopia ;* **Teshale Yihdego,** *Tigray research center ;*

Africa is reputed to the most heavily mined continent in the world. Tigray region, Ethiopia is a vast sensitive and fragile dry-land with great potential for biodiversity conservation and ecotourism. the kafta Humera Wildlife reserve,Northwestern Tigray, Ethiopia offers a critical case in point demonstrating the conservation impacts of land-mines. Although the region development organization has intended to develop the area for wildlife preservation during the late 1960s, the site was not assessed for about thirty years due to the border war conflict which left the reserve and its biodiversity in serious problems. Ground survey and elephant aerial survey indicated that a number of larger ungulates have been found dead in unexpected circumstances in the reserve and land-mines are suspected since carcasses of smaller mammals have not been found in the area. Thus,the continues field evidence showed that human pressure couped with abandoned mines have impacted directly on the migratory large mammalian populations of the reserve. Carcass of elephants have been discovered in the reserve in recent years with their tusks intact. Despite the risk of land-mines especially in the war affected areas, all effort must be made to de- mine the reserve, this will ensure the conservation of the kafta humera wildlife reserve for obvious environmental and conservation as well as social benefits.

2011-12-07 12:00 Status and Trends of High Conservation value forests in Africa

Edward N. Mwavu*, *Makerere University;*

The African continent is home to forests of high conservation value featuring high levels of flora and fauna endemism that include the Albertine Rift, Congo Basin, Eastern Arc Mountains, Madagascan, and the coastal Mangroove forests. In most parts of Africa large proportion of the human population depends entirely on natural resources (including forests) for their livelihoods leading to increasing competing demands for utilisation, development and sustainable management. For these reasons there are increasing concerns of forest degradation and loss of forest cover. The study examines the causes of changes in forest cover and quality; and their implications for biodiversity conservation and human well-being.

Date 15:00 Data-poor management of African lion hunting: how to set quotas when the population size is unknown

Edwards, CTT*, *Imperial College London;* **Bunnefeld, N,** *Imperial College London;* **Balme, G,** *Panthera;* **Milner-Gulland, EJ,** *Imperial College London;*

Sustainable management of lion (Panthera leo) hunting requires managers to set quotas restricting annual offtake. This has to take place in the absence of reliable information on the population size and as a consequence quotas are often set in an arbitrary fashion. In this investigation we show how trends in a proximate indicator of lion abundance can be used to set quotas in a sustainable manner. A simple algorithm is developed to convert changes in the number of safari days required to kill a lion into a quota for the following year. This was tested against a simulation model of population dynamics, accounting for both demographic and observational uncertainty, and shown to reliably set quotas at a sustainable level.

2011-12-08 18:30 DNA-Based Identification of Frog Remains in Mammalian Predator Stomach Contents

Egeter, B*, *Department of Zoology, University of Otago, PO Box 56, Dunedin 9054, New Zealand;* **Robertson, BC,** *Department of Zoology, University of Otago, PO Box 56, Dunedin 9054, New Zealand;* **Bishop, PJ,** *Department of Zoology, University of Otago, PO Box 56, Dunedin 9054, New Zealand;*

Amphibians are declining worldwide and introduced predators are generally accepted as major agents of this decline. Wildlife management decisions regarding the control of introduced predators to protect endangered species are often based on data derived from predator diet studies. However, visually identifying frog remains in stomach contents of small mammals was found to be unreliable. We aimed to develop a technique that would reliably detect anuran remains in small mammal stomach contents. Species-specific genetic primers were developed for three frog species. Feeding trials were conducted whereby hedgehogs (Erinaceus europaeus) and Norway rats (Rattus norvegicus) were presented frogs (Litoria raniformis) as food items and subsequently euthanized at predetermined time intervals. Kill-trapping for wild mammals in frog habitat was also undertaken. Stomach contents from all predators were subjected to both visual and PCR analysis. Identification of prey remains was substantially more successful using the DNA-based technique. The half-lives of prey DNA detection in hedgehogs (5.8 h) and rats (5.72 h) suggest that prey DNA is amplifiable for the vast majority of the gastric emptying period. In the wild, hedgehogs were identified as predators of L. raniformis and ship rats (Rattus rattus) as predators of the critically endangered Archey's frog (Leiopelma archeyi). This approach has the potential to be widely applicable to other mammalian predation studies.

2011-12-08 14:36 Impacts of human recreation on conservation of plant diversity in protected desert meadows

El-Bana, M.I.*, *Department of Plant Production, College of Agricultural & Food Sciences, King Saud University, P.O. Box 2460, Riyadh 11451, Saudi Arabia;* **Assaeed, A.M.,** *Department of Plant Production, College of Agricultural & Food Sciences, King Saud University, P.O. Box 2460, Riyadh 11451, Saudi Arabia;* **Al-Rowaily, S.L.,** *Department of Plant Production, College of Agricultural & Food Sciences, King Saud University, P.O. Box 2460, Riyadh 11451, Saudi Arabia;*

The meadows in arid and semi-arid regions are unique habitats for several rare, endangered and endemic plants and animals. In the hyper-arid central region of Saudi Arabia, they represent the natural recreational parks with high conservation value for plant diversity. The intensive human activities such as uncontrolled visitation, off-road vehicles, camping, trampling and fire-wood cutting have led to habitat fragmentation and severe impacts on native vegetation composition and diversity. This was associated with the spread and dominance of some ruderal weeds such as Malva parviflora and Cynodon dactylon. In addition, off-road vehicles especially 4-wheel

drive led to great soil loss by wind and water erosion. We conclude that recreational impacts have great ecological consequences on conservation and management of plant diversity, especially in arid fragile environments that are sensitive to disturbance.

2011-12-09 14:00 Genetic issues in fragmented populations

Eldridge, MDB*, *Australian Museum;*

Habitat loss and fragmentation is a leading cause of global biodiversity loss. As remaining natural areas become increasingly fragmented, the continued survival of populations confined to these isolated habitat patches is uncertain, as small population size and isolation will increase their probability of extinction through demographic, environmental and genetic stochasticity (inbreeding and loss of evolutionary potential). Populations naturally occurring on offshore islands are a useful model system, as they are often small, have been isolated for hundreds of generations and have proved highly vulnerable to extinction. It is becoming increasingly clear that in small, isolated population, the loss of genetic diversity (=evolutionary potential) through random genetic drift and increased inbreeding elevates the risk of population extinction. Although these negative effects can be overcome by restoring gene flow, this occurs infrequently in practice, often due to concerns about outbreeding depression. As a consequence the current genetic management of most fragmented populations is inadequate and isolated populations of many plant and animal species will unnecessarily go extinct, largely for avoidable genetic reasons. The effective genetic management of recently fragmented populations requires an improved ability to predict the risk of outbreeding depression, increased understanding of optimal gene flow and planning for the impacts of global climate change.

2011-12-08 18:30 Conservation of Rhododendron (Ericaceae) in the Himalayas of Northwest Yunnan Province, Southwest China

Elizabeth Georgian*, *University of Wisconsin-Madison;*

This study focuses on the evolutionary relationships and ethnobotany of Rhododendron species and works to conserve ethnic knowledge and biodiversity in the hotspot of northwest Yunnan Province, southwest China. The untangling of the evolutionary relationships of Rhododendron subsection Neriiflora will allow for determination of how species will respond to environmental changes, habitat degradation/loss and climate change. Evolutionary relationships will be studied using traditional phylogenetic methods. Relationships within R. subsection Neriiflora and between closely related subsections call for a revision. Assessing the ethnobotanical importance of Rhododendron species to Yunnan natives will allow for observation of the role Rhododendron plays in the daily life of the region's population and what, if any, conservation measures are employed. To collect ethnobotanical information key informants will be located through snowball sampling and informal and semi-structured interviews will be conducted. In Yunnan, the ever-present rhododendrons play a role in everyday life and constitute ethnic knowledge, but in some cases their use is not sustainable. An alternative education program designed in collaboration with a Chinese colleague will be employed to work towards preserving indigenous Tibetan ethnobotanical knowledge and biodiversity. This program will allow students to share knowledge about plants and to foster a feeling of pride towards ethnic knowledge and traditional culture. In many cases ethnobotanical information is not being transmitted to young generations.

2011-12-08 18:30 Secondary succession and factors determining change in soil condition from fallow to savannah in Sudanian Zone

Emeline P.S., ASSEDE*, *Université d'Abomey-Calavi, Faculté des Sciences Agronomiques, Département d'Aménagement et de Gestion de l'Environnement;* **Aristide C., ADOMOU,** *Université d'Abomey-Calavi, Faculté des Sciences et Techniques, Département de Biologie Végétale;* **Brice, SINSIN,** *Université d'Abomey-Calavi, Faculté des Sciences Agronomiques, Département d'Aménagement et de Gestion de l'Environnement;*

Land demand for agriculture in Sudanian Zone remains one of the greatest threats to their integrity in Africa. This work aimed to assess factors determining change in soil properties during fallow stage and it transition to savannah in Sudanian Zone of Benin. Fallow vegetation was stratified by age. Phyto-ecological inventories were performed within plots of 30 m x 30 m. Soil physico-chemical properties were determined in fallows that most represent the succession phases. Numerical vegetation data analyses resulted in four fallow types corresponding to the 4 succession phases empirically recognized. The first phase was characterized by the proliferation of large geographical spreading species that disappeared by the third phase. It exhibited the highest species richness with 18.6% exclusive to this stage. The transition from the first to the second phase was characterized by the disappearance of 77% of the overall species richness. The soil in the early succession presented a low value of organic carbon (1.4%), total nitrogen (0.067%), and organic matter (2.42%). After 8 years of fallow, very little quantitative changes occur in soil condition. The presence of Andropogon gayanus var. bisquamulatus, the importance of Leguminosae and Combretaceae made the third phase the ecological optimum for soil fertility recovery.

2011-12-08 18:30 Effects of habitat fragmentation on a sacred population of critically endangered Monkey (Cercopithecus sclateri) in Nigeria

Eniang, Edem A.*, *Dept. of Forestry and Wildlife, University of Uyo, Akwa Ibom State, Nigeria.;* **Egwali, Edwin C.,** *Dept. of Zoology, University of Uyo, Akwa Ibom State, Nigeria.;*

Effects of habitat fragmentation on a population of critically endangered Monkey (Cercopithecus sclateri) Nigeria were studied between 2000 and 2010 to determine population trends following large-scale habitat destruction and fragmentation. Several methods (broad /rapid sweeps) in conjunction with transect walks with pairs of observers searching in a zig-zag fashion within the forest. Observations were recorded on standard primate survey data sheets and subjected to analysis using descriptive/ inferential statistics. Results indicate that group sizes decreased insignificantly but significantly larger numbers of sub-adults and females carrying infants per foraging group. Total Population however increased by approximately 20% from estimated 148 in 2000 to 178 in 2010. A significant increase in infant to adult -female ratio and the observation of a first ever twin-birth in this species during mid-2010 suggested an expanding population possibly due to impacts of community –based primate conservation initiatives which began in 2004. Despite habitat disturbances, the monkeys' apparently adapted to shrinking habitat and extended foraging areas to farms and orchards thereby bringing conflicts to human populations. Community sensitization, participatory forest regeneration using indigenous multipurpose-tree species with robust conservation action plan are recommended for conservation.

2011-12-09 17:00 Historic Data Informs Dynamics of Bird Distributions in Response to Climate Change

Epanchin, PE*, *University of California, Berkeley;* **Beissinger, SR,** *University of California, Berkeley;* **Moritz, C,** *University of California, Berkeley;*

Many species have been predicted to experience range shifts in response to climate change and other anthropogenic factors. We used empirical data to test the effects of climate change and land use change over the last 100 years on the distributions of over 90 songbirds in the California Coast Range (USA). Seventy sites were first surveyed between 1910 and 1940 and were resurveyed in 2009 and 2010. We used occupancy models to provide unbiased estimates of detectability, occupancy, colonization, and extinction. We used these models to test the effects of climate change on the distributions of over 90 bird species and compared these results to the current understanding of how species respond to climate change. While climate change was an important factor in explaining distributional shifts in some species, it did not explain occupancy patterns observed for others. Although these 70 sites did not undergo urbanization or gross habitat alteration between the two survey eras, varying degrees of habitat change did occur. Some species responded positively, while others responded negatively to measures of human alterations to the landscape. Our results illustrate that empirical historical data can be an important resource for understanding how species respond to various human-induced changes to their environments.

2011-12-08 14:45 Optimal Surveillance and Eradication of Invasive Species in Heterogeneous Landscapes

Epanchin-Niell, Rebecca*, *Resources for the Future;* **Haight, Robert,** *US Forest Service Northern Research Station;* **Berec, Ludek,** *Biology Centre of the Academy of Sciences of the Czech Republic;* **Kean, John,** *AgResearch Lincoln;* **Liebhold, Andrew,** *US Forest Service Northern Research Station;*

Cost-effective surveillance strategies are needed for rapid and effective responses to new biological invasions and must account for tradeoffs between detection and control expenditures. We develop a spatially implicit probabilistic size-class model of pest colony dynamics that we employ to determine optimal surveillance efforts across a heterogeneous landscape (i.e., the surveillance effort that minimizes the total expected costs of new invasions). In contrast to previous studies, our model allows for stochastic invasion establishment and detection, does not assume knowledge of the current invasion state on the landscape, and allows for repeated invasions over time. We show how optimal surveillance depends on invasion and regional characteristics and that accounting for heterogeneity across subregions can greatly reduce management costs. We also evaluate the effect of a region-wide trapping budget on total management costs and optimal trapping densities. Our approach and the tradeoff between surveillance and eradication are inherent to the management of most biological invasions. We illustrate our approach, however, by applying it to the problem of detecting and eradicating isolated gypsy moth (Lymantria dispar) colonies in California, USA.

2011-12-09 14:00 Natural Community Conservation Planning: A quantitative assessment of the factors that lead to successful conservation planning in California

Erickson, PB, *UC Davis;* **Deiner, KL*,** *UC Davis;* **Lubell, M,** *UC Davis;* **Schwartz, MW,** *UC Davis;*

This research aims to identify factors that might foster successful implementation of Natural Community Conservation Plans (NCCP) in California. NCCPs are an innovative approach to dealing with the seemingly irreconcilable tradeoff between conservation and economic growth and development. NCCPs are designed to foster proactive biodiversity conservation while simultaneously streamlining the permitting processes for economic growth and development. Since the program began, planning efforts have covered over 300 species, many of which are threatened or endangered, and conserved over 6 million acres of habitat using adaptive management and ecosystem-focused conservation principles. Only 38% of plans initiated in California have been approved, however, with some plans in development for over a decade. We evaluated variables pertaining to demographic, ecological, governmental and financial components of NCCPs to determine whether certain factors emerge as predictors of success in plan implementation. Additionally, we surveyed elected officials in California to assess their opinions regarding value of NCCPs in addressing land use decision. Our results showed that successfully implemented plans differed from failed plans in some notable ways, including the percentage of land used for agriculture, population density, the political opinions of elected officials, and the organizational structure used for planning. These results can be a useful tool for recognizing potential pitfalls in the NCCP process. As the practice of regional, long-term conservation planning continues to spread within and beyond California, quantitative analyses of the planning process, such as we provide here, will be increasingly important.

2011-12-09 11:30 Land cover change and human population trends in the Serengeti ecosystem, Tanzania from 1984-2003

Estes, AB*, *University of Virginia;* **Kuemmerle, T,** *Potsdam Institute for Climate Impact Research;* **Radeloff, VC,** *University of Wisconsin - Madison;* **Shugart, HH,** *University of Virginia;*

The growth of human populations around protected areas in developing countries accelerates land conversion and isolates protected areas, negatively impacting biodiversity and ecosystem function. Population growth can be exacerbated by immigration either due to factors pushing people from their origins, or economic opportunities drawing them to protected areas. Counteracting isolation requires conservation of buffer areas and corridors, and necessitates a better understanding of the interactions between immigration and land conversion. Our goal was to better understand the reasons for human population growth and land cover change around protected areas. We examined agricultural expansion in the greater Serengeti ecosystem from 1984-2003, and related trends in expansion to trends in human demography. We found that agricultural expansion was greatest closer to the protected area, coinciding with the highest rates of human population growth. We also found that expansion was inversely related to the extent of stable agriculture and to human population density, indicating that people moved away from areas of high population densities and low land availability, to areas with greater natural resource availability, in particular potential arable land, closer to the protected area. This finding questions prior research that assumed that population increases adjacent to protected areas are higher because of perceived benefits associated with the protected area itself. Information of this kind is essential to the conservation planning of one of Africa's hallmark ecosystems, and should encourage further examination of population growth and land cover trends near protected areas throughout the developing world.

2011-12-08 18:30 Mapping patch connectivity for brushtail possums in Hawke's Bay, New Zealand

Etherington, TR*, *The University of Auckland;*

Invasive species are so widespread and numerous on mainland New Zealand that swift eradication of some species is no longer feasible. Therefore, as control actions to help conserve native species have to be conducted over long periods of time with limited resources, the location of these control actions needs to be prioritised. Ideally potential conservation areas that have a low risk of reinvasion should be favoured, as within these areas lower levels of invasive species may be achieved over time with fewer resources. I present a method that identifies areas across a landscape that are relatively less connected, and therefore potentially at lower risk of reinvasion. Using the concept of patch connectivity and geographic information system cost-surfaces, methods based on graph theory are used to calculate the size of catchment areas from which reinvasion is thought to likely for all locations across a landscape. By producing maps that visualise the catchment area size, it is possible to identify those areas that may be at greater risk of invasion in order to aid decision-making. This approach is demonstrated for the brushtail possum (Trichosurus vulpecula) in the Hawke's Bay region of New Zealand. A clear gradient of relative connectivity is apparent across the landscape, indicating that some parts of Hawke's Bay may be at less risk from reinvasion in the future, and therefore may be more suitable locations for long-term conservation efforts.

2011-12-07 14:12 Spatial prioritization for improved management in the Great Western Woodlands

Evans, MC*, *The University of Queensland;* **Wilson, KA,** *The University of Queensland;*

Effective conservation of biodiversity over large geographical scales must consider the contribution of a range of land uses to protecting species habitats and maintaining ecological processes. Conservation planning analyses have progressed beyond the simple selection of sites for protection within reserves, towards the spatial prioritization of zones with varying degrees of contribution to biodiversity conservation. Despite these advancements, so far little attention has been paid to determining where and what degree of management should be best directed to meet conservation objectives whilst maintaining functional integrity of the landscape. We develop and apply an approach for prioritizing conservation management on a cross-tenure basis within the largest remaining intact Mediterranean woodland in the world: the Great Western Woodlands of south-west Western Australia. We use the conservation planning tool Marxan with Zones to determine an optimal spatial configuration of management zones to achieve conservation targets for biodiversity features and ecological processes, whilst explicitly considering the underlying condition of vegetation across the landscape. We find that incorporating remotely sensed measures of vegetation condition can assist in prioritizing conservation efforts at a regional scale where available biodiversity data may be limited, and for examining trade-offs in meeting alternative conservation and land use objectives.

2011-12-08 18:30 Restoration of a rich fen by topsoil removal: temporal and spatial succession in plants and snails during ten years

Evasdotter, L*, *Dept Plant Ecology & Evolution, Uppsala University;* **Proschwitz, T von,** *Göteborg Natural History Museum;* **Nilsson, D,** *County Administrative Board of Östergötland, Sweden;* **Sundberg, S,** *Dept Plant Ecology & Evolution, Uppsala University;*

Rich fens are nutrient-poor wetland biodiversity hotspots that are threatened in Europe because of e.g. drainage and eutrophication. Still different restoration methods need to be tested, monitored for different organism groups and evaluated. In this case, a former calcareous fen in south-boreal Sweden was targeted for restoration. Most of the site (except for a 0.1 ha remnant) had been drained and cultivated a century ago and finally become abandoned and overgrown by species-poor and eutrophic vegetation. Organic topsoil of 30-40 cm was removed to the calcium-rich mineral soil on 0.5 ha ten years ago. The development was monitored annually in permanent plots regarding vascular plants, bryophytes and snails. The remnant fen acted as a reference and a dispersal kernel for the restoration. For each year the vegetation of the restored area approached that of the reference community. After ten years, almost all rich fen indicating plant species had recolonised the restored area. The main difference was that moss cover was higher and water table more stable in the reference fen. Snail species richness became similar already after three years and the most demanding species had colonized the restored area after nine years. Overall, topsoil removal was successful at this site, as it served both by lowering the soil surface towards the water table and by removing nutrients. The proximity to a dispersal kernel appeared a prerequisite for the quick recovery of the three organism groups.

2011-12-07 12:00 Disease risks and management in Conservation Translocations

Ewen, J.G.*, *Institute of Zoology;* **Sainsbury, A.W.,** *Institute of Zoology;* **Jakob-Hoff, R. ,** *Auckland Zoo;* **McInnes, K,** *Department of Conservation;*

Concomitant with our increasing understanding of the disease risks of translocation programmes, there has been some attempt by wildlife disease professionals over the last 20 years to develop appropriate methods to assess these risks. However considering the scale of the problem measured by the number of wild animals translocated per annum, the literature in this area has been weak. We will provide a brief review of the scope of published literature related to disease impacts in conservation translocations and recommendations from these studies. The evolution of methods in disease risk analysis for the translocation of wild animals has largely grown from similar methods developed for human health and domestic animal movements. While quantitative methods are available, their use in conservation translocations is limited due to our generally poor understanding of the epidemiology of infectious diseases in wild animals and the large number of infectious agents which are co-translocated. The qualitative disease risk assessment is increasingly favoured and is a more widely utilised approach. We will present a basic overview of this approach and highlight its strengths and weaknesses with the aim for stimulating debate and continued refinement.

2011-12-08 18:30 Spatial variability in habitat quality of modified tropical rainforest

Ewers, RM*, *Imperial College London;* **Turner, EC,** *Imperial College London;*

Modified forests are proliferating at the expense of primary forests across the tropics, but that modification is not spatially uniform. Using data from 183 forest plots at the Stability of Altered Forest Ecosystems Project in Malaysian Borneo, we assessed patterns of variability in forest structure across a gradient of primary forest, once-logged forest, twice-logged forest and oil palm plantation of different ages. There is a self-obvious selective removal of large trees along the land use gradient. More importantly, there are significant changes to spatial variability of forest structures. Twice-logged forests varied in structure from near-primary with some large trees through to near-heathland with sparsely distributed small stems. Similar variation in liana density was observed, with some plots heavily infested and others where lianas were virtually absent. The extent of forest damage and spatial variation in habitat quality varied among logging coupes and with time since logging. Oil palm plantations were very homogenous in structure, although there are large differences in microclimate and physical habitat structure depending on the age of the palms. Twice-logged forests harbour significant amounts of primary forest biodiversity, but we show that the term 'twice-logged forest' encompasses a wide gradient of habitat quality. Maintaining biodiversity in these forests will require more attention being paid to variability in the degree of forest damage.

2011-12-09 10:30 Genomics and the Future of Conservation Genetics

F.W. Allendorf*, *University of Montana;* **P.A. Hohelohe,** *University of Oregon;* **G. Luikart,** *University of Montana;*

We will soon have complete genome sequences from thousands of species, as well as from many individuals within species. This coming explosion of information will transform our understanding of the amount, distribution and functional significance of genetic variation in natural populations. Now is a crucial time to explore the potential implications of this information revolution for conservation genetics and to recognize limitations in applying genomic tools to conservation issues. We identify and discuss those problems for which genomics will be most valuable for conservation and curbing the accelerating worldwide loss of biodiversity. We also provide guidance on which genomics tools and approaches will be most appropriate to use for different aspects of conservation and management.

2011-12-08 18:30 Mitigating human-crane conflict in Driefontein Grasslands, central Zimbabwe: a test of scarecrow methods

FAKARAYI, T*, *Projects Officer- BirdLife Zimbabwe;* **Chirara, C,** *Director- BirdLife Zimbabwe;*

The globally threatened Wattled Crane Bugeranus carunculatus and Grey Crowned Crane Balearica regulorum were reported to damage crops in the Driefontein Grasslands, central Zimbabwe resulting in conflict with farmers. A method of using scarecrows to reduce crop damage by crane was tested. The overall goal of this project was to improve conservation of cranes through mitigating the human-crane conflict. A combination of human models and plastic balloons were erected in sampling field plots during planting seasons. No crop damage was recorded in crop fields where scarecrows were erected. It was concluded that the scarecrow models tested in this project have worked effectively and the method was well received by local villagers as it proved to be environmentally friendly.

2011-12-06 14:12 Assessment of Giant Panda Corridors: Species Occupancy, Corridor Effectiveness and Corridor Restoration

Fang Wang*, *Peking University;* **Hao Wang,** *Peking University;* **Dajun Wang,** *Peking University;* **William Mcshea,** *Smithsonian Conservation Biology Institute;* **Sheng Li,** *Smithsonian Conservation Biology Institute;*

Giant panda (Ailuropoda melanoleuca) are restricted to 30 isolated populations in China, 13 of which are small populations with high extinction risk. Our study results show significant decrease in number and distribution happened in 9 small panda populations in recent decade. To solve this problem, China proposed a plan to expand and connect panda habitats into 12 larger ones by year 2020. However, knowledge on how to build effective and efficiency corridors is insufficiency. We put 45 camera traps in 2 panda corridors in Niuweihe (Qinling Mountains, Shaanxi Province) and Huangtuliang (Minshan Mountains, Sichuan) since 2009, and collected 2790 photos of 32 animal species in 92 locations inside the corridors. The result shows in corridor area where ungulates' occurrences (Goral, Serow, Tufted Deer, Wild Boar and Reeves' Muntjac) randomly distributed, large carnivores (Panda, Black Bear) still avoid areas closed to road and house. This suggests that it takes longer time to giant panda than to ungulates in corridor community recovery, and managing impact from road and farmers house is crucial in panda corridors. The result also shows large animals' occurrences inside the corridor (Panda, Black Bear, Takin) are significantly higher in winter, which suggests a more stringent management measures during animal's winter migration. The knowledge has been adopted in panda conservation and prevented fence constructions and bamboo harvest in Niuweihe panda corridor.

2011-12-07 17:15 Herbivory as an indirect driver of change in fragmented eucalypt forests

Farmilo, BJ*, *La Trobe University;* **Morgan, JW,** *La Trobe University;*

Current fragmentation research lacks investigations on biotic interactions between species, particularly herbivory. Utilising the Wog Wog Fragmentation Experiment in south-eastern Australia, we aim to better understand the plant-herbivore interactions in fragmented landscapes and whether it is an important, but overlooked, agent of change. Herbivore impacts on four common plant species were compared in eucalypt forest that varied in fragment size (0.25 ha, 0.88 ha, 3.06 ha) using vertebrate herbivore exclusion plots. We recorded key measures of growth, reproduction and survival that will infer the role of herbivores in this fragmented environment. Initial results indicate herbivory impacts are species-specific and increase with increasing fragment size. Hence, plants in small fragments are not impacted in the same way that they are in larger fragments, and control forests. Herbivores can exert a strong influence on community dynamics and alterations to herbivore activity will most likely result in indirect changes in community composition via fragmentation.

2011-12-08 18:30 Impact of insecticide (Azardiracta indica) on immunological and physiological parameters of Biomphalaria alexandrina snails.

Fayez A. Bakry*, *Prof.Dr. of Medical malacology;* **Karem El-Hommossany,** *Dr.of Medical malacology;* **Hanan Mosalam,** *Dr.of Medical malacology;*

The present work was carried out to evaluate, effect of methanol extract of Azardiracta indica plant (Insecticide) on immunological and physiological parameters of Biompalaria alexandrina snails. The obtained results indicated that hemolymph samples from B. alexandrina snails contained two morphologically distinct types of hemocytes, designated as Hyalinocyte and Granulocytes cells. In addition, the number of both Hyalinocyte & Granulocytes and the mortality rate was significantly increased with treated with A. indica extract. Phagocytosis in group treated with tested plant was highly significant increased than control one indicating a highly increase response of snail against the treatment. The lipid peroxide and glucose levels in hemolymph of treated snails were elevated while the protein and glycogen contents showed a decrease in soft tissues when compared with the control group. In addition, the activity level of some enzymes representing glycolytic enzymes as hexokinase (HK), pyruvate kinase (PK), ,phosphofructokinase (PFK), lactate dehydrogenase (LDH),and glucose phosphate isomerase (GPI); glycogenolytic enzymes as glycogen phosphorlase, glucose-6-phosphatase(G-6-Pase); gluconeogenic enzymes as fructose-1-6 diphosphatase (F-D-Pase),phosphoenolpyruvate carboxykinase (PEPCK) was also significantly reduced in response to treatment. It was concluded that the application of LC25 of methanol extracts of Azardiracta indica plant may be helpful in snail control as it interferes with the snails' immunology and physiology.

2011-12-07 10:38 350.org: A Case Study of an International Web-initiated Environmental Movement

Feldpausch-Parker, AM*, *SUNY-ESF;* **Bernacchi, LA,** *Texas A&M University;* **Parker, ID,** *Humboldt State University;* **Peterson, TR,** *Texas A&M University;*

As experts battle over how to adapt to the impacts of climate change as well as attempt to lessen the chance of more extreme changes, the public is often relegated to the sidelines as mere observers. This technocratic view of setting climate policy, however, neglects the position and power of the public in impacting the decision-making process. In this paper we use Gidden's structuration theory and Kinsella's concept of public expertise to examine how an internet movement facilitates the reinsertion of the public into international climate policy. Our focus is on 350.org, an internet savvy non-governmental organization responsible for orchestrating the production of 5,245 separate community-based climate action rallies in a total of 181 countries around the world, two months before the Copenhagen Summit. This study demonstrates how the public, using the internet as a communication medium, has the ability to manipulate power structures by providing a space for mass organization across political and geographic borders to solicit world-wide change.

2011-12-08 11:22 Distribution of invasive plants in roads near the city of La Paz- Bolivia

Fernandez Murillo, MP, *Carrera de Biología, Universidad Mayor de San Andrés, Intituto de Ecologia de Bolivia;* **Rico, A. *,** *Instituto de Ecología de Bolivia;* **Kindlmann, P.,** *Institute for Environmental Studies, Faculty of Science, Charles University, Benátská;*

Invasive alien species are recognized as one of the greatest threats to ecological and economic welfare of the planet, because they can transform the structure of ecosystems and affect negatively the native species, by restricting their distribution or even completely excluding them. To date, however, no work in Bolivia has focused on factors that affect the distribution of invasive alien plants. In this study we therefore determined the number of invasive plant species in the vicinity of two types of roads (paved and gravel) in three regions near to the city of La Paz, Bolivia, differing mainly in altitude: high Andes, Puna and dry valley. We found 3 invasive species in the vicinity of roads in high Andes, 5 in Puna and 9 in the dry valley. The vicinity of the gravel roads contained more (13) invasive species than that of the paved roads (7). The invasive species cover close to the roads on the edge was higher than that further from the roads. Pennisetum clandestinum was the most frequently recorded species in all regions and types of road.

2011-12-06 15:15 Predation in urban environments: are cities really safer for birds?

Fernandez-Juricic*, *Purdue University;*

One of the dominant paradigms in urban ecology is that the abundance of certain species increases with the degree of urbanization. The safe-habitat hypothesis has been proposed to explain this pattern as a result of relaxed predation pressure through a reduction in nest predation with urbanization. This hypothesis has also been used to argue that individuals living in urban habitats would experience lower predation risk due to the lower abundance of native predators. I reviewed studies assessing predation risk between urban and non-urban habitats, and concluded that the evidence supporting the safe-habitat hypothesis is contradictory. There are two main factors that that argue against urban habitats being safer: mesopredator release (e.g., high abundance of lower level predators like cats) and human disturbance (e.g., recreationists and dogs using urban parks). Considering these two factors in the study of predation risk in urban habitats is relevant because the perception of risk is likely to be species-specific, depending on the degree of exposure (and tolerance) to not only native predators but also introduced predators and humans. Consequently, for some bird species, urban habitats can actually be perceived as riskier than non-urban habitats. Overall, establishing how the perceived risk of predation varies between taxa in relation to urban sprawl can help us explain patterns of species invasion and extinction in human-dominated landscapes.

2011-12-06 11:15 Applied sensory ecology: strategies to repel and attract birds using visual cues

Fernandez-Juricic, E*, *Purdue University;*

Many of the challenges that conservation biologists and wildlife managers face involve the manipulation of the behavior of individual species. Generally, this is done by following a trial-and-error approach based on experts' opinion. However, this approach does not acknowledge the diversity of sensory systems in vertebrates. Understanding the basic principles of the sensory system of a target species can greatly enhance the effectiveness of management strategies. I will present two case studies that explore different properties of the avian visual system to develop strategies to repel or attract birds using visual cues. The general approach is to: (1) characterize the sensitivity of visual pigments and oil droplets in the retina and their relative abundance and distribution, (2) determine how a target species perceives objects using avian visual models to identify the visual cues that would stand out the most, and (3) conduct behavioral studies testing the effectiveness of those visual cues in attracting or repelling birds. This approach is being applied to develop ways of reducing the frequency of bird-aircraft collisions and increasing the visual attractiveness of bird feeders. Overall, sensory ecology can provide novel strategies for protecting and managing wildlife.

2011-12-08 18:30 Asian elephant conservation and human-elephant conflict mitigation: change in paradigm needed

Fernando, P*, *Centre for Conservation and Research;* **Pathiraja, C,** *Department of Wildlife Conservation;* **Weerakoon, D,** *University of Colombo;* **Jayewardene, J,** *Biodiversity and Elephant Conservation Trust;* **Pastorini, J,** *Centre for Conservation and Research;*

Asian elephants are endangered and the main threats to their survival are range loss and human-elephant conflict. Across Asian elephant range rapid human population growth and consequent development may make range loss inevitable. However, unplanned development makes range loss much greater than need be and development unmindful of the presence, ecology and behavior of elephants creates severe conflict. Consequently the human-elephant conflict has become a major conservation, socio-economic and political issue. In Sri Lanka and rest of Asian elephant range, the main strategy for addressing human-elephant conflict is restricting elephants to protected areas. In Sri Lanka, after over 50 years of its implementation, this strategy has failed in eliminating elephants from developed areas and in mitigating the human-elephant conflict. Currently the scale of the issue is so great and widespread that conservation agencies alone cannot address it. Therefore a change in paradigm is needed with all stakeholders and especially development agencies and civil society taking responsibility for their actions in elephant range. Over the last decade we have been developing new strategies to mitigate the human-elephant conflict by taking into consideration elephant ecology and behavior and working with multiple stakeholders to implement them.

2011-12-07 17:00 Caribbean corals larger than 50 cm in diameter survive fierce long-term macroalgal competition

Ferrari, R*, *University of Queensland, Marine Spatial Ecology Lab;* **Gonzalez-Rivero, M,** *University of Exeter, Marine Spatial Ecology Lab;* **Mumby, PJ,** *University of Queensland, Marine Spatial Ecology Lab;*

The relative importance of physical and ecological processes in driving macroalgal dynamics is poorly understood. This study looked at the effects of coral-macroalgal competition on the growth and survival of three common Caribbean coral species (Porites astreodies, Agaricia agaricites and Colpophyllia natans). The study looked at two different coral colony sizes and two common Caribbean macroalgal species (Lobophora variegata and Halimeda opuntia) over one year. Not surprisingly, smaller colonies were more susceptible to macroalgal competition, bleaching and disease. While the susceptibility of coral colonies to macroalgae competition remained similar across size classes, striking differences were observed on the interactions between coral and algal species. When competing with L. variegata, C. natans was the least resistant coral species, while both species of brooder corals were least affected by the competition with this macroalgae. When competing with H. opuntia there was not a significant difference between the three coral species of the large colonies; however, A. agaricites small colonies were significantly more resistant to the competition than either of the other two coral species. There was no difference between small colonies of P. astreoides and C. natans. These results are really interesting since they identify A. agaricites, as one of the best competitors against L. variegata and H. opuntia, two of the most abundant algae on coral reefs. Fruthermore, they shed light on long-term species specific competition outcomes between corals and macroalgae.

2011-12-08 18:30 Managament effectiveness assessment of Brazilian protected areas

Ferreira, MN*, *WWF-Brasil;* **Hangae, L,** *ICMBIo;* **Kinouchi, M,** *ICMBIo;* **Drumond, MA,** *UFMG;* **Onaga, C,** *Manacá;* **Catapan, M,** *WWF-Brasil;* **Palazzi, G.,** *ICMBio;* **LIma, L,** *ICMBio*

Establishment and maintenance of protected areas are a worldwide strategy to preserve biodiversity. In recognition of this effort and challenge, the Convention on Biological Diversity adopted a Program of Work for Protected Areas, including the management effectiveness assessment of the performance of protected areas systems. The RAPPAM method - Rapid Assessment and Prioritization of Protected Area Management - provides a quick and effective way of assessing strengths and weaknesses of individual protected areas and protected areas systems. This study aimed at applying RAPPAM for the second time after five years in 292 Brazilian federal protected areas. Results indicated a significant increase in the status of management effectiveness. However, some consistent gaps and weaknesses are still present and the evolution was not homogeneous in different biomes and PA categories. These results may represent one of the largest efforts of PA monitoring in the world and are key to adequate planning and prioritization in a such a large system with funding limitations.

2011-12-06 11:45 Forecasting Consequences of Global-change Scenarios for Persistence of Compositional Diversity – a Top-down Modelling Approach

Ferrier, S.*, *CSIRO Ecosystem Sciences;* **Harwood, T.D.,** *CSIRO Ecosystem Sciences;* **Williams, K.J.,** *CSIRO Ecosystem Sciences;*

Current efforts to forecast impacts of climate and land-use change on biodiversity (to inform development of policy and management responses) are focusing almost exclusively on modelling potential changes in the distribution and abundance of individual species. This bottom-up strategy plays an important role in planning for better-known species of particular ecological, social or economic concern. However, its capacity to address changes in compositional diversity as a whole (the full variety of biological elements across all taxa, and all levels of organisation) is challenged by the sheer number of elements involved, and our grossly incomplete knowledge of both these elements and their interactions – particularly for less-studied taxa (e.g. invertebrates, microbes) in hyper-diverse systems (e.g. tropical forests). We describe a top-down, macroecological approach to addressing this problem, which focuses on modelling change in emergent properties of compositional diversity at the community level (compositional turnover, richness) rather than change in the individual elements constituting this diversity. We present examples of the application of this approach for the Australian continent, and for the entire planet, using best-available data for a range of lesser-known, highly-diverse taxa. The approach is not intended to replace, or compete with, species-level approaches to modelling global-change impacts, but rather to complement and add value to these existing efforts.

2011-12-07 14:00 Reconnecting the Spine of the Continent Wildway – A network of conservation action in Mexico, the U.S., and Canada

Fields, K*, *Wildlands Network;* **Soule, M,** *Wildlands Network;*

The Spine of the Continent Initiative puts the "large" in large-landscape conservation planning! From northern Mexico to Alaska a network of conservation NGOs, private landowners, universities, scientists, wildlife managers and citizens partner at different scales to "reconnect" the entire span of the Rocky Mountains. Throughout this Western Wildway© we cross land management jurisdictional boundaries and instead are guided by eco-regional analyses that determine priority conservation targets. Led by Wildlands Network, we employ a variety of approaches necessary to achieve landscape connectivity and close the gaps between protected areas. This presentation will review some of the successful approaches we've employed – from "publicity expeditions" to land acquisition to policy reform to private landowner outreach – in order to engage a wide spectrum of society as we apply the science of conservation biology to activism.

2011-12-08 14:44 Incorporating process into conservation decision-making for island systems

Filardi, C E*, *American Museum of Natural History;* **Sterling, E,** *American Museum of Natural History;* **Roughan, P,** *Islands Knowledge Institute;*

Islands are iconic for their isolation, diversity of unique life forms, and high extinction rates. Recent studies, however, have revealed that island ecosystems have significant and under-recognized impacts on the generation and maintenance of global patterns of biodiversity despite often extreme geographic isolation. Scientists are learning that islands are not simply the evolutionary dead ends once believed, but are instead engines of diversification in their own right, and far-flung webs of ecological connectivity. Tropical oceanic islands in particular have a dynamic connectivity, a give-and-take with one another, on both evolutionary and ecological scales. In this talk, we provide examples from across taxa, and contrasting systems across ocean basins, to define an emerging understanding of insular connectivity at regional and pan-Pacific scales. Conservation investment needs to reflect these emerging new paradigms in island biology, embracing our sense of the ecological and evolutionary scales of island life, and the contribution of insular processes to continental and

global-scale diversity. This perspective suggests practice transform traditional models of insular conservation that tend to emphasize alpha diversity and large intact systems while discounting the potential importance and opportunity of investing in more diverse assemblages of ecosystem elements (both intact and not so). It is not just island-by-island, but also pan-regional dynamics that should guide our actions. Future conservation strategies should mirror a perception common to many tropical island cultures: "The ocean does not divide us, it is what unites us".

2011-12-08 11:30 A Paradox of Resource Abundance: Food Security on the Shores of Lake Victoria

Fiorella, KJ*, *UC Berkeley;*

While ecosystem services and human health have been closely linked, the mechanisms through which natural systems interact with livelihoods and human health are often poorly understood. Yet, how ecosystems provision food resources and how conservation of biodiversity protects these resources constitutes a critical ecosystem service. I will explore links between human health and natural resource use by analyzing the role of fish access in the Kenya's Lake Victoria fishery in shaping human nutrition, livelihoods, and women's resource use. Lake Victoria is Africa's largest freshwater lake and the site of a highly productive, multi-national fishery. The adjacent province, Nyanza, is home to approximately 5 million people who experience Kenya's highest rates of poverty and HIV/AIDS infection, and who largely rely on subsistence fishing and farming, and remain particularly vulnerable to food insecurity. I will present preliminary results from a baseline health and demographic household survey and focus groups exploring community perceptions of the links among health, the environment, and fishery access, and will outline future research questions on these topics.

2011-12-08 10:45 Mitigating local causes of ocean acidification with existing laws

Foley, MM*, *Center for Ocean Solutions;* **Kelly, RP,** *Center for Ocean Solutions;* **Fisher, WS,** *US Environmental Protection Agency;* **Feely, RA,** *NOAA Pacific Marine Environmental Lab;* **Halpern, BS,** *National Center for Ecological Analysis and Synthesis;* **Waldbusser, GG,** *Oregon State University;* **Caldwell, MR,** *Center for Ocean Solutions;*

Ocean acidification is an inevitable and indisputable consequence of rising atmospheric CO2. The world's oceans have already seen an average decrease in pH from 8.21 to 8.10, a 30% decrease that will impact marine ecosystems on a global scale. Although most of our attention has focused on the main global driver—atmospheric CO2 levels—there are numerous local drivers, including erosion, runoff, and point source pollution that can act in concert with increased atmospheric CO2 to form ocean acidification hotspots in the coastal ocean. These coastal hotspots could have dramatic consequences for coastal economies and communities given the level of our dependence on these ecosystems. Our understanding of the ecological, economic, and social ramifications of increasingly acidic oceans has substantially increased in the last five years, but political will on the international and national levels has been slow to gain traction. In this presentation, we highlight the increasing presence of coastal acidification hotspots, discuss the local stressors that may be driving the formation of these local hotspots, and provide local and regional decisionmakers and grassroots organizers with suggestions for preventing and mitigating the most immediate stressors using existing legal authority. By ameliorating more immediate threats to coastal resources, local and state governments can safeguard ecosystem resilience and sustainable economic benefits from the ocean.

2011-12-07 14:45 Congruency of predictions between population dynamic and species distribution models under climate change: implications for conservation planning

Fortin, M-J*, *University ot Toronto;* **Naujokaitis-Lewis, I,** *University of Toronto;*

Species ranges are dynamic due to disturbances and global environmental changes. Although climate change is expected to lead to range expansions at high latitude range margins, habitat fragmentation might influence colonization success and ultimately species persistence. Methods are needed to account for both dynamics of climate changes on species ranges, and the dynamics of populations that integrate landscape habitat patterns. This is especially true in southern Ontario where several species reach either the northern or southern edge of their geographical range. Here, we compare predictions of species' responses to climate change using correlative species distribution models and process-based population dynamics models, which differ in their data requirements and assumptions. We evaluate the spatial congruency of predictions of the alternative methods applied to a model bird species, the Hooded Warbler (a species-at-risk in Canada). By accounting for uncertainty in model predictions, we identify regions that appear to be invariant over time and space but habitat fragmentation at the northern range margin leads to declines in measures of persistence. We discuss the implications of uncertainty and the use of alternative approaches for integration with methods for conservation planning, especially in the identification of critical habitat for recovery planning.

2011-12-06 16:45 Return of the living dead: Protecting the rediscovered weevil, Hadramphus tuberculatus, through historic DNA and the community

Fountain, ED*, *Lincoln University;* **Bowie, M,** *Lincoln University;* **Cruickshank, R,** *Lincoln University;* **Paterson, A,** *Lincoln University;*

The rarest weevil in New Zealand, Hadramphus tuberculatus, was last sighted in 1922 and presumed extinct until its rediscovery in 2004. It is classified as Nationally Endangered but historical records suggest that the weevil was once widespread among lowland areas of Canterbury. H. tuberculatus is host-plant specific and lives on speargrass, (Aciphylla sp. Apiaceae Family). Severe habitat loss and mammalian predator introduction have left only one known remaining population at Burkes Pass Scenic Reserve. Since 2005, the reserve has been surveyed for the weevil by visual searches and pitfall trapping. Captured weevils were applied mark recapture and tissue extraction. The mitochondrial gene, CO1, and nuclear gene, ITSII, were analysed for weevils collected in 2007, 2009 and 2010. Molecular analysis suggests the population maintains unexpected genetic diversity and mark-recapture shows a relatively mobile population. DNA from pinned weevil museum specimens (1890 to 1915) has also been collected so that historical and current populations can be compared to map the loss of species' genetic diversity. The molecular information will be integrated with a conservation program involving intensive maintenance of Burkes Pass Scenic Reserve and community outreach to develop a management program to sustain H. tuberculatus. It is hoped that education through a conservation brochure and publicity through news articles will facilitate the discovery of additional weevil populations.

2011-12-08 18:30 Using Local Knowledge of Traditional Management Practices from Kubulau District (Fiji) to Inform Current Actions to Maintain Sustainable Livelihood Practices

Fox, M*, *Wildlife Conservation Society Fiji Country Programme;* **Tokota'a, M,** *The Coral Reef Alliance;* **Dulunaqio, S,** *Wildlife Conservation Society Fiji Country Programme;* **Williams, H,** *The Coral Reef Alliance;* **Jupiter, SD,** *Wildlife Conservation Society Fiji Country Programme;*

As new markets for terrestrial and marine resources have been introduced in Fiji in the past few decades, community residents have lost many traditional, more sustainable practices for farming and fishing. We conducted semi-structured interviews with village elders in the ten villages of the remote district of Kubulau in Bua Province, Fiji, to record local knowledge of traditional harvesting practices of terrestrial and marine resources. Respondents were specifically asked to recall past connections of the Kubulau people with charismatic and totemic terrestrial and marine species. We found that the large majority of traditional forms of management were no longer being practiced; moreover the youngest generation within each village was not familiar with most of the traditional associations with plants and animals. We highlight several key examples of extinct management practices which could be resurrected in Kubulau to deal with ongoing and future challenges of overharvesting and to maintain sustainable livelihood practices. We additionally highlight how these lessons are being used by the Kubulau Resource Management Committee and village chiefs to adapt their ridge-to-reef management plan for Kubulau District and adjacent fisheries management area, the first of its kind in Fiji.

2011-12-07 15:30 The Yellowstone to Yukon Conservation Initiative: Continental scale collaboration for biodiversity conservation

Francis, WL*, *Yellowstone to Yukon Conservation Initiative;*

The ranges of large mammals that once occupied much of North America are now limited to the mountainous west of the continent. Even within that landscape, transportation networks, subdivision, resource exploration and development and increasing human incursions into remote areas are fragmenting habitats and populations, threatening the persistence of sensitive species. The impacts of climate change will be exacerbated by habitat fragmentation. The Yellowstone to Yukon Conservation Initiative (Y2Y) is a response to these threats, offering an inspiring vision of landscape connectivity at the continental scale. The Cabinet-Purcell Mountain Corridor (CPMC) Project will be presented as an example of successful trans-boundary conservation collaboration. Using grizzly bears as the focus of conservation planning, the CPMC Project is creating the conditions that will enable large mammal populations in southeastern British Columbia, northern Idaho and western Montana to stay connected to each other and to move in response to changing habitat conditions.

2011-12-08 12:15 Reproductive technologies to help recovery of threatened New Zealand vertebrates for ecological restoration

Frank Molinia*, *Landcare Research, Private Bag 92170, Auckland 1142, New Zealand;* **Dianne Gleeson,** *Landcare Research, Private Bag 92170, Auckland 1142, New Zealand;* **Edward Narayan,** *Environmental Futures Centre, School of Environment, Gold Coast Campus, Queensland 4222, Australia;* **Jennifer Germano,** *San Diego Zoo Institute for Conservation Research, 15600 San Pasqual Valley Road, Escondido, California 92027, USA;* **Alison Cree, Phil Bishop,** *Department of Zoology, University of Otago, PO Box 56, Dunedin 9054, New Zealand;* **Richard Jakob-Hoff,** *New Zealand Centre for Conservation Medicine, Auckland Zoo, Private Bag, Grey Lynn, Auckland 1245, New Zealand;* **John Cockrem,** *Institute of Veterinary, Animal and Biomedical Sciences, Massey University, Private Bag 11222, Manawatu Mail Centre, Palmerston North 4442, New Zealand;* **Neil Gemmell,** *Centre for Reproduction and Genomics, Invermay Agricultural Centre, Puddle Alley, Private Bag 50034, Mosgiel 9053, New Zealand*

Reproductive technologies are valuable tools for understanding species-specific reproductive mechanisms. Modern techniques have been used for managing wildlife ex situ and in recent years have even contributed to in situ conservation. In New Zealand a suite of reproductive technologies are in development to recover threatened species as key elements of ecological restoration. Protocols established in model species are being adapted for use in target threatened vertebrates (e.g. Leiopelmatid frogs, Grand and Otago skinks and Blue duck) in three stages over time. The first stage involves assessment of reproductive function, status and welfare using urinary/faecal metabolite measures to non-invasively sex individuals and/or monitor the hormones of reproduction and stress. Routine sperm collection and assessment will also be used to confirm the identity of males and to detect problems with sperm quality. These procedures underpin the second stage which is development of assisted breeding techniques like liquid- and frozen-storage of sperm and artificial insemination/fertilisation. The final stage is to establish genetic resource banks of germplasm as a valuable bet-hedging strategy to safeguard species-level genetic variation. These techniques will increase our knowledge of native species reproduction and offer much promise as tools to enhance the production of offspring of desired genetic make-up for in situ recovery and secure genetic repositories for future restoration needs.

2011-12-09 17:00 The long and the short of it; historic and contemporary genetic structure of an endangered Australian marsupial, the long-nosed potoroo (Potorous tridactylus)

Frankham, GJ*, *Department of Zoology, University of Melbourne, Victoria, 3010;* **Handasyde, KA,** *Department of Zoology, University of Melbourne, Victoria, 3010;* **Eldridge, MDB,** *Evolutionary Biology Unit, Australian Museum, Sydney, NSW 2010;*

The long-nosed potoroo (Potorous tridactylus), one of the smallest members of the marsupial superfamily Macropodoidea, is currently restricted to disjunct populations throughout coastal south-eastern Australia, from southern Queensland to western Victoria and Tasmania. It is listed as 'vulnerable' under the national Australian Environment Protection and Biodiversity Conservation Act 1999. Understanding both the historic and contemporary genetic structure of fragmented populations is important for effective conservation and to protect evolutionary potential. However, the long-nosed potoroo's elusive nature has limited investigations to date. My study has investigated broad-scale phylogeographic patterning across the species range, using mitochondrial DNA (mtDNA) and nuclear DNA (nuDNA) sequence analysis. Tissue samples were collected (n = >500) from throughout the species range. MtDNA (control region, ND2 and CO1) sequence analysis identified three previously unrecognised and significantly divergent lineages, corresponding to distinct geographic regions. However, analysis of nuDNA (BRCA, Rag, ApoB) sequences, did not show the same structuring, highlighting the importance of investigating both genomes for a complete understanding of evolutionary and population history. A fine scale mtDNA control region and microsatellite analysis is also underway to enable the most appropriate geographic scale for local population management to be determined.

2011-12-09 14:45 Predicting the risk of outbreeding depression: critical information for managing fragmented populations

FRANKHAM, R*, *Macquarie University, NSW 2109, Australia;* **Ballou, JD,** *Smithsonian Conservation Biology Institute, Washington, DC 2008, USA;* **Eldridge, MDB,** *Australian Museum, 6 College St, Sydney, NSW 2010 Australia;* **Lacy, RC,** *Chicago Zoological Society, Brookfield, IL60513, USA;* **Ralls, K,** *Smithsonian Conservation Biology Institute, Washington, DC 2008, USA;* **Dudash, MR,** *University of Maryland, College Park MD20742, USA;* **Fenster, CB,** *University of Maryland, College Park MD20742, USA;*

Many small isolated population fragments would likely benefit from re-establishment of gene flow from other fragments to recover reproductive fitness and genetic diversity, but managers rarely do this due partly to fears of outbreeding depression (OD). Rapid development of OD is due primarily to adaptive differentiation or fixation of chromosomal variants. Fixed chromosomal variants can be detected empirically. Using the breeders' equation, we predicted that the risk of OD due to adaptive differentiation is a function of selection, genetic diversity, effective population sizes, and generations of isolation. Empirical data indicated that populations in similar environments had not developed OD even after thousands of generations of isolation. We devised a decision tree for practitioners to predict the risk of OD. The risk of OD in crosses between populations is elevated when they have at least one of the following: are distinct species, have fixed chromosomal differences, exchanged no genes in the last 500 years, or inhabit different environments. Conversely, the risk of OD in crosses between two populations of the same species is low for populations with the same karyotype, isolated for <500 years, and that occupy similar environments. In the latter case, crossing can be carried out with low probability of OD. Use of the decision tree correctly identified cases where OD occurred. Current concerns about OD in recently fragmented populations are almost certainly excessive.

2011-12-08 11:45 Global success of coral reef management strategies in social-ecological outcomes

Freed, Sarah*, *Portland State University;* **Granek, Elise,** *Portland State University;*

Coral reefs are a site of social-ecological interactions that must be carefully governed to sustain both the humans and the reef involved. Several strategies have been tried for coral reef management and multiple studies have evaluated the success of the various strategies, yet we still know little about how to succeed in maintaining healthy social-ecological coral reef systems. Using examples from customary, traditional, co-managed, Marine Protected Area, and marine reserve management strategies, we set out to determine: correlation of successful social and ecological outcomes; conditions necessary to succeed in both social and ecological governance outcomes; and type of governance that most often succeeds in both social and ecological outcomes. Social outcomes included local benefits in: wealth and income; employment and livelihood opportunities; capacity in leadership and education; and availability of subsistence materials. Ecological outcomes included improvement and/or maintenance of: hard coral cover and diversity; fish abundance, biomass, and diversity; recovery

from disturbance; and water quality. We found that local involvement and governance at multiple scales are key factors in achieving social and ecological outcomes. We suggest that a nested approach to governance, involving multiple governance strategies, can help assure success in social and ecological governance outcomes.

2011-12-08 14:00 Systematic management of marine mega-fauna in a changing climate

Fuentes, MMPB*, *ARC COE Coral Reef Studies;* **Pressey, B,** *ARC COE Coral Reef Studies;* **Marsh, H,** *James Cook University;*

Marine mega-fauna, which include seabirds, sea turtles, marine mammals, and elasmobranchs, are key components of marine ecosystems that have social and economical value globally. Many populations of marine mega-fauna have declined in recent decades due largely to anthropogenic threats. Further impacts to this important group will likely occur from predicted climate change and affect their distribution, behaviour, reproduction and demographics. However, the resilience of many populations of marine mega-fauna to climate change is severely compromised by dramatic reductions in population sizes and thus their ability to adapt and recover from climate change is reduced. Therefore conservation strategies that help species moderate or cope with projected climate change are needed. However, dealing with the reality of climate change is challenging as incorporating actions to alleviate the impacts of climate change into ongoing conservation projects is often limited largely by uncertainties in what action can be taken. Thus, there is the need for new, flexible and dynamic conservation strategies that integrate climate impacts, species responses and changing ecological relationships. This talk will focus on the systematic management of marine mega-fauna in a changing climate. It will highlight the threats that marine mega-fauna face as climate change progresses, potential option for prioritizing the management of these threats and ways to engage the broad society to achieve desired conservation goals.

2011-12-08 18:30 Landscape genetics of long-eared bats (Nyctophilus) in fragmented landscapes of south-eastern Australia

Fuller, NC*, *The University of Adelaide;* **Carthew, SM,** *The University of Adelaide;* **Cooper, SJB,** *South Australian Museum;*

Bat fauna represents a significant proportion of global mammalian diversity (approximately 20%) yet we know little about how this mega-diverse order responds to one of the principal threatening processes: habitat fragmentation. We have developed a suite of microsatellite markers in order to assess and compare population genetic structure and gene-flow across fragmented and continuous habitat in two species of long-eared bats, Nyctophilus gouldi (a habitat specialist) and N.geoffroyi (a habitat generalist). The selected species display near-identical morphology but contrasting ecology and behaviour providing a valuable insight into chiropteran responses and sensitivity to this landscape scale threat. Our dataset includes 1200 individuals sampled across western Victoria and south-eastern South Australia from fourteen sites, including five control sites within extensive continuous forest and nine sites representing forest fragments of varying size and degrees of isolation. We will present results comparing gene-flow within continuous habitat to gene-flow between habitat fragments as well as data on population structure across the study region. Results identifying barriers to bat dispersal and distance thresholds for bat dispersal will also be presented. This study represents the first attempt to quantify the influence of habitat fragmentation on bat gene-flow and dispersal.

2011-12-09 15:45 Protected areas in a crowded planet

Fuller, RA*, *University of Queensland;* **Boakes, EH,** *Imperial College;* **Carwardine, J,** *CSIRO;* **Clark, NE,** *University of Reading;* **Grantham, HS,** *Conservation International;* **Klein, CJ,** *University of Queensland;* **McDonald-Madden, E,** *CSIRO;* **McGowan, PJK,** *World Pheasant Association*

More than 100,000 protected areas have been declared globally, yet in a planet that is increasingly crowded, some sites have proved to be highly permeable to severe threats including land clearance. For example, we have discovered that in South Asia, one of the world's major growth epicentres, a quarter of the land inside its protected area estate has now been cleared of natural habitat. Moreover, the rate of habitat clearance inside protected areas is indistinguishable from that on unprotected lands, and habitat clearance rates show no evidence of abating following gazettal of a parcel of land as a formal protected area. We evaluate several possible solutions to this crisis including increased governance in the region's protected areas, restoration activity in degraded sites, or degazettal of the least intact sites coupled with strict protection of replacements. We present an algorithm for prioritising replacement of protected areas that delivers efficient habitat consevervation.

MSE in fisheries: current state of the art and what is to come

Fulton, EA*, *CSIRO Marine and Atmospheric Research;*

Management Strategy Evaluation (MSE) now has a 20-year history in fisheries and is still going strength-strength. Over that period the models used in the MSE have come in many different forms, but it has been rare for the human decision making components to receive as much attention as the dynamics of the biological stocks. This imbalance is beginning to be addressed however, with the current state of the art fully incorporating human behavioural uncertainty in to the models (and other methods) used as the basis of the MSE. Illustrative examples drawn from Australian case histories will highlight how qualitative MSE, agent-based models and social network theory is broadening the processes considered in MSE. MSE in the 21st century is increasingly whole of system – treating the biophysical and anthropogenic worlds with equal attention.

2011-12-06 11:30 Do we need another plan?

G Lipsett-Moore*, *The Nature Conservancy;* **S Cowell,** *Independent Consultant;*

One of the great challenges emerging from the last 20 years of conservation planning (ecoregional plans, catchment plans, conservation blue prints to name a few), is that we are generally very good at developing plans and building a 'science base' around them, but lousy when it comes to implementation. We contend that the problem, more often than not, is that we place insufficient emphasis on the factors that are key to planning success such as resources, leadership, participation an effective process and support, at the expense of a natural desire to focus on the object of our planning. Importantly, a consistent issue is that implementation is merely an afterthought for an impressive piece of planning science. We discuss the disconnect between planning and implementation with case studies from Melanesia and Northern Australia and provide thoughts and some practical and applied solutions to assist in bridging the gap between a good plan and an effective outcome.

2011-12-07 16:30 Invasive Ant Suppression Benefits the Conservation of a Functionally Important Native Tree on a Tropical Island

Gaigher, R.*, *Department of Conservation Ecology and Entomology, Faculty of AgriSciences, Stellenbosch University;* **Samways, M.J.,** *Department of Conservation Ecology and Entomology, Faculty of AgriSciences, Stellenbosch University;*

Documenting the response of native ecosystems to invasive species management can contribute greatly to the refinement of management programs. Here, we demonstrate the effect of suppression of an invasive ant, Pheidole megacephala, on the condition of a dominant native tree of great functional importance, Pisonia grandis, on a Seychelles island. P. megacephala has caused serious indirect damage to P. grandis via a mutualism with an exotic hemipteran insect, Pulvinaria urbicola. We treated eight hectares of forest with highly specific formicidal bait, which was delivered to the field in bait stations to further reduce the possibility of non-target effects. Twenty plots within the treated area and twenty plots outside of the treated area were monitored for ant foraging activity, hemipteran density and tree condition at intervals over eleven months. In treated plots, P. megacephala foraging activity was reduced by 97% over eleven months and was followed closely by a 99% reduction in P. urbicola density. The decline in P. urbicola density contributed to a considerable improvement in P. grandis shoot condition, with a noticeable increase in canopy density. Our results demonstrate the benefit of P. megacephala management to the P. grandis forest and support the use of a treatment method that can be applied in other tropical ecosystems.

2011-12-09 11:30 MARAS: a system for monitoring structure, function and biodiversity in Patagonia rangelands. First data obtained in North Patagonia.

Gaitan, J*, *INTA, EEA Bariloche;* **Bran, D,** *INTA, EEA Bariloche;* **Oliva, G,** *INTA, EEA Santa Cruz;*

75 M hectares of temperate-cold rangelands in Patagonia, Argentina, are occupied by extensive sheep systems which provide wool to the international market. Sheep was introduced and rapidly expanded in Patagonia during the end of the XIX century. Sheep overgrazing produced land degradation and desertification in vast areas. For monitoring desertification trends, the MARAS (Monitores Ambientales para Regiones Aridas y Semiáridas) system is being deployed by INTA. It consists in ground monitors assessed with a single methodology all over the region. The sites are chosen in order to represent the main land units, and monitors are installed in paddocks with sheep grazing. Observations include: floristic composition, vegetation spatial structure and soil surface status on interpatches (adapted from Landscape Function Analysis). Soil organic carbon and texture are also tested. Time frame for reassessment is 5-years. The results obtained from the first MARAS's indicators assessment are presented and discussed.

2011-12-06 16:30 Tiritiri Matangi Island, New Zealand: Conservation education through community involvement

Galbraith, MP*, *Unitec Institute of Technology;* **Jones, G,** *Unitec Institute of Technology;*

Tiritiri Matangi Island, Hauraki Gulf, New Zealand, has an international profile as a successful ecological restoration project, and is often cited as a model of environmental stewardship. Ecological restoration on the island has always involved, and been dependent on, voluntary public involvement. Public (volunteer) involvement was formalised in 1988 with the establishment of Supporters of Tiritiri Matangi (Inc.), an organization with aims to support and promote the restoration project. The contribution that the Supporters group has made to the island's management has grown and diversified since its inception. From an initial focus on labour and funding for capital items, voluntary contributions now include supporting research and biodiversity management both physically and financially. Participation in this wider application of ecological concepts not only reinforces links between the public and scientific communities, but also facilitates even greater understanding of concepts of biological conservation outside of the professional and academic worlds.

2011-12-06 12:00 Improving plan implementation: blurring the distinction between spatial prioritization and strategic conservation planning

Game, E.T.*, *The Nature Conservancy;* **Groves, E. T.,** *The Nature Conservancy;*

Much systematic conservation planning has focused on spatial prioritization - the identification of the best places to take conservation action. It is generally assumed that more detailed strategic planning to work out the best conservation actions in each location will occur once it is decided to work there. The set of tools that conservation biologists use for strategic planning (developing, selecting and planning the implementation of conservation actions) are distinct from those used during spatial prioritization. However, as conservation embraces a wider range of strategies, often in collaboration with other sectors and industries, conservation priority will be influence as much by strategic opportunities as by the biodiversity present there. This makes it inefficient to plan for the two separately. Here we describe The Nature Conservancy's attempt to integrate its approaches to spatial planning (Ecoregional Assessment) and strategic planning (Conservation Action Planning) into a single, more efficient planning framework that better answers the questions being asked by 21st centaury conservation.

2011-12-08 18:30 How uncertain are climate impacts for African vertebrates? Exploring consensus in projections

Garcia, RA*, *Department of Biodiversity and Evolutionary Biology, National Museum of Natural Sciences, CSIC, Spain;* **Burgess, ND,** *Center for Macroecology, Evolution and Climate, Department of Biology, University of Copenhagen, Denmark;* **Cabeza, M,** *Metapopulation Research Group, Department of Biosciences, University of Helsinki, Finland;* **Rahbek, C,** *Center for Macroecology, Evolution and Climate, Department of Biology, University of Copenhagen, Denmark;* **Araujo, MB,** *Department of Biodiversity and Evolutionary Biology, National Museum of Natural Sciences, CSIC, Spain;*

Africa is predicted to be highly vulnerable to 21st century climatic changes, warranting more research to assess the impacts of these changes on the continent's biodiversity. Assessing such impacts is, however, plagued by uncertainties. Markedly different estimates of changes in climatic suitability for species can be generated from alternative bioclimatic envelope models (BEM), greenhouse gas emissions scenarios, or global climate models. Using multiple BEMs, emissions scenarios and averages of co-varying climate simulations, we examine future projections of bioclimatic envelopes and their uncertainties for over 2,500 mammal, bird, amphibian and snake species in sub-Saharan Africa. BEMs emerge as the main source of overall uncertainty, affecting species turnover projections in Northern regions down to Congo, where projected non-analogue climates cause BEMs to differ in how they extrapolate. Five consensus methodologies tested to summarise agreements among BEMs outperform most single-models in accuracy, and generally provide consistent turnover estimates. In turn, the variability arising from alternative emissions scenarios increases towards late-century, when storylines diverge more, and affects particularly high-turnover regions in Southern Africa. Our results lend support to the use of ensemble forecasting to enable more informed conservation decisions, as it provides a means of exploring and reducing uncertainties in projections of climatic suitability for species.

2011-12-08 18:30 CHARACTERIZATION OF AN INTRODUCED POPULATION OF COTTON-TOP TAMARINS (Saguinus oedipus): FROM THE MYTHS TO THE CONSERVATION OPPORTUNITIES

Garcia, S*, *Pontificia Universidad Javeriana;* **Amaya, JD,** *Pontificia Universidad Javeriana;*

The cotton-top tamarins (Saguinus oedipus) is an endemic species of Colombia, which has been considered among the 25 most endangered primate species to extinction in the world due to high fragmentation of its natural habitat as well as illegal wildlife traffic. This has led to the species to be declared globally as critically endangered (CR) according to IUCN. Although, the distribution of this species in Colombia is restricted to some areas in the northwestern Caribbean coast, there is a population outside its natural range in the Tayrona National Park (PNNT), as a result of an introduction in 1974 of a group of 16 to 30 individuals from captivity, released by a former environmental authority in Colombia. The apparently growing expansion of this specie at this PNNT has generated all kinds of assumptions and arguments about the success of this population out of its range, the potential effects generated on local biodiversity and how this phenomenon can be seen as an opportunity for the conservation of this specie. Answers to these questions and reflections are presented based on information of population characterization of this specie at the PNNT, made by linear transect and follow focus group used to estimated the abundance and distribution of the specie, and through the results of the evaluation of potential environmental factors that could explain its successful presence in this area in contrast with their current status within the natural distribution range.

2011-12-07 10:45 The importance of the human landscape in assessing conservation success

Garnett, S.T.*, *Charles Darwin University;*

Success with threatened species recovery tends to be assessed against biological indicators. Such indicators ignore the human context within which recovery takes place. In many ways threatened species are akin to poor human communities, and the conservation and recovery of threatened species has many parallels with community development. Here I propose a framework for assessing success in conservation management based on the five capitals of the sustainable livelihoods framework - natural, economic, human, physical and social. I then apply this framework to the Australian bird fauna. I demonstrate how often human and social capital is as important to threatened species recovery as biological or even economic indicators, and that 'recovery' cannot be assured unless threatened species continue to have support from skilled, committed individuals and strong institutions. Analysis within the full context of drivers of change is better able to highlight opportunities for action than examining the change in biological indicators alone. Using similar metrics for threatened species and

poor communities also highlights the synergies in areas where, as so often, they overlap.

2011-12-07 11:18 Managing bias among experts to assess IUCN Red List status

Garnett, S.T., *Charles Darwin University;* **McBride, M.,** *University of Melbourne;* **Szabo, J.,** *Charles Darwin University;* **Burgman, M.A.*,** *University of Melbourne;*

In a recent appraisal of the IUCN Red List status of Australian birds an expert panel was convened to help resolve differences for nine of the most contentious taxa. Using a two stage Delphi system initially produced widely divergent opinions on both key data and levels of uncertainty. After the second round greater consensus was apparent, demonstrating that this approach to risk management has value in this setting. However the exercise also demonstrated many of the types of bias in estimation that theory predicts will operate among experts. The strongest bias was towards tight anchoring to existing estimates, although it was later discovered that some of these were wrong by at least an order of magnitude. The exercise also uncovered several instances where advisors to the expert panel were extremely reluctant to reveal all their knowledge for fear 'their' taxon would no longer meet the criteria for threatened.

2011-12-06 14:45 Optimal survey effort for threatened species during environmental impact assessments

Garrard, GE*, *University of Melbourne;* **McCarthy, MA,** *University of Melbourne;* **Bekessy, SA,** *University of Melbourne;* **Wintle, BA,** *University of Melbourne;*

Imperfect detectability of plants and animals is a significant source of variation in biological surveys for environmental impact assessment. Failure to account for imperfect detection during an impact assessment survey may lead to poor management, inadequate conservation measures and an increased risk of local extinction of rare or threatened species. Estimates of detection probability can inform the specification of the minimum survey effort required to ensure a high probability of detection if the species is present. However, they do not take into account the prior probability of the species' presence, or the costs of survey, both of which are likely to influence minimum survey effort specifications for threatened species legislation and policy. We estimate the detectability of Pimelea spinescens subsp. spinescens, a critically endangered plant species of Victoria's native temperate grasslands, using a time-to-detection model. Using decision-theoretic methods, we then demonstrate how estimates of detectability can be used to determine the optimal survey effort for the species, taking into account the relative costs of survey and loss of the species. These estimates will be useful for setting survey effort requirements for environmental impact assessments under threatened species legislation and conservation policy.

2011-12-08 18:30 To fund or not to fund: a Bayesian Network decision support tool for investment in species conservation

Gavin Stewart, *University of York, York, UK;* **Kerrie Mengersen*,** *QUT, Brisbane, Australia;* **Georgina Mace,** *Imperial College, London, UK;* **Christopher Schmid,** *Tufts Medical Centre, Boston, USA;* **Jeff McNeely,** *IUCN, Switzerland;* **Jegar Pitchforth,** *QUT, Brisbane, Australia;* **Ben Collen,** *Zoological Society, London, UK;*

The decision of whether or not to invest the limited resources available to conservation into any given species is a complex issue. There are many potential deciding factors most of which are poorly known, and different decision-makers will have different priorities. While a number of different schemes have been proposed, to date, Bayesian Networks for decision analysis have not been widely evaluated. This paper presents three Bayesian Networks that describe the interactive primary factors involved in this decision from the perspectives of three types of decision-maker: a government official, a non-governmental organization and an inter-governmental organization. The species-independent components of the networks were quantified by these experts and the species-specific components were quantified by two expert ecologists for 13 species across a range of taxonomic groups in their area of expertise. Comparisons between networks and across species reveal very similar decisions emerging from networks with substantially different structures, connections and levels of complexity. All three networks led to support for the same ranking of highest and lowest probability of investment. Results suggest that governments and NGOs have different priorities for decision making and may give the various dimensions of their decisions different weighting yet may still arrive at similar conclusions.

2011-12-09 14:00 Biocultural diversity and biocultural approaches to conservation: what, where, and why?

Gavin, Michael*, *Victoria University of Wellington;* **Stepp, Rick,** *University of Florida;*

We introduce the symposium on biocultural approaches to conservation with an appraisal of the current state of knowledge on biocultural diversity and biocultural approaches to conservation. The concept of biocultural diversity is rapidly gaining prominence and can play a key role in integrating ecological and social aspects of conservation. At its core, biocultural diversity is a geographical phenomenon, based on observations of positive correlations between biodiversity and linguistic richness. We review work to date on these geographic patterns and suggest future directions, including research at multiple scales and a focus on the mechanisms that produce biocultural diversity patterns. We then explore the definition of biocultural conservation, reviewing a spectrum of approaches that vary in the degree to which they focus on biodiversity versus cultural diversity conservation. We also review the main arguments (both ethical and pragmatic) for conservation action that simultaneously seeks to conserve both cultural and biological diversity. We outline the major challenges to implementing biocultural conservation, including the need to engage diverse stakeholders in collaborative efforts, the importance of supportive policies and institutions at multiple scales, and the use of adaptive governance. Finally, we introduce the other speakers and highlight their contributions to the goals of the symposium.

2011-12-08 18:30 Integrating local wildlife research and serious games to engage schoolchildren in wildlife conservation in the temperate forest of Southern Chile

Gálvez, N.*, *Pontificia Universidad Católica de Chile, Sede Villarrica, CEDEL Centre of Local Develpement, Culture and Education ;* **Gutiérrez, P.,** *Pontificia Universidad Católica de Chile, Sede Villarrica, CEDEL Centre of Local Develpement, Culture and Education;*

The temperate forest eco-region of southern Chile is a critically endangered hotspot. Innovative education is needed to engage school teachers and children in conservation. Serious games for education focus on content, but most importantly learning while having fun. Through interdisciplinary work we integrated wildlife research – conducted in the Araucanía Region– with education and design to develop a strategy role-playing board game (i.e. 4 players' equivalent to 4 endangered species). Since 2006, local issues and dynamics of species have been obtained with camera traps (> 10,000 camera nights), transects, opportunistic findings of signs (e.g. scats, tracks, road kills), local knowledge and available published work. During 2010 we development the game with tests in schools (n=9) and 72 children, 9 teachers and 9 pedagogy students. It is based on the curriculum and evaluated-approved by the ministry of education. The objective is to foster positive attitudes, understanding of ecological roles and natural history of species. Most important is how each player experiences positive and negative effects of human activities such as deforestation, sustainable agricultural practices, fire, tourism etc, while they win and lose lives as the travel through a fragmented human landscape between protected areas. We conclude that serious games should be used as part of local conservation strategies

2011-12-08 18:30 Evaluation on precision of habitat use monitoring data by line transect method based on GPS locations from collared takin

Ge, BM, *Institute of Zoology, Chinese Academy of Science;* **Guan, TP,** *College of Life Sciences, Beijing Normal University, Beijing, China;* **McShea, W,** *Conservation and Research Center, National Zoological Park, Front Royal, USA;* **Powell, Dl,** *Department of Mammalogy, Wildlife Conservation Society, UDA;* **Song, YL*,** *Institute of Zoology, Chinese Academy of Sciences, Beijing, China;*

The biodiversity monitoring is the most importance work in wildlife management and environmental conservation. The monitoring line transects method was widely used in past decades in biodiversity monitoring but the data precision collected has seldom compared with other methods.

The GPS collars were considered as the advanced facilities to collecting data on animal movement and distribution. But the GPS collars are hardly used in the undeveloped countries and regions due to economical reason. We evaluate the accuracy and precision of the line transects on habitat use based on the GPS locations of takin (Budorcas taxicolor) wearing with GPS collar. We use ، 2 test to check whether the habitat use data collected from GPS collared animals can be represented by the locations of footprints/ droppings collected on the transect. The results showed that data collected on transects or from GPS locations showed a equal trend in habitat type use. Most of the locations of GPS and footprints/droppings occurred in the broadleaved forest at low and middle elevation in the south aspect. However, there was a significant difference in elevation (Chi square = 19.511, P<0.001) and slope (Chi square = 43.695, P<0.001) between the two set of data. Our results indicated that the monitoring data collected on transects can provide correct information on habitat type use of takin in a broad scale, therefore, transect method can be applied to monitor habitat use in the protected areas.

2011-12-08 15:30 Using long-term monitoring data to investigate 20-year trends of body condition of two New Zealand skink species

GEBAUER, KONSTANZE*, *University of Otago, Ecology Programme;*

In conservation biology where limited budgets lead to managers having to prioritise strategies, it is important to know if changes in population parameters are part of natural variation or due to management actions. This study investigated long-term trends of body condition of two New Zealand skink species, the grand skink (Oligosmoa grande) and the Otago skink (O. otagense). Both species are classified as threatened with habitat loss and predation being identified as major threats. A monitoring programme and predator control programme has been in place for over two decades resulting in a large set of morphological data of both species. Overall body condition of both species remained constant over time with large variations between years possible. Additionally both species exhibited a seasonal trend of body condition being lowest in spring, increasing in summer and decreasing again in autumn. The type of habitat had a major influence on grand skink body condition, being higher in exotic pasture grasslands during spring and autumn compared to animals in native tussock grasslands. This study shows that long-term data sets are important to make informed decisions and provide a better understanding of long-term trends of population parameters which short term studies could not provide.

2011-12-09 11:00 Viability of shellfish restorations across a water quality gradient

GEDAN, KB*, *Smith Fellow, Smithsonian Environmental Research Center;*

Shellfish restorations have the potential to improve water quality conditions. Interest in shellfish restorations is high among many stakeholder groups in the Chesapeake Bay, where water quality conditions range from eutrophic to more pristine. Designing shellfish restorations to be most effective requires thorough knowledge of the two-way interactions between bivalves and water quality conditions. To understand the effects on bivalve fitness of high nutrients and diel-cycling hypoxia, common conditions in the shallow, eutrophic tributaries of the Chesapeake where restorations will take place, I transplanted bivalves of four species to sites spanning the eutrophication gradient in the brackish Chesapeake Bay and examined species-specific growth rates, reproduction, disease prevalence, and survival. The four species of bivalves, eastern oyster Crassostrea virginica, bent mussel Ischadium recurvum, soft shell clam Mya arenaria, and Baltic clam Macoma balthica, were chosen for their broad use as restoration species and/or their ecological importance in the estuary. Several of the research sites are under evaluation for restoration projects, and this research will inform restoration decisions to facilitate successful outcomes. Additionally, I am working directly with community members interested in shellfish restoration to improve local water quality conditions.

2011-12-07 11:45 Conservation introductions and the risk of biological invasions

Genovesi, P*, *ISPRA and Chair IUCN SSC Invasive Species Specialist Group;*

By definition biological invasions are caused by the introduction – either intentional or accidental - of species outside their native range. Invasions are rapidly growing as a consequence of the globalization of the economy, with increasing impacts on biodiversity as well as on the ecosystem services we rely upon. Therefore it is crucial that, when considering conservation introductions (assisted colonization/assisted migration), the risk of inadvertently causing further invasions is seriously considered. An analysis of past invasions show that even rare species, as well as narrow endemic species, can become invasive when moved into new areas. The risk analysis of conservation introductions poses several challenges that need to be explored; these include how to deal with the uncertainty related to the risk analysis process, the need to apply risk assessment to taxa for which we have less experience of risk analysis, how to assess the risk in multi-species introductions, and also how to balance conservation benefits (preservation of species from extinction risks) versus biological and socioeconomic costs (risk of the species to become invasive, causing impacts on biodiversity or human livelihood). It is important that traditional risk analysis procedures, often developed in the agricultural sector, are carefully tailored to apply to conservation introductions, and that a clear evaluation or authorization process is applied to this novel conservation tool.

2011-12-06 15:30 The role of decision support tools in marine spatial planning

George L. Shillinger*, *Stanford University;* **Melissa M. Foley,** *Stanford University;* **Erin Prahler,** *Stanford University;* **Matthew Armsby,** *Stanford University;* **Heather M. Coleman,** *Pacific Marine Analysis and Research Association;*

Spatially explicit approaches for planning human activity, resource use, and maintaining or restoring ecosystem integrity in marine areas are gaining traction worldwide. These approaches provide a framework for more comprehensive, flexible, well-governed, science-based planning with a place-based focus. To achieve the ecosystem, economic, and social goals of a marine spatial planning process, planners and managers need access to spatially-explicit tools that help (1) incorporate ecological, economic, and social data; (2) transparently assess management alternatives and trade-offs; (3) involve stakeholders; and (4) evaluate progress towards management objectives. A growing number of decision support tools (DSTs) offer these functionalities and, in many cases, are easier to use than traditional geographic information systems (GIS). Based on a multi-part workshop series with tool developers, planners, and managers, we discuss how synergies between DSTs can be used to create a "toolbox;" how DSTs can fit into a general marine spatial planning framework; and how an understanding of process steps, general tool functions, and individual DST capabilities can help practitioners identify and select appropriate tools.

2011-12-09 15:00 The influence of riparian corridors on movements and residency of non-flying mammals in tropical remnants

GEURTS, KATRIEN*, *School of Earth and Environmental Sciences, James Cook University, Cairns, 4870 Queensland, Australia;* **Goosem, Miriam,** *School of Earth and Environmental Sciences, James Cook University, Cairns, 4870 Queensland, Australia;* **Wilson, Robyn,** *School of Earth and Environmental Sciences, James Cook University, Cairns, 4870 Queensland, Australia;* **Laurance, Susan,** *School of Marine and Tropical Biology, James Cook University, Cairns, 4870 Queensland, Australia;* **Turton, Steve,** *School of Earth and Environmental Sciences, James Cook University, Cairns, 4870 Queensland, Australia;*

Fragmentation of habitat results in the subdivision of large populations into small, isolated subpopulations. Many tropical rainforest species have low mobility, high ecological specialisation and low tolerance of edge and cleared matrix, which make them prone to extinction in fragmented landscapes. In the Wet Tropics bioregion of north Queensland, Australia, endemic upland species are also threatened by climate change, as suitable habitat will contract when temperatures increase. Connectivity to highland refuges is imperative for continued existence of these species. We are investigating the influence of riparian corridors on community composition and residency in remnant habitats to determine which ecological traits and environmental factors affect movements of non-flying mammals in a fragmented landscape. Non-flying mammals are surveyed by spotlighting, and also using mark recapture, radio tracking and translocation experiments in continuous rainforest, remnants

connected by riparian corridors and isolated patches. Using ecological traits of the species studied and environmental (microclimate, vegetation structure and resource availability) variables measured in the different remnants we will construct an index of matrix permeability. This will assist in future management decisions regarding restoration and revegetation of corridors to accommodate successful dispersal of these species, especially to climate change refugia, and thus allow their future persistence.

2011-12-07 11:06 People And Predators In A Moral Landscape: Exploring Attitudes Towards Large Carnivores To Perceptions Of Landscape

Ghosal, S.*, *Norwegian University of Life Sciences (UMB) ;*

This paper explores the relationship between attitudes towards large carnivores and perceptions of the landscape. This paper probes underlying themes to check if perception of the landscape has any relevance to people's attitudes towards large carnivores.. The paper is based on ethnographic research carried out in a production landscape in western India, which is dominated by the cultivation of sugarcane. The landscape is production landscape with no part of protected for biodiversity conservation. A stable population of Leopards (Panthera pardus fusca) lives in this landscape, in close proximity with its human inhabitants. This shared existence is marked by a complex matrix of interactions, including material conflicts and studied tolerance. The relationship between people and leopard is strung along a spectrum ranging from demands for permanent removal at one end to deification of the leopard as a local deity. This paper presents an analysis of applying Tim Ingold's proposition that people perceive landscapes through the tasks they perform in it to explaining why some people tolerate large carnivores in their midst, while others do not. It will conclude that often conflicts over large carnivore conservation are located in disagreement over perception of the landscape, rather than attitudes towards the large carnivore.

2011-12-07 14:48 Entomophagy, a tool for biodiversity conservation: A case study from Arunachal Pradesh, N.E. India.

GHOSH, SAMPAT*, *Dept. of Zoology, Rajiv Gandhi University, Rono Hills, Itanagar, Arunachal Pradesh, India-791112;* **Chakravorty, Jharna,** *Dept. of Zoology, Rajiv Gandhi University, Rono Hills, Itanagar, Arunachal Pradesh, India-791112;*

Indigenous knowledge plays a crucial role in utilizing the surrounding natural resources which in turn conserves genetic diversity. The acceptance of about 94 insect species as food by several ethnic communities of Arunachal Pradesh (NE India) is an example of ethno biological knowledge. This may be considered as a landmark in the search for sustainable sources of nutrition. At the same time it advocates the conservation of the species and thus the forest. So far about 75% of edible insect species recorded is being collected from forests. The ethnic people even rear some species in traditional methods. The dependence on the forest for livelihood has taught the ethnic people how to conserve forests and utilize natural resources in general and insect in particular. The present study indicates that traditional knowledge is in decline due to inclination towards western food habits. The traditional knowledge associated with entomophagy among ethnic people of Arunachal should be encouraged to preserve biodiversity which may in turn act as an effective tool for biodiversity conservation.

2011-12-09 17:45 Do broad scale changes in UV radiation correlate with global amphibian declines?

Gibbs, KE*, *University of Ottawa;* **Currie, DJ,** *University of Ottawa;*

The global decline in amphibian populations is one of the most pressing issues in conservation biology yet there is no clear consensus on which factors are driving these declines. UV radiation has been suggested as a cause because radiation has been increasing since the 1970's and amphibians are particularly susceptible to UV damage. Many studies have confirmed that UV can cause serious damage to amphibians. Here, we use a global amphibian population dataset and remotely sensed global UV radiation to examine whether there is a correlation between amphibian population changes and changes in UV radiation at a global spatial scale for numerous amphibian species. The dataset includes 936 amphibian population time series varying from 5-21 years over 1979-1999 from 37 countries (Houlahan et al. 2000). Amphibian populations were found to be declining on average. At individual sites, temporal changes in amphibian abundance are not predictably related to changes in UV intensity. Nor is the global spatial variation in amphibian population trends predictably related to variation in UV temporal trends. It could be that negative effects of UV on individual amphibians do not result in changes at the population level or that factors that affect UV at a local scale are more important to amphibian populations than broad scale UV. However, global increases in UV radiation do not appear to be a major cause of amphibian declines. JE Houlahan et al. 2000. Nature, 404, 752-755.

2011-12-08 18:30 Application of molecular methodologies for conservation of the Western Swamp Tortoise, Pseudemydura Umbrina .

Giustiniano D R*, *1School of Animal Biology, Faculty of Natural and Agricultural Sciences, University of Western Australia;* **MIlls H,** *1School of Animal Biology, Faculty of Natural and Agricultural Sciences, University of Western Australia;* **Robertson H,** *Perth Zoo;* **Groth D M,** *School of Biomedical Science, WABRI, Curtin University;*

The critically endangered Western Swamp Tortoise is considered to be Australia's rarest reptile, a species endemic to Western Australia found only in two naturally occurring sites. Efforts to prevent this species from further decline can be mainly attributed to the successful captive breeding program and the species recovery plan. The captive breeding program of P. umbrina implemented by Perth Zoo has increased the total population from fewer than 50 to approximately 700 individuals. The small founder population puts this species at a considerable risk of low levels of genetic diversity. Captive breeding programs also rely on accurate pedigrees to manage the genetics of captive populations, the potential for sperm storage in this species questions the accuracy of the current studbook. Non-invasive genetic material has been collected for all individuals from the captive breeding program. Next generation DNA sequencing using the Roche 454 platform has been used to identify microsatellite and mitochondrial DNA sequences. Molecular techniques have been used to resolve important biological questions in this species. The use of molecular markers can substantially improve conservation efforts, the application of genotypic information obtained from the Western Swamp Tortoise can be used to enhance this species captive breeding program.

2011-12-07 17:00 Colonization of new patches of forest habitat by epiphytic lichens

Gjerde, I.*, *Norwegian Forest and Landscape Institute;* **Blom, H.H.,** *Norwegian Forest and Landscape Institute;* **Sætersdal, M.,** *Norwegian Forest and Landscape Institute;* **Heegaard, E.,** *Norwegian Forest and Landscape Institute;*

Understanding dispersal processes is fundamental to the conservation of biodiversity in a changing world. We investigated the colonization of new forest habitat patches by a guild of epiphytic lichen species in former treeless heathland in coastal southwest Norway. To the north and east, the heathland area bordered on potential source areas that have been forested for a long time. All lichen bodies (thalli) of 32 preselected lichen species were mapped within a 170 km2 heathland area, the habitat patches comprising only 0.4% of the area. The age and cumulative substrate area over time (CSA) for each of the 90 habitat patches was estimated. Ten patches was classified as old (> 120 years), and the others were between 35 and 120 years old. Age and CSA explained most of the variation in species richness (R2 = 0.76). We found no effect of distance on lichen species richness; neither the distance to the edge of the heathland area nor the distance from old habitat patches within the heathland area had any significant impact. Thus, there was no sign of stepping-stone effects in the pattern of colonization of lichen species within the study area. In our setting (small patches constituting 0.4% of the area), geographical positions in the heathland area did not seem to affect propagule supply. We conclude that our habitat patches were mainly colonized by long-distance dispersal. Implications for conservation of lichens and other cryptogams are discussed.

2011-12-08 18:30 Determining the Linkages between Mangrove Detritus and Ecosystem Functioning, in a Temperate New Zealand Estuary

Gladstone-Gallagher, RV*, *University of Waikato, NIWA Hamilton;*

Mangroves are increasing in New Zealand estuaries at a rate of 4% per year, due to changes in catchment land-use and increased delivery of terrestrial sediments to estuaries. New Zealand coastal management plans often include

provisions to reduce expansion of mangrove habitats, through removal of seedling colonists and/or adult trees. The poorly defined ecological value of the services provided by mangroves in temperate estuaries provides little guidance of how mangrove removal will impact on ecosystem function. Here, we investigate one ecosystem service, that of the trophic role provided by temperate mangroves, determined by the decomposition of mangrove detritus (fallen leaves and wood) and its uptake by marine organisms. Firstly, we quantified rates of leaf litter fall from mangroves, sampling litter fall traps monthly at two sites in Whangamata Harbour, to derive estimates of forest productivity and detrital input into the estuary. Secondly, we calculated decomposition rates of buried and exposed mangrove detritus at varying tidal heights, shading, and sediment type. Finally, we measured the effect of adding mangrove detritus on infaunal organisms to determine the role that mangrove detritus plays in supporting estuarine food webs. Our results establish the linkages between mangrove detritus and estuarine ecosystem functioning, by measuring the input of mangrove material into the detrital food web as well as the resulting changes in benthic community structure.

2011-12-08 11:00 Human Health Impacts of Ecosystem Services: Wildlife Consumption and Food Security

Golden, CD*, *Harvard University School of Public Health/Center for the Environment;*

Biodiversity loss and large-scale wildlife declines are now globally pervasive and well-documented.These losses have triggered severe ecological ramifications such as trophic meltdown, loss of critical ecological interactions and extinctions of fish and game species.Surprisingly few studies have quantified the effects of wildlife declines on human economies and health outcomes, despite the essential role of wildlife consumption in shaping human evolution and in the diet of hundreds of millions of rural people across the globe. Wildlife declines are likely to have direct and powerful effects on human health and nutrition, particularly via lost access to critical micronutrients. We quantify the contribution of harvested wildlife to human nutrition in rural Madagascar and demonstrate with empirical data and predictive models that wildlife loss could induce a 1.3 fold increase in the prevalence of childhood anaemia. While many studies have suggested that wildlife can provide a food security safety net, our study illuminates quantitative links between micronutrients derived from wildlife and critical human health outcomes. These results provide a clear example of how rapid global declines of access to wildlife for consumption, due either to conservation measures or wildlife depletion, could significantly affect the health of local human populations. Such linkages between biodiversity loss and human health highlight the need for research and mitigation approaches that integrate the disciplines of public health and conservation biology.

2011-12-09 12:00 Population genomics of a conservation dependent deep-sea fish species, orange roughy (Hoplostethus atlanticus)

Gonçalves da Silva, Anders*, *CSIRO Marine and Atmospheric Research;* **Barendse, William,** *CSIRO Livestock Industry;* **Kijas, James,** *CSIRO Livestock Industry;* **Barris, Wes,** *CSIRO Livestock Industry;* **McWilliam, Sean,** *CSIRO Livestock Industry;* **Bunch, Rowan,** *CSIRO Livestock Industry;* **Hoelzel, Rus A.,** *Durham University;* **England, Phillip R.,** *CSIRO Marine and Atmospheric Research*

Marine fish are usually hard to observe, highly mobile, and often long-lived with large effective population sizes. This poses particularly difficult challenges to fisheries managers when defining stock structure. Past work in orange roughy has generally found low genetic differentiation at global spatial scales. Here, we examine genome-wide genetic variation and describe population structure in orange roughy. Allelic variation was surveyed at thousands of single nucleotide polymorphism (SNP) sites using custom-built 5K Illumina Infinium chips in samples spanning the known range of the species. We found low genetic differentiation at global scales, on the order expected under "drift connectivity". Initial clustering analysis based on discriminant analysis of principal components on the whole SNP set separated broad geographic regions (e.g., western South Africa vs. Australia), but did not separate sampling sites within regions. Thus, a large number of genetic markers have allowed us to confidently detect some population differentiation when none was initially expected, and detect population boundaries at broad spatial scales. Analyses based on outlier loci are currently underway as they are potentially valuable in determining stock structure in marine species that show low divergence over large geographical scales. The data presented improve on previous genetic analyses, however present a new challenge on how to treat such low levels of differentiation when managing fisheries.

2011-12-09 15:00 Biases in comparative analyses of extinction risk: mind the gap

González-Suárez, M*, *Estación Biológica de Doñana EBD-CSIC;* **Lucas, P.M.,** *Estación Biológica de Doñana EBD-CSIC;* **Revilla, E.,** *Estación Biológica de Doñana EBD-CSIC;*

Understanding what makes a species more vulnerable to extinction is a key objective in conservation biology. A popular and appealing answer is based on comparative analyses that explore the links between higher vulnerability and intrinsic ecological and life history traits. Comparative analyses require information on multiple species which are assumed to be a representative sample of the overall biodiversity or taxonomic group of interest. Our study challenges this assumption by describing important taxonomic, regional, and data type biases associated with the number of data available for mammalian species. We show that biases are partly explained by intrinsic species traits with larger mammals occupying bigger range areas being the best studied. Importantly, these biases in data availability affect the results of comparative analyses, raising concerns over our ability to draw general conclusions regarding which species traits are associated with vulnerability to extinction. Addressing this problem will require greater investment in data collection and dissemination, as well as the development of methodological approaches to correct existing biases.

2011-12-06 17:00 Conservation of endangered woodlands in a patch dynamic system

Good, M.K*, *University of New England;* **Clarke, P.,** *University of New England;* **Price, J. N.,** *University of Tartu;* **Reid, N.,** *University of New England;*

Eucalyptus coolabah (Coolibah) woodlands are an endangered ecological community that have been extensively cleared in Australia. Little is known of the population biology of Coolibah other than its ability to recruit en masse following flood events. On the northern riverine plains of NSW, densely regenerating Coolibah is regarded as an encroaching woody species due to a perceived increase in density, but the evidence is equivocal. We measured population structure in woodlands and regenerating stands: smaller size classes were absent from remnant woodlands and there were few large trees in dense stands. These results support a model of savanna patch dynamics in which episodic recruitment and mortality are driven by patchily distributed establishment and recruitment events. At the patch scale, tree density appears to be decreasing in some areas and increasing in others. When patches are pooled, however, all size classes are represented and the meta-population appears stable. In dense stands, we found a strong relationship between tree size (DBH) and distance to nearest neighbour indicating that intra-specific competition leads to self thinning. It is likely that dense Coolibah regrowth is simply a seral state leading to mature woodland over time, and so conservation of Coolibah woodlands should be considered at a landscape scale.

2011-12-09 18:00 Impacts of an alien grass on native coastal plant communities

Gooden, B.*, *Institute for Conservation Biology & Environmental Management, School of Biological Sciences, University of Wollongong;* **French, K.,** *Institute for Conservation Biology & Environmental Management, School of Biological Sciences, University of Wollongong;*

Alien plants significantly threaten native biodiversity, yet information on community-level impacts remains poorly understood. This study investigated the changes in coastal forest communities following invasion by an alien, stoloniferous, C4 grass, Stenotaphrum secundatum, in south-eastern Australia. Invaded plots had 80% fewer native ground-layer plants and substantially different compositions than native reference plots. Importantly, invaded and native sites did not differ in key landscape parameters, including number of living and dead trees, distance to edges

and roads, intensity of adjacent anthropogenic land use or size of the forest patch, indicating that invasion can occur across multiple landscape contexts, and species loss is driven by grass invasion rather than pre-emptive habitat disturbances. A seed bank study revealed that germinable species differed substantially from the standing vegetation, but not between invaded and native sites. Most species typical of the community were unrepresented in the seed bank. Thus, the community is not resilient to grass invasion and restoration is likely to require active replacement of targeted native species through revegetation efforts. Removal of the alien grass alone is unlikely to reinstate the native community.

2011-12-08 11:15 Traffic noise impacts on vertebrates of tropical rainforest

Goosem, M*, *James Cook University;* **Hoskin, C.,** *James Cook University;* **Dawe, G.,** *James Cook University;*

Traffic noise may affect wildlife by causing avoidance of road edges and alterations to calling (breeding) behaviour. We investigated effects of a busy highway on frog and bird abundance and calling behaviour in tropical rainforest of northeast Queensland, Australia. Traffic noise can be detected in dense rainforest up to 200 m from the forest edge at frequencies between 31.5 Hz and 2 kHz. This could interfere with communications of birds and frogs, particularly at the forest edge where noise levels are greatest. Abundance of two frog species increased significantly with distance from the road along two stream transects. However, one of these was unaffected on another two transects and a third species also appeared unaffected. In the endangered frog, Litoria rheocola, body size was smaller and individuals called more often and at a higher dominant frequency close to the road compared with individuals further from the road. For rainforest-dependent birds, abundance and species richness on transects parallel to the highway increased significantly with distance from the highway edge to 200 m inside the forest. No rainforest obligate birds were observed at the highway edge, the only area where non-rainforest birds were found. The dominant song frequencies of at least five out of eighteen bird species were significantly different at the forest edge compared with the forest interior. Traffic noise is likely to be causing many of these edge impacts and may require mitigation.

2011-12-09 14:08 Bio-economic modelling for the viable management of mixed fisheries

Gourguet, Sophie*, *CSIRO Marine and Atmospheric Research, Australia;* **Doyen, Luc,** *CNRS-MNHN Departement of Ecology and Biodiversity Management, Paris, France;* **Macher, Claire,** *Ifremer, Departement of Maritime Economics;*

Marine fisheries resources are under extreme pressure worldwide. Marine scientists and stakeholders advocate ecosystem-based fishery management (EBFM) for an effective and sustainable management. However, the way to operationalize such EBFM remains controversial. The stochastic co-viability approach can be a relevant modeling framework for EBFM as it accounts for dynamic complexities, uncertainties, risks and sustainability objectives balancing ecological, economic and social dimensions together with intergenerational equity. The present paper focuses on the case of the mixed demersal fisheries operating in the Bay of Biscay and especially harvesting Nephrops (Nephrops norvegicus), Hake (Merluccius merluccius) and Sole (Solea solea). A bio-economic multi-species and multi-fleets model is developed to examine how to preserve Spawning Stock Biomass (SSB) for every species while preserving the economic profitability for the various fleets at play. First results suggest that the viable strategies require a significant mitigation of the fishing capacities as compared to referenced year 2008 for Nephrops trawlers and gill-netters fleets that are the most contributory fleets to Nephrops and Sole fishing mortality.

2011-12-07 18:15 The habitat value of indigenous perennial tree-crop systems in a highly fragmented ecosystem of Mediterranean Australia

Gove, AD*, *Dept. Environment and Agriculture, Curtin University;* **Woodall, GS,** *Centre of Excellence in Natural Resource Management, University of Western Australia;*

The Western Australian Wheatbelt is one of Australia's most heavily cleared regions and possesses limited potential for reserve expansion. Hence, it is imperative that management consider the role of the landscape matrix in maintaining species by the provision of habitat and increasing landscape connectivity. Perennial tree-crops are of increasing interest in the region and cultivation far exceeds the area covered by conventional revegetation (~3x). Hence their habitat value should be taken into account. In this study we surveyed bird and wasp assemblages in plantations of the hemiparasitic sandalwood (Santalum spicatum) and brushwood (Melaleuca spp.) and compare these with replicated samples from annual crop (Lupin) and local native woodlands. We have found that wasp species density in tree crops is similar to woodlands, and that tree crops possess an assemblage different to that of annual crops but not necessarily resembling woodland. Sandalwood in particular exhibits bird species densities similar to that of woodlands and provides habitat for several woodland-dependent species. Further analysis will examine whether the tree crops provide a seasonal refuge when on-farm resources are lowest. At this point we suggest that indigenous perennial tree crops can go some way to increasing the extent of habitat for some woodland-dependent species, and likely increase connectivity within highly fragmented Mediterranean landscapes.

2011-12-08 11:30 Ecosystem-based adaptation in marine ecosystems of tropical Oceania in response to climate change

Grantham, H.S., *Conservation International;* **McLeod, E,** *The Nature Conservancy,;* **Brooks, A,** *Woodland Park Zoo's Tree Kangaroo Conservation Program;* **Jupiter, S.D.*,** *Wildlife Conservation Society Fiji Country Program;* **Hardcastle, J.,** *The Nature Conservancy;* **Richardson, A.J.,** *The University of Queensland;* **Poloczanska, E.S.,** *CSIRO Marine and Atmospheric Research;* **Hills, T.,** *Conservation International;* **Mieszkowska, N., Klein, C.J. and J.E.M. Watson**; *University of Queensland.*

Tropical Oceania, including Melanesia, Polynesia, Micronesia and northern Australia, is one of the most biodiverse regions of the world. Climate change impacts have already occurred in the region and will become one of the greatest threats to biodiversity and people. Climate projections indicate that sea levels will rise in many places but not uniformly. Islands will warm and annual rainfall will increase and exhibit strong decadal variations. Increases in global atmospheric CO2 concentration are causing ocean acidification, compromising the ability of organisms such as corals to maintain their calcium carbonate skeletons. We discuss these climate threats and their implications for the biodiversity of several ecosystems (coral reefs, seagrass and mangroves) in the region. We highlight current adaptation approaches designed to address these threats, including efforts to integrate ecosystem and community-based approaches. Finally, we identify guiding principles for developing effective ecosystem-based adaptation strategies. Despite broad differences in governance and social systems within the region, particularly between Australia and the rest of the Pacific, threats and planning objectives are similar. Ensuring community awareness and participation are essential everywhere. The science underpinning ecosystem-based adaptation strategies is in its infancy but there is great opportunity for communicating approaches and lessons learnt between developing and developed nations in tropical Oceania.

2011-12-06 11:30 Quantifying resistance of landscape characteristics to gene flow

Graves, Tabitha*, *Northern Arizona University;* **Beier, Paul,** *Northern Arizona University;* **Royle, Andy,** *US Geological Survey, Patuxent Wildlife Refuge;* **Kendall, Katherine,** *US Geological Survey, Northern Rocky Mountain Science Center;*

We describe a new technique to estimate the effect of environmental characteristics on gene flow. To maintain and restore connectivity within and among grizzly bear (Ursus arctos) populations, we want to understand how gene flow is affected by variables such as road density, number of buildings per square mile, highways, railroads, land cover type, and poor habitat. Most current approaches to corridor planning rely on expert opinion. Current analytical techniques use coarse search methods, take a long time, and do not provide variance estimates. Our approach provides resistance estimates and variance of those estimates for each variable. We conducted a simulation study to examine the ability of our method to detect true resistance to gene flow under different scenarios. We evaluate the influence of landscape characteristics (random, slightly patchy, very patchy), relationship form (e.g. linear, quadratic, logistic), and the underlying assumption of how animals see their landscape (randomly= resistances based

on circuit theory and all-knowing= least cost paths). We examine bias and precision of our estimates under all scenarios and provide recommendations about when our approach will be most appropriate. This technique will promote science-based corridor planning efforts for multiple species. Next we will apply this approach to > 1500 genetic captures of 545 grizzly bears from 2004 across 8 million acres in northwestern Montana, USA.

2011-12-07 16:45 Monitoring Marine Reserves - How do we know if protection is effective?

Gregor, K.E.*, *Marine Studies Department, Bay of Plenty Polytechnic;* **Young, K.D.,** *Department of Conservation;* **Overton, J. McC.,** *Landcare Research;* **Rapson, D.,** *Department of Conservation;*

Measuring the effectiveness of conservation management programs requires clear management objectives, a monitoring program specific to those objectives, and the resources to implement them. Tuhua Marine Reserve, situated in the North Island of New Zealand was established to restore representative sub-tidal rock reef faunal and floral communities. The Reserve has had a complex 18 year history regarding the setting of management objectives, achieving compliance and measuring the effectiveness of protection. In the last three years however, clearly stated objectives, enforced compliance and a revised monitoring program have enabled responses in line with desired management outcomes to be measured. Here we discuss the development of ecosystem-based management objectives and the design of a spatially and temporally explicit monitoring program for measuring progress towards these. In addition, we discuss how a long term conservation and education partnership between the government agency responsible for managing the reserve, and a regionally based tertiary institution has provided the resources to develop the monitoring program through its 18 years of trial and evaluation, and will continue to provide the resources required for the monitoring program into the future. Our study illustrates the importance of developing clear management outcomes from the outset of protection, designing appropriate monitoring programs to measure these, having partnerships in place to implement them over the long term, and reporting results in a manner relevant to management capability and accountability.

2011-12-08 14:30 Sustainability of a post-larval capture and culture (PCC) based stock-enhancement program for coral reef food-fish in Fiji

Grignon, J*, *Griffith University;* **Johnston, B,** *Department of Employment, Economic Development and Innovation;* **Pickering, T,** *Secretariat of Pacific Community;* **Morrison, C,** *Griffith University;*

In the Pacific region, overfishing and mismanagement have affected the majority of coastal fisheries. While fishing regulations have been the primary means to halt further impacts on diversity and abundance, alternative initiatives such as stock-enhancement are being promoted. The goal of this study was to evaluate the sustainability of a stock-enhancement program based on the post-larval capture and culture (PCC) of coral reef food-fish in Fiji and its suitability as an alternative income generating activity for local communities. This was done using a specifically designed cost-benefit model to test the influence of various combinations of capture effort, capture season, and culture scenarios on economic performance and the risk involved. Results found that low larval capture rates and high associated costs did not permit the program to be economically sustainable over a 20-year period in Fiji. However, other important program benefits including enhancement of reef biodiversity, local capacity building, and the ability to increase economic returns by incorporating fish for the ornamental market suggest that this program has the potential to be economically sustainable as well as providing an important conservation tool for fisheries in the region.

2011-12-08 11:00 Individual space use behavior: assessing sensitivities and vulnerabilities to roads

Grilo, C*, *Universidade de Lisboa, Centro de Biologia Ambiental/ Departamento de Biologia Animal, Faculdade de Ciências, C2 5º 1749-016 Lisboa, Portugal/Departamento de Biología de la Conservación, Estación Biológica de Doñana (EBD-CSIC), Calle A;* **Sousa, J,** *Universidade de Lisboa, Centro de Biologia Ambiental/ Departamento de Biologia Animal, Faculdade de Ciências, C2 5º 1749-016 Lisboa, Portugal;* **Ascensao, F,** *Universidade de Lisboa, Centro de Biologia Ambiental/Departamento de Biologia Animal, Faculdade de Ciências, C2 5º 1749-016 Lisboa, Portugal;* **Matos, H,** *Universidade de Lisboa, Centro de Biologia Ambiental/Departamento de Biologia Animal, Faculdade de Ciências, C2 5º 1749-016 Lisboa, Portugal;* **Leitao, I,** *Universidade de Lisboa, Centro de Biologia Ambiental/Departamento de Biologia Animal, Faculdade de Ciências, C2 5º 1749-016 Lisboa, Portugal;* **Pinheiro, P,** *Universidade de Lisboa, Centro de Biologia Ambiental/Departamento de Biologia Animal, Faculdade de Ciências, C2 5º 1749-016 Lisboa, Portugal;* **Santos-Reis, M,** *Universidade de Lisboa, Centro de Biologia Ambiental/Departamento de Biologia Animal, Faculdade de Ciências, C2 5º 1749-016 Lisboa, Portugal;* **Revilla, E ,** *Departamento de Biología de la Conservación, Estación Biológica de Doñana (EBD-CSIC), Calle Américo Vespucio s/n, E-41092 Sevilla, España*

Understanding the effects of roads and developing ways to mitigate them has become an important goal of many conservation biologists. Even for common and non-threatened species, some life-history attributes and behavior patterns make them particularly vulnerable to them. We assessed the space use response of two common species (barn owls Tyto alba and stone marten Martes foina) in roaded landscapes at different scales: home range, habitat selection, fine-scale movement and actual highway crossings. Both species seem to show low sensitivity to highways. Habitat selection in the vicinity of the highway is mainly explained by the foraging habitat and cover but the presence of the highway seems to drive the fine-scale movements. Individuals tend to cross highways in some locations that increase the road mortality risk. Our findings allow us to determine under which conditions we can expect both barrier effects and road kills in a more integrated way, but they are also important to understand of how vulnerable are these species in relation to highways and traffic, thus helping to develop more cohesive road planning strategies for biological conservation.

2011-12-07 11:02 Enhancing Conservation Practice through Effective Interdisciplinary Education

Groom, MJ*, *University of Washington Bothell;*

How do we best create solutions to our myriad conservation problems? Increasingly, interdisciplinary partnerships play a central role in creating conservation solutions on the ground, yet the bulk of our training in conservation still focuses on biological issues alone. We need to better motivate and retain individuals with a wide diversity of goals and approaches to partner in attaining conservation solutions for our future. In this presentation, I will highlight approaches taken in interdisciplinary undergraduate and graduate education programs to foster appreciation of the opportunities for being a part of forming conservation solutions. In particular, through exploring connections between biodiversity conservation and human welfare, and highlighting the interdependence among approaches to solutions, students gain a motivation to strengthen multiple goals through interdisciplinary partnerships that seek conservation and societal gains.

2011-12-09 14:00 Redefining Adaptive Management for Conservation in Action

Groves, CR*, *The Nature Conservancy;* **Montambault, JR,** *The Nature Conservancy;*

Non-profit management literature increasingly implores non-governmental organizations to measure the effectiveness of our performance. In the conservation community, we have been focused on measuring performance through adaptive management for over a decade. Although a recent survey of 29 conservation organizations indicates that adaptive management (plan-do-check-adapt) remains far from a mainstream practice, we believe there are several important lessons for promoting successful adaptive management. First, investing in measuring the effectiveness of strategies and actions needs to be tailored to the potential risk and leverage involved in a project. It is unrealistic and unnecessary for all projects to measure performance in statistically meaningful ways. Second, adaptive management will be more effective when it addresses questions that managers need answered and less effective when viewed in isolation as a scientific exercise. Third, we need to stop re-inventing the wheel and take advantage of a significant amount of published information on meta-analyses of commonly used conservation strategies. Finally, even the best designs for measuring performance will fall short unless senior managers demonstrably value getting answers to: "What

progress are we making against what we expect to do in our most important projects and how do we know?" These lessons will be illustrated in the case studies that follow in this symposium.

2011-12-08 11:30 How to Make Conservation Planning More Effective: a case study of The Nature Conservancy, U.S.A.

Groves, Craig R*, *The Nature Conservancy;* **Game, Edward,** *The Nature Conservancy*

The Nature Conservancy has a long history of taking a systematic approach to conservation through the setting of priorities (ecoregional assessments), strategic planning (known as CAP or Conservation Action Planning), and monitoring the effectiveness of conservation actions. Despite a considerable investment in conservation planning, the gap between identifying priority places and strategies and implementing conservation action based on these plans remains significant. We are recommending a number of actions to close this gap – three of which we will review in this symposium. First, planners and project directors need to have a greater understanding of the context in which a project will take place. Of particular importance are identifying what decisions a plan will influence, who the decision makers are, and constraints on the decisions and planning effort. Second, much greater attention needs to be devoted to developing a range of alternative interventions for any given project and understanding the costs and benefits of those alternatives as well as the theory of change concerning how the interventions are expected to have intended impact. Finally, project directors must take more leadership and ownership in both leading the planning process as well as better connecting the activities identified in the conservation plan to the annual operating plans of country and state programs.

2011-12-08 18:30 Next-generation sequencing in conservation genetics: rapid assessment of MHC diversity of wild populations.

Grueber, C. E.*, *Dept of Zoology; Dept of Anatomy and Structural Biology, University of Otago;* **Abdelkrim, J.,** *Muséum National d'Histoire Naturelle, Paris ;* **Zavodna, M,** *Department of Anatomy and Structural Biology, University of Otago;* **Bryant, D,** *Department of Mathematics and Statistics, University of Otago;* **Jamieson, I. G.,** *Dept of Zoology, University of Otago;* **Gemmell, N. J.,** *Centre for Reproduction and Genomics, Dept of Anatomy and Structural Biology, University of Otago;*

Assessing genetic diversity of wild populations provides crucial information for conservation management, such as informing management units or identifying suitable source populations for reintroductions. Next generation sequencing (NGS) technologies are opening up a wide diversity of exciting applications for studying wild populations of non-model species, but the costs of such techniques can be prohibitive in individual-based studies. Protocols that improve the cost efficiency of this approach would increase its accessibility in conservation management. Here we test a "pooled" sequencing method for rapid assessment of major histocompatibility complex (MHC) diversity in free-ranging bird populations. We compared diversity of the highly endangered takahe Porphyrio hochstetteri to its common congener, the pukeko P. porphyrio. Samples were assigned to conservation-informative population pools: source and translocated populations for takahe, and two geographically separated populations for pukeko. The population pools were barcoded to enable downstream identification after 454 sequencing, and allelic diversity and private alleles were estimated. Using these data we documented differences in MHC diversity among populations and species for which no prior knowledge existed, highlighting the potential of NGS as a rapid and effective tool for diversity assessment in conservation. The strengths and weaknesses of this approach, together with recommended guidelines will be presented.

2011-12-06 14:32 The role of scent and olfaction in the critically endangered Kakapo (Strigops habroptilus)

Gsell, A.C.*, *Massey University, Auckland, NZ;* **Brunton, Dianne,** *Massey University, Auckland, NZ;* **Hagelin, Julie,** *Swarthmore College, USA;* **Goodwin, Tom,** *Hendrix College, USA;*

The Kakapo (Strigops habroptilus) is a parrot unlike any other. Endemic to New Zealand, it is the largest and heaviest parrot worldwide; it is nocturnal and flightless, an obligate herbivore with a remarkably strong body-odour. Kakapo is the only parrot with a lek breeding system. Males perform flamboyant dances at close quarters and produce bizarre booming calls that can be heard over several kilometres. Females approach from far and choose one male to mate with, although it is not known what this choice is based on. The aim of this project was to ascertain what role scent plays in this charismatic parrot. Our methods include the anatomical and histological specification of the olfactory bulb as well as the visual system and a detailed analysis of the strong feather scent using gas chromatographic technologies. The visual system of kakapo seems not only to be reduced but Kakapo is literally blind at night with a retina of a diurnal bird. The olfactory bulb is comparatively large and the body-scent reveals strong individual as well as sexual differences. Kakapo became nocturnal 80 million years ago and we suggest that Kakapo developed more emphasis on other senses when it became nocturnal while neglecting its visual system. It is likely that it explores its environment using olfactory cues.

2011-12-09 17:45 An applied study of scale mismatches and social networks in biodiversity conservation

Guerrero, A.M.*, *University of Queensland;* **Wilson, K.A.,** *University of Queensland;* **McAllister, R.R.J,** *CSIRO;* **Corcoran, J.,** *University of Queensland;*

It is increasingly recognized that an understanding of the social and institutional landscape in which conservation work is conceived, planned for and implemented is as important as the ecological if we want our conservation initiatives to be successful. However, little is understood about the complex interactions between social and ecological systems and their impact on the success of biodiversity conservation initiatives. The different institutions that interact in the process of planning and implementing for conservation influence how conservation problems are defined, the type of actions that are formulated, and how they are implemented on the ground. These decisions might not match the ecological patterns or processes relevant to the conservation problem, creating a scale mismatch. Our paper explores the role of social networks in minimizing such mismatches. Social network analysis is employed in a case study in Western Australia to determine how the pattern of relations that is formed around conservation efforts affect scale mismatches, and how these might be overcome. This study contributes towards understanding the relationship between social network structure and successful biodiversity conservation, and has implications for how conservation partnerships are developed on the ground to increase the likelihood of success of conservation investments.

2011-12-08 18:30 Designing studies to detect a decline in species occupancy: power analysis under imperfect detection

Guillera-Arroita, G*, *National Centre for Statistical Ecology, School of Mathematics, Statistics and Actuarial Science, Cornwallis Building, University of Kent, CT2 7NF, Canterbury (UK);*

Monitoring populations of threatened species is essential for informed decision-making within conservation management. In the last decade, species occupancy has become a widely used state variable in monitoring programs due to the relative ease of data collection and the availability of tools that allow modelling occupancy while accounting for species imperfect detection. As conservation initiatives often operate under tight financial constraints it is important to make monitoring meaningful and cost effective and thus it is essential to carefully address study design. Here I explain how to perform power analysis for site occupancy studies while accounting for imperfect detection. I provide an expression to determine the minimum sample size required to detect a decline in occupancy with a given statistical power, target effect size and significance level. I demonstrate the relevance of incorporating imperfect detection in the power analysis by showing how the required sample size is underestimated when detection probability is not taken into account. The ability to detect a decline in species occupancy is often vital for conservation managers and conducting power analysis helps designing informative surveys for this purpose. This not only involves statistical considerations but also requires making explicit decisions about the level of decline that will trigger management action, and the acceptable probabilities of missing a decline or wrongly detecting a non-existing one.

2011-12-06 17:15 People and Park Relations in and around Chobe National Park, Botswana

Gupta, A.C. *, *University of California, Berkeley;*

Wildlife conservationists working in Africa now recognize that the cost of living near protected wildlife is high for human communities and that for conservation to succeed, local people must see direct benefits from these resources. This paper argues that moving from fortress style conservation to a more people-inclusive form of conservation governance is a step forward, but that the assumption of CBNRM that direct benefits from wildlife must be created to mitigate its costs is not always applicable. Using the case of northern Botswana's Chobe Enclave villages, my research shows that the negative impacts of the nearby national park are alleviated less by the local CBNRM project and more by other unique socio-economic and political conditions that heavily structure people's livelihood strategies. Specifically, the detrimental indirect effects of wildlife conservation policy on Chobe residents' livelihoods—namely crop destruction and livestock predation by wildlife—have been mediated by governmental policies reflective of Botswana's status as a welfare developmental state and remittances from family members working outside of the village. State transfers and strong rural-urban linkages have allowed people to "get by" in the face of decreasing livelihood options, and have arguably contributed to general acceptance of conservation policy amongst local communities. In this way, Chobe National Park may be more sustainable than other African protected areas less because CBNRM has provided effective solutions to human-wildlife conflict and more because other socio-economic and political conditions unique to Botswana help maintain a certain standard of living for local communities.

2011-12-09 16:30 The road to extinction is paved with the good intentions: the vanish of Formosa landlocked salmon (Oncorhynchus formosanus) genetic diversity

Gwo, J.-C.*, *Department of Aquaculture, Taiwan National Ocean University;*

The genetic structure of wild Formosa landlocked salmon in its main habitat of Chichiawan Stream was examined using 3 molecular markers (AFLP, microsatellite DNA and mtDNA) for 4 years (2004, 2005, 2006 and 2008). Genetic diversity of Formosa landlocked salmon was completely lost at these markers between 2004 and 2008. The carrying capacity of salmon in Chichiawan Stream is estimated about 4,800 fish and majority (>50-60%) of the fish is concentrated between Dams 1 and 3. About 1,648 fish was found at this area in July of 2004. Around 5,000 hatchery cultivated individuals, the descendants of 5 pairs of wild salmon, were accumulated during 2000 to 2004 according to the policy set by Forestry Bureau, Taiwan. At least 3,271 hatchery individuals escaped from hatchery near Dam 2, located at the midstream of the Chichiawan Stream, when Ariel Typhoon breached the hatchery in August 2004. I hypothesized that the large-scale escaped captive-bred fish decreased the survival rates of wild salmon in Chichiawan Stream in winter 2004, particularly given the period of low stream productivity the following year. Competitive displacement or density-dependent mortality may have been mechanisms underlying the decline in genetic diversity of wild Formosa landlocked salmon.

2011-12-09 16:30 Better use of ecological information in modelling climate change impacts on the distribution of small mammal populations

Haby, NA*, *University of Adelaide;*

For many vertebrates of conservation concern already impacted by landscape-scale, anthropogenic-driven processes, it is unknown which populations may persist, decline or disappear across a species' range in a changing climate. Predicted changes to the distribution of small ground-dwelling mammals with different ecological traits may be substantially improved by including environmental information that represents core resources (i.e. directly relevant to the species' fundamental niche). To investigate this, a hybrid modelling technique combining species distribution model (SDM) and population demographic information was used to track changes to metapopulation structure (RAMAS GIS). For species with more specialised habitat, diet or shelter requirements, high-resolution abiotic and biotic landscape- and quadrat-scale data improved SDMs. Low-resolution data appeared to adequately represent the distribution of more mobile, generalist species. However, low-resolution data inherently predicted fewer, larger and more isolated areas of suitable habitat, that when combined with population demographic information led to higher population abundances that were more resilient to a changing climate. These findings highlight the value of including appropriately scaled, abiotic and biotic environmental information that directly or indirectly represent resources required by small mammals to speculate more realistic range shifts, contractions or expansions in a changing climate.

2011-12-06 16:45 Acacia trees as a keystone resource for insectivorous desert-dwelling bats

Hackett, TD*, *University of Bristol;* **Korine, C,** *Ben Gurion University;* **Holderied, MW,** *Univsity of Bristol;*

Anthropogenic habitat modification places stress on the natural ecosystem. In Israeli desert, ephemeral rivers (wadis) are often characterised by stands of acacia trees, which are in decline, most likely due to human-induced water stress. We examine the importance of acacia stands of different quality to bats and arthropods in comparison to other available habitats, both natural and artificial. We assed bat activity at 30 sites with acoustic monitoring and collected arthropods using light and pit traps. Dense green acacia trees have significantly higher bat activity and arthropod abundance than any other natural habitat, including lower quality acacia stands. Town sites and date palms have high arthropod levels but only town sites rival dense green acacia trees in bat activity level. The 13 bat species recorded around acacia trees is the highest diversity in any natural desert habitat in Israel and while some species are able to utilise artificial sites others are found almost exclusively in natural habitats. Rare species (Barbastella leucomelas and Nycteris thebaica) were identified only at sites with acacia trees. Conservation efforts for these habitats should be improved and focus on the green densely packed stands of acacia trees to protect the vital habitat for protected bats.

2011-12-07 14:15 Using line transects and occupancy-based modelling to assess the status and monitor gibbons in Lao PDR: Results and implications for conservation

Hallam, C. D.*, *Wildlife Conservation Society, Lao PDR;* **Johnson, A. ,** *Wildlife Conservation Society, Lao PDR;* **Seateun, S,** *National Univeristy of Laos;* **Lathamsathith, T,** *Wildlife Conservation Society, Lao PDR;*

Laos harbors globally significant populations of crested gibbons, including the critically endangered northern white-cheeked crested gibbon (Nomascus leucogenys). In Laos gibbons are primarily threatened by illegal hunting for trade and habitat loss. Management of gibbons relies on sound information on which to make management decisions and thus there is a need to assess and monitor the status of gibbons at sites where they are present. Despite their conservation significance no systematic sampling or monitoring of gibbons has been done to date and as a result wildlife managers still lack basic information on their status and distribution throughout Laos. To address this problem, we established the country's first systematic line transect monitoring program for arboreal mammals in the Nam Kading National Protected Area (NKNPA) in central Lao PDR. For the baseline, we conducted intensive repeat sampling over 130 transects in 2008 and 2009. Transects were visited up to four times with a total survey effort of 431km. We detected gibbons 36 times on 18% of transects (n=130). Preliminary occupancy estimates for the gibbons indicate 26% (SE 0.06; p=0.3 (SE 0.08) in areas where gibbons were surveyed. The results were used to prioritize the NKNPA in a national gibbon action plan and guide management to increase enforcement efforts within the NKNPA where gibbons were detected. Although the results are reliable the method proved logistically and financially prohibitive and consideration of alternative methods are needed for future monitoring of the species in the NKNPA, and other comparable landscapes.

2011-12-09 13:00 Long-term monitoring of change in temperate grasslands- GLORIA network in the Andes

Halloy, S*, *, The Nature Conservancy and Universidad Nacional de Chilecito;* **Beck, S,** *Herbario Nacional, Universidad Mayor de San Andrés;* **Cuesta, F,** *Condesan;* **Yager, K,** *NASA;*

It has been shown that predicted warming and increased frequency of extreme weather events increases with altitude in the Andes. Combined with enormous topographic (and hence precipitation) heterogeneity, poverty and intensive use, this creates a situation of high vulnerability to global change. Since 2002 a network of Global Research Initiative in Alpine Environment (GLORIA) sites have been progressively installed in Andean countries to monitor changes, document the type and magnitude of impacts

and provide guidance to develop adaptation strategies for biodiversity, humans, and productive systems. We report on preliminary results from 10 of those sites, in addition to new sites planned in South America. These sites provide baseline data and identify processes and patterns in biodiversity and productive systems across different geographic contexts. Our research considers complementary modules of investigation that contextualize the challenges and opportunities of adaptation for biodiversity and socio-economic components, providing measures of trends as well as effectiveness of adaptive management strategies.

2011-12-09 11:15 Interpreting the status of biodiversity in grasslands with different management and climate change using ground measures and remote sensing

Halloy, S*, *The Nature Conservancy;* **Ibáñez, M,** *The Nature Conservancy;* **Touval, J,** *The Nature Conservancy;* **Boucher, T,** *The Nature Conservancy;* **Bran, D,** *Instituto Nacional de Tecnología Agropecuaria, INTA;* **Gaitán, J,** *Instituto Nacional de Tecnología Agropecuaria, INTA;* **Iglesias, G,** *The Nature Conservancy;*

Given limited options for traditional protected area conservation in large expanses of temperate grasslands, alternative approaches are needed where conservation is effected through integrated land management. Indicators have been developed to measure the sustainability of such approaches in terms of vegetation cover, biomass, carbon, etc; where biodiversity is deemed to respond in similar ways. We explored the potential for developing more direct measures of biodiversity status that would be practical yet robust, and allow scaling from the farm to a regional landscape. Most effective and practical measures included species richness, plant cover, ΔL (a community composition disturbance indicator, or its inverse 1/ΔL as indicator of Biodiversity condition), trends in the green index (EVI, Enhanced Vegetation Index) over time, and its coefficient of variation between years. In addition to proposing measures and analyses, we suggest visualization methods to provide more effective ways of sharing the information and having it adopted.

2011-12-07 15:00 Climate change vulnerability assessment for a national park in California: Evaluating community-level vulnerability

Hameed, Sarah O, *UC Davis Graduate Student;* **Baty, Jill,** *UC Davis Graduate Student;* **Holzer, Katie,** *UC Davis Graduate Student;* **Doerr, Angela*,** *UC Davis Graduate Student;*

Climate change and its consequences for natural communities pose major challenges to conservation management. Working with managers at Point Reyes National Seashore, we have taken a step towards addressing this challenge with a site-specific climate change vulnerability assessment. We took a multi-faceted approach: 1) we surveyed scientific experts regarding how climate change may impact 12 communities in the park; 2) we quantitatively compared vegetation community distribution predictions of community niche models based on three different global circulation models; 3) we mapped predicted sea level rise and erosion hazard onto vegetation communities at the park and analyzed the potential impacts to the park's communities; and 4) we assessed the vulnerabilities of select species to climate change using NatureServe's Climate Change Vulnerability Index. The results identify communities that may be most vulnerable to climatic changes in the region and highlight research priorities for the park. The process provides a blueprint for assessing climate change vulnerability in conservation areas around the world using available data and knowledge.

2011-12-07 14:30 GARM - A Genetic Algorithm for Resistance Map creation for the study of species connectivity and gene flow.

Hand, Brian*, *University of Montana;* **Landguth, E.L.,** *University of Montana;* **Raiford, D. ,** *University of Montana;*

Maintenance of species and landscape connectivity has emerged as an urgent need in the field of conservation biology. Landscape genetics provides tools to help measure genetic structure, and functional connectivity, among individuals across a landscape. The relationship between an optimal path through a complex landscape and fitness is often represented as a resistance map where high fitness is equivalent to the least cost path. Resistance surfaces are combined from different weighted landscape features representing hypotheses for gene flow, habitat, and dispersal of organisms and mostly open to expert opinion. Due to map complexity, the combinatorial power of layer permutations quickly outgrows any feasible inclusive study except by automated process. Needed are more reliable and robust methods to explore relationships between landscape features and genetic structure. Genetic algorithms (GA) mimic the process of natural evolution on sets of solutions and are well suited for searching large parameter space. We introduce GARM, a Genetic Algorithm for Resistance Map Creation which searches out parameter space of weight varied resistance maps using partial Mantel tests. GARM provides an important tool in a growing genetics landscape toolbox to help land managers and conservationists use growing empirical datasets to move from landscape maps to future predictions and helps to explore the possibilities of current conservation practices on future genetic structure.

2011-12-09 16:54 Competitive Impacts of an Invasive Nectar Thief on a Pollinator Community

Hanna, Cause*, *University of California Berkeley;* **Kremen, Claire,** *University of California Berkeley;*

Mutualistic plant-animal interactions, such as pollination, can be disrupted by a range of competitive interactions between invasive and native floral visitors. As the most abundant tree species in undisturbed Hawaiian forests, 'Ohi'a lehua, Metrosideros polymorpha, is critical to the Hawaiian fauna and the energy flow through Hawaiian ecosystems. The invasive Western yellowjacket wasp, Vespula pensylvanica, is an adept and aggressive nectar thief of the partially self-incompatible and pollen limited M. polymorpha. A BACI (Before-After, Control-Impact) experimental design was utilized to compare the standing nectar crop, floral visitation patterns, and fruit-set of M. polymorpha within high Vespula abundance control sites to low Vespula abundance removal sites. The experimental removal of V. pensylvanica, when compared to control sites, resulted in a significant increase in the availability of nectar; the diversity, visitation rate, and efficacy of the pollinator community; and the fruit set of M. polymorpha. These results provide evidence that V. pensylvanica suppresses the pollinator community through both exploitative and interference competition and negatively impacts the reproduction of M. polymopha. By elucidating the strength, mechanisms, and implications of these competitive interactions this research provides insight into the impact invaders have on ecosystem function and the impact competition has on the structure of pollinator communities.

2011-12-09 11:30 A forest carbon project in practice in the Ankeniheny-Zahamena Corridor, Madagascar

Hanta Ravololonanahary*, *Conservation International;* **Bruno Rajaspera ,** *Conservation International;* **James MacKinnon,** *Conservation International;*

Located between two national parks, the 381,000 ha Ankeniheny-Zahamena Corridor (CAZ) is one of the largest remaining relics of rainforest in Madagascar, and one of the new proposed protected areas within the expanded Malagasy System of Protected Areas. Due to its importance in terms of ecosystem services for the benefits of surrounding communities, this new protected area is planned as a Natural Resource Reserve (Category VI in IUCN classification) that is co-managed in an arrangement that integrates local communities in the management of the corridor. Effective management of the corridor would reduce carbon dioxide emissions by approximately 10 million tCO2 over 30 years and provide essential services that are key for human adaptation to climate change. This presentation will describe the progress made towards protecting the corridor as a demonstration REDD+ project, adaptation benefits that this protected area provides and explore the challenges of using protected areas to address climate change issues.

2011-12-08 18:30 Effects of intrinsic and extrinsic factors on tree survival in a temperate forest, northeastern China

Hao,ZQ*, *Institute of Applied Ecology, Chinese Academy of Sciences;* **Wang,XG,** *Institute of Applied Ecology, Chinese Academy of Sciences;*

1. Tree survival plays a central role in forest ecosystems. Although many mechanisms have been proposed as being important in explaining patterns of tree survival, their contributions are still subject to debate. 2. We used generalized linear mixed models to examine the relative importance of an intrinsic factor (tree size) and two types of extrinsic factors (abiotic and biotic neighborhood variables) on tree survival in an old-growth temperate forest in Northeastern China at three levels (community, guild and species). Biotic

variables include the basal area and number of conspecific and heterspecific neighbors within 20 m. Abiotic variables included topographic variables (i.e., slope, aspect and elevation) and soil nutrients. 3. Our results demonstrated that tree size and both abiotic and biotic neighborhood variables significantly affected tree survival, but their relative importance varied within and among the community, guild and species levels. Of the variables tested, tree size was typically the most important predictor of tree survival, followed by biotic and then abiotic variables. 4. Among the biotic factors, we found strong evidence for negative density dependence in the CBS temperate forest, based on negative effects of conspecific neighbor basal area. However, the number of conspecific neighbors had either no effect or a positive effect on tree survival, likely due to habitat-related factors promoting both recruitment and survival. 5. Among the abiotic factors tested, soil nutrients tended to be more important in affecting tree survival than topographic variables. Abiotic factors generally influenced survival for species with relatively high abundance, for individuals in smaller size classes and for shade-tolerant species. 6. Synthesis. Our study demonstrates how large, spatially explicit datasets can offer insights into the relative importance of variables driving patterns of tree mortality in unmanaged forest systems.

2011-12-06 12:00 Modelling ecosystem structure and function over the 21st century

Harfoot, M*, *UNEP-WCMC & Microsoft Research;* **Newbold, T,** *UNEP-WCMC & Microsoft Research;* **Purves, D,** *Microsoft Research;* **Scharlemann, J,** *UNEP-WCMC;* **Tittensor, D,** *UNEP-WCMC & Microsoft Research;*

Macroecological approaches have been criticized as simply describing patterns, rather than examining the underlying mechanisms that generate those patterns. An understanding of processes is important for projecting changes into the future, rather than simply extending correlative patterns spatially or temporally. Here we introduce a process-based model of ecosystem structure and function that is truly global in scope covering both the marine and terrestrial realms. The model represents the processes of interaction between organisms grouped by functional traits and captures the flow of matter and nutrients across trophic levels in what will be a stoichiometrically consistent manner. The model will provide a scientifically robust and policy relevant tool for examining the consequences of various economic and human development scenarios over the coming century. Maps of observed ecosystem functional richness and evenness will be used to validate model performance and the ultimate intent is to contribute a freely-available tool that can be used for rapid visualization by policy makers, and can be reconstructed, deconstructed, and added to by biodiversity scientists.

2011-12-07 16:45 Untangling the paradox: the use of invasive plants by native pollinators

Harmon-Threatt, Alexandra*, *UC Berkeley ;* **Kremen, Claire,** *UC Berkeley ;*

The spread of invasive plants can homogenize plant communities, disrupt native plant-pollinator networks and is believed to contribute significantly to native pollinator declines. Despite this, numerous studies have found invasive plants are often visited by native pollinators and in some systems are the primary resources supporting native pollinator species. We aimed to understand if invasive plants are significantly different than native species when comparing features that are known to influence collection. We then regrouped species by whether they were collected by Bombus vosnesenskii, a native pollinator. Morphological characters and pollen samples were collected from all blooming plant species that were available to B. vosnesenskii. Pollen was analyzed for percent carbon and nitrogen, essential amino acids and per inflorescence pollen reward for each species. We found that invasive species were not significantly different than native species for any of the measured features. However, collected species were significantly different than non-collected plant species for all features except morphology. This suggests that Bombus vosnesenskii collects pollen from plant species that provide adequate nutrition and availability regardless of nativity. Pollinator restoration efforts should consider that all native plants are not adequate resources for native pollinators and that large scale removal of invasive plants could adversely affect pollinator populations.

2011-12-07 15:15 Anticipated global change and small population demography interact to threaten the persistence of a rare cockatoo

Harris, JBC*, *University of Adelaide;* **Fordham, DA,** *University of Adelaide;* **Mooney, PA,** *South Australia Dept Environment and Natural Resources;* **Pedler, LP,** *South Australia Dept Environment and Natural Resources;* **Araujo, MB,** *National Museum of Natural Sciences, Madrid;* **Paton, DC,** *University of Adelaide;* **Watts, MJ,** *University of Adelaide;* **Brook, BW,** *University of Adelaide*

The South Australian glossy black-cockatoo (Calyptorhynchus lathami halmaturinus) is restricted to Kangaroo Island, Australia where it currently numbers 350 birds and is intensively managed. We used a sophisticated and ecologically robust method to examine the relative impacts of anticipated climate change, fire, disease, and reduced management on the species' persistence. A habitat model was coupled with a population model to create a mechanistic forecast of climate impacts. Species interactions were included by using an ensemble distribution model of the cockatoo's food plant, Allocasuarina verticillata, as a driver of habitat suitability. A novel model averaging approach was used to reduce climate model uncertainty. The sensitivity of the model to changes in input parameters was evaluated with a new application of Latin Hypercube sampling. Our results show that small population demographic processes may cause a 24% decline even if climate warming is mitigated and current management levels are maintained. If management of nest-predating possums is stopped, cockatoo extinction will be a reality. Disease, increased fire, and habitat loss from climate change are all predicted to exacerbate losses. Translocation to the mainland, even with associated management, would not mitigate these declines. This analysis demonstrates the importance of partitioning the contribution of demographic rates and anthropogenic stresses to the decline of small populations under climate change.

2011-12-08 18:30 Genetic structures of the rare alpine plants and the common congeneric plants

Harue Abe, *Niigata University;* **Yoshihisa Suyama*,** *Tohoku University;*

Many rare alpine plants are rapidly headed toward extinction due to habitat loss caused by global warming and grave robbing etc. This study aims to capitalize on effective conservation policies combining the information of the locations and the genotypes of all individuals. We compared between the endemic postglacial relict species and the widespread congeneric species in two genus, Gentiana and Mensiesia. Menziesia goyozanensis, a Japanese kind of fool's huckleberry, is a shrub species endemic only to Mt. Goyo (only one population) in the northern part of Japan, which was compared to M. pentandra. Gentiana yakushimensis Makino is a perennial herb endemic only to Yaku-shima island located in the southern part of Japan, which was compared to G. triflora. Both species are listed as 'critically endangered' in the Red Data Book of wild plants in Japan. The genetic diversity at several microsatellite loci of the common species was greater than that of the endemic postglacial relict species in both genus. The genetic differentiations (Fst) between the neighbor peaks was 0.275 for G. yakushimensi. The loss of genetic diversity within a population and genetic differentiation among populations might occurred due to habitat fragmentation and reduced population size by global warming since the last glacial period. These results show that populations of the endemic species are at risk of extinction due to genetic factors for both species. It would be important to study and monitor population dynamics and genetic diversity of next generation to further assess degree of recruitment through time.

2011-12-09 11:02 Identifying preconditions for community participation in marine conservation. A case study.

Hauptfeld, RS*, *NOAA Coral Reef Management Fellow - PR DNER;*

Spatially-explicit marine protected areas (MPAs) are considered useful tools for the protection of important ecosystems including tropical coral reefs. Research indicates that the degree to which MPAs achieve long-term conservation outcomes is related not merely to biological and physical variables, but in large part to social factors. Much attention has been paid to the benefits gained by delegating full or partial responsibility for MPA management to local communities and resource users. Providing a space for community participation in decision-making and applied activities such as research and monitoring is suggested to enhance efficiency, increase

legitimacy, and build capacity. Tres Palmas Marine Reserve (TPMR) in western Puerto Rico (PR) is a 204-acre no-take reserve recently established to protect breeding populations of threatened Elkhorn coral (Acropora palmata), whose boundaries were drawn through stakeholder input. The TPMR Management Plan explicitly includes provisions for community participation in the implementation of its goals and objectives. However, our experience has demonstrated that despite concerted efforts to engage the local population in decision-making and conservation activities, community participation has proved elusive since designation. This highlights the need to identify preconditions necessary for active community participation. We suggest several factors, including institutional, financial and intercultural-communication as key.

2011-12-08 18:30 Absence of inbreeding in an isolated Moose (Alces alces) population over a 50-year period

Hayes, KD*, *Central Michigan University;* **Sattler, RA,** *Central Michigan University;* **Vucetich, JA,** *Central Michigan University;* **Swanson, BJ,** *Michigan Technological University;*

Compared to large populations, small isolated populations experience greater loss of genetic variation and increased inbreeding due to reduced interpopulation dispersal, often with detrimental effects. The moose population on Isle Royale, an island located 24 km off the southern coast of Ontario, Canada, likely has existed as an isolated population since moose colonized it in the early 1900s. The moose have also undergone 3 demographic bottlenecks in the last 50 years. We used genetic analysis of 197 moose samples at 9 microsatellite loci to investigate inbreeding on the island from 1960-2005. We found very low levels of inbreeding (Fis=-0.07-0.04) and no significant increase (P=0.75) over that time period. Relatedness never differed from 0 and did not increase over time. The lack of inbreeding we observed suggests that the Isle Royale moose population is actively avoiding inbreeding or is experiencing dispersal from mainland populations. To study the immigration of moose to the island, the control region of the mtDNA was sequenced for 38 moose spanning the 1960 to 2005 dataset. The likely source population of the Isle Royale moose contains 5 haplotypes. We identified only 1 haplotype which has a frequency of 0.39 in the putative source population. The lack of multiple haplotypes suggests that there is no immigration to the island. Our results suggest that inbreeding avoidance is occurring and inbreeding is not necessarily a byproduct of a small, isolated population.

2011-12-09 11:18 Interventions for Human-elephant Conflict Mitigation: their Use and Effectiveness in Assam, India

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Crop raiding by elephants constitutes a major component of human-elephant conflict, causing loss of livelihood and retaliation against elephants in Assam, India. To mitigate this conflict, the Assam Haathi Project has developed low cost intervention methods to enable communities to protect their property and crops. These interventions include early-warning methods (e.g. trip wires); deterrents (chilli, spotlights), and barriers (solar power fencing). The project encourages community ownership and has found communities willing to try and invest in innovative intervention methods. The efficacy of interventions adopted by communities was assessed based on a three-year dataset from project sites. This has revealed that stand-alone interventions such as spotlights, chili fences, or electric fences were more effective in preventing crop and property damage by elephants. However, when used in combination with human noise their efficacy was compromised. This assessment has led the project to discourage use of noise when power fences, chilli fences and spotlights are deployed. The study has highlighted that periodic evaluation of usefulness of interventions can help to enhance their effectiveness.

2011-12-07 12:00 Participation and Payments: Evaluating the effect of two conservation programs aimed at alleviating lion killing in Maasailand, Kenya

Hazzah, L*, *University of Wisconsin-Madison;* **Dorenry, S,** *University of Wisconsin-Madison;* **Frank, L,** *University of California-Berkeley;*

African lion (Panthera leo) populations are in decline throughout most of Africa, but the problem is particularly acute in southern Kenya, where Maasai people are spearing and poisoning lions at a rate that will ensure near term local extinction. Compensation payments for livestock lost to predators is one approach aimed at balancing the distribution of costs and benefits of large carnivores and to deter local retaliatory killing. Another approach is participatory monitoring, where communities use their own cultural values, knowledge, and perceptions to engage in environmental monitoring. We sampled four contiguous areas that were given various treatments of compensation and/or participatory monitoring to test their effect on lion killing. We relied on seven years of human-induced lion mortality data collected from each site. The number of lions killed is used as a proxy index for local tolerance of carnivores. Compensation payments had a moderate impact on reducing lion killing; however, in times of extreme conflict compensation alone did not significantly improve people's tolerance of lions. Participatory monitoring had a greater effect on decreasing lion mortality by utilizing key component of Maasai culture, proactive conflict mitigation methods, and by providing an economic opportunity for local people to engage in pro-conservation behavior. Our analysis informs those considering compensation payments or participatory monitoring programs as strategies to enhance local tolerance for large carnivores, particularly in developing countries.

2011-12-09 12:15 Simple decision analyses for metapopulation viability of an endangered Australian amphibian

Heard, GW*, *School of Botany, University of Melbourne;* **McCarthy, MA,** *School of Botany, University of Melbourne;* **Parris, KM,** *School of Botany, University of Melbourne;* **Scroggie, MP,** *Arthur Rylah Institute for Environmental Research, Victorian Department of Sustainability and Environment ;*

Metapopulation models can provide clear direction to threatened species management, yet these tools have rarely been applied to real-world problems. Obstacles have included the abstract nature of some metapopulation models, the limited capacity of these models to incorporate parameter uncertainty, and the need for custom computer programs to apply them. In this study, we used freely-available software to develop a Bayesian metapopulation model for the endangered Growling Grass Frog, and coupled the model with multicriteria decision analyses to critique management options for this species. The model includes estimates of the effect of environmental variables on extinction and colonisation rates, and propagates uncertainty in these estimates through to predictions of metapopulation persistence under differing management scenarios. Multicriteria decision analyses integrate this uncertainty, using a simple outranking method to identify which scenario gives the highest chance of metapopulation persistence across the range of parameter estimates. We used the approach to identify optimal wetland creation schemes for Growling Grass Frogs around Melbourne, Victoria, Australia. Encouragingly, we were able to clearly discriminate between proposed options in several cases, providing important direction to managers. Given appropriate data, our approach represents a robust, intuitive and straightforward means of critiquing management options for metapopulations.

2011-12-07 10:45 The 'genetic rescue' of inbred populations using translocations

Heber, S.*, *University of Canterbury, Christchurch;* **Briskie, J.V.,** *University of Canterbury, Christchurch;*

Anthropogenic influences such as habitat loss and fragmentation, the introduction of exotic predators, and excessive hunting have forced many species through population bottlenecks. Decreased effective population size during a bottleneck can lead to increased inbreeding and the loss of genetic diversity, which both adversely affect population viability. Conservationists are thus faced with the problem of protecting a number of fragmented and inbred populations. The translocation of outbred individuals into bottlenecked populations has been shown to mitigate the negative effects of inbreeding and to restore genetic variability. However, this method depends

on the availability of suitable outbred donor populations, whereas for many endangered species there are no outbred populations left to act as such a donor. To test whether genetic rescue can be achieved by merely exchanging individuals between different inbred populations in the absence of outbred donor populations, we conducted experimental translocations between two isolated, inbred populations of the New Zealand robin. Differences in fitness traits such as reproductive success, parasite and disease loads, immunocompetence, and gamete quality were compared between "hybrid" offspring (crosses of the two populations) and inbred control offspring to determine the effect of the translocations. Our results suggest that translocations between inbred populations may be valuable in the genetic rescue of species showing severe inbreeding depression. For endangered species that survive only in small, inbred populations, this may be the only method to rescue a population from the brink of extinction.

2011-12-07 17:30 Invasive Species on the Menu: Reciprocal Predation and the Co-Persistence of Native and Non-Native Species

Henkanaththegedara, Sujan M., *North Dakota State University;* **Stockwell, Craig A.*,** *North Dakota State University;*

Understanding mechanisms that allow co-persistence of natives with non-natives may provide important insights on how best to manage highly altered systems. We report a case of reciprocal predation as a possible mechanism to facilitate co-persistence of endangered Mohave tui chub (Siphateles bicolor mohavensis) with invasive western mosquitofish (Gambusia affinis). We established experimental sympatric and allopatric populations of Mohave tui chub and western mosquitofish to evaluate reciprocal trophic interactions between these two fish species. Mosquitofish had a significant negative effect on Mohave tui chub recruitment (W=142; P<0.01). Reciprocally, tui chub had a significant negative effect on mosquitofish recruitment (W=137.0; P<0.05). One unexpected outcome was reduced survival of adult mosquitofish in the presence of tui chubs. Allopatric mosquitofish populations were significantly larger (157.2; SE ± 26.9) than mosquitofish populations sympatric with tui chubs (22.1; SE ± 4.0) (W=155.0; P=0.0002). These experimental results show intra-guild predation (IGP) between invasive western mosquitofish and endangered Mohave tui chub. Thus, IGP is an apparent mechanism facilitating persistence of Mohave tui chub in the presence of non-native western mosquitofish. Our results suggest mosquitofish control may not be necessary for the conservation management of endangered Mohave tui chub and sites harboring mosquitofish should not be overlooked as potential refuge sites.

2011-12-07 15:00 Socioeconomic impacts of community-based grasslands conservation in Mongolia's Gobi

HESS, S.M.*, *Hess Environmental Economic Analyst;* **Leisher, C,** *The Nature Conservancy, Central Science;* **Beukering, P. van,** *Institute for Environmental Studies;*

Nature conservation in developing countries cannot succeed without the support of the people who rely on nature's services for their livelihoods. This support will in part depend on how conservation efforts affect their livelihoods. We assessed the socioeconomic benefits of a donor-funded grasslands project that focused on conservation and livelihoods from 1995 to 2006 in the rangelands of Mongolia's Gobi desert. We conducted 280 household interviews, with both project and control households, and held 8 focus group discussions and 31 key informant interviews across 6 districts. We found a 12% greater median annual income as well as a range of other socioeconomic benefits for project households compared to control households in the same areas. These benefits mainly seem to result from the specific social and livelihood focus of the project, rather than from the improvements of the grasslands, which the project also generated. The key factors underlying project achievements that may be replicable by other conservation projects included the community-driven approach of the project, knowledge exchanges with communities inside and outside the country, having a local project-supported community organizer in each district, having good local leaders, and having a committed project team that spent most of its time on the ground.

2011-12-07 15:30 A model to quantify effects of habitat fragmentation and bushmeat hunting on bonobo (Pan paniscus) distributions in support of conservation planning

Hickey, JR*, *University of Georgia;* **Nibbelink, NP,** *University of Georgia;* **Carroll, JP,** *University of Georgia;*

The bonobo (Pan paniscus) is an endangered great ape endemic to the Democratic Republic of Congo and is threatened by slash-and-burn agriculture, timber harvest, and bushmeat hunting. Conservation efforts require knowledge of where bonobos occur and how these activities influence their distribution. We modeled bonobo nest occurrence based on a combination of broad-scale landscape metrics and local counts of human sign. Using a geographic information system, we calculated edge density (ED) to characterize forest fragmentation, and distance-from-river and distance-from-fire to characterize accessibility of areas to humans. Over 6 months, we conducted 68 km of line-transect surveys, stratified by these landscape metrics, and recorded all observed bonobo nests, primate vocalizations, machete cuts, paths, traps, roads, and log-cut tree stumps. Using linear regression analysis and an information-theoretic approach, we examined the relationships between nest occurrence and these local and landscape-level predictor variables. We found that the model containing ED and number of machete cuts was the most plausible (AICc=235.3, Akaike weight = 0.81). Odds ratios indicated that 32% fewer nests were expected to occur with each increase of 1 machete cut per 100 m, and that 23% fewer nests were expected to occur, for each 1-km increase of edge per 10 km2, indicating that both landscape fragmentation and local human activity affect bonobo occurrence.

2011-12-08 18:30 Structure and environmental relations of a forest fragment with monodominance of Euterpe edulis Mart.

Higashikawa, EM*, *Institute for Sustainable Development Mamiraua;* **Venturin, N,** *Federal University of Lavras;* **Machado, ELM,** *Federal University of Jequitinhonha and Mucuri Valley;* **Carlos, L,** *Federal University of Lavras;*

This study aimed to detect the influence of variations in substrate and successional stage on the floristic and structural variations of the arboreal community in a monodominant forest remnant located in Inconfidentes, MG. Trees with diameter at breast height (DBH) > 5 cm were identified and measured in 29 plots of 20 × 20 m, were systematically distributed throughout the fragment. For each plot, we obtained the following soil variables (pH, concentrations of P, K +, Ca + +, Mg + + and Al + + +; sum of bases (SB), saturation (V) and aluminum (m) and proportions of raw organic, sand, silt and clay) and structure of the fragment (absolute density (AD), absolute frequency (AF), absolute dominance (DoA), relative density (RD), relative frequency (RF), relative dominance (DOR) and covering value (CV) and stand rating or succession). We sampled 1560 individuals belonging to 111 species, 80 genera and 38 families. Euterpe edulis was the species with more abundant, representing 50.06% of the samples and characterizing the study area as a forest monodominant. A canonical correspondence analysis (CCA) found no correlation between the distribution of species abundance and environmental variables, yet for seven species were found correlations between variables related to nutritional status and soil water regime and successional stage of vegetation.

2011-12-07 14:28 Look down and check!: Monitoring liverworts to evaluate the effectiveness of hydroriparian buffers

Higgins, KK*, *Quest University Canada;*

Government policies stipulate that forestry companies must leave hydroriparian buffers around streams in order to mitigate the environmental impacts of harvesting. However, it is unclear whether these buffers effectively conserve biodiversity. In particular, studies on buffers in the coastal temperate rainforest of North America have focused on large animals. There is little information on whether small organisms such as liverworts survive in hydroriparian buffers. Studying liverworts, which are particularly sensitive to lower humidity levels in forested fragments such as buffers, is important because they may indicate whether other species can also survive. I conducted a field research study comparing liverwort communities in riparian second growth forests to those in riparian buffers. I estimated liverwort percent cover and compared liverwort communities using ANOSIM. I found that liverworts in buffers were similar to those in second growth forests. Thus, riparian buffers effectively provide habitat for

liverworts. As liverworts are extremely sensitive to changes in microclimate, other species such as vascular plants and amphibians can probably also survive in hydroriparian buffers. These results suggest that hydroriparian buffers are an effective management strategy for a range of species, particularly those that are sensitive to microclimate, and should be kept as a policy.

2011-12-08 11:45 Climate Change and Food Security: Robust Solutions from Nature.

Hills, T*, *Conservation International;*

With acknowledgment within the scientific community that reliable climate predictions are beyond the capacity of current climate modeling exercises, there is an increasing interest in adaptation solutions to climate change that buffer development from the widest range of likely climate futures. The capacity of ecosystems to contribute to these robust solutions in the food security context will be explored in this discussion, with examples from across a range of developing countries in the tropics using cost-benefit and other impact-relevant tools.

2011-12-06 11:15 North African Houbara Bustard restoration program: restocking and maintaining species ecological and behavioural functions

Hingrat, Y*, *RENECO WILDLIFE CONSULTANTS;* **Hardouin, L,** *EMIRATES CENTER FOR WILDLIFE PROPAGATION;* **Robet, A,** *MNHN, PARIS;* **Lacroix, F,** *RENECO WILDLIFE CONSULTANTS;*

The supportive breeding program run in Morocco by the Emirates Center for Wildlife Propagation aims to restore populations of Houbara Bustard (Chlamydotis undulata) in North Africa. Houbaras are artificially bred by equalizing founder representation, maximizing genetic diversity and avoiding inbreeding. Since 1998 about 42 000 houbaras have been released, with survival rates upon 50% one year after the release and above 80% in subsequent years. Long term population monitoring confirmed the ability of captive bred released (CBR) houbaras to reproduce in the wild with breeding success similar to wild houbaras. Based on these parameters PVA models revealed that protected reinforced or reintroduced populations are intrinsically increasing and viable. However, these models rely on the assumption that ecological and behavioural functions are maintained in CBR houbaras. Alteration of these functions can affect the effective population size through at least three mechanisms: reducing the population size; reducing the population growth rate, and/or by increasing reproductive skew. To verify this assumption, we used a multidisciplinary approach with sound ecological (habitat use and diet) and behavioural studies (mating system, post-fledging, natal and breeding dispersal) conducted on wild and CBR houbaras. Our results confirm the preservation of the species ecological and behavioural functions, and emphasize the reliability of our projected viability models

2011-12-06 14:52 Significance of recovery experiment for morphological variables in some fresh water algae

Hit Kishore Goswami, *Rtd Professor,24, Kaushalnagar, Misrod, Bhopal MP India;* **Dushma Das Guru*,** *Department of Botany, Ranchi Women's College, Ranchi Jharkhand , India;*

We have been examining samples from different fresh water bodies in order to identify algal composition with greater emphasis on members of some blue green algae viz. Gleotrichia and Rivularia (cyanobacteria) and a few members of chlorophyceae, mainly Scendesmus, Oedogonium and Sirocladium. We had realized that some or the other changes in morphological features and or measurements within the same species may be due to differences in pollution grades of the water bodies within the same ecological niche. Since species identification of algal species is greatly influenced by such measurements of cells and specific structures simple recovery experiments were conducted to transfer 1 ml water sample containing abnormal algae in to sterilized conical flasks containing 200 ml 50% Knop's solution. The same procedure was followed every time after two weeks. Abnormal phenotypic expressions of the same species underwent a genomic stress- test and features which did not change even after six repeats were considered genetic changes; recovered features revealed ecophenes(environmentally induced temporary changes). We have been able to establish two new species after the recovery experiments.

2011-12-07 17:00 Do population indicators work? Investigating correlated responses of bird populations in relation to predator management

Hoare, JM*, *New Zealand Department of Conservation;* **Monks, A,** *Landcare Research;* **O'Donnell, CFJ,** *New Zealand Department of Conservation;*

Using population indicators to evaluate conservation achievements is widely practised, yet seldom empirically tested. If populations are consistently correlated in response to a shared ecological driver, the indicator species approach can be used as a cost-effective, ecologically-based shortcut to measuring the effects of conservation management. Long-term monitoring of forest bird populations associated with mammalian pest control programmes in New Zealand provides a useful framework for testing the population indicator species concept. We evaluated population trends in 21 bird species vulnerable to predation by introduced mammals (primarily mustelids and rodents) at managed and unmanaged beech (Nothofagus) forest sites. Correlated population trends between species pairs were detected at individual sites. However, neither positive nor negative correlations in species trends could be predicted by life history traits and predator management did not produce consistent, correlated population trends among sites. We therefore provide evidence that in a situation where a threat is reduced, but not eliminated, the use of a population indicator approach to management and reporting is not supported. Relationships between purported indicator taxa and the suite of taxa need to be understood for various management scenarios before population indicators can be confidently applied to measuring conservation achievement.

2011-12-09 11:15 Designing sampling strategies for conservation genetics studies: a simulation tool for conservation managers

Hoban, Sean*, *Laboratoire d' Ecologie Alpine, Universite Joseph Fourier;* **Gaggiotti, Oscar,** *Laboratoire d' Ecologie Alpine, Universite Joseph Fourier;* **Bertorelle, Giorgio,** *Department of Biology and Evolution, University of Ferrara;*

Genetic data for threatened species is commonly incorporated into conservation activities (e.g., choosing source populations for stocking, detecting poaching, assessing admixture, or identifying populations of high conservation value). A major issue in planning a conservation genetic study is the number of genetic markers, samples, and populations to incorporate. Unfortunately, many studies are undertaken without clear knowledge of the type and statistical power of the data they can expect, often leading to post-hoc and ambiguous interpretation of non-significant results. There is currently no tool available for estimating power of sampling under a variety of complex demographic and management scenarios. We present a prototype of a web-based, highly user-friendly software package developed to fill this gap. The simulation-based tool includes several modules (e.g., bottlenecks, connectivity, assignment) that are customizable for species-specific genetic and demographic parameters. For each module, using case studies, we discuss the balance between markers and samples in achieving a desired power threshold. Our tool can be used by conservation managers without specific expertise in genetics. Further, its simple and flexible architecture allows incorporation of future conservation genetic methods. This package is a deliverable of ConGRESS (www.congressgenetics.eu), a FP7 EU project to produce tools to incorporate genetic biodiversity into policy and management activities.

2011-12-09 11:30 Achieving positive ecological and social outcomes through a participatory wildlife conservation project in a deprived urban area

Hobbs, SJ, *University of York;* **White, PCL*,** *University of York;*

Achieving effective biodiversity conservation is increasingly dependent on an actively-engaged society. For certain charismatic species and habitats, specific stakeholder groups can serve as a platform for conservation efforts. However, for most species and habitats, it is a considerable challenge to engage people to assist voluntarily in their conservation. Ongoing engagement is promoted by combining positive ecological outcomes with positive social outcomes at the individual and community levels. We describe the ecological and social outcomes of a participatory wildlife conservation project, monitoring native hedgehogs Erinaceus europaeus in a deprived urban area in the UK. The project is part of a UK-wide research programme (OPAL) seeking to encourage greater public engagement in biodiversity monitoring. The

results demonstrated the importance of key food resources in determining hedgehog ranging behaviour and showed that participation in the study was a positive experience for many participants, leading to potential changes in individual behaviour as well as bringing wider benefits to the community. The study also highlighted contrasts in perceptions concerning public engagement held by the participants with those held by conservation organisations. Community-based initiatives such as OPAL have a key role to play in the context of signposting and supporting volunteers to maximise the ecological and social benefits associated with public engagement in conservation.

2011-12-07 16:30 Indirect effects of herbicide on trematode proliferation in the freshwater snail host Potamopyrgus antipodarum

HOCK,SD*, *Department of Ecology, University of Otago;* **Poulin, Robert,** *Department of Ecology, University of Otago;*

Freshwater ecosystems are often exposed to intense agricultural pollution, which can impact species interactions such as those between parasites and their hosts. Here, we studied the effect of glyphosate (the active ingredient of a widely-used agricultural herbicide) on the proliferation and transmission of trematodes in the New Zealand mud snail, Potamopyrgus antipodarum. This ubiquitous and hugely abundant snail serves as first intermediate host to a wide diversity of trematodes, which multiply within the snail into cercariae and then go on to infect native invertebrates, fish and birds. Earlier evidence suggested that herbicide from agricultural run-off may weaken the immune system of the snail and promote the within-snail multiplication of the trematode Telogaster opisthorchis. We tested the effect of long-term exposure to different levels of glyphosate on cercarial production by several trematode species parasitic in P. antipodarum, as well as on the infectivity of cercariae to their next hosts. Our results provide evidence of the indirect influences of agricultural run-off on freshwater systems, and add weight to the pressure on the agricultural sector to limit the large-scale use of herbicide.

2011-12-07 18:00 Success Factors for Large-Scale Conservation Programs

Hoekstra, JH*, *The Nature Conservancy;* **Anderson, K,** *The Nature Conservancy;* **Kareiva, P,** *The Nature Conservancy;* **Ramos, A,** *The Nature Conservancy;* **Oidov, E,** *The Nature Conservancy;*

Conservationists have developed many effective solutions to localized conservation problems such as protecting and restoring habitat and controlling invasive species. The challenge comes in scaling these solutions up to national and continental scales that are commensurate with the scope of major environmental problems. Large-scale conservation programs need policy, finance, and social science expertise, in addition to conservation biology, in order to win over more diverse stakeholders. The global health industry has confronted similar scaling challenges such as making single-use needles the norm in health clinics in developing countries in order to prevent HIV and hepatitis-C infections. Large-scale impact required coordinated strategies to influence local clinic staff who deliver health care, UNICEF whose purchasing power could lower prices industry-wide, and government health and finance ministers who pay the bills. We adapted this "those who use, those who choose, and those who pay the dues" framework to evaluate success factors, common barriers, and viable alternatives for large-scale conservation programs. We examined program strategies and progress reports, and interviewed staff and relevant experts about 20 large-scale conservation programs to understand why some programs are achieving larger-scale impact than others. Our findings offer evidence-based guidance to improve the design and implementation of large-scale conservation programs.

2011-12-07 15:15 Ant eradications: a synthesis of successes, and identification of needs

Hoffmann, BD*, *CSIRO;*

Invasive ant eradication has a poor track record for success, and an even poorer history of publication of project successes and failures. Here I provide an overview of the 77 records of ant eradications. Within the post-organochlorine era , the majority of eradications (42) were very small (< 1 ha), in some cases being just one or a few nests. Two species, African big headed ant Pheidole megacephala and Yellow crazy ant Anoplolepis gracilipes, were the targets of most eradications (31 and 24 eradications respectively). It is also only in the last decade that the size of eradications has greatly increased, however, the largest eradication covered only 41 ha. In contrast, approximately 3000 infestations covering approximately 15,800 ha were eradicated over the equivalent duration of time using organochlorines, the largest eradication covering approximately 300 ha. I then discuss the current global status of ant eradication management options, and identify what I see as the actions that will provide the greatest immediate enhancement of invasive ant management, being proactive management options and greater incorporation of ant biology into eradication protocols.

2011-12-06 17:00 The threat status of New Zealand's naturally uncommon ecosystems

Holdaway, R.J.*, *Landcare Research;* **Wiser, S.K.,** *Landcare Research;* **Smale, M.,** *Landcare Research;* **Clarkson, B.,** *Landcare Research;* **Williams, P.A.,** *Landcare Research;*

Despite the best efforts of conservationists, a vast portion of the world's ecosystems are being degraded, transformed and in some cases completely destroyed by human activities. Ecosystem-level management offers a potential solution to this decline. Instead of focusing on individual species, ecosystem-level management targets the preservation of ecosystem habitat and ecological integrity, hopefully leading to the conservation of a full suite of species within each ecosystem. To allow prioritisation of ecosystem-based conservation efforts the most threatened ecosystem types need to be identified. We apply recently proposed IUCN ecosystem red list criteria for threatened ecosystems (based on changes in extent and reduction in ecosystem processes) to New Zealand's 71 previously defined naturally uncommon ecosystems. Our results identify 16 critically endangered, 19 endangered and 10 vulnerable ecosystem types. Although naturally uncommon ecosystems contain disproportionally more threatened plant species than common ecosystem types, we found no strong relationship between an ecosystems threat status and the number of threatened plant species found within that particular ecosystem. Our findings provide essential information to help prioritise conservation of New Zealand's naturally uncommon ecosystems and form a working case-study for the ongoing development of international red-list criteria for threatened ecosystems.

2011-12-07 10:46 Monitor & Manage The Marsupial Menace: Learning about biodiversity conservation through science-based computer games

Holland, EP*, *Landcare Research NZ;*

Invasive mammals such as possums, rodents and deer have a significant impact on native biodiversity in New Zealand forests. The complex and dynamic relationship between pest density and damage means that impacts on native flora and fauna are highly variable in time and space. Estimating the benefits of pest control at different sites is therefore difficult. Communicating the problem, the range of possible solutions, and justifying lethal pest control and the use of poisons, is equally complicated. Computer games provide an engaging learning and technical communication opportunity for science. We have integrated evidence-based models of pest population processes and their interactions with each other, native flora and fauna populations, and management tools such as traps and toxic bait, to aid forest management. We have used these models as the basis for a forest ecosystem game, where the user implements monitoring to understand problems around forest health and conservation condition, and management to find a solution within a budget. The game provides the wider, non-scientific community easy access to the underlying science. By using such games to juggle resources, tools and pest impacts on iconic native trees, birds and invertebrates, individual users will become better informed of the economic and ecological consequences of their choices. This will enable them to support or even participate in the development of pest management plans in their communities in an informed way.

2011-12-08 12:00 Building a better mouse-trap: improving estimates of the impact of conservation action

Holmes, K., *IUCN Species Survival Commission;* **Duckworth, J. W.,** *None;* **Hoffmann, M.*,** *IUCN Species Survival Commission;* **Mallon, D.,** *Manchester Metropolitan University;* **Stuart, S.N.,** *IUCN Species Survival Commission;*

Studies have shown that conservation actions have been both successful at preventing extinctions and also at engineering dramatic recoveries of species once on the edge. While indicators demonstrate that the CBD 2010 target was not achieved, it is estimated that observed trends in extinction risk among mammals, birds and amphibians would have deteriorated at least one-fifth again had it not been for conservation efforts. However, such estimates are conservative, because they fail, in particular, to account for deteriorations or losses that might have occurred had no action at all been taken. Consequently, to determine the actual difference that conservation makes to trends in species extinction risk, it is necessary to determine the counterfactual scenario of what would have happened in the absence of conservation action to compare with the observation of what actually happened. Here, we adopt a novel methodology that involves projecting trends in extinction risk from a pre-determined point in the past to the present based on a scenario under which all conservation actions had ceased. Our results provide insights to the true impact of conservation, and the value of current interventions. We place these results in the context of the future work and priorities of the 8,000-member strong, IUCN Species Survival Commission.

2011-12-07 11:00 Ranking Eradication of Invasive Vertebrates on Islands at a Global Scale

Holmes, ND*, *Island Conservation;* **Arnal, A,** *Island Conservation;* **Croll, DA,** *Coastal and Conservation Action Lab, Dept Ecology and Evolutionary Biology, University of California Santa Cruz;* **Kiett, BS,** *Island Conservation;* **McCreless, E,** *Coastal and Conservation Action Lab, Dept Ecology and Evolutionary Biology, University of California Santa Cruz;* **Newton, KM,** *Coastal and Conservation Action Lab, Dept Ecology and Evolutionary Biology, University of California Santa Cruz;* **Spatz, D,** *Coastal and Conservation Action Lab, Dept Ecology and Evolutionary Biology, University of California Santa Cruz;* **Tershy, B,** *Coastal and Conservation Action Lab, Dept Ecology and Evolutionary Biology, University of California Santa Cruz*

Islands have disproportionately high rates of threatened and extinct species, with invasive alien species identified as a key threat to island ecosystems. The mission of NGO Island Conservation is to prevent extinctions by removing invasive vertebrates from islands. To maximize conservation benefit and aid decision making, the Island Conservation Action Plan (ICAP) is being developed to 1) identify and 2) rank IUCN Critically Endangered and Endangered birds, reptiles, amphibians and mammals breeding on islands where damaging invasive vertebrates occur.Of the 2,934 IUCN CR/EN species, 1,123 (38%) were identified as insular. Using this species list, we collated existing datasets (e.g. Global Island Database), and consulted literature and species experts to pair CR/EN species and invasive species threats on these islands. For this process, islands with high conservation value and projected ease of eradication were targeted, using metrics including CR/EN per area, type of invasive vertebrate and overlap with other global biodiversity prioritization programs, (e.g. Alliance for Zero Extinction). This process identified opportunities to protect multiple CR/EN species on single islands in Juan Fernandez and Galapagos archipelagos as well as opportunities to protect single CR/EN species such as rock iguanas on small Caribbean cays. ICAP represents a valuable step towards ranking the mobilization of resources to aid insular threatened species recovery on a global scale.

2011-12-09 11:15 Block Managements Areas: Engaging Agriculturalists in Conservation of the Yellowstone River's Ecosystem Services

Horton, Cristi C.*, *Tarleton State University;* **Peterson, Markus J.,** *Texas A&M University;* **Hall, Damon,** *University of Maine-Orono;* **Gilbertz, Susan,** *Montana State Univerisity-Billings;*

Humans are one of many species benefitting from services provided by healthy riparian ecosystems. Managers of river resources are challenged to meet human resource needs, while meeting the needs of other species that make up the river ecosystem. This paper examines agriculturalists' communication about conservation of the Yellowstone River ecosystem services. Interviews were conducted in seven eastern counties of the river corridor to discover agriculturalists' perspectives of the riparian zone and the critical issues regarding management of the river's resources. We used qualitative content analysis to identify and categorize key ecosystem services that emerged from agriculturalists' discourse about Block Management Areas. We found: provisioning, cultural, and regulating ecosystem services were critical to agriculturalists' sense of well being; agriculturalists feared being restricted from the use of ecosystem services more than they feared the loss of services due to degradation; and Block Management Areas offered a way to conserve ecosystem services while navigating the relationship between private property rights and public access. Based on our results, we offer policy makers and resource managers a set of potential guidelines for creating and implementing conservation programs that permit agriculturalists to maintain their lifestyle while simultaneously allowing the public to benefit from ecosystem services.

2011-12-07 10:30 Conserving Urban Biodiversity: The Dynamic Relationship of Policymakers, Developers, and Citizens

Hostetler, ME*, *Department of Wildlife Ecology and Conservation, University of Florida;*

Policymakers, developers, and citizens all play a role in shifting conventional development inertia to something more compatible with urban biodiversity conservation. Policymakers create policies that enable conservation practices to be adopted by developers and citizens; developers, in turn, create the framework for residential subdivisions and commercial districts that hinder or promote the conservation actions of citizens; and day-to-day decisions by citizens impact biodiversity conservation within yards, neighborhoods, and public spaces. From establishing protected natural areas and corridors to building conservation subdivisions, current urban conservation efforts often leave out at least one or more of these stakeholders. Through case studies and "real-world" experiences with development projects, I will discuss the importance of involving all stakeholders in order to create functioning green communities. Many green development projects fail to stand the test of time, stemming from impacts during the construction phase and how people manage their homes, yards, and neighborhoods. The way forward is challenging, and I outline a range of processes, research, policy tools, and educational strategies that could be used to engage key stakeholder groups. In particular, I stress the importance of addressing decisions made during the design, construction, and post-construction phases of new subdivision development.

2011-12-08 11:00 Conservation management of rare plant species, is eco-sourcing doing more harm than good?

Houliston, G.J.*, *Landcare Research;*

There is currently a strong focus on "eco-sourcing", or using local provenance material, in restoration plantings in New Zealand and other parts of the world. This practice is often promoted as being "conservative", and is thought to preserve local adaptation. While this is likely to have no detrimental effects in species where negative genetic consequences of fragmentation are occurring, it's application to critically endangered taxa is worrying. We will present some examples of genetic data for critically endangered plant species that have had management actions curtailed due to "eco-sourcing" being incorporated as standard practice. This will include the New Zealand endemic tree daisy, Olearia gardneri ad the widely cultivated but almost extinct in the wild legume Clianthus puniceus. While eco-sourcing may have its place, the strict adherence to these ideas is highly fragmented and relictual populations is potentially greatly harmful. This also raises interesting questions about when a population isn't a population anymore, and how managers can best determine when translocation is a preferable option to maintaining local fragments.

2011-12-07 12:30 The Deep Sea Coral Research and Technology Program: Research to Conserve Biodiverse Deep-Sea Ecosystems

Hourigan, TF*, *NOAA National Marine Fisheries Service;* **Tsao, F.,** *NOAA National Marine Fisheries Service;*

Deep-sea corals and sponges form complex biogenic habitats of astonishing biological diversity. Before most areas have even been surveyed, however, these deep-sea communities are threatened, principally by damage from fishing gear. The United States National Oceanic and Atmospheric Administration (NOAA) has developed a Strategic Plan for Deep-Sea Coral and Sponge Ecosystems and launched the Deep Sea Coral Research and Technology Program, designed to provide sound scientific information needed to conserve these ecosystems. The Program conducts 3-year targeted field mapping and research of these communities, beginning in the Atlantic in 2009, and expanding to the U.S. West Coast (2010) and Alaska (2012).

The Program also analyzes and integrates existing information on the deep-sea coral ecosystems and human activities that may impact them. In partnership with regional Fishery Management Councils, this work has already informed the boundaries of the largest deepwater marine protected area in the U.S. Atlantic – protecting over 62,000 square kilometers of seafloor containing complex deepwater coral habitats. It is also providing key information to fisheries efforts to protect biogenic habitats and marine spatial planning in the Atlantic off New England and in the Pacific off the U.S. West Coast.

2011-12-08 14:15 Fire and Fidelity: Responses of Reptiles in Urban Bushland Remnants

How, RA*, *Western Australian Museum;*

The impact of fire on the composition of faunal assemblages and populations has major implications for the conservation and management of urban bushland biodiversity. Detailed capture-release studies in isolated urban remnants allow an exploration of the impact of fire on reptiles. Two fires of different intensity were monitored to contrast responses pre and post fire in species populations and assemblage composition. Individuals can, and do, escape the immediate impact of fire by movement away, but many others are cremated. Movement in front of fire increases the capture rate dramatically in both burnt and adjacent unburnt areas. Under 'cool' burn conditions the capture rate may return to pre-fire levels within 12 months, but under 'hot' fire conditions captures remained lower for up to a decade post-fire. The composition of species assemblages remains relatively similar to that before the fire after both 'hot' and 'cool' burns, indicating that the greatest impact is to individual species populations. Populations of arboreal and epigeic species exhibit greater declines than fossorial ones, although rare and uncommon species are probably the most severely affected. The persistence of individuals of many species through fire events helps explain why reptiles may survive the long-term impact of fires better than mammals. Sequential seasons with well below average rainfall appear to have a greater impact on reptile species body mass index than does the immediate impact of fire.

2011-12-09 11:30 Beyond win-win: interrogating ecosystem service dynamics

Howe, C*, *Department of Geography, University of Cambridge;* **Vira, B,** *Department of Geography, University of Cambridg;*

Ecosystem service-based conservation is often applied under the assumption that it delivers win-win outcomes. However, although the ecosystem services framework offers the potential for developing approaches that simultaneously provide ecological stability and livelihood security, there are often trade-offs associated with the pursuit of multiple objectives, by multiple stakeholders, across multiple spatial and temporal scales. Using the methodology developed by the Centre for Evidence-Based Conservation, we carried out a systematic review of the literature, collating evidence on where ecosystem service interventions had the potential to, or had resulted in synergies and trade-offs. Of 699 potentially relevant articles highlighted using our search terms, 254 were selected as appropriate for the review. We find that there is a wealth of research literature on tradeoffs in ecosystem-based conservation, and that the literature covers a diverse number of research fields, geographical areas and ecosystem services. However, there is little evidence that this is facilitating an informed dialogue, or even closer collaboration between specialist disciplines. We also demonstrate that despite the diversity of research fields, trade-offs tend to fall into three main categories: trade-offs between services, users and natural capital versus other forms of capital. We discuss these different trade-off types with reference to the economic and policy implications that they have.

2011-12-09 15:15 Priorities for continental connectivity conservation to facilitate bird migrations in eastern Australia

Howling, GM*, *NSW Office of Environment & Heritage;* **O'Connor, J,** *Birds Australia;*

The seasonal migration patterns of birds in eastern Australia provide a useful focus for attempts to prioritise landscapes for conservation action, and communicate the importance of the Great Eastern Ranges Connectivity Conservation Initiative. Birds are a highly visible and charismatic part of Australia's forests and woodlands, and the focus for significant community conservation effort. Survey records for 18 species were analysed to derive weekly and monthly time-series maps of distributions in eastern Australia. The data highlighted five distinctive patterns of migration: (1) 'broad-scale latitudinal' (e.g. Cicadabird Coracina tenuirostris); (2) 'restricted-scale latitudinal' (Black-faced Monarch Monarcha melanopsis melanopsis; (3) 'partial' (Dusky Woodswallow Artamus cyanopterus); (4) 'altitudinal' (Flame Robin Petroica phoenicea); and (5) 'rich patch' (Swift Parrot Lathamus discolor). The movement data were intersected with models for future habitat condition based on agricultural intensification, proximity to infrastructure and human population density. The results demonstrated significant 'bottle-necks' in bird migrations through a number of landscapes including the Border Ranges and Gold Coast hinterland, Hunter Valley, Southern Highlands and southwest slopes. The results confirmed the critical importance of the eastern ranges for bird migrations, highlighted significant threats to future connectivity of protected areas, and suggested priorities for the Great Eastern Ranges Initiative in the future.

2011-12-08 18:30 Challenges in conserving the endangered and endemic Cochabamba Mountain-Finch in a rural Bolivian Andean landscape

Huanca, N. E.*, *Asociación Civil Armonía, Av. Lomas de Arena # 400, Box 3566, Santa Cruz de la Sierra - Bolivia ;* **Cahill, J. R. A.,** *Centro de Biodiversidad y Genética, Universidad Mayor de San Simón, Box 538, Cochabamba - Bolivia;* **Vázquez, C. A.,** *Asociación Civil Armonía, Av. Lomas de Arena # 400, Box 3566, Santa Cruz de la Sierra - Bolivia;* **Davis, S. ,** *Asociación Civil Armonía, Av. Lomas de Arena # 400, Box 3566, Santa Cruz de la Sierra - Bolivia;*

Conservationists interested in preserving wildlife, often have difficulty in convincing and engaging local people. This has specially been true, when approaching rural communities of the Bolivian high-Andes with a conservation theme. The endangered Cochabamba Mountain-Finch (Compsospiza garleppi), an endemic bird which shares the community land above 3500m is threatened by habitat loss due to logging, burning and agricultural frontier expansion. Our focus has been on reducing threats to this species caused by the agrarian communities of Palcapampa and Ch'aqui Potrero in Cochabamba. The hard process of winning their confidence took four years, which resulted in the support and acceptance by both communities. We worked with a multidisciplinary team. We studied the habitat use, conducted awareness camps with children and women, and we imparted men with ecologically friendly farming practices. The bird territories were in areas of mixed agricultural land and native species, the territory size was 1.5±0.36 ha. The local communities have learnt to appreciate, and proudly protect this species. We started a reforestation program with 600 "Polylepis subtusalbida" nursery trees and men are practicing agro ecological farming. Reforestation efforts and a positive attitude of people should be a starting point in securing the future of this endangered species.

2011-12-09 16:46 An open-ended approach to conservation: A case study at Wicken Fen, UK

HUGHES, FMR*, *Department of Life Sciences, Anglia Ruskin University, Cambridge, UK;* **Stroh, PA,** *Department of Life Sciences, Anglia Ruskin University, Cambridge, UK;* **Warrington, S,** *National Trust, UK;* **Adams, WM,** *Department of Geography, University of Cambridge, UK;*

The conservation of biodiversity in areas such as Western Europe, where landscapes are drastically altered by human action, cannot be achieved by protection of remaining habitat fragments alone. Isolation, small size, ecological change, human pressure and climate change are among critical threats. One response, increasingly used in the UK, is to extend existing protected areas to reduce external impacts and increase opportunities for species survival through range expansion. Extension of protected areas to larger ('landscape') scales involves challenges of understanding and monitoring ecological change, of gaining support from local communities and of cost. This demands a scientific, low-cost, public-orientated and yet 'open-ended' approach. We consider these issues at a landscape-scale restoration project based around Wicken Fen National Nature Reserve, UK. Agricultural land purchased around the historic reserve is being allowed to convert to wetland habitat using natural processes and low-intensity management. The project has a 100-year timescale and it is

therefore expected that species assemblages will turn over and that provision of ecosystem services will change through time. This 'open-ended' approach to conservation requires new ways of monitoring and evaluating biodiversity and ecosystem services outcomes and a careful engagement with peoples' expectations of what such a project should and can deliver.

2011-12-07 11:15 Maintaining Biodiversity in Highly Dynamic Forested Landscapes

Hunter, Malcolm*, *University of Maine;*

Maintaining forest biodiversity in a period of unusual dynamism will require significant effort, but not radical new approaches. We can envision a conceptual triad that recognizes three basic ways to use forests: as natural ecosystems, primarily in reserves where human activities are minimized; as managed ecosystems where timber production and maintenance of biodiversity are both pursued; and as cultivated ecosystems such as plantations, where maximum timber production is pursued. First, in a system of forest reserves it will be important to represent the range of physical environments because these are the arenas within which diverse, ever-changing communities will occur. Furthermore, a reserve system should maintain altitudinal and latitudinal connectivity to facilitate the range shifts of species. Second, for managed forests maintaining a diverse array of stand conditions (the paradigm of "Diversity begets diversity") will be fundamental. Ideally this will be complemented or enhanced by using timber management systems that attempt to emulate natural disturbances (the paradigm of "Using nature's template"). Climate change will probably alter natural disturbance regimes but given that species will have evolved under past disturbance regimes we should be conservative about generating new disturbance regimes. Third, in plantations the opportunity to restore trees to deforested sites could reconnect landscapes and assist in the colonization of tree species that are shifting their geographic ranges. In summary, the unpredictable challenges of climate change will make maintaining biodiversity more important than ever, and demand that we pursue this goal vigorously while remaining flexible.

2011-12-09 17:30 Cave ecology in the Philippines, a conservation perspective: linking surface and subsurface ecosystems

Husana, Daniel Edison*, *Yokohama National University Global Center of Excellence for Environmental Studies;* **Kase, Tomoki,** *National Museum of Science and Nature;* **Yamamuro, Masumi,** *The University of Tokyo;*

Caves in the Philippines are understudied despite the high susceptibility of its environment to human disturbance. This is of particular importance as caves are known to contain unique and poorly understood fauna. We aim to provide baseline data that could help understand the obscure subterranean ecosystem. We've collected and identified cavernicolous crabs and used them as model organism. Mitochondrial DNA of freshwater crab genus Sundathelphusa was analyzed to construct their phylogeny; water quality was characterized by analyzing physico-chemical parameters; and stable isotope analysis was conducted to elucidate the trophic dynamics in the system. Results have recorded 23 cave-dwelling crab species, five of them are new. Phylogenetic relationship, showing multiple colonizations of caves, was revealed by 403 base pairs of 16S rRNA. Groundwater physico-chemical characters were recorded while high concentration of nitrite was detected in some caves suggesting human influence. ، 13C and ، 15N signatures clarified the trophic dynamics and nutrient source in cave. The rich assemblage of unique cave animals having limited geographic range and reduced dispersal ability, and the nutrient and chemical pathways are the elements that link the surface and subterranean ecosystems. We suggest further research to document biodiversity in the system, a focus on reducing human threats and surface-level habitat degradation, and protection of both above and underground ecosystems.

2011-12-08 18:30 Development of efficient technologies to capture invasive alien raccoons at low population density.

Ikeda, T*, *Hokkaido University;* **Nakai, M,** *Hokkaido University;* **Shimada, K,** *Hokkaido University;* **Yamashita, K,** *Karuizawa Dog Behavior;* **Kotani, E,** *Farmage Ltd.;* **Kawasaki, A,** *Farmage Ltd.;*

Abandoned and escaped pet raccoons have caused heavy damage not only to agricultural crops but also natural ecosystem in Japan. Although trapping campaigns brought the decrease in the number of raccoons in some places, the cost and effort to ease negative effects from trapping nontarget animals still remained high in low population density area. In this study, the training of raccoon-detecting dog and the development of raccoon trapping system by nest-box trap based on their cavity-nesting habits were employed as effective approaches at low population density. In a raccoon-detecting dog program, a female juvenile Kai dog which exhibited strong interest in raccoon scent were selected from hunting-dog varieties native to Japan. The selected juvenile is being trained in a program which was designed based on learning theory. In an operant conditioning experiment to screen raccoon scent from scents of other animals, she exhibited almost 100% accuracy. Collaborating with handler, she could detect raccoon scent set on the tree. Field experiments confirmed that bait is not required to attract raccoons to nest-box traps. Also, experiments with captive individuals helped to design favorable nest box size and entrance shape. For sensor, we developed vibration and infrared sensors, and by connecting theses sensors with relay transmitters, a local system which remotely detect capture information was structured. This study was supported by a grant from the 2009-2011 Biodiversity Technology Development Fund by the Ministry of the Environment in Japan.

2011-12-09 17:30 Kiwis saving kiwi - Recovery of a New Zealand icon

Impey, Michelle*, *BNZ Save the Kiwi Trust;* **Holzapfel, Avi,** *Department of Conservation;* **Robertson, Hugh,** *Department of Conservation;*

Kiwi (Apteryx sp.) are iconic birds endemic to New Zealand, powerful symbols of the country's social identity and natural heritage. Yet all five species have declined, some to precariously low numbers, and are still under threat mainly from introduced mammalian predators. Coordinated efforts into recovery and protection of kiwi began in 1991 with a focus on identifying rates of decline and key threats, followed by the development of best management practice and increasing the scale of predator control from hundreds to tens of thousands of hectares. Recovery is supported by a partnership between government and non-government conservation interests, and corporate sponsorship contributing significantly to kiwi management. So far, over 80 kiwi recovery projects have been initiated by local volunteer-based community groups, protecting more than half the 120,000 hectares where kiwi are managed today. Successful protection of all five species is based on a strong foundation of public interest, availability of good research, continuing innovation, a formal partnership between key stakeholders, a stable funding stream, the provision of national strategies and advocacy, and the integration and national coordination of public and private efforts. Kiwi recovery presents a successful model of engaging society in conservation, with benefits for other species and whole ecosystems. This model can be replicated for other high-profile, iconic species.

2011-12-09 15:00 Strengthening biodiversity conservation by integrating local values in nature into the design and management of protected areas

INFIELD, M*, *Fauna & Flora International;* **Mugisha, A,** *Fauna & Flora International;*

It is accepted that nature conservation will only succeed in the long run if supported by local communities. Yet efforts to build a constituency for conservation, especially amongst rural communities in developing countries, have had limited success. Efforts to engage communities in conservation have historically focused on demonstrating its economic benefits, appealing to the financial interests of communities. Little attention has been paid to the many intangible values of nature. A project with two national parks in Uganda is demonstrating that working with local communities to integrate the values and beliefs that link them to their natural world has led to a significant change in the nature of relations between conservation authorities and the people, reducing conflict and resulting in more productive and effective collaboration. Furthermore, by helping these communities retain or re-discover the beliefs, ethics and values that connect them to nature, interest in its protection has increased. The use of a cultural values approach is relevant to many conservation initiatives including protected area design and management, socio-ecological production landscapes and other resource management regimes. By strengthening links between people and place, rather than weakening them as has been often the case, conservation initiatives can become more effective. By contributing towards

the conservation of local cultures, it can also become more sustainable.

2011-12-06 16:46 Exploring the Evidence, Risks and Benefits of Payments of Ecosystem Services (PES) as a Mechanism for Supporting Conservation and Community Development

Ingram, Jane Carter*, *Wildlife Conservation Society;* **Wilkie, David,** *Wildlife Conservation Society;* **Olmsted, Paige,** *Columbia University;* **Naeem, Shahid,** *Columbia University;*

Payments for Ecosystem Services (PES) have received considerable attention in the literature and policy circles in recent years as a mechanism for combining biodiversity conservation with poverty reduction in tropical, developing countries. However, comparatively few examples of successful PES implementation in developing countries exist to guide project developers on best practice and potential risks of such an approach. This talk will present results from reviews and analyses of PES case studies to assess: 1) the availability of evidence on the use and efficacy of PES as a mechanism for conservation and poverty reduction in developing countries; and 2) the ecological, social and economic conditions that have enabled or hindered PES implementation and success in developing countries. The results of this analysis will be discussed and explored within the context of the risks and benefits of using PES compared to other approaches for conservation and development; and ways in which PES could be strengthened to enhance benefits for conservation and rural communities in developing countries.

2011-12-08 14:30 Research in community-led sanctuaries in New Zealand

Innes, JG*, *Landcare Research;* **Watts, CH,** *Landcare Research;* **Burns, BR,** *School of Biological Sciences, Auckland University;*

Biodiversity sanctuaries in New Zealand are places that are experimentally restoring indigenous ecosystems to indigenous dominance and full species complement, typically by control or eradication of introduced mammal pests and the reintroduction of missing species. Alongside other kinds, there are community-led sanctuaries on at least nine islands (total 2635 ha) and at 35 'mainland' sites (total 52,115 ha public land and 37,825 ha private land). This contribution to national biodiversity conservation is socially, and probably ecologically, very significant, but there is substantial uncertainty about best pest control strategies and tactics, resultant biodiversity gains, and costs. Research is the key tool to methodically remove this uncertainty, but local drivers of these projects rarely have research backgrounds. Developing their relationship with researchers requires trust, time and money. Research currently undertaken in sanctuaries is mostly about pest management or threatened species, and is rarely collaborative between sites, despite their common objectives. Researchers have the key role to forge such collaboration. Clear priorities are to establish a jargon and theoretical framework for assessing biodiversity gain and establishing standardised monitoring techniques for measuring it. This begs discussion among all stakeholders of what project goals actually are.

2011-12-06 14:15 Forest management plan to restore foraging habitat of endangered species Golden eagle

Ishima, T*, *Graduate School of Science and Technology, Niigata University;* **Sekijima, T,** *Graduate School of Science and Technology, Niigata University;*

Breeding success of Japanese Golden eagles, designated as an endangered species in Japan, has declined rapidly during the last three decades. The main factor causing the breeding failure is the loss of forest gaps, that eagles can forage, which were caused by the coniferous afforestation. To solve this issue, some restoration trials such a line-thinning have been conducted. Unfortunately, these trials have not always succeeded. We pointed out the necessity that not only increase the prey animal within forest gap but also create forest gap in a high use area within eagle's home range. Additionally, to hold the forest gap sustainably as a foraging habitat, restoration should be conducted in the area where the population density of hares as main prey is high and herbaceous vegetation, which have preferred by hares for many years, is produced after forest management. In this study, to extract the candidate area for restoring the foraging habitat of the Golden eagle, we estimated the area used sustainably by hares. The population density of hares was estimated high in the area where food plants are abundant and area of both meadow and cedar forest are large. Herbaceous vegetation was formed in the area where the human disturbance such as clear cut was conducted and source of seeds is closer. As the result of overlaying the distribution maps of hares and vegetation, the candidate forests for restoration were estimated only 8% in home-range of eagles.

2011-12-08 18:30 Effects of snow cover on winter range selection of Mongolian gazelles

Ito, TY*, *Tottori University;* **Hata, S,** *Tottori University;* **Tsunekawa, A,** *Tottori University;* **Shinoda, M,** *Tottori University;* **Takatsuki, S,** *Azabu University;* **Lhagvasuren, B,** *WWF Mongolia;* **Buuveibaatar, B,** *Mongolian Academy of Sciences;* **Chimeddorj, B,** *WWF Mongolia*

Understanding movement patterns of Mongolian gazelles in relation to resource availability driven by interannual climate variation is necessary to conserve this long-distance migratory antelope. Interannual variation of snow cover is large in Mongolia, thus, it may affect habitat use and movements of Mongolian gazelles. To evaluate effects of snow cover on winter range selection and movement patterns of Mongolian gazelles, we analyzed MODIS/Snow Cover data and satellite tracking data of 3 gazelles during 2002-2006 in southeastern Gobi, Mongolia. Snow-covered periods regionally averaged over the total range of the tracked gazelles decreased from 103 days in 2002-03 to 15 days in 2005-06. Winter ranges were separated at maximum by more than 300 km between years in some gazelles, suggesting their movement pattern is rather nomadic than regular migration. While the gazelles used southern part of the total range during winter with long snow-covered period, the northern part was used during winter with short snow-covered period. The gazelles seem to avoid long snow-covered areas, but to prefer areas with snow to some extent. Therefore, the differences of snow-covered periods between years were smaller in their winter ranges than those of their total range. Conservation approaches considering inconsistency of winter ranges of gazelles caused by interannual variation in snow cover formation is necessary.

2011-12-08 18:30 The vegetation of a protected area in the Brazilian Atlantic Forest: implications for its management plan

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The Brazilian Atlantic Forest is one of the 25 hotspots in biodiversity. However, only 9% of its remnants are protected areas. Among these areas, the Upper Ribeira State Tourist Park (PETAR) is one of the most rich and preserved sites. It is internationally recognized for being the only stretch of the Brazilian Atlantic Forest on limestone caves, which contributes to its high number of endemic species. Our work will show the results of a vegetation survey conducted to support the Management Plan of PETAR and provide information to harmonize conservation strategies and touristic activities. The study was made using the method of Rapid Ecological Assessment, which is based on mapping, collecting expeditions and secondary data. We selected trails embracing the whole range of forest formations and places with different conservation status. Ten different vegetation types were identified, most of them (65%) being subtypes of Ombrophilous Dense Forest. In the end, 724 native plant species were listed, providing 199 new records for the park. From these 724 species, 40 species were under some degree of threat according to official lists of endangered species while 46 others were alien species, 17 of them being considered as invasive. Information about conservation status and existing species was georeferenced and mapped, which has permitted the design of management recommendations aiming at the conservation of the local vegetation.

2011-12-06 16:30 How robust are biodiversity hotspots to climate change?

Iwamura, T*, *The University of Queensland;* **Wilson, K.A,** *The University of Queensland;* **Possingham, H.P,** *The University of Queensland;*

There are several schemes that identify global conservation priorities - places

where we should concentrate investment for biodiversity conservation at a global scale. These global conservation priorities vary considerably because they use different selection criteria. However, little is known about how robust these global conservation priorities will be to the impacts of climate change. In this paper, we examined the robustness of nine sets of global conservation priorities to climate change. We discovered that global conservation priorities that invest in areas with high endemic species richness and high irreplaceability are more robust to a changing climate. At the same time, we found that investment in more intact regions is less robust under a changing climate. Our findings will help decide where additional management is required to enable biodiversity to adapt to likely impacts.

2011-12-08 18:30 International legal trade in endangered birds: Do CITES controls have an impact?

Jackson, Wendy*, *Lincoln University;*

The Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES) is an international agreement that regulates global trade in over 34,000 species. Approximately 1250 of these species are birds, many of which are exported for the caged bird trade. When trade data for species in Appendix II suggest that exports might be detrimental to their survival in the wild, range states may be subject to recommendations for special conditions or controls under the 'Review of Significant Trade' process. Between 1991 and 1994, 65 bird species were selected for Review in three phases. Using records maintained in the UNEP-WCMC CITES Trade Database, export trends of species were tabulated for the years 1981-2007. Out of all 65 bird species, legal trade in wild-caught specimens declined for 76% while under Review or following the Review, regardless of whether recommendations were issued. Trade levels remained steady or increased for 12%, and there were mixed results for 12%. Trade in wild-caught specimens moved from range states that were issued recommendations to ones not issued recommendations for 15% of species, and trade in captive-bred specimens increased for 12% of species. In 15% of cases, there was an export spike while the species was under Review, even though trade eventually declined. These trade trends suggest that the CITES Review process is effective at impacting legal trade in wild-caught bird species, even when specific conditions or controls are not recommended to range states. What is not clear is the effect of illegal trade on overall export volumes. Accurate data are not available, making comparison with the available legal trade impossible. Calls for increased examination of illegal trade are therefore warranted.

2011-12-08 18:30 Reduced gene flow in ringed seals (Pusa hispida) caused by Hudson Bay

Jacob J. Burkhart*, *Central Michigan University;* **Stephanie Sell,** *Central Michigan University;* **Ole Nielsen,** *Fisheries and Oceans, Manitoba, Canada;* **Brendan P. Kelly,** *National Science Foundation;* **Bradley J. Swanson,** *Central Michigan University;*

Ringed seals (Pusa hispida) are ice dependent breeders. Global warming has already reduced the extent and duration of arctic sea ice. We examined the isolating effect of Hudson Bay to determine if this population may be more endangered due to global climate change. We genotyped 416 seals at 7 microsatellite loci from 12 locations along the western Arctic (WA), Hudson Bay (HB), and Baltic Sea (BS). We estimated the number of populations using STRUCTURE and BAPS and genetic structure (Fst) and relatedness (r) using GenAlEx. The most likely number of populations was 1. The average Fst (0.02) between HB and WA sites was significantly greater ($P<0.001$) than between sites within the WA (Fst=0.005). Similarly, the average Fst (0.030) between HB sites and BS was significantly greater ($P=0.01$) than Fst between WA sites and BS (0.019). Relatedness of individuals in HB to individuals in WA (r=-0.04) was significantly lower ($P=0.03$) than that found between individuals in WA (r=0.008). Similarly, relatedness between individuals in HB and BS (r=-0.05) sites was significantly lower ($P=0.01$) than relatedness between individuals in WA and BS sites (r=0.003). Despite ringed seals existing as a single population, our results suggest that the HB seals show some degree of isolation from the rest of the population. We suggest that dispersal is reduced westward by the islands northwest of Hudson Bay and eastward by the open ocean which may reduce its probability of demographic rescue.

2011-12-07 11:22 Utilizing Google Earth to document land cover changes to unprecedented levels: A case-study in West and Central Africa

JACOBSON, A*, *Duke University;* **Pimm, S,** *Duke University;* **Dollar, L,** *National Geographic Society;* **Riggio, J,** *Duke University;*

Free and widely available software and imagery allow users to map land cover changes to an unprecedented degree. With only minimal training, volunteers can use Google Earth to map and document conversion from natural landscapes to those dominated by humans. Very high-resolution imagery and a simple user interface allow even lightly trained volunteers to do valuable work. Scaling up this process allows mapping of national parks, countries or even whole continents. Recently, a small team has mapped land use conversion for all of West and Central Africa. We found the extent of conversion is spatially-different and greater than previous GIS products suggested (e.g. ESA GlobCover). Alternatively, this product is useful at small scales to identify encroachment into protected areas, remaining areas of natural habitat, and to determine connectivity. With obvious connections to conservation, free and easy-to-use software and unprecedented access to high-resolution imagery, this process can allow masses to aid conservation in concrete and discrete steps.

2011-12-07 11:00 A new IUCN guide to wildlife disease risk analysis

Jakob-Hoff, R.M.*, *New Zealand Centre for Conservation Medicine, Auckland Zoo;*

Disease is one of many threats affecting the survival of an increasing range of wildlife in situ. Translocation of wildlife for conservation management also provides a means of disseminating pathogens and exposing naive populations to new infections. Additionally, continuing expansion and movement of human and domestic animal populations into closer contact with wildlife provides new avenues for disease transmission, with animal welfare, economic, human health and social consequences. A global survey of people involved in wildlife disease risk decision making revealed a demand for a set of accessible, flexible disease risk analysis (DRA) tools that could be applied across a wide range of scenarios. Such a toolkit was developed and trialled by the Conservation Breeding Specialist Group (CBSG) of the World Conservation Union's Species Survival Commission (IUCN-SSC) a decade ago but was not widely marketed and had limited uptake. In response to the recent explosion of interest in wildlife disease, and building on new risk analysis processes and technologies, the CBSG is working with an international trans-disciplinary team to develop a new web-based and hard-copy Guide to Wildlife Disease Risk Analysis incorporating principles, tools and processes in a form readily accessible to a broad global community of end-users.

2011-12-08 18:30 Common farmland birds distribution in Poland. Predictive mapping from large-scale environmental elements

Jakub Z. Kosicki*, *Department of Avian Biology and Ecology, Faculty of Biology, Adam Mickiewicz University, ul Umultowska 89, 61-614 Poznań, Poland;* **Piotr Zduniak,** *Department of Avian Biology and Ecology, Faculty of Biology, Adam Mickiewicz University, ul Umultowska 89, 61-614 Poznań, Poland;*

We studied predicting mapping as a method for the prediction of common farmland breeding bird species occurrence, a possible management of selected types of habitats, leading to an efficient bird conservation. We analyzed three species, such as the Ortolan bunting Emberiza hortulana, Grey Partridge Perdix perdix and Common Quail Coturnix coturnix. The data were collected during the Common Breeding Birds Monitoring Scheme in years 2000-2009. Environmental predictors came from CLC 2000, DEM, WordClim and NDVI datasets. We used flexible discriminant analysis with multi-adaptive regression splines and Bayesian methods to average the models from particular years of the study. The estimated mean of the predicted occurrence error was relatively small (0.29, 0.19, 0.32, respectively). Geographical gradients and the climate turned out to be main factors determining the analyzed species occurrence, followed by selected habitat elements. These species prefer extensively cultivated farmland dominated by non-irrigated arable fields, small mixed forests, complex cultivation patterns and meadows. Polish populations of the species seem to be stable, however, in other parts of Europe their decline is a fact. Therefore, it is of great importance to be aware of large-scale factors affecting the species occurrence, what provides an opportunity to protect them better in the future.

2011-12-09 17:15 Necessity spawns plasticity: Siberian Cranes abandon specialist foraging behaviors after an extreme flood event and implications for conservation

James Burnham*, *University of Wisconsin-Madison;*

It is unusual for specialist foragers to abandon their preferred food items. Since 1983, scientists have known that Siberian Cranes utilize the shallow-water wetlands of China's Poyang Lake during the winter months where they typically specialize on the tubers of the submerged aquatic macrophyte, Vallisneria. Following an extreme flood event during the summer of 2010, surveys for Vallisneria found minimal evidence of the plant, or its tubers. In January 2011, researchers documented Siberian Cranes at Poyang foraging on two plant species in upland sedge/forb communities for the first time. In addition, researchers observed multiple instances of Siberian Cranes exhibiting novel aggressive behaviors towards co-foraging White-naped and Eurasian Cranes. These observations provide evidence that under extreme circumstances the requirements of the species are not as rigid as previously suggested and lead to two propositions: 1) the extreme flood event of 2010 provides a tangible boundary for ecosystem function within the Poyang basin, and 2) novel habitat selection patterns and foraging behaviors by species at Poyang give insights into how future extreme events may impact the system's users. More generalized habitat uses by Siberian Cranes could lead to dramatic changes in management and conservation efforts as well as engagement with local policy makers who have committed to conserving the species.

2011-12-09 14:00 Quantitative and qualitative effects of loss of large frugivores on seed dispersal patterns: a New Zealand example

Jana, RC*, *School of Biological Sciences, University of Canterbury;* **Kelly, D,** *School of Biological Sciences, University of Canterbury;* **Richardson, SJ,** *Landcare Research, Lincoln;* **Garcia, D,** *Universidad de Oviedo, Spain;* **Ladley, J,** *School of Biological Sciences, University of Canterbury;* **Clout, MN,** *School of Environment, University of Auckland;* **Karl, BJ,** *Landcare Research, Lincoln;* **Tilley, J,** *School of Environment, University of Auckland*

There is no certainty whether the loss or decline of large frugivores will affect plant regeneration. Discussion has often focused on qualitative effects, i.e. when large-seeded plants are left with no competent dispersers. Here we test for quantitative effects, i.e. changes in the spatial pattern of seed movement when large frugivores decline relative to small frugivores. In New Zealand the last remaining large native frugivore is the New Zealand pigeon (Hemiphaga novaeselaandiae). Using a 12-year dataset on seed trapping under six tree species with different fruit sizes (3.5–15.5 mm fruit width), we tested for differences in seed-rain composition between species, and evaluated if fruit size and disperser assemblages explain these differences. The small fruit were consumed by both small and large birds, but the largest fruit only by NZ pigeons. We found that there was a gradient in the proportion of heterospecific seeds found under the canopy, from one species having 1% (Elaeocarpus dentatus) to other with 99% heterospecific seeds (Dacrycarpus curpressinum). In addition, the deposition patterns of large-fruit species were skewed towards under the canopy of other large-fruited species. This creates spatial heterogeneity in the composition of the seed rain under large- and small-fruited canopies, due to interactions between fruit and crop size, fruit attractiveness, and disperser composition and behaviour. Thus, a relative reduction in large frugivores can alter seed dispersal both qualitatively and quantitatively.

2011-12-08 10:30 Herbivory Interactions Cause Phylogenetic Changes in Pinyon-Associated Communities

Jarvis, KJ*, *Northern Arizona University;* **Craig, AJ,** *Northern Arizona University;* **Allan, GJ,** *Northern Arizona University;* **Whitham, TG,** *Northern Arizona University;* **Beresic-Perrins, RK,** *Northern Arizona University;* **Stone, AC,** *Northern Arizona University;* **Gehring, CA,** *Northern Arizona University;*

We examined the hypothesis that pinyon host trees that are structurally altered by scale insect attack will support arthropod and mycorrhizal fungal communities with differing phylogenetic patterns. We collected community composition and abundance data on pinyon hosts susceptible and resistant to scale insects. We then assessed these data in relation to phylogenetic relationships among community members in the two community types. We found three major patterns: 1) arthropod communities are phylogenetically clustered, especially communities on scale resistant hosts. This indicates that these arthropod communities are composed of species more closely related to each other than would be expected due to chance. 2) Mycorrhizal fungal communities exhibited low to no levels of clustering; 3) Phylogenetic Beta Diversity analyses indicated high levels of phylogenetic diversity from one host tree to the next in both arthropod and mycorrhizal fungal communities. These results suggest that the lineages that compose both community types can vary widely, but that the arthropod communities that are present are relatively closely related. This indicates that a single ecological interaction with potential genetic basis, such as scale herbivory, can have wide ranging effects on associated communities, and that restoration efforts focusing on single genotypes may not support the community diversity that multiple genotypes would.

2011-12-08 14:16 Invasive blackberry (Rubus fruticosus aggregate) retains the diversity of small terrestrial mammals in degraded landscapes

Jasmin Packer*, *University of Adelaide;* **Sue Carthew,** *University of Adelaide;* **David Paull,** *University of New South Wales;*

Invasive weeds are well recognised as a major threat to biodiversity worldwide. Yet suprisingly little is known of their contrasting role as habitat for fauna, nor of their effect on populations. Blackberry is a highly invasive Weed of National Significance and is considered a major threat to biodiversity in the Mount Lofty Ranges of South Australia, one of 15 National Biodiversity Hotspots. It is therefore being cleared extensively from sites, including where it is known to provide habitat for the endangered Southern brown bandicoot (Isoodon obesulus) and other native fauna. Our research is investigating the effect of blackberry (Rubus fructicosus aggregate) as habitat for small terrestrial mammals. We surveyed 9 sites in the Mount Lofty Ranges during March-April 2010. The sites represented three habitat treatments: 1. control (dense native vegetation with no blackberry) 2. blackberry within dense native vegetation and 3. blackberry within sparse native vegetation. Paired trapping grids were set up 100m apart in the blackberry and native vegetation. Species richness was comparable across all sites. However, the species richness and abundance of small mammals was significantly higher in the blackberry than 100m away in native vegetation, regardless of whether the native vegetation was dense or sparse. The findings indicate that blackberry may be providing critical habitat for the persistence of small native mammals where the surrounding vegetation is sparse. This study is part of PhD research investigating the quality of habitat provided by blackberry for the endangered Southern brown bandicoot, and whether it is critical for their persistence. The research findings are informing conservation strategies for this threatened species in the Mt Lofty Ranges of South Australia.

2011-12-09 11:26 Community surveys increase the awareness and habitat restoration for the endangered Southern brown bandicoot (Isoodon obesulus) by landholders

Jasmin Packer*, *University of Adelaide;*

The Sturt Upper Reaches Landcare Group Inc. has been training and supporting local landholders to monitor the endangered Southern brown bandicoot (Isoodon obesulus) on their property since 2003. Each year landholders conduct hair funnel and vegetation surveys to detect bandicoot presence on their property. The findings indicate that landholders are able to reliably survey for bandicoot presence and conduct basic vegetation surveys, that bandicoot populations have been stable in the region during 2003-2010 and that the threshold for maximum distance from dense habitat for bandicoot presence is 20 metres. In early 2011 an evaluation of the program was conducted, including surveying landholders to assess their perception of the effect of the program on their knowledge of bandicoot conservation needs, and on their planning and action to restore habitat on their property. The majority of landholders indicated that their involvement in the program has increased their knowledge of bandicoots and their conservation needs, and that it has improved both their planning and action to restore native vegetation as habitat on their property.

2011-12-07 11:00 Lost islands? Biodiversity conservation weaknesses, challenges and opportunities in French Pacific islands

Jean-Yves Meyer*, *Delegation a la Recherche, French Polynesia;* **Atoloto Malau,** *Service de l'Environnement, Wallis and Futuna;*

The overseas territories of French Polynesia (FP) and Wallis and Futuna

(WF) are two French overseas territories located in the South Pacific, similarly surrounded by English-speaking island countries. FP includes 120 islands with a high number of endemic plants and animals, and a wide diversity of natural habitats. The comparatively small WF is composed of three islands located between Samoa, Tonga and Fiji, with a low number of endemics and few remaining native forests under high anthropogenic pressure. Whereas FP has a network of protected areas and has launched conservation programs on endangered species, WF has no legally protected area or species. The ability of France to support biodiversity conservation is limited because protection falls under the jurisdiction of local governments. Large conservation organizations are absent and only a few local nature protection groups are active. Furthermore, conflicts of interest with local communities (e.g. marine turtles) and different perceptions of species and habitats value (agrosystems vs natural ecosystems) increase the constraints facing conservation. We advocate for the reconciliation between modern and traditional conceptions of nature, the integration of local knowledge, and for more collaboration between FP and WF and their neighbouring island states and territories which were historically separated by colonialism.

2011-12-08 11:45 Climate change and freshwater ecosystems in Oceania: an assessment of vulnerability and adaptation opportunities

Jenkins, KM*, *University of NSW;* **Kingsford, RT,** *University of NSW;* **Closs, GP,** *University of Otago;* **Wolfendenac, BJ,** *New South Wales Office of Water,;* **Matthaei, C,** *University of Otago;* **Hay, S,** *University of NSW;*

Human-forced climate change significantly threatens the world's freshwater ecosystems, through projected changes to rainfall, temperature and sea level. We examined the threats and adaptation opportunities to climate change in a diverse selection of rivers and wetlands from Oceania (Australia, New Zealand and Pacific Islands). We found common themes, but also important regional differences. In regulated floodplain rivers in dry regions (i.e. Australia), reduced flooding projected with climate change is a veneer on current losses, but impacts ramp up by 2070. Increasing drought threatens biota as the time between floods extends.Current measures addressing water allocations and dam management can be extended to adapt to climate change, with water buy-back and environmental flows critical. Freshwater wetlands along coastal Oceania are threatened by elevated salinity as sea level rises, potentially mitigated by levee banks. In mountainous regions of New Zealand, the biodiversity of largely pristine glacial and snow melt rivers is threatened by temperature increases, particularly endemic species. Australian snow melt rivers face similar problems, compounding impacts of hydro-electric schemes. Translocation of species and control of invasive species are the main adaptations. Changes to flow regime and rising water temperatures and sea levels are the main threats of climate change on freshwater ecosystems.Besides lowering emissions, reducing impacts of water consumption and protecting or restoring connectivity and refugia are key adaptations for conservation of freshwater ecosystems. Despite these clear imperatives, policy and management has been slow to respond, even in developed regions with significant resources to tackle such complex issues.

2011-12-06 16:30 Patterns of bushmeat consumption in eastern Madagascar

Jenkins, R K B, *Bangor University, UK & Madagasikara Voakaj, Madagascar;* **Keane, A M*,** *University College London & Institute of Zoology, UK;* **Rakotoarivelo, A A,** *Madagasikara Voakajy, Madagascar;* **Rakotomboavonjy, V,** *Madagasikara Voakajy, Madagascar;* **Randrianandrianina, F H,** *Madagasikara Voakajy, Madagascar;* **Razafimanahaka, H J,** *Madagasikara Voakajy, Madagascar;* **Ralaiarimalala, S R,** *Madagasikara Voakajy, Madagascar;* **Jones, J P G,** *Bangor University, UK*

Wild meat consumption from tropical forests is a major threat to biodiversity and a potential pathway for transmission of emerging diseases. Understanding patterns of bushmeat consumption is important for designing mitigation measures. Madagascar is one of the world's 'hottest' biodiversity hotspots, but the issue of hunting as a threat to biodiversity on the island is only now being fully recognised. Using interviews with 1154 households in 12 communes in eastern Madagascar and local monitoring data we investigated the importance of socio-economic variables, taste preference and traditional taboos on consumption of 50 wild and domestic species. Most meals contain no animal protein, but 95% of respondents have eaten at least one protected species during their lifetime (and nearly 45% have eaten >10). The rural/urban divide and wealth are shown to be important predictors of bushmeat consumption, but their effects vary between species. Bushmeat species are generally less preferred than fish or domestic animals, suggesting that projects which increase the availability of domestic protein may have success at reducing demand. In the past taboos have provided protection to certain species, particularly the Endangered Indri, but our data suggest that this protection is rapidly eroding. Urgent action is required to ensure that heavily hunted species are adequately protected.

2011-12-08 18:30 The genetic status of threatened Manchurian trout (Brachymystax lenok Pallas; Salmoninae, Salmonidae) in Korea, inferred from mitochondrial DNA sequences

Jeong-Nam Yu*, *National Institute of Biological Resources;* **Young-Woon Lim,** *Seoul National University;* **Soonok Kim,** *National Institute of Biological Resources;* **Myounghai Kwak,** *National Institute of Biological Resources;*

The genetic status of Manchurian trout (Brachymystax lenox) in two distinct Rivers, Han River and Nakdong River, in Korea was investigated. Since this area is the southern limit line of Manchurian trout, the distribution of this species was brought to the attention of scientist as well as the public. According to the records, Manchurian trout in Nakdong River has been extinct and artificial seedlings from Han River were introduced into Nakdong River in 1980's. The mitochondrial control region (CR) of 68 individuals from two rivers was characterized into 9 haplotypes with 18 variable sites. Among two haplotypes from Nakdong River, one (H1) was dominantly found in Han River but the other (H5) was only found in Nakdong River. Moreover, populations in Nakdong River showed high haplotype diversity but low nucleotide diversity, suggesting rapid population growth from a small ancestral population. Thus, we suspected that H5 haplotype might be a private Nakdong genotype, suggesting that Manchurian trout in Nakdong River had not been extinct. The two genotypes can be explained that the very small number Nakdong endemic survivors (H1) and introduced Han River founders (H5). The alternative hypothesis is that H1 genotype was very rare genotype in Han River but it might be introduced into Nakdong River. Our genetic analysis about Manchurian trout shows that the declaration of extinct in Nakdong River might have been impatient and introduction of individuals should be determined after genetic analysis, even though it is from geographically very close distance.

2011-12-08 18:30 The genetic variation of Korean water deer (Hydropotes inermis argyropus; Cervidae, Hydropotinae) inferred from mitochondrial and nuclear microsatellite markers

Jeong-Nam Yu, *National Institute of Biological Resources;* **Jumin Jun*,** *National Institute of Biological Resources;* **Changman Won,** *National Institute of Biological Resources;* **Byoung-Yoon Lee,** *National Institute of Biological Resources;* **Myounghai Kwak,** *National Institute of Biological Resources;*

The vulnerable water deer (Hydropotes inermis argyropus) was investigated for extent of genetic variation using mitochondrial control region and 82 nuclear microsatellite markers. Firstly, the complete mitogenome of Korean water deer (H. i. argyropus) was obtained and compared to previously reported Chinese water deer mitogenome (H. i. inermis). Overall characteristics of two mitogenomes were identical and 98~100% nucleotide sequence similarities exist between them. Using next generation sequencing (NGS), we developed water deer specific microsatellite markers. We chose 400 microsatellites with higher copy numbers from di-repeat motifs for PCR amplification and assessment of polymorphism. Of these, the 79 markers were polymorphic with 2 to 11 alleles (total 334 alleles). We compared genetic variation between two Korean and Chinese subspecies using 3 microsatellite markers and it showed clear genetic differentiation between them. Moreover, Korean water deer showed lower value of He and Ho compared to Chinese population, even though Korean water deer has hundred-fold bigger and stable population size than Chinese. This implies limited gene flow between the Korean water deer populations, caused by habitat fragmentation or extreme bottleneck phenomenon in Korea, recently.

2011-12-08 18:30 The middle ground in conservation and development: Evaluating the ICDP in Kalakad Mundathurai Tiger Reserve

Jesudasan, A.*, *Ashoka Trust for Research in Ecology and the Environment;* **Soubadra, D.,** *Ashoka Trust for Research in Ecology and the Environment;* **Ganesan, R.,** *Ashoka Trust for Research in Ecology and the Environment;* **Ganesh, T.,** *Ashoka Trust for Research in Ecology and the Environment;*

Using a multi-disciplinary approach we evaluated an Integrated Conservation and Development Program (ICDP) which has been a dominant strategy to achieve a win-win situation. The ICDP in Kalakad Mundanthurai Tiger Reserve, India intended to reduce forest dependency of villagers by giving out low interest loans and by providing alternate biomass reserves. We used a propensity score matching technique to measure the impact of the ICDP on beneficiaries' household income. Long term fuel wood collectors' census, supported by remote sensing were used to infer the trend in forest recovery. In addition, focus group interviews were conducted to get the perspectives of villagers on the ICDP. The results show that there has been increase in forest cover and a reduction in forest dependence. Though there was no impact on the household income of the villagers and inadequate alternate biomass, the villagers attributed the forest dependence to loans given by the ICDP which was given under the condition that villagers stop depending on forest resources. The ICDP also commanded substantial goodwill as it was the first in this landscape to lend at low interest. ICDPs such as the one in KMTR, which encourage alternate livelihood outside Protected Areas, may still find win-win solutions.

2011-12-06 11:15 Modelling global dynamics of species distributions in a rapidly changing world

Jetz, W*, *Yale University;* **LaSorte, FA,** *Yale University;* **Guralnick, RP,** *University of Colorado, Boulder;* **McPherson, JM,** *Calgary Zoo;*

Environmental change is expected to put much of global biodiversity at risk of extinction with potentially extensive consequences for human well-being. Yet, society only has a limited understanding of the geography of both species and threats, and most attempts to gauge the magnitude of impacts are limited to select regions, species or indicators. In the face of this challenge, important opportunities exist for validating and improving biodiversity change analysis tools, for model-based integration of existing species-level distribution data at a global scale, and for dynamic change analyses that build on them. Here I will present ways to use past observational data to evaluate methods for assessing observed environmental change impacts on species distributions and discuss recent work that helps provide tools and products for a better baseline understanding of global species distributions in relation to future threats. Specifically, I will elaborate on insights from using the US Breeding Bird Survey data for validating model-based projections of biodiversity change. I will discuss recent first attempts of global baseline assessments of environmental change impacts for whole diverse taxa. Finally, I will introduce approaches and tools provided by the recently initiated "Map of Life" project for integrating biodiversity distribution data and performing dynamic change analyses.

2011-12-09 11:45 The influences of vegetation, flow and climate on stream macroinvertebrates: lessons from the big dry.

Jim Thomson*, *Monash University;* **Leon Metzeling,** *Environment Protection Authority, Victoria;* **Ross Thompson,** *Monash University;* **Nick Bond,** *Monash University;* **Ralph Mac Nally,** *Monash University;*

The potential impacts of climate change and associated land cover changes on aquatic ecosystems are of great interest to policy makers, managers and ecologists. We used 20 years of macroinvertebrate monitoring data from south eastern Australia to investigate trends in river condition over a period of prolonged drought. We also explored how amounts of native vegetation in upstream catchments and local riparian zones influenced aquatic macroinvertebrate assemblages and their responses to changing flow and climate conditions. We linked macroinvertebrate data to a DEM-derived stream network and other spatial datasets to derive physiographic, vegetation, flow and climate data for > 1800 sampled reaches. We used a Bayesian hierarchical model to simultaneously examine temporal trends and the interactive effects of vegetation, flow and climate at several spatial scales. We found strong evidence of widespread changes in macroinvertebrate assemblages over the drought period, with large reductions in the prevalence of flow-dependent and pollution intolerant taxa. Macroinvertebrate condition measures (SIGNAL, EPT richness, total richness) and their rates of decline were spatially variable and displayed complex relationships with vegetation, flow and climate attributes. However, stream condition was consistently higher in streams with large amounts of native vegetation in upstream catchments and in local riparian zones, regardless of climate, flow or physiographic setting. These results suggest that protecting and restoring native vegetation in riparian and catchment zones may help to mitigate the effects of climate change on aquatic biota.

2011-12-07 14:15 Assessing the value of public lands and waters to U.S. birds: the 2011 State of the Birds Report

Jocelyn Aycrigg*, *National Gap Analysis Program, University of Idaho;* **Chris Eberly,** *Department of Defense Partners in Flight;* **Daniel Fink,** *Cornell University;* **David Mehlman,** *The Nature Conservancy;* **Ken V. Rosenberg,** *Cornell University;* **John R. Sauer,** *U.S. Geological Survey;* **J. Michael Scott,** *Idaho Cooperative Fish and Wildlife Research Unit, U. S. Geological Survey, University of Idaho;*

Nearly 850 million acres of land and 3.5 million square miles of ocean in the U.S. are publicly-owned. These habitats are essential to > 800 bird species in the U.S., 251 of which are federally threatened, endangered, or of conservation concern. We estimated the distribution of habitat-obligate birds on public lands and evaluated the responsibility of our public agencies for bird species in each primary habitat. We determined the percentages of distributions on public lands by combining bird distributions modeled from eBird citizen-science data with USGS-GAP's Protected Areas Database of the U.S. (PAD-US 1.1). More than 300 bird species have 50% or more of their U.S. distribution on public lands and waters. Our results highlight the importance of public lands and agencies in bird conservation, as well as areas where increased protection and management are needed. Conservation and effective management of habitats and birds on our public lands and waters are essential to balance the need for resources from logging, mining, and energy extraction with conservation needs in all habitats. Public agencies have a major influence on the success of bird conservation. Through effective interagency management of these important habitats, they can help restore declining species and keep common birds common.

2011-12-08 18:30 Motorboat noise and its effects on coastal fish growth

Johansson, K*, *Swedish University of Agricultural Sciences;*

Increased recreational boating activities in coastal areas might have both behavioral and physiological effects on fish, yet long term effects of noise disturbance have been poorly investigated. To explore such effects, two fish species, Eurasian perch (Perca fluviatilis) and roach (Rutilus rutilus), were placed in enclosures in a quiet coastal area in the Bothnian Bay of Sweden. Experimental subjects were either kept in a silent location or in a location occasionally exposed to noise from an outboard engine situated ten meters away. In addition, individuals were either separated into species-specific enclosures or grouped together in equal numbers. During a two week period, fish were fed twice a day during noise exposure and then measured and weighed so that specific growth rate (SGR) calculations could be performed. No differences between the experimental treatments were observed for perch, but noise exposure did affect SGR values for roach negatively. However, no declines in growth rate were observed for either species in the mixed enclosures. Two experimental runs separated in time showed the same patterns. Thus, the roach with its acute sense of hearing was disadvantaged by motorboat noise, but only in isolation (single species enclosures). Conservation and management success may therefore be predicted by individual species traits or overall species composition.

2011-12-08 15:00 How to Ensure Facts and Experience Prevail Over Power and Fear in Natural Resource Governance – In US Policy, CITES, CBD and UNFCCC

John Fitzgerald*, *SCB;*

A key question is how to ensure that policy makers use the best scientific knowledge appropriately in developing and enforcing policy. We will discuss (species and climate) examples from international law and US legislative, administrative and judicial processes to set out practical means to project,

protect and apply science-based policies. We will discuss funding for expert witnesses, controls on misrepresentation of facts in government processes, scientific integrity procedures, and more. For example, to reveal the likely costs of legislative proposals US Budget Act of 1974 requires that before bills can be voted on by the full House or Senate they have to be accompanied by a budget estimate provided by the non-partisan Congressional Budget Office. Legislatures and Plenaries of Treaty Conferences could provide a process to support science in policy by requiring that the primary proposals on the agenda of a COP or in proposed authorizing legislation be accompanied by a majority (and if necessary, dissenting) analysis, citing peer-reviewed science, and by an independent published peer review of those explanations. The reviewers could be drawn, after checking for financial conflicts of interest, by the Congressional Research Service or IPBES respectively from rosters of experts provided by SCB and other professional societies. The scientific basis for the final decision could be subject to judicial or IPBES review as well.

2011-12-07 15:00 International Treaties, IPBES, and Domestic Policies in Protecting and Restoring Forests (and Paying Forest Experts)

John Fitzgerald*, *SCB ;* **Jonsson Bengt-Gunnar,** *SCB-IPBES Task Force & MIU, Sweden;*

The nations of the earth have recognized in several nearly universally ratified treaties that sustaining the biological diversity and quality of forests is necessary for sustaining life as we know it. The Convention on Biological Diversity goes even further and instructs nations that are party to it to restore degraded ecosystems. We will explore innovative ways to empower and fulfill these general obligations using the science of forest conservation and restoration through market and non-market mechanisms. In reviewing key treaty provisions and their domestic law counterparts, we will describe powerful tools to produce investment and procurement decisions that restore forests. We will review effective policies for taxes, penalties, fines, tariffs, and embargoes that work together to restore forests' function and coverage and protect people at the same time. We will discuss the limited role that offsets can play. Several nations and the EU are enforcing strong laws that go beyond parks and protect certain forests for the sake of the functions they provide even while they allow sustainable uses of those forests. The US and the EU have banned the importation of illegally harvested wood or other forest products. The question then is, what does it mean to be legally harvested? If a permit is issued by a country that has not fulfilled its treaty obligations with respect to that tree or forest, is it a legitimate permit? What is the balance between Greenhouse Gas emissions and ecosystem sequestration that is sustainable and what kind of earth can we sustain? The IPBES and other bodies can help answer these questions in a powerful way if we adopt procedures that reject policy decisions that are neither precautionary nor based on the best available science.

2011-12-06 16:42 Near real-time monitoring systems for deforestation, illegal logging, and fire

John Musinsky*, *Conservation International;*

The destruction and degradation of the world's forests from deforestation, illegal logging and fire has wide-ranging environmental and economic impacts, including biodiversity loss, the degradation of ecosystem services and the emission of greenhouse gases. In an effort to strengthen local capacity to respond to these threats, Conservation International has developed a suite of near real-time satellite monitoring systems generating daily alerts, maps and reports of forest fire, fire risk, deforestation and degradation that are used by national and sub-national government agencies, NGO's, scientists, communities, and the media to respond to and report on threats to forest resources. Currently, the systems support more than 1000 subscribers from 45 countries, focusing on Madagascar, Indonesia, Bolivia and Peru. This presentation will explore the types of innovative applications users have found for these data, challenges they've encountered in data acquisition and accuracy, and feedback they've given on the usefulness of these systems for REDD+ implementation, protected areas management and improved forest governance.

2011-12-07 14:20 Using systematic monitoring to evaluate and improve the management of a tiger reserve in northern Laos

Johnson, Arlyne*, *Wildlife Conservation Society;* **Vongkhamheng, Chanthavy,** *Wildlife Conservation Society;* **Saypanya, Santi,** *Wildlife Conservation Society;* **Hansel, Troy,** *Wildlife Conservation Society;* **Strindberg, Samantha,** *Wildlife Conservation Society;*

Monitoring and evaluation is a key ingredient for improving effectiveness of conservation projects. However, there are few actual examples of how this is successfully being done as part of an adaptive management cycle. From 2003-2010, we monitored tigers and their prey, key threats to their long-term survival and our management interventions in the Nam Et-Phou Louey National Protected Area; the last known site for breeding tigers in Indochina. We used monitoring results to regularly evaluate and improve management interventions through several iterations of the project cycle. A baseline survey estimating 7-24 tigers within a 3,548km2 area was used to set a population target and define a 3,000 km2 totally protected zone. Identification of the main threats, including direct killing of tigers and overhunting of prey as well as contributing factors, led us to select two interventions – law enforcement and public outreach- to reduce threats. Spatial deployment of enforcement and outreach teams was based on biological monitoring results and changes in illegal hunting and public attitudes to evaluate effectiveness of management interventions and ensured appropriate refinement over time. Several enabling conditions made successful adaptive management possible including donor-support for monitoring, mandatory venues for reporting results, technical support to design monitoring systems, mentors and long-term support to build national capacity and guide application of the results.

2011-12-07 15:00 Tanzania's national inventory of wildlife corridors

Jones*, *T;* **Caro,** *T;* **Davenport,** *TRB;*

A critical conservation goal for the United Republic of Tanzania is to maintain its remaining wildlife corridors as this is seen as vital for maintaining its globally important wildlife populations. A nationwide assessment in 2009 documented 31 remaining wildlife corridors in mainland Tanzania, of which 23 (74%) were categorised as in extreme or critical condition, defined as likely to disappear within an estimated five years. Now, two years on, we review the current conservation status of these 23 corridors, as well as development of new corridor policy and legislation. We present updated information from several of these corridors, including a case study in south-central Tanzania showing that the two remaining corridors between the Udzungwa Mountains and the Selous Game Reserve, an important link between Tanzania's major western and southern wildlife communities, have been completely blocked since 2007, with serious ecological and socio-economic implications. Overall, our review suggests that 2009 predictions about the state of some of Tanzania's wildlife corridors were valid. We provide recommendations for restoring connectivity, and discuss the prospects for preventing further corridor losses across mainland Tanzania.

2011-12-07 11:45 Disease management options for contagious cancer in Tasmanian devils

Jones, M. E.*, *University of Tasmania;*

Tasmanian devils are threatened with extinction from a novel contagious cancer. Since Devil Facial Tumour Disease was detected in 1996, species decline has exceeded 60%, with local declines of 95%. Contagious cancers, in which live tumours cells are the pathogenic agent, are rare in nature. Conditions for their emergence include low genetic diversity or immunosuppression, and intimate injurious contact. Having already lost half their genetic diversity, devils are the clearest case yet of the devastating consequences of low genetic diversity for the emergence of new diseases. Options for management of the devil and its tumour that will lead to the recovery of devil populations in the wild are limited. In the case of extinction in the wild, reintroduction could occur from an ex-situ insurance metapopulation of healthy devils managed for retention of a high level of remaining genetic diversity. Recent results indicate reduced population impacts and disease prevalence and possibly virulence as the tumour encounters a different host genetic subpopulation for the first time. In-situ management needs to be based on understanding of the evolutionary interaction between the tumour and its host. Genetic rescue, through mixing genetic subpopulations, would enhance the resilience of the species to this and future threats.

2011-12-08 10:46 Conserving a critical landscape connectivity in south India

Jones, S*, *LORIS-The Biodiversity Conservation Society;*

The hill ranges of the semi arid lower Eastern Ghats in Chittoor district of Andhra Pradesh, India are part of its larger landscape connectivity with the Western Ghats, a Biodiversity Hotspot. The Eastern Ghats is an important bio-geographic region much valued for its floral diversity, endemism and complex geology. Conservation of this connectivity is critical for the re-colonization of the remnant isolated populations of many species of global conservation significance. Situated between two National Parks within the district, these lesser-known dry-deciduous forests are also part of an elephant corridor. The protection of this connectivity between these isolated habitats is extremely important to overcome the barriers for the distribution of various other species, to ensure their genetic interchange and facilitate seasonal movement. For the local village communities, traditionally, these forests have been a major source for subsistence. Some of these forest patches in the past were conserved as 'Sacred Groves' by these communities and are island gene pools of many threatened species. Involving the communities in protection of habitat corridors and stepping stones by improving contiguity and habitat quality could be an important part of an overall regional landscape conservation framework.

2011-12-07 14:00 History and Land Use Effects on Biodiversity in European Boreal Systems

Jonsson, BG*, *Dept of Natural Sciences, Mid Sweden University;*

The European boreal forest covers more than 700 million ha. Its industrial utilization started in the early 1800s in the southern parts of Fennoscandia and has since gradually moved to the northeast and during the late 1900s finally reached the Ural Mountains. This timber frontier was a first wave of extraction focused on the most valuable trees. During the 1900s, large scale clear-cutting has been introduced and is now the major harvesting method. In Fennoscandia, and increasingly in Russia, this has led to large landscape transformation, with major changes in natural disturbances, tree species composition and age structure. Only Russia harbor larger landscape of pristine forests, while only scattered fragments of natural forests remain in other countries. This transition has caused major decline in forest biodiversity and for example, the Fennoscandian redlists include more than 2000 species. This contrast with the FAO status description, that show increasing forest cover in northern Europe – while failing to acknowledge the sever situation for biodiversity due to the loss of natural forests. To provide a better knowledge basis, the Barents Protected Area Network (BPAN) has been established. Taking its starting point in the CBD Program of Work for Protected Areas, it supports the establishment of a representative network of protected areas that has a high potential in safeguarding the biodiversity, functional natural ecosystems and related ecosystem services in the region.

2011-12-08 14:45 How SCB Can Help IPBES Make International Agreements Affecting Conservation More Effective In Conserving and Restoring Biodiversity?

Jonsson, BG*, *Dept of Natural Sciences, Mid Sweden University;*

IPBES has the potential to become an important process, linking best available knowledge to political processes forming conservation policy. In order to fulfill its vision, SCB as a leading learned society in the area of conservation therefore needs to seriously consider its role and contribution. A first step was taken when the ad-hoc committee on IPBES was formed in 2009. With representatives from all sections it has followed the process and participated in recent meetings, including the first IPBES plenary two months ago. The current challenge for IPBES is to get the best science onboard and creating a sense of common ownership with the scientific community. This is an ongoing process that SCB need to support by; -
Monitor the formal process and participate in upcoming meetings -
Make strong links to the regional sections and support their involvement - Seek representation in the IPBES plenary and its executive body -Develop and update its expert of rooster with the needs of IPBES in focus - Provide updated information to our membership and the scientific community at large on IPBES and its needs This suggest that the ad-hoc committee need to continue its work, that IPBES should be a focal issue for both global and regional policy committees and that the EO needs to make a strong effort in developing rooster of experts.

2011-12-09 11:15 Wild thing, I'm just not that into you: Examining exotic pet owner's preference for captive-bred or wild-caught animals

JOSEPH, LIANA*, *Wildlife Conservation Society;* **Courchamp, Franck ,** *Université Paris Sud;* **Redford, Kent,** *Wildlife Conservation Society;*

Commercial farming of endangered species is promoted as a mechanism for protecting wild populations from over-exploitation. In theory, by flooding the market with a farmed alternative, the demand for wild-caught varieties will be reduced. Despite some successes, there are strong arguments against farming. One such argument is that wild-caught varieties are often preferred to the farmed alternatives. If this is true then farming will fail to protect wild populations as poaching will continue and may, in some cases, be exacerbated by the presence of a legal product on the market. Here we examined consumer preference for wild and farmed varieties of exotic pets. First, we used a market survey to examine the volumes sold and prices paid for wild and farmed varieties. Second, we used an internet-questionnaire to examine acquisition criteria. We discovered that source is one of the main choice criteria for acquisition by pet owners: farmed varieties are valued more than the wild-caught varieties. This is the first time a preference for farmed products has been demonstrated empirically; other studies have demonstrated a preference for wild-caught varieties of food and traditional medicines. This result is important when compared to these other studies as it may help to explain why commercial farming may sometimes successfully reduce the pressure on wild populations of species that are used in the pet-trade but may not benefit the conservation of species used for other purposes.

2011-12-09 17:15 Genetic Structure and Connectivity of Tiger (Panthera tigris tigris) Populations in Central Indian Forests

Joshi A*, *Post-Graduate Programme in Wildlife Biology and Conservation, Bangalore;* **Ramakrishnan U,** *National Centre for Biological Sciences, bangalore ;* **Edgaonkar A,** *Indian Institute of Forest Management , Bhopal;*

Over the last century there has been a massive reduction in the size of tiger habitats in India. One of the important areas supporting tiger populations in India is the Central Indian forested landscape; facing the serious problem of habitat fragmentation. While the focus of the current conservation efforts is few protected areas (PAs), this study attempts to evaluate the importance of forest patches in between, based on their effect on the genetic structure of tiger population in this landscape. Non-invasive sampling of tiger DNA in six protected areas was carried out by collecting scats. The identification of different populations, genetic structure and assignment tests were conducted based on 10 polymorphic microsatellite marker data for 47 individuals. The results reveal presence of 5 different populations in the sampled region. FST values suggest high historical connectivity in the Central Indian landscape. The assignment tests shows evidence for present long distance migration of individuals. The Least Cost Path analyses designated routes in the landscape, which could possibly be facilitating movement of tigers. This study provides an insight to the importance of the forest connectivity and the potential dispersal of large carnivore like tigers.

2011-12-06 11:15 Complementing Community-Based Marine Management Initiatives With Strategic Planning to Meet Local- And National-Scale Objectives In Fiji

Jupiter, SD*, *Wildlife Conservation Society Fiji Country Program;* **Mills, M,** *ARC Centre for Excellence for Coral Reef Studies, James Cook University;* **Pressey, RL,** *ARC Centre for Excellence for Coral Reef Studies, James Cook University;*

Most marine protected area networks are generally initiated in an ad hoc manner, with reserves that are often located in places that do not contribute to the full representation of biodiversity targets. In Fiji, locally marine managed areas (LMMAs) have grown rapidly in number from 1 site in 1997 to approximately 150 LMMAs in 2009, with at least 216 separate customary closures. While the main objective for establishment of LMMAs is to improve food security, as a large collection of management actions, the network can also support the Fiji Government commitment to effectively protect at least 30% of Fiji's inshore areas. To determine how much the Fiji LMMA network contributes to national objectives, we used an innovative approach to gap analysis that considered the size of the managed areas and the potential effectiveness of the management actions, as defined by

an expert group. We found that the current FLMMA network effectively protected approximately 10-25% of each target habitat (mangroves, intertidal mudflats, reefs), though the amount of protection varies substantially by province. We used these results to begin a dialogue with provincial administrators and members of the Fiji Locally Managed Marine Area network to identify candidate sites for protection and management to fill the gaps.

2011-12-08 14:45 Conservation of Highly Migratory Ichthyofauna Using Ecosystem-Based Management Principles at Local and National Scales in Fiji

Jupiter, SD*, *Wildlife Conservation Society Fiji Country Program;* **Jenkins, AP,** *Wetlands International-Oceania;* **Qauqau, I,** *Wildlife Conservation Society Fiji Country Program;* **Weeks, R,** *Wildlife Conservation Society Fiji Country Program;* **Mailautoka, K,** *Wildlife Conservation Society Fiji Country Program;*

The freshwater and estuarine ichthyofauna of tropical high island ecosystems are highly migratory with a high proportion of endemic, amphidromous fishes that move across multiple habitats during their lifecycle. Our research from Fiji has demonstrated that three variables, percent catchment forest cover, presence of non-native tilapias, and presence of hanging culverts, exert strong negative influence over freshwater fish species richness and abundance. We present two examples of how we incorporated these scientific findings into development of priorities for catchment management at the national and provincial scale. At the national scale, we used a set of decision rules in GIS that considered habitat intactness and complexity, hydrology, and sensitivity to erosion. Each combined catchment-fishing ground mapping unit (n = 76) was scored for relative erosion potential, extent of road network, number of creek crossings, presence/absence of non-native freshwater fish, mangrove area relative to catchment size, mangrove habitat complexity, reef area relative to fishing ground size, and reef habitat complexity. The results indicated areas to target investment for preservation versus restoration. At the provincial scale, we defined targets in Marxan software for the amount of forests and major creeks/rivers protected in order to identify which local landowners should be targeted for consultations to establish new community forest parks and riparian buffers. These parks and managed areas will be embedded in a broader ecosystem-based management system that considers both community and national rules governing activities inside and outside of protected areas.

2011-12-07 18:00 The Satoyama Index: A biodiversity indicator for agricultural landscapes

Kadoya, T*, *National Institute for Environmental Studies;* **Washitani, I,** *The University of Tokyo;*

Agricultural development to meet rapidly growing demands for food and biofuel and the abandonment of traditional land use have had major impacts on biodiversity. Habitat diversity is one of the most important factors influencing biodiversity in agricultural landscapes. In this study we propose an ecological index of ecosystem or habitat diversity in agricultural landscapes – the Satoyama Index (SI) – that is discernible under appropriate spatial units (e.g., 6 km×6 km) from 1 km×1 km gridded land-cover data available from an open-access web site. A high SI value is an indicator of high habitat diversity, which is characteristic of traditional agricultural systems, including Japanese satoyama landscapes, while a low value indicates a monotonic habitat condition typical of extensive monoculture landscapes. The index correlated well with the spatial patterns of occurrence of a bird of prey (Butastur indicus) and species richness of amphibians and damselflies in Japan. The values of the SI also corresponded well to the spatial patterns of typical traditional agricultural landscapes with high conservation value in other countries, for example, the dehesas of the Iberian Peninsula and shade coffee landscapes in Central America. Globally, the pattern of East/South-East Asian paddy belts with their high index values contrasts markedly with the low values of the Eurasian, American, and Australian wheat or corn belts. The SI, which correlates landscapes with biodiversity through potential habitat availability, is highly promising for assessing and monitoring the status of biodiversity irrespective of scale.

2011-12-09 14:04 Predicting ecosystem function from ecosystem structure: Implications for valuation of ecosystem services and development of policy instruments

KADYKALO, ANDREW N.*, *Department of Biology, University of Ottawa;* **Findlay, C. Scott,** *Department of Biology & Institute of the Environment, University of Ottawa ;*

Ecosystem services are simply ecological functions that demonstrably contribute to human welfare. Assessing the level of a given service in an ecosystem requires assessing the level of the associated functions. But direct measurement/estimation of ecosystem functions (e.g. primary production, pollination; nutrient cycling, etc.) is often technically demanding, not possible or resource-intensive. Consequently, ecosystem functions are often estimated via (a) estimates of ecosystem structure; (b) inference from ecosystem structure to function based on assumed structure-function relationships (e.g. Inference about primary productivity (a function) from NDVI (a structural attribute). The validity of this inference determines the predictive value of ecosystem structure with respect to ecosystem function, and hence, the uncertainty and biases associated with the estimation of the level of associated ecosystem services. For several wetland services accumulation curves were constructed by measuring studies, which fulfill selection criteria vs. effort spent searching and using the service with the highest asymptote (presumed most data meeting selection criteria and predictive value data) a meta-analysis was performed. We conclude that the predictive value of ecosystem function with respect to ecosystem structure is relatively poor and therefore presents concern for ecosystem valuation studies and development of environmental policy instruments.

2011-12-08 11:15 'Conservation' among animist beliefs of the Ikundi-ku of Papua New Guinea

Kagl, John*, *Wildlife Conservation Society, Papua New Guinea Programme;*

Many indigenous peoples do not distinguish conservation from broader knowledge and belief systems. This is the case for the Ikundi-ku, who live in one of the most remote and least developed parts of Papua New Guinea (PNG). For 35 years the Ikundi-ku have resisted the efforts of missionaries to covert them to Christianity and have strong animist beliefs where everything is related to everything else. I worked with these people to see if their approach to harvesting and forest management is compatible with the goals of the conservation organization I work for. There appears to be much common ground. The Ikundi-ku want to retain large areas of forest because they say "… it is our mother, the source of our life and existence. She provides for everything we need. ". They also revere many sacred sites that resemble conservation areas in being clearly demarcated with restrictions on entering or taking plants and animals. Species that decline rapidly when over harvested in PNG (e.g. cassowaries), are still abundant in Ikundi, suggesting hunting at present levels is sustainable. As the human population grows and missionaries colonise the area, however, the pressure to abandoned scared sites and harvest will grow. Research is therefore needed into the relative impacts of sacred sites, low human population densities and traditional harvest methods on sustainability. Initiatives are also needed to ensure the Ikundi-ku retain their 'mother forest' without falling into a 'poverty trap'.

2011-12-07 11:30 Integrating wildllife and community health to promote conservation and sustainable livelihoods

Kalema-Zikusoka, Gladys*, *Conservation Through Public Health;* **Rubanga, Steven,** *Conservation Through Public Health;* **Byonanebye, Joseph,** *Conservation Through Public Health;* **Gaffikin, Lynne,** *Evaluation and Research Technologies for Health;*

Bwindi Impenetrable National Park is home to approximately half of the world's estimated population of 780 critically endangered mountain gorillas, and is also surrounded by very high population densities of 300 people per square kilometer amongst the poorest in Africa, who are stakeholders in gorilla ecotourism and yet have limited access to modern health services. Two scabies skin disease outbreaks in two Bwindi mountain gorilla groups in 1996 and 2000/1, resulting in the death of an infant and sickness in the rest of the group, were eventually traced to surrounding communities, possibly through contact with scabies mite infested clothing when gorillas left the park to forage on community land. Subsequent community health education workshops and research on the risks of TB disease transmission at the human/wildlife/livestock interface further emphasized the linkages.

These findings resulted in the formation of Conservation Through Public Health (CTPH) in 2003, a registered Ugandan NGO and US non-profit, whose focus is the interdependence of wildlife health and human health in and around Africa's protected areas. CTPH implements three integrated Population, Health and Environment (PHE) programs to address these issues: wildlife health monitoring, community public health and information, communication and technology, through partnerships with governments and local communities.

2011-12-08 15:00 Taking Eradication Funding and Measurable Outcomes One Step Further – Restoring Island Ecosystems

Kappes, P*, *Oregon State University;* **Jones, HP,** *UC Santa Cruz;*

Islands contain a significant proportion of global biodiversity. Seabirds are ecosystem drivers that support islands and their associated biodiversity through guano fertilization. Unfortunately, invasive mammals have ravaged insular ecosystems and seabird populations around the globe, resulting in devastating ecosystem-scale effects. In response to these dual threats, invasive mammals have been eradicated from islands throughout the world. The goal of these removal campaigns is to ecosystem recovery but it remains unclear if island ecosystems can recover passively, especially where seabirds do not readily recover. We advocate that the island restoration community incorporate seabird restoration techniques into eradication projects to enhance conservation outcomes. Joining the two efforts allows practitioners to initiate seabird restoration soon after eradications, increasing the chances of luring any remaining birds with experience breeding at that location. Because considerable time and money is put into funding, public approval, planning, building infrastructure, and performing both eradication and seabird restoration projects, it makes sense to treat seabird restoration as part of eradication projects, rather than reinvesting time and money to initiate a new restoration project. We encourage practitioners to look for opportunities to integrate seabird restoration and eradication programs, in order to truly restore island ecosystems and the biodiversity they support.

2011-12-07 16:42 Should we use pedigrees to detect inbreeding depression when the founders might be related?

Kardos, MK*, *University of Montana;* **Luikart, G,** *University of Montana;* **Allendorf, FW,** *University of Montana;*

Habitat destruction and overexploitation of species may often decrease population sizes and increase the frequency of inbreeding (mating between close relatives). Accurately assessing individual inbreeding is necessary to fully understand its importance to individual fitness and population growth. The historically preferred method to measure inbreeding is to use a pedigree to calculate an individual's inbreeding coefficient (F) which is the reduction in heterozygosity due to parents being related; this method assumes that the pedigree founders are both non-inbred and unrelated to one another. We used simulated populations with full pedigrees to assess the effects of violating these assumptions on the ability of F to approximate the true level of inbreeding and to estimate the strength of inbreeding depression. Violating the assumption of non-inbred pedigree founders had little effect of the relationship between F and the true level of inbreeding. However, when approximately 40-90% of pedigree founders were closely related, F was a poor approximation of the true level of inbreeding and the power to detect inbreeding depression was severely reduced, particularly when pedigrees containing fewer than ten generations were used. Our results suggest that pedigree-based estimates of inbreeding and its effects on fitness may be unreliable when a large proportion of pedigree founders are closely related.

2011-12-06 14:45 Repair and Recovery of Damaged Nature

Kareiva, P., *The Nature Conservancy;* **Jones, H.*,** *UC Santa Cruz;* **Marvier, M.,** *Santa Clara University;* **Fuller, E.,** *The Nature Conservancy;* **Zavaleta, E.,** *UC Santa Cruz;*

Human impacts on earth have been huge, and numerous environmental assessments have pointed out that the ability of ecosystem services to support human wellbeing are declining globally due to ecosystem damage. Moreover, ongoing growth in the human population and in human demands for food and energy are sure to further stress nature. A key question is to what extent can nature and ecosystems recover from damage and egregious environmental insults? We are undertaking a systematic examination of case studies of recovery and repair or lack of recovery and repair. Preliminary results suggest mean perturbation magnitudes are highest for agriculture, eutrophication and invasive species perturbations. Species abundances are affected more strongly than species diversity by perturbations and species diversity variables recovered more quickly than species abundance variables. Our analysis indicates authors' interpretations sometimes do not match up with our objective recovery estimates, with authors tending to underplay recovery. Resilience decreases from annual species to those with longer generation times. Grasses have higher resilience than do tree species and invertebrates have much higher resilience than do birds and fish. We found no difference in resilience between different trophic levels. We hope to use these results to build recovery and resilience theory, help prioritize restoration projects, and identify the key metrics that drive ecosystem recovery following perturbations.

2011-12-09 14:30 Implications of bird vs. monkey seed dispersal behavior for genetic structuring of palm populations

Karubian, J, *Tulane University;* **Ottewell, K*,** *Tulane University;* **di Fiore, A,** *New York University;* **Link, A,** *New York University;*

In tropical rainforests, up to 85% of tree species rely on seed dispersal by frugivorous vertebrates, but many of these animals are declining as a result of overhunting and loss of habitat. The extent to which this will impact on the tree species they disperse is unclear as it is challenging to quantify seed dispersal patterns due to the long range movements of animal vectors. Some vertebrates, however, exhibit behaviors whereby seeds are moved to a particular destination (e.g. roosting sites) resulting in clumped distributions of seeds at these sites, allowing us insight into the implications of particular dispersal behaviors for seed survival and genetic structuring of plant populations. Here we examine the effects of destination-based seed dispersal behavior by two endangered large-bodied frugivorous vertebrates, Long-Wattled Umbrellabirds (Cephalopterus penduliger) and Spider Monkeys (Ateles belzebuth) on the genetic structuring of seedling pools of the widespread palm, Oenocarpus bataua, at forest sites in Ecuador. Using genetic identification techniques we quantify the number and diversity of seed sources represented in pools of seedlings found either in Male Umbrellabird leks or underneath Spider Monkey sleeping trees, relative to "background" seedling pools located away from these focal points. We show that vertebrate dispersal behavior can have a profound impact on the distribution of genetic diversity in recruiting populations of O. bataua, and that the loss of these dispersal agents is likely to have negative genetic consequences for the palm.

2011-12-09 15:00 Collaborative fisheries research enhances assessments and fosters stakeholder support for marine science

Kay, MC*, *UC Santa Barbara;* **Lenihan, HS,** *UC Santa Barbara;* **Wilson, JR,** *UC Santa Barbara;* **Miller, CJ,** *California Lobster and Trap Fisherman's Association;*

Assessment of fish populations and conservation policies such as marine reserves is difficult due to high costs and logistical challenges. In recent years, however, scientists are finding traditionally unlikely allies among commercial fishermen whose tools and talents can enhance fisheries research. In this study we describe two projects that demonstrate the scientific benefits of collaborative fisheries research (CFR) between academic scientists and lobster fishermen in Santa Barbara, California. The first project is a marine reserve assessment in which sampling with fishing gear expands spatio-temporal coverage through comparison with historical fishery catch/effort records and a concurrent port sampling program. These comparisons reveal a four to eight-fold increase in trap yield and 5–10% increase in the mean size (carapace length) of lobsters inside vs. outside of reserves. A second project mobilizes fishermen in a tag-recapture program that provides detailed information about lobster growth and movement. We used these data to estimate mortality outside reserves (Z=0.53) using a novel stock assessment method that is low cost, reserve based, and stakeholder driven. Our program successfully fosters stakeholder buy-in for marine science, and does so for a traditionally contentious issue (reserves), as evidenced by lobster industry advocacy for expansion of our CFR program throughout California to monitor lobster population status and reserve performance statewide.

2011-12-06 15:45 Incorporating Predation Risk into Nesting Decisions by an Urban Adapter and an Urban Avoider

Kearns, LJ*, *The Ohio State University;* **Rodewald, AD,** *The Ohio State University;*

Behavior can indicate the adaptability of a species to novel environments, such as urban ecosystems with altered predator communities. In urban forest fragments in central Ohio, USA, we studied the northern cardinal (Cardinalis cardinalis), an urban adapter, and the Acadian flycatcher (Empidonax virescens), an urban avoider, to compare how nest-site selection behaviors might be influenced by predation risk, and if so, what types of information about that risk might be most influential. We assessed how changes in vegetation characteristics between subsequent nesting attempts were influenced by public information about 1) the predator community or 2) the risk of nest depredation at a site, or 3) private information based on fate of previous nests built that season. We evaluated models with these predictor variables and julian date of nest attempt using Akaike's Information Criterion (AIC). For changes in nest height, the top model included only previous nest fate and julian date for cardinals, and julian date for flycatchers. However, the top model for predicting change in nest concealment for cardinals included predation risk and julian date, and nest concealment increased between subsequent nests as the risk of nest depredation increased. For flycatchers, however, the top model only included julian date. These results suggest that the urban adapter may be more responsive to predation risk than the urban avoider at the nest-site scale.

2011-12-08 18:30 Metapopulations, mitochondria and McMansions: Conservation genetics of an endangered Australian frog in an urbanising landscape.

Keely, Claire C*, *The University of Melbourne;* **Parris, Kirsten M,** *The University of Melbourne;* **Heard, Geoff W,** *The University of Melbourne;* **Melville, Jane E,** *Museum Victoria;* **Hamer, AJ,** *Royal Botanic Gardens Melbourne;*

Urbanisation is a leading cause of species extinctions worldwide and is considered a major threat to global biodiversity. Recently proposed urban growth boundaries will increase the extent of Melbourne, Australia, by an additional ~40,000 hectares. The endangered Growling Grass Frog (Litoria raniformis) will be directly impacted by Melbourne's urban expansion over the next few decades. Remnant populations of this frog occur throughout the proposed urban growth areas, and the species is known to be sensitive to habitat fragmentation caused by urbanisation. I assessed the genetic structure and diversity of remnant populations of L. raniformis across Melbourne's urban fringe, as part of broader research on the conservation requirements of this species. Tissue samples were collected from 270 individuals, and combined with a further 178 samples from an existing collection. Haplotype composition and diversity were determined by sequencing a fragment of the mitochondrial gene, COI. Preliminary analyses reveal similarities between populations distributed across Melbourne's north, with shared haplotypes present. Information acquired during this project will be integrated into models of metapopulation viability for L. raniformis around Melbourne, and will inform specific management options such as reintroductions and translocations.

2011-12-09 11:15 Protected Area Restoration: Investing in Ecological Integrity and Resilience in a Changing World

KEENLEYSIDE, K.A.*, *Parks Canada;* **Pellatt, M.G.,** *Parks Canada;* **McLennan, D,** *Parks Canada;* **Dumouchel, C,** *Parks Canada;* **Woodley, S,** *Parks Canada;*

Increasingly, individual countries, the scientific community, and conservation organizations are recognizing that parks and other protected areas play a key role in contributing natural solutions to the challenges posed by climate change. This presentation focuses on how actions aimed at protecting, connecting, and restoring ecosystems, and connecting people with nature, enhance ecological, social and economic resilience to climate change. We use examples from Parks Canada's experience in restoring ecological integrity to illustrate how protected areas policies that are well-aligned with conservation science can contribute to meeting global biodiversity and climate change goals. The presentation demonstrates how ecological restoration activities in and around protected areas play a role in climate change adaptation and mitigation at the same time that they re-establish or enhance biodiversity and ecological connectivity, provide meaningful educational and visitor experiences, and contribute to the well-being of local communities.

2011-12-06 11:15 Linking environmental policy and conservation of ecosystem services – evaluating social and ecological controls in an agricultural ecosystem

Kelly Garbach*, *University of Calfornia Davis, Departments of Envirnomental Science & Policy, Plant Sciences;* **Alejandra Martínez-Salinas,** *CATIE Center for Tropical Agriculture Research and Higher Education;* **Mark Lubell,** *University of Calfornia Davis, Department of Envirnomental Science & Policy;* **Fabrice A.J. De Clerck,** *CATIE Center for Tropical Agriculture Research and Higher Education;* **Valerie T. Eviner,** *University of Calfornia Davis, Department of Plant Sciences;*

Agricultural lands are increasingly being called upon to provide biodiversity habitat and multiple ecosystem services. Payment for Ecosystem Services (PES) is emerging as a policy tool to promote conservation practices, such as planting live fences (hedgerows) in pasture-dominated systems. However, concerns about resource competition between trees and herbaceous species have prevented their widespread adoption. This study investigated: 1) the role of PES in driving live fence adoption and management; and 2) influence of live fences on the availability and distribution of three ecosystem services: bird diversity, pasture productivity, and microclimate regulation. Interviews with 101 farmers revealed that participating in PES significantly increased use of multistrata live fences (un-pruned trees, full canopy), compared with non-participants; PES participation did not influence use of simple live fences (pruned trees, sparse canopy). Un-pruned multistrata fences had unique influence on ecosystem services: multistrata live fences hosted twice as many bird species as surrounding pastures and simple live fences. Multistrata fences resulted in a ≤5m tradeoff zone directly beneath the tree canopy, in which midday air temperatures were mitigated by 10 °C and pasture productivity was reduced by up to 60%. In contrast, simple live fences did not reduce pasture productivity, but also did not have significant benefits for bird diversity or microclimate regulation.

2011-12-09 13:15 Will global change alter mast seeding in tussock grasslands?

Kelly, D*, *Biological Sciences, University of Canterbury;* **Geldenhuis, A,** *Mathematics and Statistics, University of Canterbury;* **Byrom, AE,** *Landcare Research;* **James, A,** *Mathematics and Statistics, University of Canterbury;* **Holland, EP,** *Landcare Research;* **Lee. WG,** *Landcare Research;* **Plank, M,** *Mathematics and Statistics, University of Canterbury;* **Cowan, PE,** *Landcare Research*

Many plants worldwide show mast seeding (synchronous highly variable seed crops among years), often triggered by temperature cues. There has been much speculation about how global change might alter the magnitude, frequency, and spacing of high-seed years in mast-seeding species, with downstream effects on seed predation, plant regeneration, and the speed of elevational shifts in species ranges. Whether, and how, climate change alters reproduction depends on the exact mechanisms that plants use to trigger high-seed years. Here we present a novel mechanism for how masting plants respond to temperature cues, using New Zealand snow tussocks (Chionochloa species) as an example. This mechanism both fits the observational data better than previous models, and predicts that global change will not cause long-term changes in mast seeding patterns.

2011-12-06 11:30 Experimental reintroduction of a macropod into an environment with predators; comparing their habitat use during the establishment phase to post establishment.

KEMP, LF*, *The University of Adelaide;* **Carthew, S,** *The University of Adelaide;* **Johnston, G,** *University of South Australia;*

Forty-six tammar wallabies (Macropus eugenii eugenii) were experimentally reintroduced into Innes National Park in South Australia. Predators were present, and animals were intensively radio-tracked over a 21 month period. The establishment phase post reintroduction is a critical time as animals may fail to survive if they cannot find resources and avoid predators in an unfamiliar habitat. The experimental reintroduction tested whether release group familiarity influenced anti-predator strategies, as indicated by habitat use. Results showed that during the establishment phase (first month post

release) animals released with unfamiliar conspecifics were 55% more likely to use high cover habitat, and they foraged closer to cover than did those animals released in pre-established groups. Overall, animals made better predator-avoidance habitat choices once they were accustomed with the habitat. One year post-release animals were 38% more likely to use high cover habitat, they remained significantly closer to cover while foraging, and group sizes were 3.2 times larger than during establishment. Results from this study were imperative in the planning of subsequent reintroduction events for this species.

2011-12-07 14:15 Village-REDD+: a concept that promotes broad participation and spreads benefits widely among forest dependent people in Papua New Guinea

Ken, Bensolo*, *Wildlife Conservation Society, Papua New Guinea Programme;* **Arihafa, Arison ,** *Wildlife Conservation Society, Papua New Guinea Programme;* **Clements, Tom,** *Wildlife Conservation Society, Papua New Guinea Programme;* **Kuange, John,** *Wildlife Conservation Society, Papua New Guinea Programme;* **Samson, Mellie,** *Wildlife Conservation Society, Papua New Guinea Programme;* **Zeriga-Alone, Tanya ,** *Wildlife Conservation Society, Papua New Guinea Programme;* **Sinclair, J Ross,** *Wildlife Conservation Society, Papua New Guinea Programme;*

Papua New Guinea (PNG) has some of the world's largest remaining tracts of rainforest, in and around which live many of the poorest people in the nation. Conservation and development projects on forested lands in PNG have largely failed to deliver either conservation or development. Among the causes of failure have been a poor understanding local social groups and land tenure, resulting in crippling disputes and the capture of benefits by elites. The Reduced Emissions from Deforestation and forest Degradation (REDD+) mechanism that presents a significant new opportunity to address conservation and development, will also founder if it does not learn lessons from past failures. The 'Village-REDD+' concept developed by the Wildlife Conservation Society is an approach to forest management that minimizes disputes and maximizes equal distribution of benefits by operating at appropriate social scales and bundling carbon credits into administratively and economically viable 'carbon-credit pools'. This approach features a detailed community mobilization process with local Benefit Sharing Agreements that enable resource owners to achieve the development goals they have indentified for themselves. To succeed REDD+ activities in PNG will need to raise awareness and lower expectations, build strong partnerships with all levels of government, have flexibility in policy and design to account for diverse local conditions and respond to local needs with bottom-up development planning.

2011-12-08 18:30 Quantification of carbon in grasslands, plantations and natural forests in the Markham-Ramu Valley, Papua New Guinea

Ken, Bensolo*, *Wildlife Conservation Society, Papua New Guinea Programme;*

A robust carbon accounting methodology is essential to generate empirical estimates of carbon sequestered, storage and emissions from various carbon pools before the Reduced Emissions from Deforestation and forest Degradation (REDD+) mechanism can be applied. Few such data exist for Papua New Guinea (PNG) despite this being considered a potentially significant country for REDD+ activities. This study is aimed at addressing the paucity of data for PNG by quantifying carbon in above- and below-ground biomass and soil in grasslands, plantations and natural forests. Sampling was undertaken on a series of belt transects (100m x 10m) randomly established in each habitat type. In grasslands below-ground biomass was higher than the above-ground. Carbon in litter was similar across the three habitat types at between 39-45% carbon. Soil carbon in natural forests (6.5%) was higher than grasslands (4.4%) and plantations (3.1%). Trees in natural forests sequestered up to 27 tC/ha in their above-ground live biomass compared to 6 tC/ha in plantations. Net absorption in plantations and forest reserves was estimated at 33 tC/ha or 121 tCO2 equivalents, and net emissions from grasslands and sugarcane burning at 17 tC/ha or 63 tCO2e. Afforestation increased net carbon sequestration and storage than that stored in bare grasslands that are prone to continuous burning in PNG.

2011-12-06 17:15 The effects of human activities on the avian scavenger community in Masai Mara National Reserve, Kenya

Kendall, Corinne*, *Princeton University;*

The six species of vulture found in Masai Mara National Reserve, Kenya have declined by 30-60% over the last thirty years and consumption of Furadan-contaminated carcasses used by pastoralists to kill predators appears to be the primary cause. This study aims to assess the susceptibility of different scavenging raptors to poisoning events and wildlife declines. Using over 2000 km of roadside surveys and behavioral observations at sixty experimental carcasses placed in and around the reserve, I assessed the effects of human settlement and wildlife density on avian scavenger habitat use and foraging behavior. Hooded vulture and Tawny eagles, which are generally subordinate to other scavenging raptor species, had higher abundance overall and at carcasses in areas of high settlement and low wildlife density, where the majority of poisoning events occur. Bateleurs, Ruppell's vultures, and Lappet-faced vultures occurred at lower abundances near human settlements, which may reduce their risk of poisoning. African white-backed vultures showed high reliance on each other both to find and to feed at carcasses and may thus be highly susceptible to continued declines as their own densities and the quality of their habitat continue to degrade. This study demonstrates the importance of considering multi-species groups and their interactions as a technique for assessing susceptibility to human activities across a guild and thus in predicting future declines.

2011-12-09 17:30 Habitat loss and climate change refugia in four threatened and endemic Fijian tree species

Keppel, G*, *Curtin University;* **Van Niel, K,** *University of Western Australia;*

Fiji is part of the Polynesia/Micronesia global biodiversity hotspot but information on the distribution and ecology of its biota is limited. We determine the biological niches of four tree species endemic to Fiji based on available distribution and ecological data. Using this data we determine the potential distribution of species and compare that with their actual distribution. We also model likely future distributions under anthropogenic climate change. Our results show that Cynometra falcata (Caesalpinaceae; dry forest endemic) and Dacrydium nausoriense (Podocarpaceae; mesic forest endemic) have suffered the greatest loss of habitat since human colonization and would be highly threatened by further habitat clearing and by predicted climate change impacts. Podocarpus affinis (Podocarpaceae; cloud forest endemic) has been little impacted by habitat clearing but is predicted to experience significant habitat loss under predicted climate change scenarios. Moderate impacts (both for past habitat loss and for predicted future impacts are demonstrated for Degeneria vitiense (Degeneriaceae; rainforest endemic). The four threatened target tree species have been differently impacted by past habitat loss and are likely to be affected differently by anthropogenic climate change, illustrating the need for detailed ecological information and the need for different conservation strategies.

2011-12-06 15:15 Current trends in french bats population highlghts by old heterogenous dat

Kerbiriou, C*, *Conservation des Espèces, Restauration et Suivi des Populations, UMR 7204 MNHN-CNRS-UPMC, 61 rue Buffon, Paris, France ;* **Julien, JF,** *Conservation des Espèces, Restauration et Suivi des Populations, UMR 7204 MNHN-CNRS-UPMC, 61 rue Buffon, Paris, France ;* **Marmet, J,** *Conservation des Espèces, Restauration et Suivi des Populations, UMR 7204 MNHN-CNRS-UPMC, 61 rue Buffon, Paris, France ;* **Robert, A,** *Conservation des Espèces, Restauration et Suivi des Populations, UMR 7204 MNHN-CNRS-UPMC, 55 rue Buffon, Paris, France ;* **Lemaire, M,** *Muséum d\'histoire naturelle de Bourges, Les Rives d'Auron, Allée René Ménard, 18000 Bourges;* **Arthur, L,** *Muséum d\'histoire naturelle de Bourges, Les Rives d'Auron, Allée René Ménard, 18000 Bourges;* **Lois, G,** *NatureParif, 84, Rue de Grenelle 75007 ;* **Couvet, D,** *Conservation des Espèces, Restauration et Suivi des Populations, UMR 7204 MNHN-CNRS-UPMC, 55 rue Buffon, Paris, France*

In the context of biodiversity loss, we need information of population trend at large time and space scale, however well documented animal population dynamics are generally scarce, short time series and based on heavy

protocols requiring animal manipulation, which are usually impossible to conduct in species of conservation concern. For bat species, an alternative approach could consist in doing appropriate analysis of participating networks monitoring. We firstly observed that whereas a great proportion of European bat species have a bad conservation status due to various pressures (agriculture intensification, urbanization or forest management), during the last 10 years, French bats populations seem to stabilize and even for some species, to slightly increase. In order to have a better understanding of the current trends in bat populations we used data rediscovered from old registers (data provide by tags\' museum registers, count in roosts and data from care centers of wildlife, from 1939 until now) and sometime we even had the opportunity to interview their producer. Here, we compare the strong decline observed thanks to these old data with recent counts in roost cavities by evaluating differences in species distribution, roots communities' composition and population abundance variations. Using population dynamics modeling we conclude that in order to attempt meaningful analysis of such time series and provide a source of data for implement biodiversity indicator, it is necessary to include local knowledge of people involve on field survey in these analyses (existence of disturbances, site protections) with the aim to assess the impact of climate changes and land use changes.

2011-12-09 14:45 REDD and cap and trade: why and how to include forestry on a large scale

Kerr, S*, *Motu Economic Research;*

Protecting and enhancing carbon storage in forests to mitigate climate change requires that resources are transferred voluntarily between industrialised countries and the developing countries where carbon rich tropical forests are found. Voluntary opt-in programs that create 'offsets' relative to a baseline level of forest are popular and intuitively appealing. However since any regulator will make errors in predicting baselines and participants will self-select into the program, adverse selection will mean that many of those who participate will be motivated by windfall gains on a project they intended to do anyway rather than by the opportunity to make real behavioural change. This reduces efficiency and environmental integrity. A subsidy for all carbon in forests leads to full participation but is extremely costly to the developed country funders. We present a simple model to analyze this trade-off between adverse selection and the cost of the programme. We find that increasing the scale of voluntary programs both improves efficiency and reduces transfers. This suggests that country or region level 'projects' such as those Norway is developing are a promising way forward. We then discuss how New Zealand has created a cap and trade program to incentivise landowners to protect, plant and enhance carbon storage in forests on a large scale and how this model might be adapted for some developing countries.

2011-12-07 15:00 Involving the Community in Conserving the Endangered Micronesian Megapode

Ketebengang, HEATHER*, *Palau Conservation Society;*

Micronesian Megapodes are globally endangered species. The northernmost atoll of Palau, Kayangel, is home to Palau's largest population of megapodes. The islands are also home to many introduced species, including high densities of rats. In 2009, the Palau Conservation Society, in partnership with many regional technical partners, initiated a project to eradicate rats, mice, and cats from Kayangel. The project required extensive community support and involvement, and future biosecurity also required ongoing community buy-in and involvement. We used many methods to secure community support and interest, including extensive education and outreach (in community and one-on-one settings), meetings, and participatory field work. Although the project was highly technical and constantly in flux, we found that our methods were adequate to secure community engagement. Benefits from community engagement expanded beyond the scope of the eradication project and resulted in advances in protected areas. We share our experiences, lessons learned, and recommendations for involving communities in the conservation of birds and other species.

2011-12-08 18:30 Evaluation of the introduction history and genetic diversity of serially introduced fish populations in New Zealand

Kevin M. Purcell, *North Dakota State University;* **Craig A. Stockwell,** *North Dakota State University;* **Nicholas Ling*,** *University of Waikato;*

The reconstruction of invasion routes for invasive species is crucial to the management and evolutionary study of invasive species. The western mosquitofish, Gambusia affinis, has been widely introduced from its native range in the southeastern United States for its putative abilities as a vector control agent. Here we evaluate the introduction history of G. affinis, to the north island of New Zealand. We use molecular markers to verify the published historical record of this invasion, and to evaluate the genetic diversity among populations following its serial introduction to New Zealand. We found strong support for the published introduction history, indicating that populations in New Zealand are descended from populations from central Texas. The introduced populations show significant losses of allelic richness (AR =4.55-7.77) compared to the parental populations (AR =11.44-12.33). By contrast, heterozygosity did not differ between parental and introduced populations. We also found evidence that the genetic divergence among introduced population in New Zealand (FST = 0.0843) is greater than that of their native source populations (FST = 0.002 -0.009). It seems that the bottleneck and founder effects of serial introductions in these populations have reduced allelic richness but have had little impact on overall genetic diversity. Understanding the relationship between the introductions and founding populations as well as the impact of serial introduction events will help to manage the introduction of invasives and assist us in understanding the differential success of some populations.

2011-12-08 18:30 Radioactive pollution in the South Atlantic as a possible stress factor in some incidents of penguin mortality

Kevin Mathewson*, *Independent;* **Félix Maldonado,** *University of Chile;*

The late 20th century witnessed stark declines in penguin populations in the South Atlantic, particularly in the Falkland Islands. This project examines the possibility that radioactive contamination may be a factor in some penguin die-offs in recent decades. Maps track mortality incidents and possible pollution sources. Incidents include: High penguin mortality in the Falklands in the summer of 1985-86; The massive die-off in the Falklands in December 2002; Events in South America, South Africa and Antarctica. Incidents are broken down into those that could be consistent with radiation sickness with no current explanation; those with partial explanations; and those with generally accepted explanations. Also noted are instances of immune system failure, digestive system failure and breeding failure. Upwellings from three possible sources of contamination are suggested: 1. Nuclear weapons lost at sea during the Falklands War in 1982; (see: IAEA (2001). Inventory of accidents and losses at sea involving radioactive material. (IAEA-TECDOC-1242, p. 36); 2. Other possible contamination from vessels such as nuclear submarines; 3. Possible dumping of nuclear waste. The question is whether further investigation of this possibility is warranted to explain what has been happening.

2011-12-09 16:38 Re-wilding an illegally captured Caracal (Caracal caracal) in Iran

Khaleghi Hamidi,Amirhossein*, *Plan for the Land Society;* **Ghadirian,Taher,** *Plan for the Land Society;* **Memarian,Iman,** *Faculty of Veterinary Medicine, University of Tehran;* **Hooman,Farbod,** *Department of Environment of Iran,Fars Provience;* **Marzieh Mousavi,** *Department of Environment of Iran,Wildlife Bureau;*

Re-wilding wild cats is always a significant challenge for field biologists. Sharing experiences of these efforts can improve the success of future feline re-wilding projects. For this project, a male caracal cub illegally captured from the wild and subsequently held in captivity for two years was radio-collared, released and monitored to assess its re-acclimation to the wild. For one year prior to its release the caracal was trained to hunt rodents and birds in captivity. It was released in November 2009 and monitored weekly. On seven occasions it was found near the release site, a spring water resource. Ten days after the last monitoring and 68 days after the release date, the cat was found in a corralle 95 km northeast of Shahr-e-Babak city. The caracal was kept for two days in the corralle. Post-recapture examinations revealed that the cat carried a blood parasite and a dermatophyte on its skin. A scientific board has decided to not to continue the project or re-release the animal.

2011-12-07 16:46 Population Genetics of the Endemic Spiny-breasted Frog (Quasipaa fasciculispina) in Fragmented Khao Soi Dao Population, Chantaburi Province, Thailand

KHUDAMRONGSAWAT, JENJIT*, *Department of Biology, Faculty of Science, Mahidol University, Thailand;* **Chomcheun Siripunkaw,** *Mahidol University at Nakornsawan, Thailand;*

The spiny-breasted frog (Quasipaa fasciculispina) is endemic to the Cardamom region of southeastern Thailand and southwestern Cambodia. The first specimen described as Q. fasciculispina was collected in Khao Soi Dao, Chantaburi Province, Thailand. This existing population is surrounded by golf courses and agricultural farms, which increasingly expand and may threaten the health and viability of the population. Due to its endemism and vulnerable status, there is a great concern regarding the reduction in genetic diversity for long-term existence. This study aimed to determine the population genetics of Q. fasciculispina in Khao Soi Dao using microsatellite DNA as molecular markers. Other biological aspects of this population were also observed. The results showed low genetic diversity in number of alleles per locus possibly due to its narrow distribution and endemism. The observation of its biology revealed its nocturnal and predatory behaviors to control the number of nocturnal insects and other poisonous arthropods. This information regarding the role of this species in the ecosystem can be used to raise public awareness of such an important fauna in their community.

2011-12-09 14:48 Performance evaluation of species prioritisation methods – accounting for social and governance aspects

Kim, MK*, *School of Earth and Environmental Sciences, James Cook University;* **Marsh, H,** *School of Earth and Environmental Sciences, James Cook University;*

The limited resources available to conserve threatened species require conservation efforts to be prioritized. Species prioritization methods have proliferated in the scientific literature, with several being formally adopted in various jurisdictions. A review of the literature on prioritization methods reveals rapid progress in the technical aspects. Much less effort has been devoted to the operational aspects required to implement prioritization schemes. We know of no performance assessment of species prioritization published in the peer-reviewed literature. We assessed participants' and potential users' perceptions of the 'Back on Track' program, a species prioritization framework adopted by the Queensland Government (Australia). The program's outputs appear to have been primarily used to support applications for State and Federal funding rather than to guide conservation action per se. The interviewees' assessment of the program's performance was influenced by their perceptions of: (i) governance aspects (e.g. adaptability, transparency, capability); (ii) the alignment between program outputs and the knowledge they need for resource allocation; and (iii) the alignment between priorities identified by the program and the priorities of funding sources. We conclude with recommendations to incorporate these aspects in program design and evaluation.

2011-12-07 15:30 Understanding the

King, JR*, *University of Central Florida;* **Tschinkel, WR,** *Florida State University;*

"Invasive" ants are routinely blamed for many negative ecological effects, particularly the reduction of native ant faunae. Although the fire ant, Solenopsis invicta, has frequently been cited as a prime example of such a species, our experiments in the natural ecosystems of northern Florida have shown that it is rare in most undisturbed habitats, but invades rapidly when the habitat is disturbed by plowing. Disturbance directly reduces native ant populations first, and fire ants then recruit to the disturbance, creating the illusion that fire ants suppress native ants. Our results and the observations that most "invasive" ants are found in human-altered habitats and are much less abundant or absent in native ecosystems (i.e. not "invasive") suggests that invasive ants, like most exotic species are a symptom of land use change and human transport. We urgently need to redirect research to the question of how the life history characteristics of the most troublesome "invasive" ants are matched to the characteristics of the disturbed habitats they colonize. Further, experiments are sorely needed to quantify the actual impact of invasive ants on species of concern. Only then will a more measured and nuanced understanding of the impacts introduced ants, ant ecology, and conservation concerns emerge.

2011-12-07 16:30 Navigating cultural ecosystem services to inform environmental management

Klain, S*, *University of British Columbia;* **Gould, R,** *Stanford University;* **Chan, K,** *University of British Columbia;* **Satterfield, T,** *University of British Columbia;* **Levine, J,** *University of British Columbia;*

The rapidly expanding field of ecosystem services has focused on the valuation of material contributions from ecosystems to people without substantially delving into intangible cultural benefits from nature. To facilitate broader consideration of why nature is important to people, catalog locally important ecosystem services and inform spatial natural resource decision-making, we developed a flexible semi-structured interview protocol. This includes prompts to enable interviewees to 1) verbally articulate material and non-material benefits from and values pertaining to nature, 2) spatially identify places associated with these benefits and values and 3) assign relative monetary, non-monetary and environmental threat value across a land- or seascape. We tested this protocol in northern Vancouver Island and Kona, Hawaii. Our results document contributions of ecosystems to livelihoods as well as emotional and personal values people associate with nature. We show how people bundle various services, benefits and values when they discuss what's important to them related to ecosystems. Also, results indicate that conceptualizing nature as a service provider is only one of many ways in which people communicate nature's importance. The research outputs, which provide a fuller representation of the values and benefits people associate with ecosystems, can complement a deliberative environmental decision making process.

2011-12-08 15:15 Balancing decisions between land- and sea-based conservation management actions to increase the resilience of coral reefs

Klein, C, *The University of Queensland;* **Possingham, H.P.*,** *The University of Queensland;*

Coral reefs have exceptional biodiversity, support the livelihoods of millions of people, and are threatened by multiple human activities on land and in the sea. Limited resources for conservation require that we efficiently prioritize where and how to best sustain coral reef ecosystems. Here we develop the first prioritization approach that can guide conservation investments in both land- and sea-based conservation actions that cost-effectively mitigate threats to coral reefs. We apply the approach at two scales: 1) the ecoregional scale covering six Coral Triangle countries, an area of significant global attention and funding; and 2) across Fiji's three largest islands. Using information on threats to marine ecosystems, effectiveness of management actions at abating threats, and the management and opportunity costs of actions, we calculate the rate of return on investment in different conservation actions in each ecoregion and sub-catchment. Across the Coral Triangle, we discover that sea-based conservation is almost always a better conservation investment than land-based conservation within any ecoregion, but land-based conservation in one ecoregion can be a better investment than marine conservation in another. Previous prioritization approaches do not consider both land and sea-based threats or the socioeconomic costs of conserving coral reefs.

2011-12-09 14:24 Efficient conservation in a global recession

Knapp, John*, *Native Range, Inc.;* **Cory, Coleen,** *The Nature Conservancy;* **Vermeer, Lotus,** *The Nature Conservancy;* **White, Mike,** *Tejon Ranch Conservancy;* **Walker, Kelvin,** *Native Range, Inc.;* **Macdonald, Norm,** *Native Range, Inc.;*

Prior to the 2008 global recession, conservation funding was already severely limited even as the need for it was increasing. Resource managers must utilize scarce funding efficiently to be competitive and to meet objectives in this era of dwindling dollars. Tackling multiple landscape-level ecological management tasks at the same time can provide economies-of-scale. The benefits derived from this approach can be increased by employing ecologists with broad ecological knowledge who can perform a wide range of services, versus utilizing single-species experts. Project consolidation and multi-tasking efficiency can further be enhanced by decreasing access time between project sites, which is frequently the most costly project expense. Deploying personnel across the landscape in a "leap frog" fashion

with small helicopters not only can reduce project expenses by 50%, but enables resource managers to tackle other issues by completing projects up to 12 times faster than traditional methods. Case studies from the Channel Islands and Tehachapi Mountains in California, USA where such techniques have been used will be presented in detail. Tasks completed simultaneously include: eradication of invasive plants and animals, monitoring of endemic vertebrates and invader entry sites, and mapping of rare plants, hydrologic features, illegal marijuana plantations, and infrastructure.

2011-12-08 10:30 Defining conservation problems for effective planning solutions: learning the hard way to bridge the research-implementation gap.

Knight, AT*, *Stellenbosch University;*

Professionals involved in conservation planning, whether managers, policy-makers or researchers, aim to be as effective as possible. Each grapples with their "conservation problem" in the context of their personal perspectives and goals, institutional or organizational mandates, available resources, and various other influences. Although conservation problems are often portrayed as globally homogenous phenomena, they are defined differently by different individuals. In effect, conservation problems are not "real", but are context-specific human constructs defined by individuals according to their orientation. The ways in which conservation problems are defined determines both our individual and collective effectiveness within conservation planning initiatives. Significant confusion is apparent within the conservation planning fraternity as to how to define conservation planning problems. This possibly results from several interacting factors, including: 1) the absence of an explicitly-stated conservation planning conceptual framework which focuses on re-orienting individuals mental models towards effectively implementing conservation action; 2) operational models for conservation planning being developed in theory without being tested through 'real-world' practice; 3) problem orientation being confused with problem formulation; 4) competing interests when defining who constitutes valid 'expert' input in defining problems; 5) failure of our universities to effectively prepare graduates as effective problem-solvers capable of usefully applying mixed-methods approaches rather than "professionals"; and 6) currently confusing terminology which fails to differentiate between activities which implement action and those which do not. These various challenges to bridging the research-implementation gap are discussed through examples, and several possibly useful approaches and tools are presented for minimizing this confusion and improving the effectiveness of conservation planning initiatives.

2011-12-08 11:18 Feral Cats - Pest in the Indian Ocean

Koch, K*, *1Biodiversity and Climate Research Centre (BiK-F), Siesmayerstrasse 70, 60323 Frankfurt;* **Algar,D,** *2Department of Environment and Conservation, Science Divison, 6026 Woodvale, Western Australia;* **Schwenk,K,** *1Biodiversity and Climate Research Centre (BiK-F), Siesmayerstrasse 70, 60323 Frankfurt;*

Cocos Keeling Island and Christmas Island are offshore islands halfway between Indonesia and Western Australia in the Indian Ocean. Both islands exhibit a low level of human disturbance since exploration of both islands began around 1800 by European settlers. The fauna shows a high level of endemism and it is severely threatened by invasive feral cats. Therefore, a major cat eradication program started on the islands, conducted by the Department of Environment and Conservation, Western Australia, to protect the indigenous fauna. Cat population genetics will provide important information about the demographics and population structure which enables us to develop more effective control and eradication strategies. We studied mitochondrial and nuclear genes (microsatellites) to evaluate genetic diversity, assess gene flow from villages and identify the origin of invasive populations by comparing them to various populations from Western Australia. Results show that island populations are genetically differentiated and cats of both islands originate from different European regions. A reference library created to enable future biosecurity measures which will determine if quarantine measures are efficient and long-lasting. If post-eradication reinvasions take place, we will be able to determine the origin of invaders and adjust the quarantine measures according to the population genetic results.

2011-12-06 17:00 Knowledge of Indonesian University Students on Biological Commons Dilemmas

Koch, Sebastian*, *Georg-August-Universität Göttingen, Albrecht-von-Haller-Intitute for Plant Sciences, Didactics of Biology;* **Barkmann, Jan,** *Georg-August-Universität Göttingen, Department of Agricultural Economics and Rural Development;* **Sundawati, Leti,** *Institut Pertanian Bogor, Faculty of Forestry, Department of Forest Management;* **Bögeholz, Susanne,** *Georg-August-Universität Göttingen, Albrecht-von-Haller-Intitute for Plant Sciences, Didactics of Biology;*

Biological resource managers and educators need knowledge on several dimensions of natural resource use. To examine the knowledge acquisition, we compared knowledge of beginners and graduates of several natural resources-related university programs of a leading Indonesian institution of higher education (n=1044). We use a knowledge model differentiating (1) situational, (2) conceptual and (3) procedural knowledge, and three knowledge domains: (a) ecological, (b) socio-economic and (c) institutional knowledge. Examples were taken from socio-ecological commons dilemmas concerning non-timber forest products and local fisheries. Overall, graduates had higher knowledge scores, but the effect size was small (p, .001, Cohen's d= .264). At high scores, no differences were found in situational knowledge showing that students were able to cope with the material presented. Graduates had higher scores than beginners in the more the demanding questions on conceptual and procedural knowledge (p, .001, d= .417 and .335). Here, overall scores were low. Within conceptual knowledge, only the ecological and socio-economic knowledge domains improved (p, .001, d= .238 and .347). While institutional knowledge is often decisive for successful biodiversity conservation, the investigated university programs did not increase the low knowledge in this domain appreciably. Our study is the first quantitative indication of this potentially serious deficit in tertiary biodiversity education.

2011-12-06 11:45 Harnessing Technological and Social Trends for Conservation: There's an App for That!

Koh, LP*, *ETH Zurich (Swiss Federal Institute of Technology Zurich);*

Growing demands for water, food and energy are expected to intensify land-use conflicts in the developing tropics where population growth has been most rapid, the people are poorest, and biodiversity is richest and yet most threatened globally. An emerging challenge for decision-makers in these regions is to reconcile human development and environmental protection. By 2015 there will be a billion additional internet users in the developing tropics, many of whom will be accessing the web through mobile communications devices, such as 'smartphones' and tablet computers. These technological and social trends present exciting opportunities for conservation scientists to communicate their work to the general public. I present an ongoing effort in my group to develop science-based decision-support tools through a combination of basic and applied research. As an example, I discuss the development of a matrix-calibrated species-area model that predicts biodiversity loss due to land-use change. By collaborating with software developers, we produce a user-friendly mobile application for this theoretical model. This tool helps to inform land-use and development decisions in the tropics with regards to biodiversity impacts and tradeoffs. Such radical and high-risk research normally falls outside of conventional academic pursuits. It might, however, yield significant payoffs for advancing conservation science, policy and practice to achieve more sustainable development in the tropics.

2011-12-08 18:30 Habitat fragmentation accelerates the inter-specific hybridization of stream salmonids

Koizumi, I*, *Hokkaido University;*

Habitat fragmentation causes different types of detrimental effects on wild populations, such as reducing connectivity and increasing harsh habitat edges. Here, I show for the first time that habitat fragmentation also promotes inter-specific hybridization. Salmonid fishes have external fertilization, which increases the chance of hybridization. In the wild, however, reproductive isolation generally operates due to the shifts in breeding timing, area and behavior. Sympatric charrs (Dolly Varden and white-spotted charr) in the Sorachi River in central Hokkaido, Japan, rarely produce their hybrid probably because Dolly Varden spawn later in the season and upper reaches of streams although they are partially overlapped.

Microsatellite analysis revealed that rate of natural hybridization was much less than 1% for the sympatric charrs. However, in a tributary stream that has an impassable erosion-control dam, more than 30-50% were hybrid over five years. Post-F1 hybrids were also observed. This result indicates that spawning area of Dolly Varden was confined to lower stream reaches where mature white-spotted charr can approach. Because dams are ubiquitous all over the world, similar disturbance may exist many river systems.

2011-12-06 11:30 Complementarity as a strategy for ecorregional priorization

Koleff, P. *, *The National Commission for Knowledge and Use of Biodiversity ;* **Urquiza-Haas, T. ,** *The National Commission for Knowledge and Use of Biodiversity ;*

Despite the network of protected areas (PA) covers 12% of the land surface in Mexico, its performance is still unsatisfactory. At the ecoregional scale, 61 level IV terrestrial ecoregions are underrepresented in the network (<12%), these cover 70% of the land surface. Expanding the PA system to cover conservation gaps is an overwhelming task, and further information is required to focus on the most relevant ecoregions. Here we used the information on vertebrate distribution models to identify minimum sets that favors complementarily among ecoregions. Representation of all bird species (n=938) was attained with a set of 11 level IV ecoregions belonging to the Tropical Humid Forests, Temperate Sierras, North American Deserts and Tropical Dry Forests. Representation of all amphibians (n=303), reptiles (n=662) and mammals (n=442) required a larger set of complementary ecoregions, 24, 41 and 32, respectively. Minimum sets belonged to all level I ecoregions, with the exception of the Southern Semi-Arid Highlands for amphibian representation. Birds have on average larger ranges and exhibit lower beta diversity patterns, thus fewer units are required to represent all species, and a single ecoregion (2.3%) can achieve the representation of a large number of species (77%). Identification of minimum sets should ideally also take into account the extent of habitat transformation within each level IV ecoregion and different species features such as endangerment and endemism.

2011-12-08 10:45 Genetic differentiation of Wild Asian Elephants in Salakphra Wildlife Sanctuary, Thailand

Kongrit, C*, *Department of Biology, Faculty of Science, Mahidol University, Bangkok, Thailand;* **Siripunkaw, C,** *Department of Biology, Faculty of Science, Mahidol University, Bangkok, Thailand;* **Akkarapatumwong, V,** *Institute of Molecular Biosciences, Mahidol University, Nakhonpathom, Thailand;* **Srikosamatara, S,** *Department of Biology, Faculty of Science, Mahidol University, Bangkok, Thailand;* **Brockelman, WY,** *Department of Biology, Faculty of Science, Mahidol University, Bangkok, Thailand;*

Salakphra Wildlife Sanctuary (WS) has been isolated from the Western Forest Complex of Thailand (WEFCOM) by roads, dams and villages. Habitat isolation could affect population viability and genetic structure of wild Asian elephants in Salakphra WS. Moreover, human-elephant conflict occurs every year, especially in the dry season. DNA samples were extracted from elephant dung collected at Salakphra WS. Mitochondrial DNA, microsatellite DNA and sex determination markers were used for determining population genetics of this elephant population. At least 182 elephants were identified. Genetic diversity based on microsatellite DNA of the Salakphra population was similar to that of captive elephants. Significant genetic differentiation of the elephants in different zones was observed. The elephants in the north seemed to be isolated from the other zones. Management plan to conserve the elephants in Salakphra WS and to connect the Salakphra population to other populations in WEFCOM should be conducted which requires collaborations from local people and several organizations.

2011-12-07 14:15 A First Order Approach for Quantifying Critical Habitat for Freshwater Fishes at Risk

Koops, M.A.*, *Fisheries and Oceans Canada;* **Vélez-Espino, L.A,** *Fisheries and Oceans Canada;* **Randall, R.G.,** *Fisheries and Oceans Canada;*

Critical habitat identification is an important element for the management and conservation of species at risk. However, species at risk are often characterized by significant demographic and ecological data limitations. Here we examine two aspects of critical habitat that could, in theory, be evaluated from basic life history data and allometric relationships. First, we provide an approach for a first-order quantification of the area required for critical habitat identification. We define the minimum area for population viability (MAPV) as the amount of suitable habitat required for a demographically sustainable population and demonstrate its computation for Canadian freshwater fishes at risk from allometric relationships. Second, the term essential fish habitat (EFH) has been used to describe the habitat whose restoration and protection will have the greatest impact on population viability. Using demographic analysis, we assess EFH and contrast it with potential detection of limiting habitat derived from habitat-explicit modelling. We demonstrate this approach using information from all Canadian freshwater fishes listed as Threatened or Endangered. This approach to quantifying MAPV and identifying EFH from available life history and biological data is the first step in the development of robust guidance to manage and protect the habitat of freshwater fishes at risk.

2011-12-08 18:30 Dietary Analysis of the Andean Fox (Lycolopex culpaeus) in the Ecuadorian Highlands

Kristina Timmerman*, *St. John's University;* **John Nelson,** *St. John's University;* **Benjamin Besasie,** *St. John's University;*

The Andean fox (Lycalopex culpaeus) has a geographical range spanning from Argentina to Ecuador. While data on diet is readily available in the southern range of this species, there is a dearth of information in the northern range. In order to manage this species properly, resource use and diet data are necessary throughout the species entire range. The primary research goal was to compile fox dietary information in the Mazar Wildlife Reserve, Ecuador. Dietary data were collected via scat analysis from samples found throughout the reserve. Each sample was identified to species (there is only one canid species in the region) and each sample location was recorded and reviewed for content (n = 10). In order of weight percentage, the following items were present in scat: mammalian hair (88.46%), mammalian and avian bones (2.95%), plant material (2.57%), insects (0.86%) and parasites (0.17%). Mammalian prey included wild guinea pig (Cavia porcellis), Andean cottontail rabbit (Sylvilagus brasiliensis), and scavenged alpaca (Vicugna pacos). Based on these preliminary research results, Ecuadorian L. culpaeus appear to focus on small mammals. These results are similar to dietary studies in Argentina and Chile. Future research should include a more intensive scat analysis study that includes individual fox identification and if foxes change their food resource use over time.

2011-12-07 10:45 Changing host communities and disease dynamics in coastal seas - conservation lessons from salmon

Krkosek, M*, *University of Otago;*

Coastal seas have experienced large changes in the abundance and composition of fish. First, fisheries have depleted populations and altered the composition of communities. Second, wild populations are rapidly becoming dwarfed by domesticated populations held in aquaculture operations. It is increasingly becoming recognized that the connectance of wild and domestic populations via shared parasites has created disease dynamics that now limit, if not threaten, wild populations. These effects are perhaps best understood for salmon, but may be broadly applicable as aquaculture continues its rapid global expansion.

2011-12-07 15:30 Oyster reef restoration in the northern Gulf of Mexico: Economic values and impacts and opportunities for engaging marginalized local communities

Kroeger, Timm*, *The Nature Conservancy;*

Oyster reefs have experienced the largest reduction from their historic extent of any marine habitat type, even though they provide a range of valuable ecosystem services. This is due partly to the fact that until recently, only their value as oyster producers has been quantified and considered in management decisions. This study builds on recently completed work that quantifies key service flows from oyster reef restoration in Mobile Bay, Alabama, USA, and develops estimates of the local and regional net welfare gains and economic impacts associated with four service flows produced by an oyster reef restoration project in Mobile Bay: populations of oysters and oyster-associated fish species; wave energy dissipation leading to reduction

in coastal erosion; and denitrification. We find that reef restoration produces substantial economic values and impacts, some of which are captured by the marginalized Vietnamese-American community that dominates local oyster fishing. We use key informant interviews and focus groups to assess the extent to which this community is interested in engaging in large-scale coastal restoration efforts envisioned for the northern Gulf of Mexico, and identify key obstacles that need to be overcome to increase the community's capacity to fully participate in and benefit from restoration efforts.

2011-12-08 18:30 Conserving Tallgrass Prairie in the USA with Prairie-Based Farming

Kronberg, SL*, *EcoSun Prairie Farms, Inc.;* **Johnson, WC,** *EcoSun Prairie Farms, Inc.;* **Boe, A,** *EcoSun Prairie Farms, Inc.;* **Schumacher, TE,** *EcoSun Prairie Farms, Inc.;* **Erickson, LM,** *USDA-NRCS;*

Very little of the tallgrass prairie remains in the United States because most has been converted to grow annual crops because farmers believe they can make more money producing maize and soya beans than from prairie-based products. As part of a process of proving that prairie-based agriculture can be a viable alternative to row crop production, about 200 ha of high quality farmland in eastern South Dakota, which had been used to grow maize (Zea mays) and soya beans (Glycine max), was converted to tallgrass prairie during the summers of 2008 to 2010. The farm now provides relatively large blocks of grassland habitat needed for many obligate grassland birds that avoid small, fragmented patches for nesting. Number of breeding pairs of grassland birds such as bobolink (Dolichonyx oryzivorus), grasshopper sparrow (Ammodramus savannarum), and upland sandpiper (Bartramia longicauda) increased on the farm within 1 to 2 years when the cropland that had been used to grow maize and soya beans for a century was restored to native grassland. Restoring the grassland required considerable work, but was only the first phase in the process of providing evidence to farmers and absentee landowners that grass-based agriculture is an economically viable alternative to row cropping. The second phase of the project is in progress and includes evaluation of the profitability of seed production from native plants, grass production for hay and cellulosic biofuel, and livestock production.

2011-12-06 10:30 It's a vine life: Conservation and pest control through translocation of threatened falcons

Kross, SM*, *School of Biological Sciences, University of Canterbury;* **Tylianakis, JM,** *School of Biological Sciences, University of Canterbury;* **Nelson, XM,** *School of Biological Sciences, University of Canterbury;*

The New Zealand falcon (Falco novaeseelandiae) is a nationally threatened species, and is the country's only remaining endemic bird of prey. The "Falcons For Grapes" (FFG) project has recently been relocating wild falcon chicks into artificial nest sites within vineyards in Marlborough. The innovation of FFG is that by relocating falcon chicks to vineyards, it aims to create self-sustaining conservation, whereby an increase in falcon numbers concomitantly creates a form of integrated pest management to decrease the detrimental effects of pest birds in vineyards. To assess the conservation value of FFG we used remote videography to compare the breeding behaviour of wild- and relocated- falcons. Results suggest that prior to the age at which chicks are able to thermoregulate falcons living in vineyards spent a greater proportion of each day in the nest compared to their wild counterparts, but that feeding rates did not differ. To assess the pest management potential of FFG we compared pest bird abundance and grape damage in vineyards containing resident falcons with control vineyards. Falcon presence in vineyards significantly decreased the number of grape-removing introduced pest birds, leading to a concomitant 95% reduction in the incidence of grape removal compared to vineyards without falcons. This research suggests that the goals of agriculture and predator conservation can converge.

2011-12-07 10:30 Assessing the impact of climate and land use change on Midwestern United States river systems

Krueger, DM*, *Michigan State University;* **Wang, L,** *Institute for Fisheries Research;* **Infante, D,** *Michigan State University;* **Whelan, G,** *Michigan Department of Natural Resources;* **Tsang, Y,** *Michigan State University;* **Wieferich, D,** *Michigan State University;* **Cooper, A,** *Michigan State University ;*

Decisions to conserve or restore important stream habitat may be influenced by predictions of future climate and land use. Fish habitats in Midwestern streams (USA) are not equally vulnerable to changing environmental conditions. Hence, we modeled the response of fish habitat to projected climate and land use changes. River temperature and flow regimes are fundamental components of fish habitat and were linked to individual stream reaches along with fish data, land use, geological, and downscaled climate data. We used artificial neural networks to model mean daily stream temperature and flow for all reaches in the study region. Indicator analysis was used to identify ecologically significant temperature and flow metrics (calculated from predictive models) as well as fish metrics "sensitive" to climate and land use. Temperature and flow metrics were then linked to fish assemblage measures and incorporated into Boosted regression trees to score fish habitat under current and projected scenarios for all stream reaches. We found the greatest magnitude of change between current and future habitat (i.e., vulnerability) occurred in cold water streams due to thermal stress and increased urbanization, thereby impacting several native and sport fishes. Habitat maps resulting from our modeling approach provide managers with tools to prioritize management scenarios at multiple spatial scales and improve their ability to identify and conserve critical fish habitat in the region.

2011-12-07 16:45 Biodiversity impacts of feral pigs in a temperate rainforest ecosystem

Krull, CR*, *University of Auckland;* **Burns, BR,** *University of Auckland;* **Choquenot, D,** *Landcare Research;* **Stanley, MC,** *University of Auckland;*

Feral pigs (Sus scrofa) are globally widespread invasive species, inhabiting a diverse range of environments. Concerns have been raised about their impact on native plants and animals, broader influence on ecological processes, and the transmission of pathogens, especially the newly discovered Kauri root rot disease (Phytophthora taxon Agathis). This study evaluated the biodiversity impact associated with ground disturbance by pigs in a temperate rainforest ecosystem, located in the North Island of New Zealand. Ground disturbance effects vegetation through direct removal, but also indirectly through modification of the below ground subsystem and soil characteristics. This paper describes the spatial extent of ground disturbance by pigs within the ecosystem, and uses exclosure plots established in recently disturbed areas to show the rates of rooting and recovery. The direct and indirect effect of ground disturbance on vegetation diversity and a number of key soil characteristics are also presented. These results are helpful in predicting the response of ground disturbance to pig control in order to assist managers in identifying control regimes that protect key biodiversity traits. This study demonstrates that invasive species such as the feral pig can be extremely damaging to native ecosystems, directly and indirectly through the modification of ecosystem processes.

2011-12-09 17:15 Villagers and REDD+: better understanding the issues for local people will improve the success of forest conversation projects in Papua New Guinea

Kuange, John*, *Wildlife Conservation Society, Papua New Guinea Programme;* **Arihafa, Arison ,** *Wildlife Conservation Society, Papua New Guinea Programme;* **Samson, Mellie,** *Wildlife Conservation Society, Papua New Guinea Programme;* **Zeriga-Alone, Tanya ,** *Wildlife Conservation Society, Papua New Guinea Programme;* **Sinclair, J Ross ,** *Wildlife Conservation Society, Papua New Guinea Programme;*

The REDD+ mechanism is seen as a way to conserve the vast but threatened lowland rainforests of Papua New Guinea (PNG), while also bringing much needed development to the rural poor. Many projects have failed in PNG because they do not respond to local conditions or expectations. In order to develop a concept for REDD+, we surveyed rural people to understand issues that might impact on project success. Low-impact development activities were most highly ranked by local people. They prioritised non-cash benefits, such as schools and healthcare for their social group (e.g. 'clan'), and water and housing for their families. Most peopled wanted benefits distributed directly to themselves, their family or social group, and did not choose community leaders or groups because of a perceived lack of trust, skills or cooperation. Disputes over land and benefit sharing were seen as the major risks to REDD+, with lesser risks from poor capacity to

manage activities or money and breakdowns in law and order and social cohesion. Most people preferred customary dispute resolution over formal mechanisms. Community leaders said their relationship with government was poor but could be improved by more regular visits to villages and better funding, training and communications. If REDD+ and other projects put sufficient investment into understanding and addressing issues important to local people as detailed in our study, they stand a better chance of succeeding where other projects have failed.

2011-12-08 10:38 Conservation planning under climate change - should we and could we?

Kujala, H*, *Metapopulation Research Group, University of Helsinki;*

2011-12-08 18:30 Assessment of Soil Microbial Respiration in Afforested and Grassland Area of ISM, Dhanbad, India

Kumar,S*, *Indian School of Mines, Dhanbad;* **Chudhury,S,** *Indian School of Mines, Dhanbad;* **Maiti, S.K,** *Indian School of Mines, Dhanbad;*

Deforestation and changes of land use from natural forest to grassland are the important contributors to increasing concentrations of atmospheric CO2. This also leads to a reduction in soil carbon storage due to the rapid decomposition of organic carbon when exposing the soil to different land use pattern. This study investigate the diurnal changes in soil CO2 efflux at the natural afforested tropical and grassland area of ISM, Dhanbad campus (India). The survey was carried out during the monsoon period with the relative humidity of about 99.4 % at the night. The moisture content in these two sites is 20 ± 0.68 % and there is positive correlation between the soils CO2 efflux (FCO2) and moisture content. The average soil temperature recorded was 28.78 oC (28.68-29.10 oC) for forest area and 38.830C (29.10-48.450C) for the grassland area respectively. A positive correlation was also observed between soil temperature and CO2 efflux while relative humidity showed a negative correlation. FCO2 under the trees in three sites were 5.70 ± 2.1 µmolCO2/m2/s, 1.40 ± 0.71 µmolCO2/m2/s and 4.8 ± 0.75 µmolCO2/m2/s respectively. Soil FCO2 under the grassland area in three sites were 11.20 ± 1.40 µmolCO2/m2/s, 5.33 ± 1.47 µmolCO2/m2/s and 4.88 ± 0.75 µmolCO2/m2/s respectively. The higher FCO2 in the grassland sites compared to afforested area. The soil FCO2 showed significant diurnal changes and these patterns were highly correlated with the soil surface temperatures and moisture content. The soil FCO2 was higher in the daytime and lowest in early morning. Soil FCO2 would be due to biological activities as well as physical phenomena. The fluctuations of the CO2 concentration were mainly due to the soil respiration and plant photosynthesis in the field. The production and release of CO2 from soil layers is an environmentally sensitive and important component of the carbon balance for most ecosystems and therefore relevant for understanding and predicting the global carbon cycle.

2011-12-06 16:45 Indirect poisoning: Impact on two critically endangered Gyps vultures in Assam, India

Lahkar, Kulojyoti*, *Wildlife Conservation and Study Centre;* **Phukan, Mridupaban,** *Wildlife Conservation and Study Centre;* **Risebrough, Robert W.,** *The Bodega Bay Institute;*

Since 2003, when the use as a veterinary medicine of diclofenac, a non-steroidal anti-inflammatory drug (NSAID), was shown to be the primary cause of the sudden and catastrophic declines of three species of Gyps vultures in south Asia, we have monitored the nesting and nesting success of G. tenuirostris and G. bengalensis in Assam, India, and have documented other factors that currently affect their survival and that are expected to affect their future recovery. These include the deliberate destruction of nests, cutting and thinning of nesting trees, occasional scarcity of food, egg collection for medicinal purposes and, in 2010 – 2011, the poisoning of carcasses with insecticides to kill rabid dogs and jackals. Three-year running averages of the number of nestings of both species suggest a decline in the order of 50% over the seven year period, with a particularly sharp drop recorded in 2010 – 2011. Our conservation efforts include an awareness campaign to protect nesting trees, nests and nestlings, to use safer drugs in veterinary medicine instead of diclofenac and to avoid the poisoning of carcasses likely to be consumed by vultures.

2011-12-08 18:30 Making the extra information count: incorporating auxiliary detection data in site occupancy studies.

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Occupancy has become a popular state variable in conservation programs for monitoring species as well as for investigating species-habitat relationships. In order to account for species imperfect detection, occupancy models require survey replication, following standardised sampling protocols. Yet, supplementary information regarding the presence of the target species within the monitored area may also be available. Such data may for instance be derived from local reports of carnivore kills or opportunistic sightings by conservationists. These auxiliary detection data, not collected according to the monitoring protocol, have traditionally been discarded or used in an ad hoc manner. Here we present a method to integrate auxiliary detection data into the site occupancy modelling framework and explain how to do this using existing occupancy software. Incorporating these data allows a more accurate estimation of occupancy and we provide an expression to quantify this improvement. We also show how to take into account the availability of auxiliary information in the important stage of survey design. We illustrate how the optimum level of survey replication is reduced and for which type of situations this matters most. The inclusion of auxiliary detection data within occupancy studies may offer a reduction in the required survey effort and associated costs, something relevant in conservation where resources are often limited.

2011-12-08 11:15 Limited dispersal due to forest fragmentation results in increased genetic relatedness and inbreeding in an arboreal marsupial

Lancaster, ML*, *School of Earth and Environmental Sciences, The University of Adelaide;* **Taylor, AC,** *Australian Centre for Biodiversity and School of Biological Sciences, Monash University;* **Cooper, SJB,** *Evolutionary Biology Unit, South Australian Museum;* **Carthew, SM,** *School of Earth and Environmental Sciences, The University of Adelaide;*

Habitat fragmentation can alter the ecology, social structure and mating system of a species. For example, limited dispersal out of patches can result in higher genetic relatedness among individuals, inbreeding, and increased susceptibility to local extinctions. Using a southern Australian system heavily impacted by forest fragmentation (only 14% of native bushland remains), and an arboreal marsupial with known reduced dispersal in this system (the common ringtail possum, Pseudocheirus peregrinus), we explored relatedness, mate choice and inbreeding avoidance in fragments compared with a large, nearby continuous forest. Within each sex and between potential mates (male-female pairs), we found pair-wise genetic relatedness and an inbreeding co-efficient (FIS) to be higher in fragments than the continuous forest. Using parentage assignment tests within an intensively sampled patch (n sampled adults = 100, n sampled pouch young = 30), we found relatedness of actual mates in the fragment to be significantly higher than the patch average relatedness (range: 0 – 0.56). Our results suggest that the main mechanism to avoid inbreeding in common ringtail possums is dispersal, and in fragmented systems, reduced capacity for dispersal can have serious genetic consequences. Our results will go towards informing the construction of proposed biodiversity corridors in this region.

2011-12-07 12:45 Pelagic Marine Protected Areas: Achieving Effective Ecosystem-based Management

Lance Morgan*, *Marine Conservation Institute;* **Sara Maxwell,** *Marine Conservation Institute;*

Pelagic ecosystems have complex ecological interactions that are difficult to manage. Our understanding of these interactions is often limited, making it difficult to incorporate them into pelagic MPA management. One emerging question for managers of pelagic MPAs is the degree to which ecosystem overfishing might impact the status of seabird populations breeding within an MPA, but foraging at large distances from the MPA. To better understand this interaction and devise a robust management

strategy, we undertook a literature review and conducted a workshop focused on subsurface predator facilitated foraging for seabirds within the US Pacific Remote Islands Marine National Monument. Experts clarified and ranked major research questions critical to understanding and managing the interaction and also proposed studies to address these questions. They were further asked to consider the potential impact of these methods on management objectives, the relevant spatial scale for research, the level of complexity and risk of methods, and cost and necessary frequency of studies. The workshop outputs will be used by managers to more efficiently apply limited funding to priority research questions. This plan details a framework for developing research questions and methods aimed at management strategies in data-poor regions such as pelagic MPAs.

2011-12-08 15:45 More than just nuts: Do Brazil nut concessions conserve biodiversity along the Interoceanic Highway in Peru?

Larsen, TH*, *Conservation International;* **Nunez, G,** *Amazon Conservation Association;*

The Interoceanic Highway is the first paved road to cut through the wilderness of the southwest Amazon. Road construction usually leads to deforestation and biodiversity loss. Brazil nut concessions support the principal non-timber forest product in Peru, providing local economic incentives for forest conservation outside of protected areas. Brazil nut concessions may therefore provide an effective tool for conserving biodiversity along the highway, although this has not previously been evaluated. We sampled mammal and dung beetle communities in eight Brazil nut concessions located at varying distances from the highway and the nearest large town. Overall, species richness and abundance of mammals and dung beetles was high in Brazil nut concessions. However, we found that hunting pressure varied strongly among sites, and heavily hunted concessions represent 'empty forests'. Hunting appears to have a cascading impact on dung beetle communities; beetle species richness and biomass correlated positively with large mammal biomass, as well as primate biomass alone. Dung beetle species richness and biomass correlated positively with distance from road. Only beetle biomass correlated positively with distance from town. Promoting and expanding Brazil nut concessions can provide a useful strategy to maintain connectivity and biodiversity along the nascent Interoceanic Highway. However, it is imperative that illegal timber extraction and hunting are properly regulated in concessions.

2011-12-08 18:30 Conservation Priorities for Mexican Islands

LATOFSKI-ROBLES, MARIAM*, *Grupo de Ecología y Conservación de Islas, A.C.;* **Aguirre-Muñoz, A.,** *Grupo de Ecología y Conservación de Islas, A.C.;* **Méndez-Sánchez, F.,** *Grupo de Ecología y Conservación de Islas, A.C.;* **Reyes-Hernandez, H.,** *Universidad Autónoma de San Luis Potosí;* **Schlüter, S.,** *Fachhochschule Köln;*

An accurate science-based planning is essential to maximize the investment's return in conservation efforts to protect biodiversity, especially when funds are limited. This is particularly important in threatened and fragile areas, such as the islands worldwide, which have small land surface area but very high species richness and endemisms. In the case of the Mexican islands, through the prioritization of sites with desired attributes, we seek to prevent extinctions and protect more species with less investment. Mexico, being a megadiverse country, has approximately 1,600 islands and islets (only 0.2% of the country's surface). Just 149 Mexican islands host 7% of all Mexican vertebrate and plant species as well as 18% of threatened birds and mammals. Furthermore, the eradication of invasive vertebrates on islands has proved to be a very efficient restoration tool. To prevent extinctions and restore insular ecosystems, 49 eradications have been successfully conducted on 30 Mexican islands. A similar number of eradications, on more complex and larger islands are pending. Prioritization is recognized as an essential tool to achieve a strategic goal: to have all the Mexican islands free of invasive vertebrates in the coming years. A GIS-based multicriteria decision analysis is being developed, involving geographical data (islands and archipelagos), the conservation preferences, and the combination of data and preferences based on decision rules. Important attributes taken into account are: species richness, endemisms, threatened species, biosecurity risks, presence of invasive species, human population and activities, and natural resources, among others. This endeavour will guide future restoration and sustainable development plans, providing information for conservation practitioners, government agencies and donors to decide on which islands and when to program the conservation efforts.

2011-12-06 16:45 Towards participatory ecosystem-based planning in Indonesia: a case study in the Moluccas

Laumonier, Y*, *CIRAD-CIFOR;* **Locatelli, B,** *CIRAD-CIFOR;* **Bourgeois, R,** *CIRAD;* **Shantiko, B,** *CIFOR;*

Ecosystem based planning is often seen as a key element in new strategies for mainstreaming forest biodiversity conservation and maintaining essential ecosystem support services. The main objective of the participatory ecosystem based planning program in the Moluccas, Indonesia, included the need to take into account priorities of local stakeholders within the conditions set by the local environmental conditions. To properly engage and acquire comprehensive information from local communities and government, we use methods such as Participatory Prospective Analysis (PPA), and collaborative biophysical and social data recording for the preparation of an ecosystem based land use zoning. While the necessity for revising the existing plan was explicitly identified with stakeholders and given official recognition by the local government, other more technical results concern a collaboratively made set of specific planning recommendations, developing a collaborative logical, rule-based approach (a model) that was used to introduce our ecosystem based planning approach in Indonesia. Based on such results, several micro-project activities have been collaboratively identified that should benefit both local population and conservation of the natural resources. Challenges remain in trying to integrate such an ecosystem based planning into land-use planning in Indonesia and recommendations are made for future research in that area.

2011-12-06 10:30 Assaulting avarice: combating World Growth International and its anti-environmental allies

Laurance, William F.*, *James Cook University;*

World Growth International (WGI), a Washington, D.C.-based lobby group, has established itself as one of the leading critics of the global environmental movement. WGI will not reveal its funding sources, but appears to be supported primarily by multinational corporations involved in logging, oil palm, and pulp and paper plantations in Southeast Asia. By aggressively attacking efforts to promote tropical forest conservation—including REDD initiatives, the Roundtable on Sustainable Palm Oil, World Bank guidelines encouraging sustainable development, and nearly any critic of the corporations it apparently represents—WGI speaks to an eager pro-development constituency. It is a mistake to dismiss WGI as a fringe group or to ignore its wide-ranging efforts. Although using a litany of dubious claims, slanted arguments, and aggressive tactics, WGI is well-funded and staffed and has close associations with other vocal conservative groups, including the U.S. Tea Party, ITS Global in Australia, and the Consumers Alliance for Global Prosperity. I will describe my personal efforts and those of colleagues to combat the tactics of WGI and its founder, former Australian ambassador Alan Oxley.

2011-12-07 11:00 Ecosystem decay of Amazonian forest fragments

Laurance, William F.*, *James Cook University;* **Lovejoy, Thomas E.,** *George Mason University;*

I will synthesize key findings from the Biological Dynamics of Forest Fragments Project, the world's largest and longest-running experimental study of habitat fragmentation. Although initially designed to assess the influence of fragment area on the Amazonian biota, the project has yielded insights that go far beyond the original scope of the study. Results suggest that edge effects play a key role in fragment dynamics, that the matrix has a major influence on fragment connectivity and functioning, and that many Amazonian species avoid even small (<100 m wide) clearings. The effects of fragmentation are highly eclectic, altering species richness and abundances, species invasions, forest dynamics, the trophic structure of communities, and a variety of ecological and ecosystem processes. Moreover, forest fragmentation appears to interact synergistically with ecological changes such as hunting, fires, and logging, collectively posing an even greater threat to the rainforest biota.

2011-12-09 16:34 Welfare and ethics in animal reintroductions

Lauren A. Harrington*, *WildCRU, Oxford University;* **Axel Moehrenschlager,** *Calgary Zoo;* **Merryl Gelling,** *WildCRU, Oxford University;* **Joelene Hughes,** *WildCRU, Oxford University;* **Rob Atkinson,** *RSPCA, UK (now: The Elephant Sanctuary, USA);* **David**

W. Macdonald, *WildCRU, Oxford University;*

Despite differences in focus, goals and strategies between animal welfare and conservation biology, both are inextricably linked in many ways, and greater consideration of animal welfare has considerable potential for increasing conservation success. Nevertheless, animal welfare is not often considered explicitly within conservation practice. Welfare considerations are particularly relevant in reintroductions where human intervention is extensive. We carried out a systematic review of the recent scientific, and web-based, literature on animal reintroductions (mammals, birds, amphibians and reptiles, but not fish). We quantified the occurrence of potential animal welfare and ethical issues in reintroductions, and reviewed monitoring that is currently carried out that might indicate animal welfare status, and supportive actions that might improve welfare. We identified seven aspects of reintroductions that currently appear to be underutilised, that we believe are relevant to welfare concerns and warrant further attention and we outline welfare and ethical considerations throughout the reintroduction process. We propose that an Ethical Review Process is implemented for reintroduction projects, similar to that required for animal research in the UK, as a mechanism by which welfare and ethical considerations could be better incorporated into reintroduction projects and formally evaluated on a case-by-case basis.

2011-12-07 14:04 Methods for multi-species conservation planning in the context of global change

Lawson, DM*, *San Diego State University;*

Multi-species conservation planning approaches are needed because coexisting species respond differently to threats and management. I present an approach using quantitative conservation objective functions to synthesize risk of quasi-extinction (QER) from single-species, single-patch stochastic population models. The objective function results for a set of management scenarios are summed within a framework developed using habitat suitability projections representing the extent and overlap of suitable habitat under the present and two future climate scenarios. Management scenarios are then ranked and the optimum selected for each climate scenario. I tested alternate objective functions, QER thresholds and species sets to evaluate the influence on the management rankings. I used results from metapopulation models to evaluate dispersal effectiveness to inform reserve design and the need for translocations. My case study involves four species of southern California's coastal chaparral, a highly fragmented landscape. The species differ in response to the primary threats of altered fire regime and, due to differing dispersal abilities, habitat fragmentation. My results show the management rankings to be robust across QER thresholds, conservation objective and climate scenario. However, some QER thresholds failed to distinguish among management alternatives reducing the influence of one species on the rankings. Thus thresholds should be selected that distinguish among management. The species set can strongly influence the rankings. Dispersal even for the species with the best ability was not effective in the case study thus connectivity is a lower priority that patch area and future artificial dispersal may be required.

2011-12-08 18:30 Long-distance dispersal by spores – How fat is the tail?

LÖNNELL, NIKLAS*, *Plant Ecology, Department of Botany, Stockholm University,SE-106 91 Stockholm, Sweden;* **Hylander, Kristoffer,** *Plant Ecology, Department of Botany, Stockholm University,SE-106 91 Stockholm, Sweden;* **Jonsson, Bengt Gunnar,** *Department of Natural Sciences, Engineering and Mathematics, Mid Sweden University, SE-851 70 Sundsvall, Sweden;* **Sundberg, Sebastian,** *Department of Plant Ecology, Evolutionary Biology Centre (EBC), Uppsala University, Norbyvägen 18 D, SE-752 36 Uppsala, Sweden ;*

Dispersal is a key process important for understanding many conservation issues like expansion of invasive species, survival of populations in fragmented landscapes, and species responses to climate change. However the dispersal ability of species with small diaspores is still poorly known. To study the long-distance dispersal of small diaspores, we transplanted a reproducing mother colony of the moss Discelium nudum (spore diameter > 20 µm) into a non-habitat matrix in two open areas where the species did not occur in the immediate vicinity and in a region where it is generally rare. Approximately 2000 pots with suitable substrate (acidic clay) were placed at distances up to 600 m and 1 km. From 40–50 m the maximum colonization rate was stable with mean colonizations of between 1 % up to 600 m and 20 % up to 1 km, in the two areas. This study extends the studied range by two orders of magnitude compared to most previous experiments. A fat tail of the dispersal curve for many species with small diaspores is in agreement with the inference from other studies on shorter distances and from modelling. However, the surprisingly high colonization rate at the longest distances in this study (600, and 1000 m) suggests a mixing of large number of spores in the air before the colonization took place. This study raises interesting questions about the role of a single dispersal source to build up a high background deposition at landscape scale.

2011-12-08 14:08 The effect of forest habitat change on the breeding success of an area-sensitive passerine- A multi-temporal approach

Le Tortorec, E*, *University of Turku;* **Suorsa, P,** *University of Turku;* **Helle, S,** *University of Turku;* **Käyhkö, N,** *University of Turku;* **Hakkarainen, H,** *University of Turku;*

Habitat fragmentation has been shown to have large, consistently negative effects on a wide variety of species by, for example, increasing predation rates and decreasing reproductive success. Although habitat fragmentation has been extensively studied in a number of species the methodology used has been somewhat one-sided since landscapes have generally been assumed to be static in models. In this study we constructed a multi-year database of habitat structure to study how intense forest harvesting affects the breeding success of an area-sensitive species, the Eurasian treecreeper (Certhia familiaris). We used an eight- year dataset (1999-2006) of morphological and breeding data from treecreepers in Central Finland and combined it with six classified Landsat images from the study period. For each year we calculated the area of mature forests around each nest box at the breeding territory (200m) and landscape (500m) scales. The classified images showed that commercial forestry caused clear changes in the amount of habitat even between single years. We also found that the amount of forest habitat at the breeding territory scale was positively associated with the number of fledglings produced. We suggest that incorporating landscape change into species studies is necessary in order to realistically model dynamic species-habitat interactions. Our study shows that this can be accomplished through a simple classification performed on freely available satellite images.

2011-12-08 15:00 Scale effects on indicators of biodiversity state facing global changes: The relevance of the mean species trait approach to evaluate the biodiversity fate.

Le Viol, Isabelle*, *National Museum of Natural History, UMR7204 MNHN-CNRS-UPMC;* **Porcher, Emmanuelle,** *National Museum of Natural History, UMR7204 MNHN-CNRS-UPMC;* **Julliard, Romain,** *National Museum of Natural History, UMR7204 MNHN-CNRS-UPMC;* **Jiguet, Frederic,** *National Museum of Natural History, UMR7204 MNHN-CNRS-UPMC;* **Kerbiriou, Christian,** *National Museum of Natural History, UMR7204 MNHN-CNRS-UPMC;* **Devictor, Vincent,** *ISEM, UMR 5554;*

The ecological meaning and the relevance of biodiversity indicators for the evaluation of biodiversity state are still debated and not clearly established. Recent studies suggest that a new family of biodiversity indicators, reflecting variations in explicit species-specific traits in species assemblages (Mean Species Traits Abundance, MSTA), is relevant to survey biodiversity trends facing global changes. Here, we highlight the strengths and weaknesses of these indicators both from practical and ecological perspectives, focusing on their relevance at different scales. Using the trend in the community specialisation index as case-study, we show that this metric, which can be easily adapted on several taxonomic groups (plant, invertebrate, vertebrate) either with presence/absence or abundance data, is sensitive to several human pressures at various spatial and temporal scales. Applied on trends in Bird communities facing human pressures (fragmentation, urbanisation, agriculture intensification), we highlight particularly their independence to scale effects in comparison with more classical indices (richness, diversity). Our results, which highlight the ongoing functional biotic homogenization process from local to global spatial scale, show the relevance of such mean species trait approach.

2011-12-06 15:00 Climate influences on dispersal and survival of northern fur seal pups

Lea, M-A*, *IMAS, University of Tasmania, PB 129, Hobart, TAS 7005, Australia;* **Sterling, JT,** *National Marine Mammal Lab, AFSC, NOAA, 7600 Sand Point Way NE, Seattle, WA 98115, USA;* **Bond, N,** *JISAO, University of Washington, Seattle, WA, USA;* **Melin, S,** *National Marine Mammal Lab, AFSC, NOAA, 7600 Sand Point Way NE, Seattle, WA 98115, USA;* **Ream, RR,** *National Marine Mammal Lab, AFSC, NOAA, 7600 Sand Point Way NE, Seattle, WA 98115, USA;* **Gelatt, T,** *National Marine Mammal Lab, AFSC, NOAA, 7600 Sand Point Way NE, Seattle, WA 98115, USA;*

Northern fur seal pups, Callorhinus ursinus, from declining populations in the Bering Sea contend with extreme and highly variable oceanic conditions during their first winter migrations. Understanding how naive animals from increasing and decreasing populations respond to changeable environmental cues is fundamental to disentangling possible mechanisms driving observed, large-scale declines. We tracked 166 newly-weaned pups from four North American populations, both increasing and decreasing, to determine the influence of wind conditions, sea surface height and temperature and proximity to productive frontal features on the foraging state of individual pups. Pups conducted far-ranging migrations across the North Pacific Ocean, triggered by the onset of autumnal storms. At-sea conditions differed markedly between the two years as did pup movements. Alaskan pups travelled faster when 'assisted' by tailwinds and spent more time in northern latitudes in less stormy years. The migration patterns of pups were more random than those published for adults also indicating that young animals undergo a period of learning at sea. We provide examples and speculate on how storms may impact survival of naive pups, particularly in years when pup weaning mass is low. We conclude that increasing intensity and frequency of storm events in the North Pacific Ocean could have repercussions on pup behaviour and population demographics of Northern fur seals across their range.

2011-12-06 11:30 Are species distribution models useful tools for predicting climate change impacts?

Leathwick, J*, *Department of Conservation;*

Statistically-based species distribution (or niche) models (SDM) are widely espoused as tools for predicting global change impacts on species distributions. However, despite their increasing statistical sophistication, the use of SDM for this purpose is complicated by a number of issues, both ecological and statistical. Ecological issues include challenges with identifying functionally relevant predictors, accounting robustly for the effects of inter-specific competition, and the effects of human modification of landscapes and biotic assemblages on the dispersal ability of species. Statistical issues revolve around the use of inter-correlated sets of predictors, and prediction into novel environments. Greater caution is recommended in the use of SDM for predicting global change impacts on species distributions, and some guidelines for more robust use are presented.

2011-12-08 18:30 Aboriginal-led efforts to study and protect woodland caribou in Canada

Lee, PG*, *Global Forest Watch Canada;* **Qualie, G,** *Grand Council of the Crees (Eeyou Istchee);*

Across Canada, the southern limit of woodland caribou range has receded northward, the annual rate of industrial disturbances is accelerating, and the prospect of supporting self-sustaining local populations of caribou throughout their current distribution is rapidly diminishing. In 2010, the Grand Council of the Crees, the political body that represents approximately 14,000 Crees or "Eeyouch," of eastern James Bay and Southern Hudson Bay in Northern Quebec, Canada, commissioned studies to document issues, and inform actions, related to their concerns about the potential negative effects of proposed forestry road construction and other industrial developments on woodland caribou within their traditional territory—Eeyou Istchee. Given the potential economic trade off that may be necessary to protect the caribou, federal and provincial Governments have been reluctant to release information to allow the Crees and wildlife managers to draw an accurate portrait of the viability of the caribou in this area. The absence of official information makes it difficult to advance constructive dialogue toward conservation solutions. Asserting their Treaty rights, the Crees have called for a moratorium on industrial development, in particular forestry, until they are assured that the caribou will be protected. In conjunction with this, the Crees sought out alternative means to create the missing portrait necessary to advance their conservation interests. The results of this work, presented here, paint a dramatic picture of the rate and extent of change within Eeyou Itschee, and the ramifications for caribou in this area.

2011-12-07 14:24 What should conservation prioritization deliver?

Lehtomäki, J*, *University of Helsinki / Finnish Environment Institute;*

Conservation prioritization software Zonation is starting to be used as a part of national conservation planning in Finland. Decision makers working with conservation have clearly expressed a need for tools capable for detecting conservation priorities based on existing GIS data as well as taking into account complex ecological features such as connectivity. However, it is not always clear what sort of information and what format would be the most useful for managers and decision makers. Additionally, utilizing the existing and often very heterogeneous data sets is a complex task. Conservation scientists must engage in interactive collaboration with various stakeholders in order to be able to produce useful decision support systems. By using the Finnish conservation prioritization project as a case study, I will as following questions: What kind of end product should conservation prioritization process deliver? How should the managers working with conservation issues be effectively involved in the process of building and execution a conservation prioritization analysis?

2011-12-06 15:45 Initial steps toward a U.S. Biodiversity Observation Network

Leidner, AK*, *AAAS Science & Technology Policy Fellow, Earth Science Division, NASA Headquarters, Washington, DC, USA;* **Howie, SL,** *NatureServe, 4001 Discovery Drive, Suite 2110, Boulder, CO, USA;* **Geller, GN,** *NASA Ecological Forecasting Program and Jet Propulsion Laboratory, California Institute of Technology, Pasadena, CA, USA;*

Biodiversity Observation Networks (BONs) hold data from many sources, including in situ and remotely sensed observations, and cover many levels of diversity, including genes, populations, species, communities, and ecosystems. Initiating and sustaining such networks, and enhancing their interoperability, can support more efficient use of current data and is important for understanding the status and trends of biodiversity. Many people agree on the value of such efforts for making policy decisions and recognize the role that such networks could play for informing national and international assessments of biodiversity (e.g., the newly created Intergovernmental Platform on Biodiversity and Ecosystem Services). However, the resources required to create a network, and the amount of community support required, are major challenges. In the United States, several efforts have been put forth for creating networks of interoperable environmental observation systems, and here we describe some of these and discuss common themes and the many challenges that have emerged. We then present an initial vision and possible next steps toward developing a national biodiversity network for the U.S. (US BON); these ideas emerged from a workshop comprised of interested parties from government agencies and non-governmental organizations, convened in August 2011. A US BON could eventually become a regional component of the Group on Earth Observations Biodiversity Observation Network (GEO BON).

2011-12-08 18:30 Flagship species and engaging the community

Leigh, KA*, *Conservation Ecology Centre Cape Otway;* **Corke, LM,** *Conservation Ecology Centre Cape Otway;*

Engaging the community is critical for encouraging local ownership and increasing the sustainability of conservation. Nonetheless, conservation research programs are often concentrated on scientific rigour, at the expense of public participation. Data integrity and community participation need not be mutually exclusive, and holistic conservation programs can also involve the public in a variety of activities to achieve direct conservation outcomes. One way of attracting public support is through the use of Flagship species, in particular, carnivore species. While there is some debate around the validity of carnivores as ecological umbrella species, they can be effective Flagships for engaging a wide range of stakeholders in landscape level conservation strategies. The resulting increase in resources and capacity can then be strategically applied to benefit broader biodiversity conservation.

We present two such carnivore flagship projects i) the African Wild Dog (Lycaon pictus) in Zambia and ii) the Tiger Quoll (Dasyurus maculatus) in Australia. In addition to collaborations with research institutions and government agencies both projects have partnerships with ecotourism operators, local stakeholders and NGOs, and include community participation in data collection and conservation activities. In both cases, involvement of the wider community has increased capacity for research as well increasing conservation outcomes across the landscape.

2011-12-07 14:30 Can marine protected areas help reduce poverty? Evidence from four site in Asia Pacific and the policy implications

Leisher, Craig*, *The Nature Conservancy;* **Van Beukering, Peter,** *VU University;* **Scherl, Lea M,** *James Cook University;*

Many of the world's richest and most diverse habitats are found in places where poverty is a pressing issue. This four-country study in the Asia-Pacific region shows that marine protected areas can contribute to poverty reduction. The study is based on 958 household interviews, 33 key informant interviews, and 18 focus group discussions in four study sites: Navakavu, Fiji; Solomon Islands, Arnavon Islands; Indonesia, Bunaken and the Philippines, Apo Island. We used quantitative-qualitative approach, triangulated data sources, and compared "treated" to "control" sites. Across the four sites, we found empirical evidence that poverty had been reduced by: (i) improved fish catches; (ii) new jobs, mostly in tourism; (iii) stronger local governance; and (iv) benefits to health and women.

2011-12-09 14:45 Optimizing reserve adequacy for the conservation of amphibians in the Brazilian Atlantic Forest under climate change

Lemes, P.*, *Laboratório de Ecologia Aplicada e Conservação, Departamento de Ecologia, ICB, Universidade Federal de Goiás, Brasil. ;* **Loyola, R.D.,** *Laboratório de Ecologia Aplicada e Conservação, Departamento de Ecologia, ICB, Universidade Federal de Goiás, Brasil. ;*

Spatial conservation prioritization should seek to anticipate climate change impacts on biodiversity aiming to mitigate them through the development of dynamic spatial plans. Here, we defined spatial priorities for the conservation of amphibians inhabiting the Brazilian Atlantic Forest that overcome the likely impacts of climate change to this imperiled fauna. First, we produced potential geographic distribution maps for 444 amphibian species both for current time and for 2050 using four modeling methods and three different climate models to evaluate model uncertainty. Our objective was to generate a nested ranking of priority sites for conservation minimizing the mean geographic variation in among species ranges, the mean uncertainty associated to species distribution models, and maximizing, at the same time, complementary species representation across the existing network of protected areas. This solution already includes possible dispersal corridors linking current and future priority sites for amphibian conservation. Under a small proportion of protected land (10%), the mean species extinction risk is ca. 40%; uncertainty is 2.8% and less than 20% of species' ranges are protected on average. These results, highlight a clear trade-off in amphibian conservation planning: to conserve higher proportions of species distribution and minimize extinction risk, decision makers would need to either sacrifice land protection or their certainty of planning effectiveness.

2011-12-07 17:45 Political transformation, lag phase and invasion of alien species. How planted for centuries Walnut Juglans regia became invasive in Central Europe?

Lenda, M*, *Institute of Environmental Sciences, Jagiellonian University;* **Skórka, P,** *Institute of Zoology, Poznań University of Life Sciences;* **Moroń, D,** *Institute of Systematics and Animal Evolution, Polish Academy of Sciences;* **Woyciechowski, M,** *Institute of Environmental Sciences, Jagiellonian University;*

Invasive species are severe threat for biodiversity. Many alien species stay for certain period time in low population size before demographic explosion, however the reason why this time lag ends, is poorly understood. We describe the initial invasion of agricultural landscapes in Central Europe by the alien Walnut Juglans regia which is planted from Middle Ages thus it stayed in a lag phase for 800 years. Specifically, we tested how land abandonment after the political transformation of the 1990s and native Corvids, that cache seeds, contributed to this invasion. Ten plots (225 ha) in the agricultural landscapes of southern Poland and 130 other plots (100 ha) across Poland were established to study factors affecting the presence and abundance of Walnut at the landscape and biogeographical scales. 96 % of wild Walnuts grew in abandoned fields. The presence and abundance of Walnuts at a landscape scale was higher on abandoned fields located in the proximity of human settlements. Walnut seeds were mostly cached by Rooks Corvus frugilegus. Rooks carried seeds from gardens and preferentially hid them in arable fields; we did not observe caching in abandoned fields. The oldest Walnuts were 20 years old. This led us to conclude that the invasion by Walnuts was only possible because of land abandonment as a result of political transformation.

2011-12-08 18:30 Solutions and Challenges to Addressing Population Growth and Climate Change

Lepczyk, CA, *University of Hawaii at Manoa;* **Bergstrom, R,** *University of Hawaii at Manoa;* **Chynoweth, M*,** *University of Hawaii at Manoa;* **Ellsworth, L,** *University of Hawaii at Manoa;* **Henly-Shepard, S,** *University of Hawaii at Manoa;* **Iwashita, D,** *University of Hawaii at Manoa;* **Miller, K,** *University of Hawaii at Manoa;* **Rhodes, R,** *University of Hawaii at Manoa*

The world's population is nearing 7 billion and predicted to reach 9.1 billion by 2050. Continued population growth will result in increased resource consumption and greenhouse gas emissions, enhancing the effects of climate change. Synergisms between population growth and climate change will therefore have substantial negative impacts on environmental resources. However, solutions to population growth are often absent within the context of climate change solutions. Our objective was to examine the topics and solutions that address both population growth and climate change. We conducted a systematic search of peer-reviewed literature published from 1980–2011. Of 1,438 papers addressing population growth and climate change, only 153 (11%) included solutions. Among these papers the most frequent topics and solutions offered addressed the societal aspects of population growth and climate change. Land use/land cover change and greenhouse gas emissions were also frequently discussed, while changes in policy, economics, and land use/land cover were the most frequently offered solutions. Education was the topic least discussed and, along with energy and health, was least mentioned as a solution. Importantly, the number of papers offering solutions increased significantly over time, with 48% of them published since 2008. These results suggest that while solutions to human population growth have seldom been discussed as climate change solutions, they are beginning to be considered.

2011-12-09 17:30 Reciprocal effects of fire management inside and outside protected areas on regional conservation goals

Leroux, S.J.*, *University of Ottawa;* **Cumming, S.G.,** *Universite Laval;* **Krawchuk, M.A.,** *University of California, Berkeley;* **Schmiegelow, F.K.A.,** *University of Alberta;*

Protected areas (PAs) are common tools for conserving natural ecosystems, but the landscape matrix surrounding PAs is also critical for achieving conservation goals. Natural disturbances such as forest fire move between PAs and the matrix, and management in either area can affect their frequency, magnitude and direction. In many forested biomes, some level of fire suppression is applied to protect timber supply, communities, infrastructure and fire-sensitive species. We use a spatial dynamic model (CONSERV) to investigate how differences in fire management between PAs and the matrix affect regional conservation goals. We parameterized CONSERV for a large region in northern Canada, which experiences an active wildfire regime. Our conservation goal was to maintain representation of the regional suite of vegetation communities. We simulated a factorial experiment of alternate levels of fire management effectiveness within PAs and the matrix for historical and projected future fire over 200 yrs, and tracked changes in landcover over time. Our results demonstrate that fire suppression in the matrix can alter vegetation communities inside PAs and that free-to-burn policies within PAs allow large fires to spread into the matrix. Changing climates in northern Canada, in conjunction with expanded infrastructure and growing communities, may lead to increasing demand for fire suppression. This will conflict with the preservation of natural processes in PA's, unless they are very large.

2011-12-09 17:15 Predicting insect phenology using temperature-based growing degree days

Lessig, Heather*, *North Carolina State University;* **Ries, Leslie,** *University of Maryland;* **Haddad, Nick M.,** *North Carolina State University;*

Global climate change appears to be causing shifts in many species phenology, particularly insects that are highly sensitive to temperature. This can have major ecological consequences, as rising temperatures might lead to early emergence in some insects but not in their host plants. Using data from 13 years of transect surveys conducted by volunteers throughout Ohio (United States), we used a simple temperature-based measurement, growing degree days, to predict when 15 butterfly species would first emerge in the year. We found that growing degree days were most effective in predicting emergence of species that have distinct flight periods and a rapid emergence. When combined with basic geographic and species-specific variables, growing degree days can be used as a simple predictive tool to understand how species may react to shifts in climate. In doing so, we can better understand how climate change might affect future insect populations and their interspecific interactions.

2011-12-07 14:30 Risks of incursion, collapse and the influence of climate change on an invasive ant

Lester, P.J.*, *Victoria University of Wellington;*

The risks of establishment, spread, effects and persistence of invasive ants is influenced by a range of intrinsic and extrinsic factors. I will discuss the invasion of Argentine ants (Linepithema humile) into New Zealand as an example of how these factors can influence the population dynamics and impact of invasive ants. We have shown that this ant is a common passenger in imported produce. Despite this propagule pressure, the entire New Zealand population has little genetic diversity and are likely to be the descendants from one successful incursion. Geneticists would predict that populations with limited genetic diversity would likely collapse due to inbreeding depression or a limited ability to adapt to new parasites and pathogens. Such collapses are frequently observed in New Zealand. Climate change will lessen the likelihood or risk of collapse of populations in some areas. But in other locations climate change may hasten local extinction. Under such circumstances, and with a long-term perspective, some invasive ants may have little ecological or evolutionary risk or impact.

2011-12-08 11:30 Impact of forest fragmentation on dispersal and gene flow in a nationally endangered Australian marsupial, the Southern Brown Bandicoot

Li, You*, *The University of Adelaide;* **Lancaster, ML,** *The University of Adelaide;* **Cooper, SJB,** *South Australian Museum;* **Carthew, SM,** *The University of Adelaide;*

Fragmentation poses a serious and ongoing threat to biodiversity. Effective dispersal of animals can be limited in isolated or fragmented populations, which in turn makes them more susceptible to losses of genetic diversity and eventual extinction. In south-eastern Australia, land clearing for exotic softwood plantations and agricultural land has resulted in the fragmentation of continuous remnant forests into smaller, isolated patches surrounded by potentially hostile matrix habitats. The nationally endangered Southern Brown Bandicoot (Isoodon obesulus obesulus) relies heavily on vegetation at ground level for nesting, foraging and movement, and is therefore likely to be affected by habitat modification. Using a panel of 14 microsatellites, we explored genetic diversity, gene flow and dispersal across 11 remnant fragments in the Mt Burr Range. Genetic diversity was relatively low, but was highest in the mid Mt Burr Range. Broad scale genetic differentiation (Fst) was significant, however, patches within each region were not significantly genetically different from one another. Our results suggest that approximately 1 km of pine plantations may not pose a severe impediment to dispersal of individuals between patches, however, greater distances and different intervening matrices do. Our results will be used to inform the implementation of biodiversity corridors in the region.

2011-12-07 14:56 Indigenous use of coastal wetland resources in a changing climate

Ligtermoet, E*, *PhD Candidate, ANU;* **Baker, R.,** *Supervisor, ANU;* **Jackson, S.,** *Supervisor, CSIRO;*

Coastal indigenous communities are particularly vulnerable to the impacts of a changing climate. Sub-coastal freshwater wetlands and floodplains play a vital role in indigenous livelihoods and cultural practices across Northern Australia. These freshwater systems are at risk of saline intrusion from rising sea levels, as well as the synergistic effects of invasive weed species, feral animals and increased storm events. This is likely to impact communities utilising freshwater resources. Changes to country are often not new to Indigenous communities who have in the past dealt with significant disruption to traditional management practices, introduced weeds and feral animals. World heritage listed Kakadu National Park in the Northern Territory, containing Ramsar listed wetlands, will be a case study site. Participatory research methods will be adopted in this study as sharing knowledge systems will be crucial to developing appropriate mitigation and adaptation strategies, particularly for wetland systems under co-management. This research aims to determine what the potential impacts of climate change on indigenous resource use of wetland biodiversity in Northern Australia will be and what adaptation or mitigation strategies might be employed to best (culturally and ecologically) manage the resources in a changing climate.

2011-12-06 12:00 Excluding stakeholders from decision-making: implications for conservation policy in low-income nations

Liles, MJ*, *Department of Wildlife and Fisheries Sciences, Texas A&M University, College Station, TX 77840;* **Peterson, TR,** *Department of Wildlife and Fisheries Sciences, Texas A&M University, College Station, TX 77840;*

Biodiversity hotspots in low-income nations are often top priorities for conservation action. However, in many of these countries biodiversity continues to decline, suggesting that current conservation policy may be ineffective. Our objective is to examine how socio-political contexts of low-income nations influence the development and effectiveness of conservation policy. We used El Salvador as a case study to begin addressing this question, to which we applied the combination of four elements described by Scott (1998) as drivers in state-initiated social engineering. First, we reviewed critical socio-political developments during the last 130 years in El Salvador. Second, we drew on the historical record to describe how sea turtle conservation emerged along the Salvadoran coast. Third, we examined the development of the moratorium on sea turtle egg consumption, approved by the national government in 2009. Fourth, we analyzed interviews conducted with 22 local egg collectors between 2009 and 2011 to better understand their perspectives toward the moratorium, their involvement in its creation, and their commitment to its implementation. We conclude by discussing the implications of alienating critical stakeholders from conservation decision-making processes in low income nations and offer recommendations on ways to achieve and sustain desired-long term outcomes via more inclusive processes.

2011-12-08 14:28 The effects of non-random species loss on spatial and temporal biodiversity in intertidal algal communities

Lilley, Stacie*, *University of Canterbury;* **Schiel, David,** *University of Canterbury;*

Loss of biodiversity has pervasive impacts on the world's ecosystems, yet there is still considerable debate about how to quantify aspects of diversity and how it varies over space and time. Beta-diversity has several spatial components and interpretations, but its temporal component is far less tractable because it can only be gauged painstakingly through time. Our work compares the spatial and temporal components of diversity. Here we show that temporal diversity, ₜ, in rocky intertidal algal communities comprises a large portion of total diversity, that it can take several years to become evident, varies by tidal zone, and depends on impacts to canopy species. Furthermore, our experiments show that short-term impacts to these habitat-forming canopy species can have long-term consequences on community structure, and all aspects of diversity.

2011-12-06 15:15 Optimal allocation of environmental water to maximise frog, plant and waterbird conservation benefits

Linke, S*, *Griffith University, Brisbane, Australia;* **Januchowski, S,** *Griffith University, Brisbane, Australia;* **McMahon, J,** *Griffith University, Brisbane, Australia;* **Olley, J,** *Griffith University, Brisbane, Australia;* **Turak, E,** *NSW DECC, Sydney, Australia;* **Blakey R,**

NSW DECC, Sydney, Australia; **Possingham HP,** *University of Queensland, Brisbane, Australia;*

Habitat loss through water abstraction in regulated rivers is a key driver of biodiversity decline in rivers all over the world. In this project, we combine principles from systematic conservation planning with environmental flow science to maximise the persistence of wetland frogs, plants and waterbirds, as well as ecotypes. Watering requirements for wetland complexes were derived from hydrological inundation models. We then modelled species distributions for these wetland complexes and mapped an ecological classification. The optimisation was designed to find is the most efficient allocation that fulfils conservation targets for the highest number (and potentially highest diversity) of species and ecotypes? In the optimisation, we used a simulated annealing algorithm to optimally allocate water across multiple seasons. We found that a mixed portfolio of dam releases and buybacks from multiple watering points was needed to achieve conservation targets – as well as actions in multiple seasons. While in general piggy-backing releases on natural high flows delivers the best outcomes, low flow events need to be enhanced to satisfy requirements of some bird species as well. This demonstrates complementarity of both actions and timing, hardly ever considered in the conservation literature. Based on a contrast with a single ad-hoc release strategy, we demonstrate how a targeted, systematic release schedule benefits more species and thus leads to increased efficiency and defensibility in river conservation.

2011-12-06 11:45 Human behavioral ecology and conservation - collaborative A.P.E.S. required

Linklater, WL*, *Centre for Biodiversity and Restoration Ecology, Victoria University of Wellington;* **Gavin, M,** *School of Geography, Environment and Earth Sciences, Victoria University of Wellington;* **MacDonald, EA,** *Museum of New Zealand, Te Papa Tongarewa;* **Monfort, TL,** *School of Psychology,Victoria University of Wellington;*

All major threats to biodiversity, including habitat-loss, invasive species, over-exploitation and climate change, are consequences of human behavior. Strategic mitigation or prevention of conservation crises, therefore, are primarily exercises in behavioral management or modification. Such work occurs at the nexus of anthropology, psychology, ecology and sociology (APES). The potential for behavioral ecology (the study of the ecological and evolutionary basis of animal behavior) to contribute at this nexus is large, but undeveloped compared to recent developments in APS. We begin by introducing the different scales at which each of APES focus and provide a scheme of key conservation topics where behavioral ecology might contribute most. We introduce some of our own research, which seeks to understand relationships between biodiversity and the knowledge, attitudes, beliefs, and actions of people, and how those relationships are modified by context. Evidence suggests that understanding and managing human behavior, although an inherently more complex problem, provides a short-cut and longer-term solution to leading conservation challenges - but it will require collaborative APES.

2011-12-06 15:15 Gaps on pronghorn conservation in Mexico

List, R*, *Instituto de Ecologia Universidad Nacional Autónoma de México;* **Valdés, M,** *Instituto de Ecologia Universidad Nacional Autónoma de México;* **Zarza, H,** *Instituto de Ecologia Universidad Nacional Autónoma de México;*

The pronghorn is the only extant member of the Antilocapridae family, but with an estimated population of 1500 individuals is one of the most threatened mammals in Mexico. In order to determine conservation actions at the landscape level, we assessed the contribution of the current Natural Protected Areas (NPA) and Wildilfe Management Units (WMU -which are complementary to the NPA-) to pronghorn populations in Mexico. Apart form the Vizcaino Biosphere Reserve in the Baja California Peninsula, where its population is contained within the Reserve, in the states of Sonora, Chihuahua and Coahuila only 13 out of 104 pronghorn records obtained from aerial surveys conducted between 1997 – 2006 were included in a NPA, and only 2 were within UMA. The persistence of pronghorn populations is further threatened in the border region where the United States – Mexico border fence and associated surveillance road, may be limiting the movements of 1) the Sonoran pronghorn from Mexico to the United States -where this population is considered endangered-, and 2) from the United States to northeastern Sonora and northwestern Chihuahua, reducing the viability of these populations, respectively in the United States and Mexico. New WMUs need to be established to enhance the protection for the pronghorn, and connectivity needs to be maintained or recovered in critical areas along the border to allow pronghorn movement.

2011-12-07 17:45 Genetic Responses to Climate Change in the Common Brown Butterfly (Heteronympha merope)

Lister, A*, *La Trobe University, Bundoora, Australia;* **Murray, N,** *La Trobe University, Bundoora, Australia;* **Sunnucks, P,** *Monash University, Clayton, Australia;* **Kearney, M,** *University of Melbourne, Parkville, Australia;* **Norgate, M,** *Monash University, Clayton, Australia;* **Yazgin, V,** *La Trobe University, Bundoora, Australia;* **Barton, M,** *University of Melbourne, Parkville, Australia;*

The extent to which climate change will affect organisms depends in part on their ability to adapt to those changes. To assess and predict this ability requires an integration of molecular ecology, functional genomics and functional ecology. The common brown butterfly, Heteronympha merope, provides a baseline for these studies as past research (Pearse 1978) allows investigations into how the species has responded to thirty years of climate change. Pearse's studies included an enzyme-based population genetic structure across most of the geographic range of the species. In this component of the integrative project, we compare contemporary allozyme population structure with Pearse's historical data. Of particular interest are geographically isolated populations from Queensland and South Australia which Pearse found to be genetically distinct from the homogeneous contiguous range. This pattern persists, although a new, apparently non-isolated, site without historical counterpart (Mount Remarkable, SA) has also been found to be highly distinct. Comparisons with DNA markers strongly suggest that patterns of allozyme differentiation are driven by adaptation. South Australian populations show evidence of clinal variation in the Pgm locus, which has been associated with flight capacity and thermotolerance in other butterfly species. In conjunction with the other components of the project these findings will underpin a predictive model of adaptive responses to climate change.

2011-12-08 18:30 Impact of alien Spartina alterniflora on the Breeding saltmarsh waterbirds in Yancheng National Nature Reserve, China

Liu,CY*, *Northeast Institute of Geography and Agricultural Ecology,Chinese Academy of Sciences;* **Jiang, HX,** *Research Institute of Forest Ecology, Environment and Protection,Key Laboratory of Forest Protection of State Forestry Administration,Chinese Academy of Forestry;*

The severe ecological impact and economic costs of invasive plant species are well acknowledged, which is the second greatest cause of direct habitat loss and fragmentation in terms of the threat posed to biological diversity. Spartina alterniflora (Smooth cordgrass) is a perennial grass native to the east coasts of North America. Within the past two centuries, it has been introduced accidentally and intentionally to Europe, the Pacific coast of North America, New Zealand, and China. At present, Yancheng National Nature Reserve (hereafter YNNR) became the largest Smooth cordgrass distribution region in China. As globally important wetland, YNNR showed a global significance for breeding waterbirds, such as Larus saundersi (Saunder's gull), Tringa tetanus (common redshank), and Sterna hirundo (common tern) and so on. Over the past decades, the overspread of Spartina alterniflora was not only direct reducing the area of breeding habitat of saltmarsh breeding waterbirds, but also indirect lower in quality of their habitat. The degradation and shrinking of native saltmarsh wetlands might cause declined of number of birds, and eventually decreased the local bird diversity of both the saltmarsh breeding waterbirds.

2011-12-06 16:30 Effects of Food Supplementation on Black-Tailed Prairie Dogs (Cynomys ludovicianus) at their Northern Extent

Lloyd, NA*, *Centre for Conservation Research, Calgary Zoo;* **Smith, D,** *Centre for Conservation Research, Calgary Zoo;* **Moehrenschlager, A,** *Centre for Conservation Research, Calgary Zoo;*

This research investigates whether black-tailed prairie dog (Cynomys ludovicianus) populations are food limited on their northernmost range extent. A 'before-after-control-impact' (BACI) experiment used food supplementation, while accounting for natural food variation, to test

whether increased food positively impacted body condition, survival, reproduction, density and colony expansion. Experimental results did not support food limitation. Reproduction and density increased from 2008–2009 but remained similar between control and treatment plots. Correlations between vegetation biomass and density suggest that natural food availability in 2008 may have driven population growth into 2009. Percentage of edible vegetation varied between 2008–2009, raising the question: are prairie dog populations' food limited in some years but not others? A negative correlation between winter survival and summer density, suggests internal regulation through density-dependent mortality. Greater overwinter survival than summer was likely due to differences in predation pressure. Colony expansion was greater in the absence of food supplementation, suggesting food scarcity drives colony expansion. Results suggest that northern prairie dog populations may be functioning near environmental carrying capacity. This research has important implications for conservation and management of prairie dogs and reintroduced black-footed ferrets (Mustela nigripes) in Canada.

2011-12-08 11:06 Specialist and generalist differential responses to different types of disturbances.

Lorrilliere, R.*, *MNHN UPMC CNRS UMR 7204;* **Couvet, D.,** *MNHN UPMC CNRS UMR 7204 ;* **Robert, A.,** *MNHN UPMC CNRS UMR 7204 ;*

Human activities are expected to result in a diversity of directional or stochastic constraints, affecting species either directly or through an effect on their resources. Numerous evidences have suggested that specialist species are particularly sensitive to these constraints, resulting in a biotic homogenization where numerous specialist species are replaced by few generalists. We developed a dynamic model that mimics the use of different types of resource by a community of interacting species with heterogeneous levels of specialization in resource use. We investigated the effects of different types of environmental constraints (directly affecting either the growth of species or the availability of resources), on the dynamics of theoretical communities of various sizes, structures and functional attributes. We found that : (1) moderate resource-mediated constraints lead to dramatic reductions of the average level of specialization of communities (CSI), whereas direct constraints have no effect on the CSI. (2) The type and magnitude of constraints affecting communities can be diagnosed only by using combinations of indicators (e.g., CSI + the distribution of species abundances...). Overall, the model helps to interpret of biodiversity metrics in the biotic homogenization context.

2011-12-08 15:15 Oceanographic drivers of recruitment, growth, and genetic diversity in a long-lived exploited marine fish

Lotterhos, KE*, *Florida State University;* **Markel, RW,** *University of British Columbia;*

Global warming is predicted to affect the timing and duration of oceanographic events that may be important to the reproductive success of marine species. Black rockfish (Sebastes melanops) are a long-lived marine fish whose populations have been declining since the 1980's due to recreational fishing. Black rockfish release larvae (a process called parturition) into an uncertain oceanographic environment that is characterized by annual fluctuations in temperature as well as the strength and duration of upwelling. We monitored black rockfish recruitment for 5 years (2005-2010) that differed substantially in their oceanographic regimes. We found that the abundance of recruits was determined largely by upwelling and secondly by temperature at settlement. Through otolith and genetic analysis we discovered that warmer temperatures between parturition and settlement increased genetic diversity and decreased relatedness among recruits, and upwelling at settlement increased the abundance of recruits but not the number of breeders that contributed to that cohort. These results suggest that colder temperatures and high upwelling cause sweepstakes-like processes to operate on black rockfish populations, in which fewer females produce a large cohort of fish.

2011-12-06 11:00 The Conservation Imperative in Twenty-first Century Amazonia

Lovejoy, Thomas E*, *George Mason University;* **A2,** *Heinz Center;*

The challenge for Amazonian conservation in this century includes climate change, deforestation, fire, gold mining,cattle and soybeans,infrastructure projects plus mining,oil and gas and forestry concessions. It is instructive to review what was effective in the past century in advancing conservation and sustainable management, but the lessons from the past are insufficient for the future. The Amazon needs to be managed as a system and requires an integrated Amazon policy.

**2011-12-06 11:15 Out on a Limb: Using Education as a **

Lowman, MD*, *North Carolina State University;*

Education of citizens, policy-makers, students (including K-through-Gray), and other community constituents is critical to foster stewardship of tropical forests. Innovative new partnerships and emerging educational tools can provide mechanisms for communicating the value of ecosystem services, inextricably linked to forest conservation. I present 3 case studies where education of diverse stakeholders led to actions that prioritized conservation: 1. working with religious leaders to save church forests in Ethiopia; 2. empowering indigenous people in tropical regions by building canopy walkways for education/ecotourism to provide revenue streams; and 3. reaching under-served audiences through innovative new technologies and social media to raise science literacy. When conservation biologists apply their tools and skills to engage in education outreach, positive conservation outcomes can be achieved.

2011-12-09 14:00 Meeting the challenges in spatial conservation prioritization in the 21st century

Loyola, RD*, *Universidade Federal de Goiás;*

Spatial conservation prioritization uses quantitative techniques to create spatial information on conservation priorities. In its beginnings, most studies addressed conceptual problems, definition of optimization methods for complex model formulations, and development of computational tools for providing community with a way to apply the principles of spatial prioritization to numerous conservation problems. Today, much of these issues are solved. Recent trends include the development of methods to cope with data and model uncertainties, and methods for understanding the consequences of climate change to biodiversity and the tree of life. Conservation practitioners also include economic costs of biodiversity conservation. Framing all these concerns is conservation opportunity, which ultimately drives the implementation of conservation strategies and help to develop national and international policies. Here I discuss the challenges for spatial conservation prioritization in a changing world. I address trending topics such as multi-action planning methods accounting for multiple costs; the inclusion of system dynamics, stochasticity and uncertainty in conservation planning; the incorporation of ecosystem and evolutionary processes in spatial prioritization; and how to engage all elements of the society into conservation planning development.

2011-12-09 12:15 Reassessing global conservation priorities with species richness estimates

LUCAS N. JOPPA*, *Microsoft Research;* **David Roberts,** *Durrell Institute of Conservation and Ecology, School of Anthropology and Conservation, University of Kent;* **Stuart Pimm,** *Nicholas School for the Environment, Duke University;*

For most organisms, the number of described species considerably underestimates how many exist. This is itself a problem and causes secondary complications given present high rates of species extinction. How different would conservation priorities be, were the species catalogue complete? Flowering plants form the basis of biodiversity "hotspots" — places where high levels of endemism and habitat loss coincide to produce high extinction rates. About 15% more species of flowering plant are likely unknown, almost certainly rare, and depending on where they live, suffer high risks of extinction from habitat loss and global climate disruption. Using a novel modeling approach, we show that regions predicted to contain large numbers of undiscovered species are already conservation priorities. Our results leave the ranked priorities more-or-less intact, but suggest considerably higher levels of species imperilment than previously acknowledged.

2011-12-06 16:30 Relations between urban bird and plant communities and human well-being and connection to nature

Luck, G.W.*, *Institute for Land, Water and Society, Charles Sturt University ;* **Davidson, P.,** *Institute for Land, Water and Society, Charles Sturt University;* **Boxall, D. ,** *School of Psychology, Charles Sturt University;* **Smallbone, L.,** *Institute for Land, Water and Society, Charles Sturt University;*

In many cases, urbanization reduces the richness and abundance of native species. Living in highly modified environments with fewer opportunities to interact with a diversity of native species may adversely affect residents' personal well-being and emotional connection to nature. We assessed the personal well-being, neighbourhood well-being (a measure of a person's satisfaction with their neighborhood), and level of connection to nature of over 1000 residents in 36 residential neighborhoods in regional Australia. We modelled these response variables as a function of natural features of each neighborhood (e.g., species richness of birds and density of plants) and demographic characteristics of surveyed residents. Vegetation cover had the strongest positive relations with personal well-being, whereas residents' level of connection to nature was weakly related to variation in bird species richness and plant density. Demographic characteristics such as age and level of activity explained the greatest proportion of variance in well-being and connection to nature. However, when controlling for variation in demographic characteristics, neighborhood well-being was positively related to a range of natural features, including bird species richness. Demographic characteristics and how well-being was quantified strongly influenced our results, and these factors must be considered when attempting to determine relations between the urban environment and human well-being.

2011-12-06 15:45 Collaborative Assessment of Extinction Risk of the Largest Avifauna in the World

Luis Miguel Renjifo*, *Pontificia Universidad Javeriana;* **Juan David Amaya,** *Pontificia Universidad Javeriana;* **María Fernanda Gómez,** *Pontificia Universidad Javeriana;* **Jorge Ivan Velázquez,** *Stonny Brook University;*

Assessment of extinction risk is fundamental for conservation planning and practice. IUCN developed a system that can be objectively applied to most taxa. This is largely based on population and distribution sizes, and trends of change in them. These estimates are often opinions with no explicit link to empirical data or ecological knowledge. We assessed extinction risk of the bird species in Colombia in a highly collaborative process that allowed us to compile historical, recent and unpublished data. We invited ornithologists and highly qualified birdwatchers to provide information ranging from records to species accounts. Several institutions and researches provided information on: distributions, generation time, detailed climatic data, deforestation and other measures of habitat change across the country. We modeled species distributions using Maxent or produced expert models for little known species. We obtained estimates of population sizes using measurements of habitat and known population densities, and rates of deforestation as proxy for rates of change in population size. Though these methods involve high levels of uncertainty they are based on evidence. This approach could be used elsewhere to enhance accuracy of estimates in countries with high biodiversity and low information levels.

2011-12-07 17:15 A seascape model of the impacts of disturbance on functional diversity of marine benthic communities

Lundquist, Carolyn*, *NIWA;* **Thrush, Simon,** *NIWA;* **Coco, Giovanni,** *NIWA;* **Pritchard, Mark,** *NIWA;* **Hewitt, Judi,** *NIWA;* **Phillips, Ngaire,** *NIWA;* **Bowden, David,** *NIWA;*

Marine soft sediment habitats are modified by disturbances from fishing, mining and other human and natural disturbances. However, the difficulty and expense of sampling in these habitats make it challenging to evaluate success of different strategies to manage disturbance impacts. Here, we present a seascape model of disturbance/recovery dynamics in benthic communities dominated by both infaunal and epifaunal taxa. We define eight functional species groups, each with different parameters for dispersal, age of maturity, age of mortality and interactions with other species, resulting in varying timelines of recovery from disturbance for each functional group. We translate 'model' functional group dynamics into functional attributes of organisms typically found in inshore and offshore communities with New Zealand's EEZ. We validate the model using inshore data from Tasman and Golden Bays, and offshore data from the Chatham Rise and Challenger Plateau. Our results demonstrate links between spatial and temporal rates of disturbance and the persistence of various functional groups in soft sediment ecosystems. Our results further suggest that seascape models can be used to inform management scenarios to minimize disturbance impacts on seafloor communities.

2011-12-08 10:45 Predicted impacts of climate change on New Zealand's biodiversity

Lundquist, CJ*, *NIWA;* **Ramsay, D,** *NIWA;* **Bell, R,** *NIWA;* **Swales, A,** *NIWA;* **Kerr, S.,** *Motu Economic and Public Policy Research;*

In New Zealand, climate change impacts have already been observed, and will increase in future decades. Average air temperature is predicted to warm by 2.1C by 2090 for a mid-range IPCC scenario (A1B), with larger increases possible for some IPCC scenarios with higher rates of future emissions. Sea-level rise projections range between 0.18 – 0.59 m by 2100, based on six IPCC future emission scenarios excluding future rapid dynamical changes in polar ice-sheet flow. Global surface ocean pH is predicted to decrease by an additional 0.14 – 0.35 units by 2100, with a similar decrease expected in New Zealand waters. Rainfall is predicted to change significantly, with increased precipitation in the west, and reduced precipitation in the east, and more intense rainfall events. Increasing temperature is likely to result in species' range shifts southward and upward, and mortality during extreme heat events. Ocean acidification is expected to cause declines in carbonate communities, with cold water communities predicted to decline first due to a lower aragonite saturation horizon in cold waters. Sea-level rise is likely to impact on coastal biota, reducing coastal habitats, changing inundation patterns, and increasing vulnerability to storm surges and tides. Changes in storm and rainfall intensity are predicted to increase disturbance to terrestrial and aquatic communities. Areas with increased precipitation will amplify rates of disturbance, erosion and sedimentation into aquatic, estuarine and coastal ecosystems, while areas with low precipitation will experience increased fire risk. In New Zealand, climate change projections are being integrated into management, including increasing protection and improving management of coastal habitats. Contributing to a global reduction in greenhouse gas emissions, New Zealand is the first country to include forestry in their Emissions Trading Scheme, already positively affecting biodiversity by reducing deforestation.

2011-12-07 14:00 Invasive ant species: History and Impacts

Luque, GM*, *Universite Paris Sud XI;* **Courchamp, F,** *Universite Paris Sud XI;*

As social insects ants form populous, well-protected and long-lived colonies that often become abundant and can profoundly affect the ecosystems they invade. The complex and highly integrated behavior of ant colonies contributes importantly to the success of these introductions. We will review the documented ecological consequences of invasive ants including effects on invertebrates, vertebrates, plants and their associated arthropods, and soil, together with multiple and synergistic effects of ant invasions that may lead to large scale ecosystem level consequences, all which provides essential knowledge for prioritizing conservation efforts. We will review the different approaches carried out to lead to a comprehensive understanding of the causal factors that promote invasiveness, as well as the mechanisms that mediate the invasion process, including ecology, behavior and genetic studies, predictive modeling approaches, and examination of broad biogeographic and taxonomic patterns of introduction. This research determines whether invasion success may be tied to the evolution of characteristics related to geography rather than life history traits constrained by phylogeny. It also suggests clear ways by which predicting and preventing the future establishment of invasive ant species may be accomplished and helps to determine high risk geographic regions under current and future climatic conditions and which species are most likely to be problematic in many regions.

2011-12-09 14:30 Improving Conservation Outcomes Through Adaptive Management on the Connecticut River, USA

Lutz, K*, *The Nature Conservancy;* **Zimmerman, J,** *US Fish and Wildlife Service;* **Hatfield, C,** *US Army Corps of Engineers;* **Palmer, R,** *University of Massachusetts;*

The Nature Conservancy, U.S. Army Corps of Engineers, University of Massachusetts have partnered to examine the role of dam operations on altered hydrology in the Connecticut River watershed, a large basin located in the northeastern portion of the United States. Specifically, alternative scenarios of system-wide dam management are being explored to naturalize river flows and improve aquatic and riparian biodiversity while continuing to provide flood control, water supply, and hydropower generation. Over 3,000 dams have been identified in the Connecticut River basin, and a system-wide approach is needed to understand interactions between dam operations and ultimate effects on river flows and river-dependent communities. We will pair hydrologic information with ecological information of river-dependent species and communities to develop flow restoration scenarios that will improve ecological conditions, be functional at a system-wide scale, and provide for human water management needs. Through the articulation of strategy effectiveness measures throughout the planning process we have been able to make course corrections to improve conservation outcomes. This case study will demonstrate how the adaptive management process allowed for improvements in the project including our approaches to science, stakeholder engagement and integration of state and federal policy.

2011-12-09 14:20 Paying for big cats: the carbon opportunity

Macdonald EA*, *University of Oxford;* **De Barros AE,** *University of Oxford;* **Malhi YM,** *University of Oxford ;* **Macdonald DW,** *University of Oxford;*

Tropical forests sit at the confluence of three linked global crises: rates of forest loss, biodiversity loss and rising global temperatures associated with catastrophic levels of anthropogenic green house gas emissions. Reducing Emissions from Deforestation and Degradation and the enhancement of forest carbon stocks (known as REDD+) is therefore proposed as a climate change mitigation strategy. While REDD+ remains an entirely carbon-focussed policy, it is hoped that its implementation will provide a diverse array of co-benefits such as watershed management, protection from soil erosion, sustainable community development and, crucial for this study, biodiversity conservation. Arguably, this use of carbon-offset mechanisms to lever biodiversity conservation (and the wider framework of Payments for Ecosystems Services) offers the greatest vehicle for investment in biodiversity in recorded history. Taking as case studies, two wide ranging felids (the Tiger (Panthera tigris) and the Jaguar (Panthera onca)), this interdisciplinary study first uses spatial analysis to show how REDD+ could deliver optimal benefits to both carbon sequestration as well as biodiversity conservation, before exploring the policy context in which this might be delivered.

2011-12-07 12:00 Assessing Nesting Habitat Monitoring Protocols for Bog Turtles: Do We Know What Females Really Want?

Macey, S.*, *Fordham University;* **Clark, J.A.,** *Fordham University;*

The bog turtle (Glyptemys muhlenbergii) is a U.S. threatened species, primarily because the early successional wetland habitat that bog turtles require is increasingly rare. Since adequate nesting areas may be a limiting factor in degraded habitats, The Nature Conservancy (TNC) used expert opinion to draft a habitat monitoring protocol to assess nesting habitat suitability and site viability. We explored (1) whether restoration improved the amount of "suitable" habitat and (2) whether the current monitoring indicators and criteria reflect the microhabitats of actual nest-sites. Four sites in New York State were assessed in 2008 and, after restoration at three of those sites, we repeated the monitoring in 2010 and determined that the amount of "suitable" habitat had decreased at all four sites. Consequently, we ranked all sites as "poor" viability. Using radiotelemtery to locate nests, we recorded microhabitat condition data at each nest-site. CART analysis showed that woody stem density and distance to water/muck variables best described nest-site selection rather than the criteria set forth in the TNC protocol. Daily mean nest temperatures were significantly warmer than random – suggesting that females are selecting warmer nest-sites. Since restoration is the primary conservation action for bog turtle recovery, it is essential to understand nest-site selection and develop appropriate protocols for nesting habitat assessments to measure the effects of restoration.

2011-12-09 14:12 The Value of Extralimital Species to Ecotourism in the Eastern Cape

Maciejewski, K*, *Nelson Mandela Metropolitan University;* **Kerley, G. I. H,** *Nelson Mandela Metropolitan University;*

The Private Protected Areas (PPAs) in the Eastern Cape stock an abundance of charismatic species with the aim of increasing diversity of species for ecotourism. Many species, which historically did not occur in the Eastern Cape, known as extralimital species were introduced under the auspices that it would increase ecotourism by enhancing the tourist's wildlife experience. Our hypothesis is that this is not the case and stocking extralimital species does not necessarily lead to increased interest by tourists. Given this, marketing of reserves should be used to bring more awareness to indigenous species and educate tourists the importance there of. We assessed the role that extralimital species play in ecotourism in Shamwari Game Reserve, South Africa by conducting research into the behaviour of tourists on game drives. The methodology we used included a mixed-method approach where quantitative as well as qualitative data was collected. The results suggested that tourists do not have a preference for specific species but value the experience of the reserve as a whole. During game drives most of the time was spent viewing elephants followed closely by the white rhino which was also ranked as the most important species based on proportions of viewing and stopping time. Results from questionnaires indicated that the lion was the most valued large mammal species and the black rhino was favoured over the white rhino. The study concludes that there is no value in the stocking of extralimital species and PPAs should abide to national legislation which requires the removal of extralimital species from all conservation areas.

2011-12-08 18:30 House mouse research on Saddle Island, New Zealand: Population and invasion biology

MacKay, JWB*, *School of Biological Sciences, University of Auckland;* **Murphy, EC,** *Department of Conservation, New Zealand;* **Hauber, ME,** *Hunter College, City University of New York, USA;* **Clout, MN,** *School of Biological Sciences, University of Auckland;*

After humans, house mice (Mus musculus) are probably the most widely spread mammal species in the world which is testament to the species' adaptability and ability to invade new areas. Mice cause significant damage to the native ecosystems they invade. It is therefore extremely important to prevent them from colonising new areas and (where possible) to eradicate existing populations. Nearly 40% of mouse eradication attempts on islands have failed for unknown reasons and the invasion biology of the species has never been studied. Aspects of mouse biology were experimentally investigated on a small island in New Zealand over the course of two years. Population densities, ranging behaviour and aspects of population genetics of mice living on the island were recorded between January and August 2008 before the population was eradicated using trapping and poisoning. Invasion biology was then investigated through experimental releases of pairs of mice onto the mouse-free island. The results of these experiments highlight the impressive invasion potential of mice. Recommendations are made to both improve mouse eradication success and surveillance methods.

2011-12-09 10:30 Natural Solutions: Protected areas helping people to cope with climate change

Mackinnon, Kathy, *IUCN/WCPA;* **Dudley, Nigel,** *IUCN/WCPA;* **Sandwith, Trevor*,** *IUCN ;*

Climate change will have profound impacts on biodiversity, requiring new conservation strategies to link and restore natural habitats to maintain viable species. Improved protection and management of natural habitats can also play a critical role in helping human societies to cope with climate change. Protected areas are especially effective tools for mitigating climate change by protecting carbon stores in vegetation and soils and sequestering carbon dioxide from the atmosphere in natural ecosystems. Globally protected area systems store 15% of terrestrial carbon; wetlands and coastal and marine habitats such as mangroves and kelp forests are also important carbon sinks. Furthermore protected areas can play a vital role in adaptation strategies, helping local and vulnerable communities by buffering local climate, and reducing risks and impacts from extreme events such as storms, droughts, and sea-level rise. Conservation areas, especially when well-managed, are proven, cost effective and sustainable tools to protect ecosystem integrity and essential ecosystem services that help people cope with climate-related changes in water supplies, fish stocks, and other wild foods, diseases, and

agricultural productivity. The social and biodiversity benefits of protected areas fully justify additional support and funding for conservation, including payments for ecosystem services and new REDD+ mechanisms.

2011-12-07 16:45 Comparing environmental performance of organic and integrated management kiwifruit orchards

MACLEOD, CJ*, *Landcare Research;*

Organic farming is often promoted as a solution for counteracting the adverse impacts of agricultural intensification on biodiversity. However, it is unclear whether the biodiversity benefits derived from organic farming require an adoption of organic farming in its entirety (i.e. a systems-level approach) or whether the benefits derived are due to just a small subset of the associated management practices. Using data collected from kiwifruit orchards in New Zealand, we assess whether orchards managed under an organic system support enhanced biodiversity and soil quality than those under integrated management systems. We then test whether variation in specific land management practices among kiwifruit orchards better predicts biodiversity and soil quality than overall differences in management system, to determine whether environmental gains can also be achieved on non-organic orchards. We conclude with a power analysis investigating whether our current study design has the power to detect significant changes in environmental performance.

2011-12-07 16:30 Landscape composition and scale determine butterfly richness in gardens: evidence from citizen-scientist garden counts in Belgium

Maes, D*, *Research Institute for Nature and Forest (INBO;* **Vanreusel, W,** *Natuurpunt;* **Van Dyck, H,** *UCL;*

Butterflies are among the best-known invertebrates by the general public. Making use of this social basis, the largest volunteer nature organisation in Belgium, organised monthly garden butterfly counts since 2007. To do so, volunteer citizen-scientists observed 19 easily recognisable and common butterflies species in their gardens. In total, 1140 gardens were counted in which almost 92000 individuals were observed. We analyzed the effect of both structural (area of 8 different land use types) and functional (composition and number of patches of land use types) landscape heterogeneity on butterfly species richness in gardens at 5 different spatial scales (radius 500-2500m). The smallest spatial scale (radius 500m) best explained the variation in the number of species in the gardens. Species richness was highest in gardens surrounded by a large total area of unfragmented semi-natural biotopes and a low area of densely build-on areas. Additionally, we examined the effect of the amount and the configuration of biotopes beyond 500m on butterfly species richness. A positive effect was observed for the number of deciduous woodland patches >1ha in the ring between 500- 1000m and for the area of meadows in the ring of 1000-1500m, while a negative effect of the number of densely build-on patches in the ring of 2000-2500m was demonstrated. In a next stage, we will also focus on the gardens characteristics itself and on the interaction between garden and the surrounding landscape.

2011-12-08 18:30 Temporal change in the butterfly fauna in three wards of western Tokyo, Japan, and relevant ecological factors

Maezumi, T*, *Institute of Agricultural and Life Science, The University of Tokyo;* **Suda, S,** *Institute of Agricultural and Life Science, The University of Tokyo;* **Kadoya, T,** *National Insutitute for Environmental Studies;* **Izumi, W,** *Institute of Agricultural and Life Science, The University of Tokyo;*

We constructed a butterfly database using records collected by citizen scientists during the period from 1923 to 2008 in the three westernmost wards of Tokyo, Japan. Using the database, we examined the temporal change in the butterfly fauna in the area and analyzed the contribution of nine ecological traits to the difference between two periods: 1923-1960 (past) and 1982-2008 (recent). Of the 66 species recorded in the past, 16 species had disappeared in the recent period. Logistic regression showed that the disappearance was significantly associated with three ecological traits: univoltine ($P<0.01$), feed plant specialist ($P<0.05$), and inability to utilize cultivated plant species as feed plants ($P<0.01$). By contrast, all six species newly recorded in the recent period were bivoltine or multivoltine, and four of these species utilized cultivated plant species. The newcomers were species that were known to have recently expanded their distributions in Japan, probably due to warming, the heat-island effect, and global climate change. Our results indicated that this type of database is useful for revealing temporal trends in rapid butterfly faunal change and for analyzing factors affecting the change.

2011-12-06 15:00 Assessing species vulnerability to climate change: use of breeding bird survey data to develop distribution models and predictions for the 21st century

MAGGINI, R*, *Swiss Ornithological Institute, Sempach, Switzerland;* **Lehmann, A,** *Climatic Change and Climate Impacts, Institute for Environmental Sciences, University of Geneva, Switzerland;* **Zimmermann, NE,** *Swiss Federal Research Institute WSL, Birmensdorf, Switzerland;* **Bolliger, J,** *Swiss Federal Research Institute WSL, Birmensdorf, Switzerland;* **Foppen, R,** *European Bird Census Council, Beek-Ubbergen, the Netherlands;* **Schmid, H,** *Swiss Ornithological Institute, Sempach, Switzerland;* **Beniston, M,** *Climatic Change and Climate Impacts, Institute for Environmental Sciences, University of Geneva, Switzerland;* **Zbinden, N,** *Swiss Ornithological Institute, Sempach, Switzerland*

Climate change is affecting biodiversity worldwide and represents a new challenge for conservation. Project ClimBird has three main objectives: i) to assess to which extent breeding birds have already shifted their distribution along the elevational gradient in Switzerland; ii) to predict how the forecasted changes in climate but also in land use will modify their distribution across the country in the future; iii) to identify the most vulnerable species so as to efficiently inform authorities of the seriousness of the threat and to prioritize conservation actions. The assessment of the elevational range shift was performed using the data of the Swiss national monitoring program for common breeding birds and revealed a significant upward shift for 33 species. The current distribution across Switzerland was modelled using data from different in-house sources: monitoring, atlas, ornithological databases. The modelled distributions were then projected for the 21st century according to combined scenarios of climate and land use change. Results clearly show that the greatest species turnover is expected for the alpine region and more specifically for the Eastern Alps. A vulnerability index was defined on the basis of the change in distributional areas and the ranking suggests that most vulnerable species will be species with particular habitat requirements and alpine species for which Switzerland has a key responsibility in the European alpine landscape.

2011-12-07 16:30 Effects of a highly interactive species, the black-tailed prairie dog, on urban avian diversity

Magle, SB*, *Lincoln Park Zoo;* **Salamack, KA,** *Wildlife Habitat Council;* **Crooks, KR,** *Colorado State University;* **Reading, RP,** *Denver Zoo;*

Urbanization and habitat fragmentation have the potential to influence bird communities, and these phenomena, as well as ongoing lethal control measures, have also reduced the range of the black-tailed prairie dog (Cynomys ludovicianus) by an estimated 98% since the beginning of the 20th century. Prairie dogs are highly interactive species that can influence bird species diversity, abundance, and richness. Past research on prairie dog-bird dynamics was conducted on native prairie and few studies investigated whether these interactions persist in an urban setting. We performed bird counts on 20 habitat fragments (ten colonized by prairie dogs, ten uncolonized by prairie dogs) spread throughout the Denver metropolitan area, and calculated Shannon-Weiner diversity, richness, and counts of individuals within specific avian guilds. Mean avian diversity and richness increased with increasing fragment connectivity, and decreased on fragments isolated for longer periods of time. Avian diversity and richness did not differ between fragments with prairie dogs and fragments without prairie dogs, suggesting that this element of the keystone role of prairie dogs is not fully retained in urban habitat. Future studies of the role of prairie dogs as keystone species in urban systems should include other taxa as well as incorporate the role of the urban matrix surrounding prairie dog habitat.

2011-12-06 14:45 Improving multicriteria rating systems for setting conservation priorities

Maguire, LA*, *Nicholas School, Duke University;*

Rating systems that combine multiple factors to prioritize which species or areas to protect first are ubiquitous in conservation science and practice. Even the most thoughtfully developed and widely used systems exhibit flaws that violate principles of multicriteria analysis. These flaws can lead to misguided recommendations for action and compromise the use of these systems to coordinate action among conservation institutions. Some common flaws include (1) omitting important factors that are hard to measure; (2) defining performance categories too vaguely for different users to produce consistent ratings; and (3) losing control over the weight accorded to each factor in composing the overall rating by (a) including multiple, overlapping metrics for factors where data are readily available, (b) assigning arbitrary maximum numbers of points to individual factors, and (c) using idiosyncratic algorithms for combining scores on individual factors to create an overall rating. An additional flaw common to many GIS-based rating systems is re-classifying results into equally populated categories (e.g., each containing one-tenth of the items rated), which precludes comparing ratings from different applications of the same system. Fortunately, many of these flaws can be corrected, or at least mitigated, with modest changes. This is important because many of these rating systems are deeply embedded in the cultures of conservation institutions and wholesale changes could be disruptive.

2011-12-08 11:02 A Compairing of two Different Population of [Branchiopoda; Chirocephalus sp.] with Conservative Approach within Soulukli & Arneh Temporary Wetland NE Iran

Mahmoud soufi*, *Department of Environment and Energy Science and research Branch Islamic Azad University, Tehran, Iran. ;* **Bahram Zehzad,** *Shahid Beheshti University, Tehran, Iran;* **Haji Gholi Kami,** *Department of Biology, Faculty of Sciences, University of Golestan, P. O. Box 49165, Gorgan, Iran.;* **Ali Turk Qashqae,** *Department of Environment and Energy Science and research Branch Islamic Azad University, Tehran, Iran;* **Mosa Ghorbani Orjanli,** *4Department of Geological Sciences research of Iran;*

The worldwide loss of temporary waters threatens many branchiopod crustacean species. In many areas of the world, the diversity, species composition, and conservation status of large branchiopods remain largely unknown. Wetlands, currently covering less than 6% of the earth's land surface, are being destroyed at an alarming rate worldwide although less well studied. fairy shrimp and other crustacean populations inhabiting temporary waters are declining worldwide Abiotic factors are often implicated in speciation events, a tentative compairing investigation was conducted on (march-june 2011) within Soulukli (1357m altitude) & Arneh (790m altitude) temporary wetland in the Golestan National Park northeast of Iran. Indeed we finde a new localities in Hyrcanian forest for the Genus of Chirocephalus sp. (specimens is now describing) these temporary habitats have an obviously differences in composition of invertebrate and macrophyte communities, particularly on populations, proportion of sexual rate and number of eggs in ovisac. But the actual impact of both abiotic and biotic factors on species diversity is not well understood. Given the large within pool population sizes, the biggest threats are likely to be due to habitat degradation and loss. Such temporary habitats before being discovered are locally destroyed.

2011-12-07 11:30 Empowering Citizens to Promote Conservation: The Florida Master Naturalist Program

Main, MB*, *University of Florida;*

Conservation goals cannot be achieved without public support, but people are unlikely to support efforts they don't understand. Attempts to engage the public often take the form of dire warnings and requests for monetary support. Conservation education programs provide an additional strategy, one which educates public audiences about the environment around them, the plants and animals therein, and the ecological processes that support these while also providing important services to people. The Florida Master Naturalist Program (FMNP; www.MasterNaturalist.org) is a highly successful and self-supporting program that was developed to educate, inspire, and prepare public audiences to engage in conservation efforts and to educate and inspire others we may otherwise never reach. The FMNP operates on a collaborative strategy that currently includes 170 certified instructors from 90 organizations that issued 948 graduate certificates during 2010 and more than 6,000 since the program's inception. The FMNP curriculum includes both natural history/conservation education and technique-oriented courses that prepare individuals to participate in citizen-scientist monitoring programs. This presentation will describe the FMNP, strategies for curricula and instructor network development, administration of the program, and some examples of impacts and success stories associated with FMNP graduates. Attendees of this presentation will gain ideas and insights on how to develop public education programming that motivates and empowers graduates to engage in conservation and education efforts in their local communities and assist us to promote a stronger conservation ethic among the citizenry at large.

2011-12-07 15:15 Conservation Sucess, Communities and the Private Sector

Mainka, Sue.*, *IUCN;* **Carbone, Giulia,** *IUCN;* **Asante-owusu, Rachel,** *IUCN;*

The private sector is a major player in drivers of biodiversity change and also increasingly engaged with local communities to identify optimum means by which to achieve business results that still support biodiversity conservation. IUCN has engaged with several multinational businesses at several levels and using several different mechanisms to support better conservation outcomes. This presentation will summarize the sorts of engagements employed and the lessons learned from those efforts.

2011-12-08 15:00 Analysis of Climate Change Impacts to Marine Species Under the United States of America (US) Endangered Species Act (ESA)

Maison, KA*, *JIMAR/NOAA Fisheries;* **Opay, P,** *NOAA Fisheries ;*

The Protected Resources Division (PRD) of the Pacific Islands Regional Office (PIRO) of the National Marine Fisheries Service (NMFS) is the lead for management and recovery of ESA-listed marine species in the Pacific Islands Region. Under multiple Sections of the ESA, PIRO PRD analyzes past, present, and future impacts of anthropogenic activities on listed species, including those related to climate change. Multiple levels of uncertainty in climate predictions, ecosystem impacts, and species adaptability make this challenging. PIRO PRD has recently analyzed potential impacts of climate change on sea turtles in Biological Opinions that analyze proposed government actions under Section 7 of the ESA. Additionally, we are evaluating global efforts to mitigate greenhouse gas emissions in connection with our review of a petition under Section 4 of the ESA to list 82 species of coral. Different levels of certainty exist in the literature as to currently observed and potential future impacts of climate change on different species. Our challenges and responses associated with incorporating climate change impacts into marine species management are presented.

2011-12-08 18:30 Monitoring Source Population of Tigers (Panther tigris tigris) in Pench Tiger Reserve, Madhya Pradesh of Central Indian Landscape

Majumder, A*, *Wildlife Institute of India;* **Sankar, K,** *Wildlife Institute of India;* **Qureshi, Q,** *Wildlife Institute of India;* **Jhala,Y.V,** *Wildlife Institute of India;*

Monitoring large carnivore in a small reserve is really a challenging task for any manager. Between June 2006 and March 2011, thirty six pairs self triggered camera traps were deployed (area 200 km ^{2}) to monitor source populations of tiger in Pench Tiger Reserve, Madhya Pradesh,India. The estimated over all survivor rate (Robust design) was 0.64 (standard error or SE 0.07) and growth rate (Pradel model) was (-) 0.07 where as population of tigers (Mark Recapture method) for successive five years were 14 (SE 0.01), 13 (SE 0.04), 11.4 (SE 1.4), 10 (SE 0.6) and 12 (SE 0.5). Though estimated wild prey biomass (using line transect method) for tigers in this natural reserve, 6013 kg/km^2, is one of the highest in Indian sub-continent, the poor emigration rate (0.23±SE 0.09) and high cub-mortality (0.47±SE 0.01) might have governed the source population towards decline (as no poaching was so far recorded during the study period). One adult female, one adult male and two sub adult male tigers were radio-collared to understand their ranging pattern in this small reserve and estimated home ranges (Minimum Convex Polygon method) were 34 km^2, 30.4 km^2, 55 km^2 and 12.3 km^2 respectively during this period. The corridor connecting other major source populations with Pench, therefore need to be monitored for the long term

basis to maintain the viable populations of tigers in this landscape.

2011-12-07 14:52 An Integrated Ecosystem-Based Management Model for the Kaipara Harbour, New Zealand

Makey, L J*, *AUT University;* **Harding, D,** *Te Uri o Hau Settlement Trust;* **Breen, B,** *AUT University;* **Morrison, M,** *National Institute of Water & Atmospheric Research (NIWA);*

The Kaipara Harbour is New Zealand's largest estuarine ecosystem (947km2 with a catchment of 641,000 ha) and one of the largest in the world. It is also the most sacred treasure of the indigenous Māori people of the Kaipara region who are spiritually and physically intertwined with the Harbour. Combined with the diversity of species and habitats that the harbour contains, combined with increasing and conflicting resource use, this makes the Kaipara an ideal place to practice and test integrated ecosystem-based management (EBM). A comprehensive review of the EBM literature and theory revealed that in order to progress EBM in New Zealand, implementation must integrate and connect both traditional Māori knowledge of environmental management and western scientific knowledge. The primary focus of this doctoral research has been on developing a model of integrated EBM that addresses both indigenous Māori and western, pakeha, values held for the Kaipara Harbour; and apply tools (i.e., conservation assessments, GIS decision-support tools, local ecological and traditional knowledge, and spatial information technology) which recognise systematic planning principles, are defensible, scientifically sound, and offer a range of management scenarios for estuarine-marine biodiversity conservation and production. Some recommend outcomes are presented.

2011-12-07 16:58 Understanding invasion history and the eradication project of the Argentine ant in Japan

Maki, Inoue*, *National Institute for Environmental Studies;* **Koichi, Goka,** *National Institute for Environmental Studies;*

The Argentine ant, Linepithema humile, has successfully spread from its native range in South America across much of the globe. A form of social structure, supercoloniality, whereby individuals from separate nests cooperate, is attributed to its successful worldwide expansion. The Argentine ant, first noted in 1993, is now found in several regions of Japan. Early detection as well as rapid control is required to prevent further expansion of the species. We attempted to demonstrate the genetic structure of introduced Argentine ant populations in Japan and how they relate to other introduced and native populations to understand its invasion history. We have just started the eradication project of the Argentine ant in the port of Tokyo, Japan.

2011-12-06 16:30 Impact assessment of dams on population dynamics of mahseer fishes (Tor species) in Yamuna river of Garhwal region, India

Malik, D.S.*, *Gurukula Kangri University, Haridwar, India;*

India is one of the mega-biodiversity countries in the world and occupies ninth position in term of fresh water mega-biodiversity. Nature has endowed as rich wealth of lentic and lotic aquatic ecosystem consisting rich freshwater fish diversity to Garhwal region of Indian subcontinent. The Yamuna river is the longest tributary of Ganga river ecosystem, provide a natural habitats for existing fish diversity of Himalayan region. The several dams have been constructed on different locations of major rivers in Garhwal region under the hydro-power generation program. These dams have generally resulted in negative impacts to native riverine fishes. The mahseer (Indian carp) as 'Sport fish' has been continue to be decimated by fragmented natural habitats due to damming the water flow in riverine system and categorized as threatened fishes of India. The present fish catch data has revealed that mahseer fishes (Tor tor and Tor putitora) were contributed about 32.5 %, 25.6 % and 18.2 % in upper, middle and lower riverine stretches of Yaumna river. The CPUE (catch per unit effort) of mahseer fishes also indicated about a sharp decline of fish biomass, changing growth pattern, sex ratio and maturity stages of fishes. Only 12.5 – 14.8 % mahseer female brooders have shown maturity phases in breeding months. The present status of mahseer fishery has attributed to the over exploitative nature in Yamuna river. The mahseer population is shrinking continuously in down streams of Yamuna river due to cumulative effects of various ecological stress. Mahseer conservation program should be implemented for enhancement of viable population size of mahseer species and restore the genetic loss of mahseer fish germplasm in Yamuna river of Garhwal Himalayan region.

2011-12-08 18:30 Genetic assessment of population decline in Wisconsin sharp-tailed grouse (Tympanuchus phasianellus)

Malone, KM*, *Central Michigan University;* **Hull, SD,** *Wisconsin Department of Natural Resources;* **Swanson, BJ,** *Central Michigan University;*

Loss of genetic diversity is a major factor in extinction for small populations. Populations with high levels of genetic diversity are less likely to suffer the effects of inbreeding resulting from isolation and small population size. The sharp-tailed grouse (Tympanuchus phasianellus) population in Wisconsin (WI), U.S.A has experienced a 50% decline since 1991. Because this population consists of several small, isolated subpopulations, inbreeding was identified as a possible threat to its persistence. We used 8 microsatellite loci to analyze genetic variation and gene flow in the WI subpopulations, as well as a contiguous population that spans throughout Nebraska, North and South Dakota, U.S.A, and which is considered demographically healthy. The WI subpopulations had lower allelic diversity (A=3.3), lower heterozygosity (H=0.34), and higher inbreeding (FIS=0.412) than the contiguous population (A=8.0; H=0.75; FIS=0.185). FST values were high in WI (0.25) compared to the contiguous populations (0.002), indicating relatively low levels of gene flow among WI subpopulations. We conclude that Wisconsin's sharp-tailed grouse population is suffering from a lack of genetic diversity and reduced interpopulation dispersal that is not typical for this species and actions must be taken to ensure the long-term persistence of sharp-tailed grouse in this state. We suggest that birds be translocated between WI subpopulations in an effort to increase gene flow and alleviate inbreeding.

2011-12-08 11:30 Applying a project prioritisation protocol to conserve New Zealand threatened species

Maloney, RF*, *Department of Conservation;* **Davis, JP,** *Department of Conservation;* **Joseph, LN,** *Wildlife Conservation Society;* **O'Connor, SM,** *Department of Conservation;* **Possingham, H,** *University of Queensland;*

More than 2000 species are threatened or at risk of extinction in New Zealand, yet we directly manage less than 200 of these. Our ability to plan, adequately resource, monitor and report on outcomes for threatened species in need of management is limited by the size and complexity of the task, and in many cases, because of our uncertainty in our ability to achieve adequate results. We have developed and implemented a protocol that provides transparent and consistent plans. Prescriptions are made up by species experts, threat managers and local experts using best available data and their experience, and for each species the process took a few hours in total. Prescriptions had to meet an agreed objective to obtain the long-term persistence for each species, and described the exact locations in which fully-costed actions to mitigate named threats to target levels needed to occur. The prescriptions were then ranked on the basis of the four factors making up a prescription: cost, feasibility of actions, urgency, and an optional weighting to adjust for distinctiveness and representativeness values in a New Zealand context. The cost-efficiency ranking ensured that the greatest number of species could be managed for any given budget. We have now built prescriptions for all ~650 threatened and at risk species that are currently in decline in New Zealand, and we are applying it to the Department of Conservation's threatened species budget which is targeted at securing the long-term persistence of threatened species. We will discuss the benefits in using this protocol for achieving significantly greater conservation gains threatened species management.

2011-12-09 14:15 Identifying Trade-offs Between Management for Palm Harvest and Livestock Grazing and Conservation of Plant Diversity in the Western Ghats, India

Mandle, Lisa*, *Botany Department and Ecology, Evolution and Conservation Biology Program, University of Hawaii at Manoa;* **Ticktin, Tamara,** *Botany Department and Ecology, Evolution and Conservation Biology Program, University of Hawaii at Manoa;*

Much of the world's remaining terrestrial biodiversity exists in human-managed tropical ecosystems. Understanding the effects of management

activities is necessary to conserve these areas for the benefit of both local livelihoods and biodiversity. In the Western Ghats region of India, as in many other tropical ecosystems, people use fire to manage wild plant harvest and livestock grazing. We combine results from ecological studies and interviews with local harvesters to understand how fire, leaf harvest and grazing impact the population dynamics of a wild palm (Phoenix loureiri) as well as the composition, structure and diversity of surrounding plant communities. Matrix population models demonstrate that the potential for sustainable palm leaf harvest depends on fire frequency. Increased grazing following fire – along with increased harvesting intensity – reduces projected population growth rates (ƛ). We find similar levels of plant diversity between areas managed by local communities for leaf harvest and livestock grazing and an adjacent protected area. However, areas with livestock grazing have a greater abundance of common species and fewer rare species, suggesting a trade-off between managing for local benefits and managing for plant conservation. Understanding trade-offs between different management goals is important to ensuring that conservation contributes both to human well-being and the maintenance of biodiversity.

2011-12-08 11:00 Climate and the macroecology of abundance

Manne, Lisa*, *City University of New York;* **Hawkins, Bradford,** *University of California at Irvine;* **La Sorte, Frank,** *Yale University;*

Characterizing the geographic pattern of distribution of abundance among species allows analysis of community structure, predictors of this structure, and how this structure changes over time. The North American Breeding Bird Survey collects yearly point-counts of North American birds during the summer breeding season across over 4000 routes. Using this information, we asked three questions for bird species in each of four time periods: 1974-1976, 1984-1986, 1994-1996, and 2004-2006. 1) We hypothesized that total abundance(summed across all species) is related to local climate. Results were significant, but little variability in total abundance is explained by local climate (R2 values were in the range 0.08 – 0.12). 2) We analyzed the geographic pattern in variability of total abundance within relatively large sampling units (one-degree grid cells). This variability shows a clear latitudinal trend, with lower variability at the more northern latitudes. 3) We characterized the distribution of abundance among species with Fisher's alpha, hypothesizing that this index would show a latitudinal trend, and would become more variable in later time periods. Fisher's alpha varies geographically, though the pattern is somewhat anomalous due to lack of significant alpha estimates in the prairies, and interestingly, this pattern does not vary with time. Variability in total abundance shows a latitudinal trend, which cannot be explained by the distribution of abundance among species.

2011-12-06 15:15 People, Production and Biodiversity Protection: Bringing it all Together

Margules, C.*, *Conservation International;* **Kirkman, A,** *Conservation International;*

Societies and governments now have to respond to radical changes in ecosystem processes that previously have been taken for granted, unmeasured and unpriced by markets. To make an analogy with the financial sector, if we think of natural resources as our capital we are now faced with learning how to live off the interest rather than running down the principal. Alternative models of economic development that value and incorporate the contribution of ecosystem processes and biodiversity need to be developed. This paper describes two field demonstrations of alternative development paradigms that are now being implemented and tested. One is in the Birds Head Seascape, Papua Barat Province, Indonesia and the other in the Tonle Sap, Cambodia. They were chosen because they are in global biodiversity hotspots, because livelihoods and food security are at risk, because strategies to adapt to climate change are needed in both, and in Tonle Sap, because freshwater quality is at issue. There needs to be many more. There is 'no one size fits all'. Each is highly contextualized to place and to governance arrangements, though changes to governance are likely to be part of the process. But there are the commonalities of ecosystem-based management and the aims of securing livelihoods into the future, while sustaining ecosystems and biodiversity. This is a complex, time-consuming and challenging process. It requires specialist knowledge from many disciplines, new policies, a long-term view and adequate funding. But there needs to emerge a viable alternative to business as usual.

2011-12-08 18:30 Distribution and Threat of Atlantic Forest Endemic Birds under Climate Change Scenarios

Mariana M. Vale*, *Federal University of Rio de Janeiro (UFRJ);* **Maria Alice S. Alves,** *University of the State of Rio de Janeiro (UERJ);* **Maria Lucia Lorini,** *Federal University of Rio de Janeiro (UFRJ);* **Tiago Vieira de Souza,** *Federal University of the State of Rio de Janeiro (UNIRIO);* **Cristiane M. Medeiros,** *University of the State of Rio de Janeiro (UERJ);*

We model the re-distribution of 141 birds endemic to a biodiversity hotspot – the Brazilian Atlantic Forest – under a "business as usual" scenario of green house gas emission for 2050. We used Maximum Entropy distribution modeling with eight environmental variables. We then estimated specie' threat status by 2050, using IUCN's extent of occurrence criterion. Of the 137 species with reliable models (AUC > 0.8), 117 are predicted to lose distribution area under climate change, with an average range contraction of 51% (or 287,180km2). The predicted reduction in distribution size will bring six species to the threshold for threat. When we discount from the modeled sitributions the areas that area already deforestation, the number of predicted threatened species doubles. The contraction of species geographic ranges reflected itself on the geographic patter of endemic bird richness in the Atlantic Forest. The areas with the highest bird richness, in central Atlantic Forest, are greatly reduced in the future scenario. One relatively small area in northern Brazil, however, is predicted to have a moderate increase in bird richness. That area, though, is highly deforested and therefore, might not be able to fulfill its role as a "climatic refuge" for Atlantic Forest birds under climate change.

2011-12-06 10:45 Biodiversity, biogeography and protected areas in highly threatened portion of the Brazilian Cerrado

Mariana Napolitano e Ferreira*, *Universidade de São Paulo, departamento de Ecologia;* **Cristiano de Campos Nogueira,** *Universidade de Brasília;* **Vania R. Pivello,** *Universidade de São Paulo, departamento de Ecologia;* **Paula H Valdujo,** *Universidade de São Paulo;* **Debora Silvano,** *Universidade de São Paulo;* **Luis F Silveira,** *Universidade de São Paulo;* **Ana Paula Carmignotto,** *Universidade Federal de Sao Carlos;*

The establishment of representative protected area systems in poorly studied, biologically diverse tropical areas poses a serious challenge to conservation, especially in regions suffering extensive human pressure and habitat loss. We assessed the representativeness of the regional protected area system in the Brazilian state of Tocantins, northern portion of the Cerrado hotspot, based on the distribution of 109 target species of vertebrates and plants. The major aims of the study were to investigate the existence of significant, non-random biogeographical patterns, and to evaluate the performance of current reserves in protecting regional biodiversity patterns. Results indicated that selected target species represent biogeographical patterns of Tocantins biota, which are, however, only partially protected in current reserves. Significant gaps were detected in the protection of the species and biotic elements in the study system. Our results highlight the importance of considering biogeographical patterns when selecting target species for conservation planning, including endemic species that are both vulnerable to habitat loss and important surrogates of evolutionary processes. Given appropriate data collection and correct choice of target species, the scarcity of biodiversity data is not an impediment to systematic conservation approaches in tropical regions with high biodiversity levels and incipient reserve systems.

2011-12-09 10:30 The world's temperate indigenous grasslands: their conservation, values and sustainable management, from a New Zealand perspective.

Mark, AF*, *Alpine Ecology Research Group, University of Otago and Temperate Grasslands Conservation Initiative, IUCN;* **Dickinson, KJM,** *Alpine Ecology Research Group, Department of Botany, University of Otago;* **Schwendenmann, L,** *School of Environment, University of Auckland;*

Temperate grasslands, one of the world's great biomes, are in an altered and highly endangered state. Occupying ~8% of the earth's surface, only ~5% of the biome is protected, despite the many ecosystem services,cultural and social values it supports. Land transformation resulting from intensification and the separate effects of grassland burning and grazing need assessment to

achieve sustainable management. Low- to mid-altitude grasslands are the most threatened worldwide, including in New Zealand,where, despite ~15% of the baseline (1840) grassland area (31%) now protected, there is a serious lack of low-to-mid altitude representation. Only 5% of the remaining 25% of the short (Poa and Festuca spp.) tussock grasslands are protected, despite the high proportion of threatened biota that they support. The mid-high altitude grasslands are better protected (40% of the 96% still remaining low-alpine, and 21% of the 81% still remaining montane-subalpine snow tussock grasslands) and are also fundamentally important for ecosystem services, particularly water yield and soil conservation.. The Glendhu paired (snow tussock vs. Pinus radiata) catchment study at 460-670 m in SE South Island, for example, has recorded a generally steady differential yield since canopy closure in 1991, with a 43% reduction in 2010, 28 years after planting. Carbon storage in healthy tall snow tussockland as at Glendhu is also important, both above- and below-ground, which, being grassland, has not yet been formally recognised in international protocols. These and other temperate grassland values justify greater recognition in decisions on their sustainable management and formal protection.

2011-12-08 14:20 Shade coffee as an ecological trap for Neotropical birds

Mark, Melissa*, *Columbia University;*

Highly abundant Neotropical birds living in agroecosystems such as shade coffee are not considered of high conservation concern, yet little is known about the demographic patterns of these species. I evaluated the reproductive consequences of habitat selection in two understory insectivores, the rufous-and-white wren (Thryothorus rufalbus) and the plain wren (Thryothorus modestus), in a Nicaragua coffee agroecosystem. I measured habitat selection and its effect on nest success at three scales: the landscape, the territory, and the nest site. The rufous-and-white wren exhibited strong preference for shade coffee within the territory and as a nesting site, driven by vegetation characteristics common to coffee and forest. Pairs that included shade coffee in the territory or as a nesting site experienced significantly higher nest loss than individuals whose territories or nesting sites were in forest. However, the plain wren did not exhibit a strong preference for any single habitat type, even though nest success was highest in edge areas. This study indicates that shade coffee may serve as a population sink or ecological trap for certain species and further study of the demographic patterns of birds living in shade coffee is recommended to ensure their persistence in agroforestry landscapes.

2011-12-08 18:30 Effect of climate change on ectotherms and endotherms in mainland Spain

Marquez, A.L.*, *Universidad de Malaga;* **Real, R.,** *Universidad de Malaga;*

We evaluated the relative contribution of climate in making a given area favourable for 128 species of non-volant tetrapods in mainland Spain by using variation partitioning and weighting the effect of climate in relation to non-climatic factors (spatial, topographic and human) in the period 1961-1990. We then projected the pure independent effect of the climatic to the future models. We used two Atmosphere-Ocean General Circulation Models: CGCM2 and ECHAM4; and two special reports on emission scenarios: A2 and B2. We used fuzzy logic operations to calculate, for each future projection, several features of the predicted impact of climate change on the species favourability, namely the increment in favourability (I), the favourability overlap (O), the favourability maintenance (M) and the predicted shift in favourability (S), with respect to the 1961-1990 period. Our results show that the number of ectotherms that will lose favourable areas is higher than the number of endotherms. In general all the non-volant teprapods have a high predicted maintenance rate (M>0.8), this means that for most of this species it will conserve a significant part of their present distribution.

2011-12-06 10:30 Is triage feasible in species conservation? The sirenia case study

Marsh, H*, *James Cook University ;*

IUCN emphasizes that conservation action should not be automatically linked to Red Listing, stressing that management interventions should be applied only after analysis of threatening processes and the measures needed to counteract them. The Order Sirenia (sea cows) is one of three mammalian orders identified as being at risk of extinction. All four extant sirenians are classified as vulnerable by IUCN. The capacity of the 80+ range states to conserve sirenians was assessed assuming that capacity depends on both the sirenian population size and the state's Human Development Index. International assistance is unwarranted for populations in the thousands in seven countries with Very High Human Development Indices. Very small populations (less than one hundred) and small populations in 19 countries with Very Low Human Development Indices must be unlikely to persist. International aid is likely to make most difference to the conservation of sirenian populations in 26 countries with populations in the hundreds and high and medium Human Development Indices. Nonetheless, this triage approach may be impossible to implement as all range states are eligible to sign up to the Memoranda of Understanding developed under the Convention for Migratory Species in expectation that they are eligible for international assistance.

2011-12-07 15:45 How long should we wait to protect critical habitat?

Martin, Tara*, *CSIRO Ecosystem Sciences;* **Chades, Iadine,** *CSIRO Ecosystem Sciences;* **Possingham, Hugh,** *CEED, University of Queensland;* **NCEAS Working Group,** *Complex Environmental Decisions;*

Protection of critical habitat – the habitat required for a species' survival, recovery and persistence - has been identified as an essential step in the recovery and conservation of threatened species. Its protection is also one of the most contentious decisions faced by environmental agencies. Both uncertainty about what constitutes critical habitat and lack of political will to protect critical habitat once identified is crippling the recovery process. We tackle this inertia through the provision of a decision analysis framework which answers the question: how long should we invest in learning about critical habitat for a given species before switching our resources to protecting critical habitat? If we wait too long to protect critical habitat, then a species may go extinct, yet if we make a decision too early based on insufficient knowledge we may protect insufficient or the wrong habitat and again fail to recover and protect the species. We discover that it is rarely optimal to learn for a long time before making a decision to protect critical habitat. In general, as the level of threat to a species increases, the optimal time to learn before making a decision to protect critical habitat decreases.

2011-12-09 10:45 Threat diagnostics: inferring causation from vertebrate population declines

Martina Di Fonzo*, *Imperial College London and Institute of Zoology, Zoological Society of London;* **Ben Collen,** *Institute of Zoology, Zoological Society of London;* **Georgina Mace,** *Imperial College London;*

Accurately diagnosing the causes of population decline is paramount to the successful conservation management of vertebrate species. I explore the possibility of identifying the cause of mammal population declines based solely on changes in times-series convexity, using a dataset of 279 populations. First, I use the life-history and population-trend characteristics of species within this dataset to develop a technique which identifies the onset of pressure based on switches in population growth rate. Secondly, I test a method for diagnosing the cause of population decline according to the convexity of its decline-curve and identify broad decline-curve categories that reflect the dynamics of different simulated exploitation regimes. I demonstrate that the onset of constant, proportional harvesting is easier to identify than fixed-quota harvesting and that constant, proportional harvesting and increasing, fixed-quota harvesting are the only pressure-types that result in consistent decline-curve shapes. These pressures produce declines that best-fit concave, exponential and quadratic, convex functions, respectively. I selected time-series from my dataset upon which to test these methods and show that declines can be classified according to threat-type. This study also identifies the presence of rapid, convex declines as a method for prioritising conservation action. I suggest that "decline concavity" could be used to classify threatened species under IUCN criteria.

2011-12-09 11:15 Prairie dogs and ecosystem services: A key element in the maintenance of Mexican grasslands

MARTINEZ-ESTEVEZ, LOURDES*, *Laboratorio de Ecología y Conservación de Fauna Silvestre, Instituto de Ecología, Universidad Nacional Autónoma de México (UNAM) Circuito Exterior S/N, Ciudad Universitaria, Coyoacán, 04510 México, D.F. México.;* **Pacheco, Jesús,** *Laboratorio de Ecología y Conservación de Fauna Silvestre, Instituto de Ecología, Universidad Nacional Autónoma de México (UNAM) Circuito Exterior S/N, Ciudad Universitaria, Coyoacán, 04510 México, D.F. México.;* **Ceballos, Gerardo,** *Laboratorio de Ecología y Conservación de Fauna Silvestre, Instituto de Ecología, Universidad Nacional Autónoma de México (UNAM) Circuito Exterior S/N, Ciudad Universitaria, Coyoacán, 04510 México, D.F. México.;*

Grasslands are one of the most threaten ecosystems in the world due to human activities, loss of native species, and desertification. Prairie dogs are an extremely important feature of North American grasslands. They are considered a keystone species for their role in maintaining grasslands' structure and function, and preventing desertification, especially in southern US and Mexico. Their decline to less than 2% of the original range has resulted in severe negative environmental effects, and has raised concerns on the impact on the provision of ecosystem services, especially those related to food production as habitat degradation reduces its ability to maintain agriculture and grazing. Here we compare grasslands and invading mesquite scrublands and provide solid evidence that prairie dogs are fundamental in the provision of ecosystem services. Water infiltration, prevention of soil erosion, soil characteristics (e.g. compactation layer), plant cover, and primary productivity were all higher or better in prairie dog grasslands when compared with the mesquite scrubland. These indicate severe loss of ecosystem services with the increasing landscape desertification, and have strong implications for conservation, land management, and human well – being.

2011-12-07 17:30 Cumulative impacts to coastal ecosystem services in British Columbia

Martone, Rebecca G*, *Institute for Resources, Environment and Sustainability, University of British Columbia;* **Thompson, Allison,** *Institute for Resources, Environment and Sustainability, University of British Columbia;* **Singh, Gerald G,** *Institute for Resources, Environment and SusInstitute for Resources, Environment and Sustainability, University of British Columbia;* **Chan, Kai M.A.,** *Institute for Resources, Environment and Sustainability, University of British Columbia;*

To provide for the well-being of coastal communities and practice an ecosystem-based approach, resource management must contend with cumulative human impacts on ecosystem services, or the ecosystem processes that benefit people. Despite the increase in popularity of the ecosystem services framework, there is little information available on the impacts of multiple human activities on ecosystem service provisioning. What is missing is a transparent, transferable method to explicitly consider impacts to and trade-offs among ecosystem services to inform managers so that they can set priorities and plan human activities spatially. Using data available from the literature, we developed spatially explicit mechanistic models of how several land-based activities—agriculture, forestry practices, and coastal development—can lead to shellfish harvest closures along the British Columbia coast. We demonstrate the utility of a mechanistic approach, providing managers the detailed understanding necessary for making informed decisions about activities that cross ecosystem boundaries, and clarifying how human activities link to the benefits derived from marine systems.

2011-12-07 17:15 Using private agreements and collaborative research to design and test area-based fisheries management approaches

Mary Gleason*, *The Nature Conservancy;* **Michael Bell,** *The Nature Conservancy;* **Matt Merrifield,** *The Nature Conservancy;* **Steve Rienecke,** *The Nature Conservancy;* **Jono Wilson,** *Bren School, Univ. of California Santa Barbara;* **Chuck Cook,** *The Nature Conservancy;*

In California's Central Coast region, a coalition of conservation, fishing interests, and academic partners are using the best available science and local knowledge to design and test area-based management approaches for the groundfish fishery. The Nature Conservancy purchased trawl permits in a quid pro quo arrangement with local fishermen to design and establish trawl closure areas through a regulatory process in 2006 to protect sensitive habitats and to reduce trawling effort. Since then, we have implemented further local zoning of fishing effort and converted some trawl effort to more selective gear through private legal agreements that incorporate mechanisms to capture better local data on spatial patterns of fishing effort, bycatch, and landings to facilitate the refinement over time of a regional area-based management plan. We have reduced the fishing footprint, reduced bycatch of 6 overfished species, and increased economic returns to participating fishermen. Collaborative research (eg. on trawling impacts), near real-time capture of spatial fishery information, performance metrics, and modeling have informed adaptive management of the fishery. As the fishery has transitioned to an Individual Transferable Quota ("catch shares") system, we are using spatial fishery plans to further reduce bycatch of overfished species and maximize fishing opportunities in the "working seascape" outside of protected areas to achieve significant conservation and economic gains.

2011-12-06 14:00 Understanding the Connections between Birds and People in Urban Areas Informs Conservation

Marzluff, JM*, *University of Washington;*

Urban bird communities can be extraordinarily diverse and engaging to human residents, yet fragile. I discuss the diverse and stimulating nature of urban bird communities and investigate the direct connections between human attitudes and actions and bird behavioral, ecological, and evolutionary responses. The response of birds to land cover change, resource supplementation, and persecution in urban areas is especially pronounced. Conserving birds in urban areas requires an understanding of these responses, and it may be enhanced by a mechanistic understanding of how human actions affect bird population processes (size, reproduction, survivorship, and dispersal in particular). While ecologists understand that population viability determines community richness, in most studies of avian ecology in urban areas population ecology is ignored. Rather, avian ecologists typically enumerate species richness and relate this metric directly to human actions. I will consider what, if anything, we lose by our focus on richness over mechanistic understanding. Those interested in conserving birds in urban areas face the challenge of balancing the needs of birds with those of people. I will argue that the more we understand the myriad direct, indirect, reinforcing and destabilizing connections between the populations of birds and people the more effective will be our efforts to conserve the urban biota.

2011-12-09 15:30 Marine protected areas and poverty alleviation: Insights from Papua, Indonesia

Mascia, Michael B.*, *WWF-US;* **Pakiding, Fitryanti,** *UNIPA;* **Fox, Helen E.,** *WWF-US;* **Glew, Louise,** *WWF-US;*

Marine protected areas (MPAs) are an integral component of local, national, and international strategies for biodiversity conservation, but their impacts on human well-being remain contested. Advocates tout MPAs as a 'win-win' strategy that simultaneously alleviates poverty and conserves biodiversity, while skeptics argue that MPAs place the welfare of fish above that of impoverished fishing communities. To inform this debate, we initiated a pilot study to develop and test rigorous, quasi-experimental methods for documenting the social impacts of MPAs. We examine MPA impacts on ~30 indicators of social well-being across five social domains: economic well-being, health, political empowerment, education, and culture. We characterize the governance of marine resources in MPA and matched non-MPA communities, enabling us to explore if, and how the long-term impact of MPAs is shaped by the intervention itself. Baseline results from Teluk Cendrawasih National Park and Teluk Mayalibit KKLD highlight the importance of research design, sampling power, and measuring human well-being in multiple dimensions. Future research will continue to follow these sites and others over time, laying the foundation for rigorous documentation and exploration of protected area-poverty linkages.

2011-12-09 14:45 Conservation in a human dominated landscape of Rwanda: What can we learn from the last decade of conservation of Nyungwe National Park?

Masozera, Michel*, *Wildlife Conservation Society;*

Conservation in Rwanda must be understood in the context of that nation's recovery from a civil war and genocide and its chronic underlying problems of poverty, landlessness, and high population density. The newly created Nyungwe National Park is recognized sites of global importance for its biodiversity and endemism values. This park is also seen as primary source of tourism revenue and ecological services, such as water catchment, water supply, erosion control, and hydroelectric development potential. To address major threats to Nyungwe such as poaching and illegal cutting of forest woods, mining, and wildlife fire the park management has implemented a number of strategies ranging from law enforcement, community based conservation through enterprises development, tourism revenue sharing and establishment of conservation committee at village levels. A ranger based monitoring program (RBM) has been introduced to monitor key animal species and threats to biodiversity as well to assess the effectiveness of these solutions and refine future management actions as threats change in importance over time. Our experience demonstrates that RBM information collected has been useful in guiding management actions of the park especially in deciding to change the status of Nyungwe as a National Park. But to maintain the accuracy in data collection capacity building is necessary for field staff involved to understand why this information is collected and how the results are integrated in the park planning process. We have also realized that RBM information can have a wider impact if shared with local government authorities (district leaders) and development partners around Nyungwe National Park through joint action forum meetings. The lack of baseline information on socioeconomic conditions around Nyungwe hampers our ability to precisely quantify the impacts of conservation interventions on local livelihoods

2011-12-09 16:50 Higher survival and site fidelity of subadult than adult saddlebacks translocated to the New Zealand mainland

Masuda, Bryce M.*, *Department of Zoology, University of Otago;* **Jamieson, Ian G.,** *Department of Zoology, University of Otago;*

Post-release mortality and dispersal can limit the effectiveness of animal translocations as a conservation management tool. However, by selecting and releasing individuals with a higher probability of survival and site fidelity, conservation managers can increase the likelihood of a successful translocation. We monitored a South Island saddleback (Philesturnus carunculatus carunculatus) population for one year after release to understand the role of three individual characteristics (sex, age, and previous pairing history) and post-release mortality and dispersal on initial population establishment. Thirty-eight saddlebacks were translocated to a fenced mainland sanctuary near Dunedin, New Zealand in April 2009. Immediately following release, survival declined sharply in a similar fashion to post-release mortality observed after saddleback translocations onto offshore islands. Individuals continued to disappear more gradually from the sanctuary until after the start of the breeding season five months after release, likely due to dispersal. At one year after release, significantly more subadults survived and remained at the release site compared to adults. Our results suggest that releasing a greater proportion of subadults than adults could have a positive effect on reintroduction outcomes. Our results emphasize the importance post-release monitoring in reintroductions to determine individual characteristics associated with a higher probability of survival and site fidelity.

2011-12-08 18:30 Crop-Raiding Patterns of Wildlife and Damage Mitigation around Moukalaba-Doudou National Park in Gabon

Matsuura, N*, *Kyoto University, Japan;*

Several conservation programs exist in central Africa, but management of the protected areas has been difficult, which can be partially attributed to the conflicts between conservation agencies and local communities. In particular, wildlife damage to crops is a major source of conflict because it threatens the survival of the local people. Therefore, it is essential to monitor and mitigate the actual damage to the fields by including the efforts of the local people. The author examines crop raiding by wildlife around Moukalaba-Doudou National Park in southwestern Gabon. Forty-three local people (28 males and 15 females) were interviewed about the extent and characteristics of crop raiding by several species. The fields of several locals were also monitored for about two years to assess actual crop damage by wildlife. Interview data indicated that according to the locals, crop raiding, especially by elephants (Loxodonta africana cyclotis), is one of the most serious problems in the community, and they spend considerable time, physical effort, and money to protect their fields. Quantitative data from monitoring shows that crop raiding by large mammals is not frequent, but the extent of damage is large in one such event. On the basis of the results and discussions with local people, the author suggests that community guarding is an effective and sustainable method for mitigating damage.

2011-12-07 13:15 Marine Conservation and Satellite Telemetry: A Review and Framework for Effective Applications

Maxwell, SA*, *Marine Conservation Institute;* **Hart, KM,** *US Geological Survey;* **Costa, DP,** *University of California Santa Cruz;* **Crowder, LB,** *Stanford University;*

Satellite telemetry has emerged as one of the most prominent technologies in marine science and is a powerful conservation tool given the spatial nature of many management strategies. Despite resources applied to this costly technology, however, telemetry has yet to be used on a large scale to effectively drive conservation and management decision-making. We reviewed over 200 peer-reviewed articles focused on the satellite tracking of marine mega-fauna in major conservation and ecological journals to determine: (1) the focus of conservation telemetry studies; (2) the global distribution of studies; and (3) the level of quantification and resulting conservation impacts. The majority of studies focused on bycatch or protected areas, though only 40% of studies quantified telemetry study components, making outputs unable to adequately inform management. We found uneven geographic distribution of studies, with study sites in North America, Europe and Australia comprising over 56% of studies reviewed, with 34.4% of studies originating in South America, Africa and Asia; Antarctica accounted for remaining studies. Many studies lacked solid recommendations resulting from telemetry outputs. Based on our review, we detail an empirically-based framework that (1) emphasizes how resource managers can use telemetry as a powerful management tool, and (2) guides researchers who employ telemetry in conducting studies in a cost-effective way that maximizes aid to management decisions.

2011-12-09 14:44 The drivers of tropical deforestation: a comprehensive review of the literature

MAY-TOBIN, CALEN*, *Union of Concerned Scientists;* **Boucher, Doug,** *Union of Concerned Scientists;* **Elias, Pipa,** *Union of Concerned Scientists;* **Lininger, Katherine,** *Union of Concerned Scientists;* **Roquemore, Sarah,** *Union of Concerned Scientists;* **Saxon, Earl,** *Union of Concerned Scientists;*

Tropical forests are disappearing around the world. This clearing causes around 15% of global carbon emissions, leads to the rapid loss of biodiversity, and destroys the livelihoods of many indigenous peoples. We comprehensively reviewed the literature on drivers of tropical deforestation and found a number of trends. While deforestation was predominately driven by small farmers and government action in the 1970s and 1980s, since the 1990s most deforestation has been driven by large scale commercial agriculture. In Latin America, and Brazil in particular, forest clearing has mostly been due to expansion of cattle pastures and for a period in the late 1990s and early 2000s soy bean expansion. In Southeast Asia, deforestation has mainly been due to expansion of oil palm plantations and timber harvesting. In Africa small farmers and wood fuel collection still play a role, although deforestation rates are considerably lower there than in other regions. Additionally, increased urbanization and trends toward a diet based on meat, particularly beef, have helped drive deforestation. While deforestation continues, there are many ways that society can act to end it. Citizens can pressure companies to change their practices and no longer produce goods on deforested lands. Likewise, policies that increase productivity of tropical agriculture and provide a monetary value for maintaining intact forests can help conserve forests and benefit local communities.

2011-12-08 18:30 Discovery and implementation of charismatic species in the Chilean Long-Term Socio-Ecological Research (LTSER) Network

Márquez-García, M*, *Instituto Milenio de Ecología y Biodiversidad (IEB);* **Caballero, P,** *Instituto Milenio de Ecología y Biodiversidad (IEB), Parque Etnobotánico Omora;* **Díaz-Forestier, J,** *Instituto Milenio de Ecología y Biodiversidad (IEB), Fundación Senda Darwin;* **Hernández, CC,** *Instituto Milenio de Ecología y Biodiversidad (IEB), Centro de Estudios Avanzados en Zonas Áridas (CEAZA);* **Marcelo, W,** *Instituto Milenio de Ecología y Biodiversidad (IEB), Fundación Senda Darwin;* **Marticorena, FL,** *Museo Antropológico Martin Gusinde;* **Armesto, JJ,** *Instituto Milenio de Ecología y Biodiversidad (IEB), Pontificia Universidad Católica de Chile;* **Rozzi, R,** *Instituto Milenio de Ecología y Biodiversidad (IEB), University of North Texas*

Charismatic species are attractive species for the general public which can be used to raise environmental awareness. The Science Outreach Program of the Institute of Ecology and Biodiversity (IEB) has been developing a strategy of charismatic species that stimulates the dialogue between science and society for nature conservation, in the three long term socio-ecological research sites in Chile (30°, 42° y 55°). As the focus of the study was to identify charismatic flora and fauna in these sites from local community perception, and not only from esthetic or ecological criteria defined a priori, we chose a variety of methods. We used questionnaires, interviews with key stakeholders and documentary sources analysis. The results showed a distinct preference and major identification with alien, domesticated and edible flora and fauna, instead of native species that are mainly researched by scientists. Anyway, it was possible to identify popular native species for local community, with the potential to motivate conservation actions. These results allowed us to design divulgation activities that promote the valuation of the selected species. During the first stage of implementation, we produced teaching material as documentaries, field guides, calendars, reusable bags and playing cards. This strategy integrates traditional and scientific knowledge, emphasizing that biological and cultural conservation requires a participative process where knowledge is generated and used jointly.

Date 15:15 Modelling the behaviour of local resource users: grazing, the environment, and institutions

McAllister, RRJ*, *CSIRO Ecosystem Sciences;*

A key determinant of the sustainability of natural resource use is the effectiveness of institutions (governance). Critically, institutions play a role in matching the scale of natural resource management to underpinning ecological processes. This issue is strongly demonstrated in dryland systems (arid, semi-arid, dry subhumid), where extreme resource variability across time and space is a pervasive feature. In drylands the environment is not sufficiently fertile, moist or predictable for cropping or other intensive forms of agriculture, yet around 400 million people from around the globe depend on dryland resources for their livelihood, mainly through livestock production. The key to thriving in such climates, where livestock-based livelihoods are tightly coupled with the environment, is in managing variability. In this talk we present an economic model for managing environmental risk. The model, based on modern portfolio theory, unpacks the trade-offs between coping with variability over time and space. This provides a basis for understanding the role of institutions in using dryland natural resources sustainably.

2011-12-09 17:00 An experimental test of environmental decision theory

MCCARTHY, MA*, *The University of Melbourne;*

This presentation reports the results of an experimental test of environmental decision theory, a high-profile and vibrant research field. Environmental decision theory encompasses a range of methods that seek optimal solutions to solve environmental management problems. It has been applied to numerous topics in conservation biology including reserve design, allocation of funding to endangered species, surveillance for threatened and invasive species, and optimal management of threatened species. Despite its widespread and growing use, applications of environmental decision theory have not been tested experimentally. I report on an experimental test that examined the ability of environmental decision theory to maximize the detection of five different plant species by field surveyors. Optimal surveillance design is sensitive to detection rates. Expert plant ecologists searched nine quadrats for species in which the detection rates were controlled by modifying their abundance. The predicted benefits of environmental decision theory, as measured by the ability to increase detections of these species, were realized in the experiment. This experimental test demonstrates the potential of using decision theory to optimize detection of rare species, whether they are threatened or invasive.

2011-12-08 18:30 Slow and steady: demographic and genetic trends of wood turtle populations

McColl, CA*, *Central Michigan University;* **Willoughby, JR,** *Central Michigan University;* **Lewis, TL,** *University of St. Thomas;* **Swanson, BJ,** *Central Michigan University;*

Populations of wood turtles, Glyptemys insculpta, have steadily decreased over the past 30 years due to the destruction and degradation of necessary habitat. We examined populations of wood turtles in Michigan, USA to determine the distribution of populations, quantify demographic trends, and measure the effect of declining population size on genetic diversity. Wood turtle samples (n=68) were collected from 3 rivers in the Lower Peninsula of Michigan and amplified at 9 microsatellite loci. The programs STRUCTURE and BAPS identified 2 populations that split sampling sites between a North and South population. In both populations, MSVar analysis of genealogies estimated r<0, indicating demographic decline. However, FIS values generated in GENALEX suggested little to no inbreeding has occurred (average North FIS=0.25, average South FIS=0.23) and no evidence of a bottleneck was detected using the program BOTTLENECK (p=0.303 North, p=0.290 South). The relatively high genetic diversity observed in the North and South populations, which is uncommon to find in declining populations, is likely due to immigration between the two populations (FST=0.043) coupled with the long lifespan of the wood turtle. The steady demographic decline observed and the slow loss of genetic diversity presents a unique conservation opportunity to improve populations demographically without the added cost and considerations necessary in conservation of genetically depauperate populations.

2011-12-07 11:45 Development of novel quantitative approaches for prioritizing eradications

McCreless, E*, *Univ. of California, Santa Cruz;* **Wilcox, C,** *CSIRO ;* **Spatz, D,** *Univ. of California, Santa Cruz;* **Newton, K,** *Univ. of California, Santa Cruz;* **Croll, D,** *Univ. of California, Santa Cruz;* **Tershy, B,** *Univ. of California, Santa Cruz;*

Removal of introduced animals from islands is an increasingly utilized conservation tool that has protected and restored native populations on more than 700 islands worldwide. However, the global scale of invasions on islands greatly outweighs conservation resources; estimates indicate that at least 40% of the world's 180,000 islands, or 72,000 islands, host at least one invasive animal species. Thus, eradication projects must be prioritized. Eradication benefits and costs vary widely across islands and political boundaries, and incorporating both biodiversity and cost in conservation prioritization results in more efficient use of scarce resources. We use two mathematical optimization techniques, integer programming and simulated annealing, to tackle the island prioritization problem. Integer programming identifies sets of islands to meet specified biodiversity conservation goals while minimizing the cost of attaining those goals. Simulated annealing allows us to maximize a variety of biodiversity benefits simultaneously – for example, selecting islands to jointly maximize the abundance of rare species and the evenness of species distributions on selected islands. We illustrate island prioritizations at regional and global scales, and demonstrate the utility of these tools for helping managers and funders improve the conservation return on investment from eradication projects.

2011-12-08 13:00 When to move a species in the face of climate change.

McDonald-Madden, E.*, *University of Queensland and CSIRO Ecosystem Sciences;* **Runge, M.C.,** *United Stages Geological Survey;* **Possingham, H.P.,** *University of Queensland ;* **Martin, T.G.,** *CSIRO Ecosystem Sciences;*

A highly controversial biodiversity adaptation strategy to combat negative climate change impacts is managed relocation. While the scientific community debates the merits of managed relocation, species are already being moved to new areas predicted to be more suitable under climate change. Hence, guidance on when to implement managed relocation

is urgently required. Using decision science thinking, we construct a framework to guide the timing of relocation given climate change. Counter-intuitively, we show that in some circumstances it may be optimal to wait and allow small populations to grow before moving them. Where there is uncertainty about the impact of climate change, it can be advantageous to wait and learn. These counterintuitive results show the importance of our framework for aiding decision-making on the timing of manage relocation. Our framework advances decision-making in the face of uncertainty about climate change.

2011-12-07 11:00 Niche Partitioning and Ontogenic Changes in Feeding Habits of Green Sea Turtles (Chelonia mydas) at a Foraging Ground in the Central Pacific

McFadden, K*, *American Museum of Natural History;* **Sterling, E.,** *American Museum of Natural History;* **Arengo, F.,** *American Museum of Natural History;* **Vintinner, E.,** *American Museum of Natural History;* **Gomez, A.,** *American Museum of Natural History;* **E. Naro-Maciel,** *City University of New York, Staten Island;*

Juvenile green sea turtles are thought to spend several years in surface pelagic habitat prior to recruiting to neretic foraging grounds at 25-35 cm curved caparace length (CCL). After recruitment, the prevailing hypotheses suggest they switch from an omnivorous foraging strategy to a more herbivorous adult diet. However, data on the range of variation in feeding behavior of newly recruited, immature, and mature green sea turtles remains poorly understood. In this study, we examine the variability in feeding habits of different stage classes of green sea turtles at a major foraging ground at Palmyra Atoll in the Central Pacific Ocean using stable carbon and nitrogen isotopic analyses of turtle tissue samples in order to better understand the ecological requirements of these globally endangered species. A one-way ANOVA indicated a significant bimodal distribution in ,15N signatures with the smallest groups of turtles (< 59.9 cm CCL) and largest turtles (> 90 cm CCL) having enriched ,15N signatures compared to turtles 60.0 - 89.9 cm CCL ($p < 0.05$). This suggests that new recruits and adults of breeding size may consume prey items higher on the trophic chain compared to medium sized turtles. The smallest turtles (< 49.9 cm CCL) were significantly depleted in ,13C values compared to all other sized turtles and may suggest that new recruits retain some signatures of their previous planktonic foraging habits. An understanding of the possible ontogenetic shifts in feedings habits and changes in their reliance on various prey items is necessary for effective species and habitat conservation.

2011-12-06 11:45 Resistant kernel modeling of landscape connectivity at multiple scales: a case study involving marbled salamanders in central Massachusetts, USA

McGarigal, Kevin*, *University of Massachusetts;* **Compton, Brad,** *University of Massachusetts;* **Cushman, Sam,** *USDA Forest Service, Rocky Mountain Research Station;* **Whiteley, Andrew,** *University of Massachusetts;* **Gamble, Lloyd,** *US State Department;*

Population dynamics of vernal pool-breeding amphibians take place at multiple scales, representing pool-centered breeding, and connectivity to local upland habitat, to neighboring pools, and among regional clusters of pools. Strategic conservation must take connectivity at these multiple scales into account. We developed a model of connectivity for the marbled salamander (Ambystoma opacum) in Massachusetts, and applied it to nearly 30,000 potential vernal pools across the state. This model is based on the resistant kernel estimator, a modification of the standard kernel estimator that takes landscape resistance into account. The model is parameterized with data from an intensive long-term demographic study of a single metapopulation and an extensive landscape genetics study. We used inferred rates of gene flow among populations to empirically estimate landscape resistance for dispersal between pools. Model results rank pools in Massachusetts by an integrate measure of local, neighborhood, and regional connectivity. Results suggest that the most connected pool complexes occur in areas with rapidly increasing suburban development. A sensitivity analysis suggests that pool rankings are relatively insensitive to uncertainty in parameter estimates. This connectivity model can be an important tool in prioritizing conservation areas and demonstrates the usefulness of resistant kernel estimators for connectivity modeling.

2011-12-09 14:52 From policy to practice via the science of invasion biology

McGeoch, MA*, *South African National Parks and Centre for Invasion Biology;*

International policy responses to biological invasion have increased significantly over the last four decades. However, trends in the numbers of alien species and the threat that they pose to species extinction risk have increased over the same period. The Convention on Biological Diversity's 2020 Aichi Target for invasive alien species nonetheless remains largely similar to previous targets. The interplay between policy, monitoring and reporting on the status of biological invasion, and implementing actions to manage this environmental problem is thus not always clear. The science of biological invasion has an important contribution to make here. It has provided the basis for sound policy and management to date, and has also identified and illustrated the caveats and connections between policy and prevention and control activities. This has been clearly apparent at global, national and protected area scales. The fields of science most relevant in this context have been systematics and vector ecology, although evidence of the impact of invasive species on biodiversity has been essential for motivating the policy response at all levels. Although science plays a unifying role in the management of biological invasions, focussed effort by invasion biologists is needed to realise this.

2011-12-06 12:30 Future Ocean Governance in [Aotearoa] New Zealand: Linking Science to Policymaking

McGinnis, Michael Vincent*, *Institute of Policy Studies, School of Government, Victoria University of Wellington, PO Box 600, Level 5, West Wing Railway Building, Bunny Street ;*

The changing character to the world's oceans and coastal ecosystems will make ecological sustainability a significant challenge. Global climate disturbance and the over-use of coastal marine resources have synergistic impacts on coastal marine ecosystems. A sector-by-sector approach to ocean governance will prove irresponsive to these cumulative impacts. New Zealand does not have a comprehensive coastal marine governance framework in place that can protect marine life. In addition, the country does not require environmental assessments for proposed use of marine areas beyond 12 nm. Yet, the country has begun to lease marine areas for aquaculture, marine mining and offshore oil development. A range of planning tools are described that can improve and strengthen New Zealand's ocean governance framework, including marine spatial plans, marine zoning, and the designation of marine protected areas or MPAs in support of marine life. These planning tools should include stakeholders, policymakers, and scientists in public planning activities that cut across sectors, interests, and issue areas.

2011-12-08 18:30 Gathering Scientific Input to Government Conservation Policy-making: A Case Study Highlighting Ecological Processes

McGregor, AM*, *Environmental consultant;* **Bennett, AF,** *School of Life & Environmental Sciences, Deakin University;*

How can scientific knowledge and the 'accumulated wisdom' of experienced ecological scientists be efficiently gathered to inform government conservation policy-making? In the State of Victoria, Australia, a two-part project was commissioned by an alliance of environmental non-government organisations. A range of scientists, other relevant professionals and practitioners were consulted via workshops, extended interviews and discussion groups. Their views were compiled regarding the condition and importance of the ecological processes that sustain biodiversity in Victoria, and consequently the policy priorities for their management and conservation. The resultant reports distilled the findings as credible, well-informed and focussed input to preparation of the State Government's long-term policy on biodiversity and land health. Further benefits arising from the project included: 1) it stimulated new ways of thinking about conservation priorities in Victoria; 2) it fostered greater interaction among and between ecologists, policy analysts and conservation groups; and 3) the credibility of the recommendations was enhanced by both the breadth and reputation of those participating and the production of peer-reviewed publications.

2011-12-08 18:30 An Inconvenient Tree: Inherent Trade-offs Between Carbon Capture and Invasion Risk

McGregor, KF*, *The Bio-Protection Research Centre, PO Box 84, Lincoln University, Lincoln 7647, New Zealand;* **Watt, MS,** *SCION, PO Box 29237, Fendalton, Christchurch, New Zealand;* **Hulme, PE,** *The Bio-Protection Research Centre, PO Box 84, Lincoln University, Lincoln 7647, New Zealand;* **Duncan, RP,** *The Bio-Protection Research Centre, PO Box 84, Lincoln University, Lincoln 7647, New Zealand;*

Climate change is widely acknowledged to be a serious threat to global biodiversity, leading many governments to commit to reducing carbon emissions though carbon sequestration via afforestation of marginal land. In many countries, non-native conifers are likely to be the preferred choice for such schemes due to their rapid growth rates and economic value. However, many conifers are also known to be highly invasive, leading to a trade-off between carbon capture and future invasion risk. Therefore, it would be desirable to know which species pose a significant risk. Predicting invasions can be problematic, with a range of biogeographic, biological and human factors interacting to influence invasion risk. We used the commercially important genus Pinus to quantify introductions and invasions in New Zealand and Great Britain in order to tease apart the effects of different factors on invasion success, with the aim of quantifying risk. We show that common patterns in selection at the introduction stage for species with a good climate match to the recipient region and a suite of life-history traits related to fast reproduction, are mediated by introduction effort to co-determine the probability of invasion. Our results highlight the inherent conflicts between afforestation for carbon capture and future invasion risk.

2011-12-06 11:45 Nature's Last Stand: Protecting Remote Areas Critical to Conserving Biodiversity

McInturff, Alex*, *Stanford University;* **McCauley, Douglas,** *Stanford University, Hopkins Marine Station;* **Micheli, Fiorenza,** *Stanford University, Hopkins Marine Station;*

Remote areas have sustained some of the world's most intact and fully functioning ecosystems. These places face underestimated threats from accelerating human population growth and resource use. We argue that remote zones deserve increased conservation attention, as protection can ensure they remain storehouses of unique natural wealth. To facilitate this protection, we have created a map specifying critical remote places where inaccessibility and biodiversity are highest. We combine data on travel time to the nearest city (>50,000 people; 1km2 resolution) with the most current data (100km2 resolution) on bird, mammal, amphibian, and plant species richness distributions in a novel attempt to identify the world's most remote and biodiverse places. We compare these priority remote areas with current distribution of protected areas, and assess global and local correlations between remoteness and biodiversity. Products from this effort help delineate specific, important, and achievable conservation targets and help guide priority setting in conservation. We believe that by protecting the regions highlighted in this effort we can establish strongholds of biodiversity that may become critical to the future of global conservation.

2011-12-06 17:15 Valley oak recruitment: climate change, community dynanics and the importance of regional-scale resourse gradients

McLaughlin, BC*, *UC Santa Cruz;* **Zavaleta, E,** *UC Santa Cruz;*

The ability to anticipate and prepare for climate change is a major focus in conservation ecology. Bioclimate models are one of few available predictive tools for adaptation planning, but are often limited in their ability (1) to account for local-scale movement and interactions and (2) to account for climatic tolerances in life-stages other than the adult, which may be more vulnerable to warming. We assess the species' bioclimate model projections for California valley oaks (Quercus lobata) against actual demographic patterns in the projected expanding, persisting and contracting areas of the current distribution, and evaluate whether patterns of sapling recruitment in these areas correspond to the projected shifts. Ours is the first study we know of to identify emergent climate-related constriction of a species around microrefugia. Additionally, key climate parameters associated with oak saplings are different from those associated with adults. Sapling recruitment appears to be restricted to cooler and wetter sites than is reflected in the distribution of adults, suggesting that a model parameterized by adult-stage distribution data may overpredict the potential for an adaptive shift. Particularly in species with complex life histories, analyses of life-stage vulnerability to climate change and the identification of landscape-scale microrefugia are central to understanding climate-related species movement. Targeted biological fieldwork on changes in spatial demographic patterns could improve the reliability of projected species responses to climate change.

2011-12-08 18:30 Broad and fine scale habitat preferences of an endangered marsupial, the Sandhill Dunnart (Sminthopsis psammophila) in a semi-arid environment

McLean, AL*, *The University of Adelaide;* **Philp, B,** *The University of Adelaide;* **Lancaster, ML,** *The University of Adelaide;* **Carthew, SM,** *The University of Adelaide;*

Since European settlement there have been dramatic and widespread changes to Australia's natural environment. As a result a number of plant and animal species have become extinct or endangered. In recent times, mineral exploration activities and the commissioning of new mines in pristine semi-arid areas have exacerbated these problems. One species threatened by mining is the nationally endangered Sandhill Dunnart (Sminthopsis psammophila). For management plans to be implemented, habitat requirements of the species need to be understood. On the Eyre Peninsula, South Australia (one of three core remaining strongholds), we investigated broad- and fine-scale habitat requirements of S. psammophila to gain an understanding of species distribution and how individuals move through and use the vegetation available. Additionally, we explored whether the age of the habitat post-fire influences these aspects of the species' ecology. Data are still being gathered but preliminary results suggest that the age of habitat post-fire will influence the distribution of S. psammophila, as fire affects the structure of Triodia irritans, a Spinifex grass species that S. psammophila uses for shelter and foraging. Our results will be used to inform mining and government agencies on appropriate burning and land management regimes to ensure the persistence of this species.

2011-12-09 17:02 Playing conservation catch up for data deficient organisms – data mining for Queensland macrofungi

McMullan-Fisher, SJM*, *Fungimap;* **May, TW,** *RBG Melbourne;*

Extremely few macrofungi are formally listed on conservation schedules in Australia or globally, due mainly to the perception that most species of fungi are data deficient. For the Australian state of Queensland, newly available databased herbarium records were accessed in combination with an electronic name list to compile a list of macrofungi for the state. Significant holdings of macrofungi exist in herbaria outside the state, hence the need to access the aggregated holdings of Australia\'s Virtual Herbarium. Access to an up-to-date name list was also vital, to prevent synonyms (which can be numerous) from being treated separately. Among the 1035 species of basidomycete macrofungi recorded from Queensland, 45% are represented by only single collections, while 14% are known from 10 or more collections. Taking into account the number of collections and the spread of distribution, our data allow ~200 species to be considered not at risk, at least as far as rarity. Among the remaining species, ~100 distinctive species have been identified for targeted surveys, especially aimed at community groups such as Fungimap. Such surveys, which utilise networks of recorders dispersed across the state, have the potential to confirm rarity and distribution and enable formal listing under state and national legislation.

2011-12-08 18:30 Bushmeat, commodities and climate. An econometric analysis of the supply of bushmeat to an urban market in south west Ghana.

McNamara,J*, *Imperial College, Zoological Society of London, Grantham Institute for Climate Change;*

The forests of the Ashanti Region in central-southwest Ghana provide numerous goods and services upon which many rural households depend, both for income and for sustenance. One of the key ecosystem services from which humans have historically derived benefit is bushmeat. The exploitation of bushmeat sits within the context of other livelihood options, in particular farming, and provides valuable income in times of hardship when other revenue streams and food stuffs are not readily available. As a result, the decisions taken by hunters as to whether to hunt, what to hunt and how to hunt are influenced by a variety of factors including climate, fuel prices, availability and cost of alternative goods and the price of bushmeat in local markets. Using a data collected over 27 years from a central bushmeat

market in Kumasi, Ghana, an econometric analysis was conducted to determine to what degree fluctuations in key commodities influence the supply of bushmeat into the market. Although bushmeat supply was shown to be relatively constant over this period, there were significant changes in species composition entering the market and climatic variation was shown to play a major role in explaining changes in overall biomass entering the market. The results indicate, that changes in rainfall patterns may have consequences for the overall intensity of hunting in the region and ability of certain species to persevere under increased levels of exploitation.

2011-12-07 14:00 Through the lens of time: Evaluating success in the longer term

McNeely, JA*, *IUCN;*

Many conservation initiatives, based on sound principles of conservation biology, have proven their success over time. Many sacred sites, for example, have served a conservation function for hundreds, perhaps thousands, of years based on what, in retrospect, are sound biological principles. And constraints on human behavior that serve a biologically-sound conservation function, such as taboos on hunting females during breeding seasons, have also proven their worth. But early success is no guarantee of sustainability, especially with social, economic, political, and ecological conditions changing rapidly in many parts of the world. If a protected area established for the conservation of certain species and ecosystems is no longer effective when climates change, what responses are available to conservationists? How can conservation biology inform more durable approaches to conserving biodiversity and ecosystem services? How can political and public support enable these new approaches? What are the risks posed by greater flexibility in conservation? What are the potential gains? And how are these costs and benefits to be assessed? This presentation will suggest some options for consideration, suggesting that eternal vigilance in monitoring the effects of conservation measures should be a fundamental principle of conservation biology.

2011-12-07 14:15 Status and trends of high conservation value forests in Asia

McNeely, JA*, *IUCN;*

Asia contains a vast diversity of forest types, from the taiga of Siberia to the tropical rainforests of Indonesia. These include some of richest forests in the world, in terms of genes, species, and ecosystems (biodiversity). They also include a diversity of approaches to forest management, though virtually all countries (Iraq is an exception) have protected areas and agencies devoted to forest conservation. Asia also supports about half of the world's human population, and their increasing demands are putting greater pressure on the forests in terms of direct harvesting, replacement of species-rich forests with monospecific plantations, and overharvesting of forest products. A few countries, such as Japan and China, have reduced the rate of forest loss, compensating by imports of timber and other forest products from other countries (called "displacement" in the climate negotiations). Others, such as Thailand, have virtually halted the harvest of old-growth forests, depending on plantations for most domestic needs. But the vast majority of Asian countries are losing their forests, though at variable rates. Forest conservation includes assigning management rsponsibility to local communities (community-based forest management), strengthening forest management agencies, and devoting particular attention to conserving forests of high conservation value. This presentation will review the status and trends of high conservation value forests in each country, the conservation measures being taken, and ways that the international conservation community can help support these critically important forest resources.

2011-12-08 14:00 Swimming in the Alphabet Soup: Key opportunities and challenges of global conventions and programs

McNeely, JAGovernments have now established a reasonably comprehensive international framework of conventions for conserving biodiversity and ecosystem services. These include, among others, the Convention on Biological Diversity (CBD), the Convention on*, *SCB;*

Governments have now established a reasonably comprehensive international framework of conventions for conserving biodiversity and ecosystem services. These include, among others, the Convention on Biological Diversity (CBD), the Convention on Wetlands of International Importance (Ramsar), the Convention on Migratory Species (CMS), the Convention on the Law of the Sea (LOS), the World Heritage Convention (WHC), and the Convention on International Trade in Endangered Species (CITES). These have been supplemented by programs such as the UNESCO Man and the Biosphere Program (MAB) and the new Intergovernmental Platform on Biodiversity and Ecosystem Services (IPBES). The multitude of instruments may seem daunting, but they offer conservation biologists many opportunities for influencing policy at local, national, and international levels. This presentation will provide guidance on how to do so effectively.

2011-12-09 14:30 A New Conservation Ethic - Can conservation survive without indigenous peoples?

Mead, ATP*, *IUCN CEESP, Maori Business (VMS);*

Indigenous peoples and conservationists have strong values and visions for the wellbeing of the environment, but historically and up to this day, they have been and are still often in conflict with each other at national, regional and international levels. Two sectors of society who should be able to find common ground relatively easily and yet are often at opposite ends of environmental and indigenous development issues. The cause of the conflict is not just 'personal' or emotive at a 'local' level, it has been entrenched in global conservation policy on issues such as diverse as the designation of protected areas, sustainable livelihoods of indigenous and local communities, sustainable harvesting of whales or other threatened species, genetically modified organisms, biofuels, indigenous land settlements, to name but a few. At the heart of many of these conflicts are not only differences in approaches to conservation but also to economic development. There are a multitude of global initiatives underway which signal a rapidly growing movement amongst indigenous peoples and citizens generally, to look beyond capitalism without boundaries, and consider a future which requires us to make more of a commitment to nature - to Mother Earth. For example, the Earth Charter, the World Assembly of Inhabitants, the Vth World Parks Congress Durban Accord, the UN Declaration on the Rights of Indigenous Peoples, the Bariloche Declaration, the Draft Universal Declaration of the Common Good of the Earth and Humanity, the CEESP Conference, "Sharing Power: A New Vision for Development", and others. Many of these initiatives advocate a rights-based approach to conservation. What is a rights-based approach to conservation? What methods have proven successful for implementing rights-based approaches that achieve measureable progress? What concrete benefits can be expected from its adoption and implementation? Who will enjoy those benefits? This presentation examines the notion of a 'new conservation ethic' which brings together indigenous peoples and conservationists through a common ethical framework.

2011-12-07 14:45 Lessons Learned from the Conference 'Sharing Power: A New Vision for Development'

Mead, ATPM*, *Chair, IUCN CEESP; Snr Lecturer, MBUS-VMS;*

January 12-15, 2011, the IUCN Commission on Environmental, Economic & Social Policy (CEESP) convened a global Conference called 'Sharing Power: A New Vision for Development in Whakatane, NZ. The Conference was a partnership between two global organisations/networks - the International Union for the Conservation of Nature (IUCN) and the IUCN Commission on Environmental, Economic & Social Policy (CEESP), and two Mäori (indigenous) organisations, Te Rūnanga o Ngāti Awa (a tribal authority) and Te Whare Wānanga o Awanuiārangi (a tribal university). The Conference brought together over 180 scientists, economists, indigenous leaders, environmentalists, academics, policy makers in national governments and international agencies, and many others who care about the quality of heritage this generation passes on to future generations, from 47 countries. Structured over four working days, with plenary sessions and ninety-eight presentations in workshop sessions, participants looked at the need for policy and decision makers in governments and corporations to accommodate a greater level of inclusion of indigenous peoples and all citizens, in national and international policies on the management and governance of bio-cultural resources, and advocates the rights of mother earth – the planet. Keynote speakers included; Elinor Ostrom (Nobel winner in Economics 2009), Ashok Khosla (President of IUCN and the Club of Rome), Winona La Duke (Honour the Earth,

Anishaanabe) and Hirini Moko-Mead (Te Whare Wananga o Awanuiarangi, Ngati Awa). Sharing Power as a theme, explored de-centralisation in the governance and management of bio-cultural resources. Speakers looked at how to enable indigenous peoples and local communities to have greater rights and responsibilities in governance and management of the landscapes and ecosystems they live in and near. What are some of the successful models of indigenous and community managed natural resources? How can all people better exercise their citizenship responsibilities to the environment? A New Vision for Development assumed the current capital based model has flaws that have created social and economic inequities, and lead to large scale environmental damage. Speakers tackled questions such as; what other development models exist? What are the key components of shared responsibility in conservation management and governance change necessary to ensure a sustainable future? How can local and indigenous visions of development with sustainable conservation be nurtured? This presentation will provide highlights on the outcomes of this highly successful Sharing Power Conference.

2011-12-07 11:45 Conservation, sustainable use, and economic development: land owners, academia, and government working together in Mexico

Medellin, RA*, *Institute of Ecology, UNAM/Arizona-Sonora Desert Museum;*

It is now more than clear that conservation can only be achieved with the resolute support of the land owners and other stake holders. It is our duty as conservation professionals to make this a reality. Over the past 15 years, Mexico has expanded collaborative programs with land owners to engage them in biodiversity management and conservation. A program created in the Federal Government in 1995, now contains well over 15% of the Mexican territory. The UMA program (Units of Management for Wildlife Conservation for its Spanish acronym) promotes sustainable uses of wildlife (plants and animals) in areas actively protected by the land owners. This relatively new program can only make progress with the active, decisive participation of University-based biologists who provide management plans, expertise, and orientation to improve conservation. A tripod approach (government, land owners, academia) is having a significant impact in biodiversity conservation, sustainable use, and economic development. Some examples illustrate the great potential and significant impact that programs like this one can have.

2011-12-08 18:30 Molecular biodiversity inventory of the ichthyofauna of the Czech Republic

Mendel, J*, *Institute of Vertebrate Biology, v.v.i., Czech Republic ;* **Papousek, I,** *Institute of Vertebrate Biology, v.v.i., Czech Republic ;* **Vetesník, L,** *Institute of Vertebrate Biology, v.v.i., Czech Republic ;* **Halacka, K,** *Institute of Vertebrate Biology, v.v.i., Czech Republic ;* **Bartonova, E,** *Institute of Vertebrate Biology, v.v.i., Czech Republic ;* **Sanda, R,** *National Museum, Czech Republic;* **Urbankova, S,** *Institute of Vertebrate Biology, v.v.i., Czech Republic ;* **Konickova, M,** *Institute of Vertebrate Biology, v.v.i., Czech Republic*

The Czech Republic lies in the centre of Europe and from the point of view of hydrology its territory belongs to three drainage areas – those of the North Sea, Black Sea and Baltic Sea. This fact has an important influence on abundant species diversity of its ichthyofauna. The occurrence of 94 species of lampreys and fish of 13 orders and 23 families was historically confirmed here both in natural waters and fish cultures. Some of them are already extinct. Other 24 species face various levels of endangerment. The Czech-Canadian project within the iBOL initiative analyzed about 1500 individuals from about 200 locations. Using a comprehensive approach (morphology, DNA barcoding, nDNA analysis) the haplotype variability was identified and pure species from hybrids were differentiated. At least in 5 genera, higher species variability than that described in literature was identified. DNA barcodes for about 72 recent indigenous and non-indigenous species were prepared. A new reference collection of all fish species of the Czech Republic for the National Museum was assembled. Efficiency of a new identification method, S7indel diagnostics, for taxonomic and biodiversity purposes was evaluated. The study was carried out within the framework of the research project no. M200930901 supported by the Academy of Sciences of the Czech Republic and no. 206/09/P608 supported by the Grant Agency of the Czech Republic.

2011-12-09 16:30 Improving the Robustness of Approaches for Setting Habitat Targets based on the Species-area Relationship: An example from the English Channel.

Metcalfe, K*, *Durrell Institute of Conservation and Ecology, University of Kent, Canterbury, Kent, CT2 7NR, United Kingdom;* **Garcia, C,** *The Centre for Environment, Fisheries and Aquaculture Science (Cefas), Pakefield Road, Lowestoft, NR33 0HT, United Kingdom;* **Foveau, A,** *Institut Francais de Recherche pour l'exploitation de la Mer (Ifremer), Laboratoire Resources Halieutiques, Boulogne-sur-Mer, France;* **Dauvin, JC,** *Universite de Caen Basse Normandie, Laboratoire Morphodynamique Continentale et Cotiere, UMR CNRS 6143 M2C, 2-4 rue des Tilleuls, F-14000 Caen, France;* **Coggan, R,** *The Centre for Environment, Fisheries and Aquaculture Science (Cefas), Pakefield Road, Lowestoft, NR33 0HT, United Kingdom;* **Vaz, S,** *Institut Francais de Recherche pour l'exploitation de la Mer (Ifremer), Laboratoire Resources Halieutiques, Boulogne-sur-Mer, France;* **Harrop, SR,** *Durrell Institute of Conservation and Ecology, University of Kent, Canterbury, Kent, CT2 7NR, United Kingdom;* **Smith, RJ,** *Durrell Institute of Conservation and Ecology, University of Kent, Canterbury, Kent, CT2 7NR, United Kingdom*

Conservation practitioners are increasingly using approaches based on the species-area relationship to set conservation targets for terrestrial and marine habitats. Although this method is transparent and scientifically defensible, there has been little research on how robust it is under different sampling conditions. Here we investigate how targets developed for marine habitats are influenced by changes in: (1) the number of samples used to generate estimates of species richness; (2) the non-parametric estimator used to derive estimates of species richness; and, (3) the level of habitat classification for which targets are developed. We show that targets are affected by each of these factors but sample size has the greatest impact, so that targets grow by up to 40% when sample sizes are increased from 50 to 300. Nonetheless, this still remains the best approach for setting habitat targets, so we suggest practitioners can improve current practice by: (1) using the Jackknife2 estimator, which like the Bootstrap estimator requires fewer samples to reach stable estimates but is less sensitive to sample size issues, and (2) developing calibration rules that can be used to increase targets for under-sampled habitat types.

2011-12-07 11:15 A Greenprint for Re-building a Biodiverse Garden City: Post 2010/2011 Earthquake

Meurk, C*, *Landcare Research;* **Stewart, G,** *Lincoln University;*

Christchurch (NZ) was crippled by earthquakes in September 2010 and February 2011. Life is resilient and regeneration is occurring, neighbours helped neighbours in their shattered homes, and commercial, civil and political life responded rapidly to the emergency. Around 100 community groups formed to meet local needs and a Christchurch Earthquake Recovery Authority (with citizen representation) has been established by government to fast-track rebuilding of the city. Essential services need to be restored quickly, but configuration and quality of emergent spaces requires careful consideration and buy-in from sometimes antagonistic factions – identifying with an English Garden City image versus a nouveaux, sustainable multi-city. A New Garden City must avoid building on land prone to liquefaction and sea level rise; provide wider floodplain exclusion; and make safe green space accessible to all residents. Greenspace should accommodate a greater diversity of native and non-invasive exotic species with half of large trees being indigenous to provide quality resources for native wildlife. A nested arrangement of habitat stepping stones with linkages along streams and cycleways will achieve ecological viability and a citizenry able to experience nature within walking or cycling distance of their homes. Threatened herbaceous species will find niches in lawns, walls, roofs, pathways and earthquake rubble.

2011-12-08 18:30 Spider responses to grazing in an African savannah

Mgobozi, M.P., *Centre for Wildlife Management, Centre for Invasion Biology, University of Pretoria, South Africa;* **Somers, M.J.*,** *Centre for Wildlife Management, Centre for Invasion Biology, University of Pretoria, South Africa;* **Dippenaar-Schoeman, A.S.,** *National Collection of Arachnida, Biosystematics Division, Agricultural Research*

Council, Plant Protection Research Institute, South Africa/Department of Zoology and Entomology, University of Pretoria, South Africa;

In African savannas heavy grazing of tussock/bunch grassland results in a compositional shift of grass species to form grazing lawns. Grazing lawns have been thought to be an undesirable outcome of over grazing. However, they could be their own stable state grassland community and thus important and significant contributors to savanna biodiversity. To investigate the effects of grazing on spiders we used pitfall traps and sweep netting to sample spiders along 1) a grazing intensity gradient, and 2) grazing lawns versus tall bunch grasses. Higher species richness was observed in moderately and intensely grazed sites in comparison to ungrazed sites. Intensely grazed sites consistently illustrated low diversity and species richness for pitfall trap data. No significant differences were observed between moderately grazed and intensely grazed sites and this may be a consequence of structural heterogeneity. A distinct spider assemblage pattern on grazing lawns was observed, indicating that grazing lawns are not just depauperate tall-grass systems. On the contrary, higher abundance, diversity and species richness of spiders was observed on grazing lawns than in tall, bunch grassland. A loss of grazing lawns may have cascading effects, at least in some taxa.

2011-12-09 11:00 Genomic information reveals threatened species isolated before European settlement: implications for reintroduction efforts.

Michael K. Schwartz*, *USDA Forest Service, Rocky Mountain Research Station;* **Brian Knaus,** *USDA Forest Service Pacific Northwest Research Station;* **Aaron Liston,** *Department of Botany & Plant Pathology, Oregon State University;* **Kristy Pilgrim ,** *USDA Forest Service, Rocky Mountain Research Station;* **Richard Cronn,** *USDA Forest Service, Rocky Mountain Research Station;*

Conservation decisions increasingly rely upon molecular information to define population connectivity, identify units for conservation, and date population divergence events. Central to these studies is mitochondrial DNA (mtDNA) genotyping, as most mammalian mtDNA studies examine hypervariable sites within the displacement loop (D-loop). However, in some situations the D-loop can show minimal divergence. Conversely, hypervariable positions can evolve so rapidly that multiple, superimposed substitutions can obscure evolutionary histories providing misleading results. Multiplexed massively parallel sequencing enables genome comparisons at a reasonable expense. The increased information from complete genomes strengthens inferences of relationships and narrows divergence time estimates. In this talk we report on complete mtDNA genome sequences from fisher (Martes pennanti), a threatened North American carnivore that exhibits low D-loop diversity. In California, fishers are found in the northern portion of the state and in the Sierra Nevada in the South, with a 430 km "gap" between populations. Earlier D-loop data suggested that the common haplotype was shared among the populations, information which has been used to justify reintroduction into this gap. Here we show with complete mitochondrial genome sequences that this common haplotype is actually two distinct haplotypes. Furthermore, the time of divergence from genome sequences suggest that these populations have been isolated prior to European colonization. These results reveal the dangers of making conservation decisions with less-than-genomic information.

2011-12-09 11:45 Bryophyte contribution to ecosystem services in New Zealand indigenous tussock grasslands

Michel, P*, *Manaaki Whenua-Landcare Research;* **Lee, WG,** *Manaaki Whenua-Landcare Research;*

In New Zealand montane tussock grasslands, bryophytes are an important component of the vegetation, contributing ca 3.1 % of the total vegetative biomass and 71% of the ground cover. The bryophytic biomass is predominantly mosses, Hypnum cupressiforme and Leptotheca gaudichaudii (ca. 79.5%). Bryophyte composition and accumulation in indigenous grasslands can influence catchment-scale hydrological processes by intercepting rainfall, dew and fog, and absorbing up to 14 times their dry mass in water. The inter-tussock bryophyte carpet contributes to a mean additional water storage capacity of 0.2mm. Anthropogenic disturbances (e.g. fire) modify the bryophytic communities favouring the establishment of species adapted to survive in dry and exposed environment (e.g. Polytrichum and Campylopus species). The reduced bryophytic biomass and cover of modified communities result in a mean loss of 90% in the potential water storage. Bryophytes also play a great role in the decomposition processes of native tussock grasses (e.g. Chionochloa rigida), with decomposition rate under dense cushion of moss species improving by up to 73%. Mosses appear to alter microbial biomass and these interactions are species dependent. Alterations in the bryophytic landscape thus can have critical consequences on the ecological processes of indigenous tussock grasslands and potentially on associated global ecosystems functions and dynamics.

2011-12-07 15:30 Trading off short-term and long-term risk: minimizing the threat of island extinctions from catastrophes and sea-level rise

MICHELLE REYNOLDS*, *Pacific Island Ecosystem Rearch Center, US Geological Survey;* **Brady Mattsson,** *USGS;* **Conor McGowan,** *USGS;* **Andrew McClung,** *USGS;* **Sarah Converse,** *USGS;*

Designated as Papahanaumokuakea Marine National Monument, the remote atolls of the Hawaii provide crucial habitat for endangered endemic birds and millions of seabirds. Despite their protected status, many species are faced with the threat of extinction due to random catastrophes such as diseases, and tsunamis. To reduce the risk that a catastrophe would lead to extinction, managers propose to restore multiple "insurance" populations on appropriate islands, currently unoccupied to increase their ranges. A longer term threat to low island species is sea level rise associated with global climate change. Unfortunately, establishment of populations on multiple low-lying islands is unlikely to provide long-term species viability since, climate change scenarios predict islands may be inundated by rising sea levels. To maintain viable populations of endemic endangered island species, managers must design and implement a strategy that considers both the longer-term sea level rise as well as the immediate stochastic threats while integrating uncertainty, budget limitations, complex logistics, and public opinion of management actions needed to establish species on higher elevation islands. We examine endangered Laysan teal (Anas laysanensis) as a case study and apply state-dependent decision-making to explore optimal adaptive management actions to protect species facing climate change.

2011-12-07 11:10 Which religion has most potential to save biodiversity?

Mikusinski, G.*, *Swedish University of Agricultural Sciences, Department of Ecology, Grimsö Wildlife Research Station;* **Blicharska, M.,** *Swedish University of Agricultural Sciences, School for Forest Management;*

Numerous solutions have been proposed lately to face the accelerating global decline of biodiversity. However, what seems to be missing is a greater effort to incorporate biodiversity-oriented thinking in everyday actions of individuals and nations. We need a complementary strategy that shapes ethical attitudes and strive for a more pro-environmental thinking and lifestyles of individuals and nations. Religions that are carriers of basic beliefs, ethics and worldviews may specifically influence people's behaviour should therefore be seriously considered in biodiversity conservation-oriented discourse. We conducted analysis of spatial overlap between major global religions (Christianity with Roman Catholic Church, Islam, Hinduism and Buddhism) and several biodiversity templates indicating the most important areas from the global conservation perspective. Our analysis clearly indicated that the majority of these areas are situated in countries dominated by Christianity, and more specifically Catholicism. We concluded that the greatest potential to influence biodiversity discourse seems to rest on the Roman Catholic Church, which not only "rules" over millions of believers in countries important for global biodiversity, but also has a centralised structure enabling spreading pro-environmental preaching world-wide.

2011-12-08 14:45 From co-existence to exclusion: mechanisms behind the generalist replacement of specialists in the face of disturbance.

MILDENSTEIN, TAMMY L.*, *Wildlife Biology Program, College of Forestry and Conservation, University of Montana, Missoula, MT 59812, USA;*

Ecological specialists are disappearing globally relative to generalists across a wide range of taxa. Anthropogenic disturbance is hypothesized to be the

main cause. This so-called specialization-disturbance (SD) hypothesis is supported by large data sets that show positive correlation between species' ecological specialization and extinction risk. But, managers on the ground need finer detail on how specialization increases sensitivity to disturbance. To test the SD hypothesis and support endangered species conservation, I studied the population-level responses of two coexisting fruit bats in the Philippines to their main threats: habitat loss and roost site disturbance. My results suggest the specialist is much more sensitive to disturbance than the generalist. Population abundance correlates closely with native forest cover for both species (R2>0.92). However, the specialist is uniquely dependent on forest, with a 3-dimensional ecological niche that lies only in forest and is entirely included within the larger niche of the generalist. The specialist populations are less abundant and require >5.6 times more forest than generalists. The specialist is also >6.2 times more sensitive to disturbance at and around the roost than the generalist. To maintain persisting populations of the specialist species, managers need to address colony compositions that are heavily skewed toward the generalist and strictly protect roost sites and surrounding forest from disturbance.

2011-12-07 14:40 Adapting Toward the Best of Both Worlds: Natural Resource and Infrastructure Vulnerability Assessment of the Hudson River Estuary

Miller, D.*, *New York State Department of Environmetal Conservation, Hudson River National Estuarine Research Reserve;* **Spector, S.,** *Scenic Hudson;* **Winner, J.,** *Scenic Hudson;* **Blair, B.,** *New York State Department of Environmetal Conservation, Hudson River National Estuarine Research Reserve;*

Sea level rise (SLR) is the most immediate climate change challenge to the Hudson River Estuary ecosystem, with up to 1.4m of relative SLR projected by 2080. Within the projected inundation zone lie over 13,000 acres of tidal wetlands and vegetated shallows, and over 5000 acres of supratidal and floodplain habitats that will likely be inundated. We conducted a vulnerability analysis that provides stakeholders with a high-resolution understanding, through both space and time, of SLR impacts on the estuary's natural habitats and built infrastructure and creates a planning framework for local and regional adaptation efforts. Along 160 miles of tidal river we 1) projected inundation and flood risk according to two SLR scenarios, with models reiterated at decadal time steps, 2) identified river stretches and sites that have important natural or built resources within or near the risk zone, and 3) classified each site according to their resiliency or vulnerability to periodic or constant inundation. Our results identified sites at which natural resource conservation and infrastructure protection may proceed independently, as well as areas of potential conflict where balanced solutions must be found. Considering these conflict zones through time, and considering them within a whole-estuary context, provided different perspectives on trade-offs between shoreline hardening and habitat migration and point the way toward a range of locally-appropriate management options.

2011-12-09 14:40 California's MLPA Initiative: Transitioning A Science-driven and Stakeholder-based Planning Process to Decision-makers and Resource Managers

Miller-Henson, Melissa*, *California Marine Life Protection Act Initiative;* **Fox, Evan,** *California Marine Life Protection Act Initiative;*

States and nations are increasingly placing priority on area-based planning and management that involves not only the best science, but also active participation of local communities and stakeholders. However, there are challenges to designing planning efforts that can then successfully transition to decision-making and resource management when they are conducted by different organizations. The California MLPA Initiative (MLPAI), was created and charged with helping the state redesign its MPAs through a science-driven, public planning process where stakeholders actively engaged in collaborative consultation and negotiation; the resulting recommendations were then presented to the state for decisions about how best to pursue implementation, which is carried out by two different state resource management agencies. The MLPAI was an experiment in combining consideration of how to design MPAs to achieve what are primarily ecosystem-based ecological goals with consideration of multiple human uses, interests, values and knowledge types; this type of interdisciplinary approach to addressing ecological, social and economic factors requires a flexible and adaptive approach to be successful, a model that is not common to state natural resource management. This example illustrates some of the challenges experienced; recommendations are made for how to better ensure a successful transition and improved long-term management of protected areas.

2011-12-09 11:45 Evaluating an eradication program for the northern Pacific seastar, Asterias amurensis, in Victoria, Australia.

Millers, Kimberley*, *University of Melbourne;* **McCarthy, Michael,** *University of Melbourne;* **Carey, Jan,** *University of Melbourne;*

Our ability to manage a spreading introduced marine species is often impeded by the lack of scientific information and limited resources. Management strategies aimed at controlling marine invasive species are often data poor and therefore continuously under review. This study aims to evaluate the management strategies of a recent incursion of the invasive seastar, Asterias amurensis, at Anderson Inlet, Victoria. In 2004, government agencies and community members commenced an eradication program to slow the spread of Asterias amurensis, along the coast of Victoria. Over the duration of the program, volunteers used a number of removal techniques to reduce the population size. Eradication was declared at Anderson Inlet in June 2004. Search method, search time, removal rate and cost were monitored during the eradication process. Over 250 individual seastars where removed during the removal program by community volunteer divers. Removal rate decreased exponentially with time. There are few examples of eradication of marine invasives and therefore this is a unique opportunity to gain valuable information to improve the efficiency and effectiveness of resource allocation in applied real-world scenarios. The findings of this evaluation will assist managers utilise resources when managing incursions of this and other species across the southern Australian coast.

Date 14:00 Integrating fisheries approaches and household utility models for improved resource management

Milner-Gulland, E.J.*, *Imperial College London;*

Natural resource management is littered with cases of over-exploitation and ineffectual management, leading to loss of both biodiversity and human welfare. Disciplinary boundaries stifle the search for solutions to these issues. I combine the approach of management strategy evaluation, widely applied in fisheries, with household utility models from conservation and development, to produce an integrated framework for evaluating the effectiveness of competing management strategies for harvested resources against a range of performance metrics. I demonstrate the strengths of this approach with a simple model, and use it to examine the effect of manager ignorance of household decisions on resource management effectiveness, and an allocation trade-off between monitoring resource stocks to reduce observation uncertainty and monitoring users to improve compliance. I show that this integrated framework enables management assessments to consider household utility as a direct metric for system performance, and that while utility and resource stock conservation metrics are well aligned, harvest yield is a poor proxy for both, because it is a product of household allocation decisions between alternate livelihood options, rather than an end in itself. This approach has potential far beyond single-species harvesting in situations where managers are in full control, enabling a range of management intervention options to be evaluated within the same framework.

2011-12-08 18:30 Wood density variation in an altitudinal gradient: a key component for determining above-ground biomass

Mireia, Torello Raventos*, *James Cook Univeristy;* **Bird, Michael,** *James Cook University;* **Saiz, Gustavo,** *James Cook University;* **Lloyd, Jon,** *James Cook University;* **Dan Metcalfe,** *CSIRO;*

More reliable knowledge on the complex responses of vegetation to climate change is one of the most urgent needs for tropical forest preservation. Quantifying the terrestrial above-ground carbon stocks in tropical forests along an altitudinal gradient provides a way to improve the understanding of vegetation dynamics in the face of climate change. Tropical forests are known for possessing a wide range of wood densities, adding complexity to the accurate estimation of tones of carbon per area. We have selected 9 plots in tropical forests in North Queensland, Australia along an altitudinal gradient (50-1500 m) in 2 main soil types. Throughout my PhD 1) I have placed dendrometers in my field sites to study the above-ground net primary productivity; 2) I have developed a new field-based and non-destructive method to determine the wood density in a tree plantation. 3) I am studying

the relationships between wood density and environmental variables. 4) I am quantifying the coarse woody debris decomposition rates along an altitudinal gradient. Our analysis demonstrates that the ultrasonic velocity and wood density are positively related. A more comprehensive analysis will be performed in the coming months. This scientific project will predict relationships between wood density and environmental variables to infer carbon stocks at local and global scale. The outcomes of my research will be a further step to minimize the impact of climate change on our planet.

2011-12-07 18:15 Matrix heterogeneity affects population size of Harvest mice in fragmented landscape

Misako Kuroe*, *Akita Prefectural University;*

In a highly fragmented landscape, not only habitat size and arrangement but also heterogeneity of landscape matrix affects population sizes through dispersal process. Most previous studies estimated matrix-dependent dispersal parameters using radio-tracking data or mark-recapture data which were difficult to obtain. In this study, I demonstrated that matrix resistances can be estimated by using distribution data. I investigated nest distributions of Harvest mice (Micomys minutes), which inhabits tall grassland in agricultural landscape. First, statistical modeling by Bayesian estimation showed that patch size and patch connectivity including matrix heterogeneity were important for nest distributions. Estimated values of matrix resistance depend on landscape elements; rice and crop field showed low resistances, and forest, creak, road and residential area showed high resistances. Second, to test the effectiveness of the pattern-oriented Bayesian modeling, I conducted field experiments and model validations. The field experiments of habitat loss showed that the colonization rates were also depended on matrix compositions, which were consistent with estimated matrix resistances. The model validation showed that the model including matrix heterogeneity well predicted the population sizes in more fragmented landscapes, while the model without matrix heterogeneity could not. These results suggest that matrix resistances estimated by distribution data were applicable for predicting population size, and in addition to habitat management, matrix restoration will be an effective strategy to enhance population size in fragmented landscape.

2011-12-07 16:50 Population genetics: A promising future of wildlife conservation

Mishra, A*, *Bundelkhand University, Jhansi, India;* **Mishra, S,** *Wildlife Institute of India, Dehradun, India;*

The biological diversity of our planet is rapidly reducing due to direct or indirect effect of human interference. Most of the species have already become extinct while others are facing the risk of extinction. In view of advances taken place in DNA technologies in recent years, population genetics has become widely used to reveal future status and conservation of both abundant and endangered species. Population genetics focuses on the effects of present genetic structuring or sub-structuring on long-term survival of a species which facilitates wildlife managers protect biodiversity by identifying different conservation units. There are two major tools in population genetics, mitochondrial DNA markers and nuclear DNA (microsatellite DNA) markers. Mitochondrial DNA evolves up to 10 times faster than the nuclear DNA. It is regarded as an important tool in studying evolutionary relationships among various taxa due to its conserved protein-coding regions, high variability in non-coding sequences and lack of recombination. Microsatellites DNA, due to their high degree of polymorphism and co-dominance, have been widely used to study different aspects of population genetics viz. gene flow, inbreeding depression, immigration, emigration, parentage analysis and genetic diversity. Here, we describe the importance of population genetic tools for better implementation of conservation and management plans for wildlife.

2011-12-07 17:30 Participatory forest management in Kenya informed by scientific and land use change research

MITCHELL, NICHOLAS*, *Institute for Applied Research, Karlsruhe University of Applied Sciences, 76133 Karlsruhe, Germany;* **Schaab, Gertrud,** *Institute for Applied Research, Karlsruhe University of Applied Sciences, 76133 Karlsruhe, Germany;*

Examples of protected area management are increasingly labelled as participatory although reality can sometimes lag behind the claims of inclusivity. The example of Kakamega Forest in Kenya has not only brought together two governing authorities with forest-adjacent communities but has also incorporated the active contribution of the BIOTA East Africa scientific research project into the management planning process. A management zonation scheme has been devised that takes account of the commercial expectations of foresters and the needs of the adjacent human population, and the additional scientific input has also brought ecological considerations to the fore. Land use change research has constituted one of the most pertinent parts of the knowledge base and has led to plans for restoration of corridors linking only the habitats known to have been actively fragmented. The involvement of socio-economists has also led to the addition of a livelihood support zone outside the forest boundary for the first time. The inclusion of scientists within the management planning process has both enabled the ready access to research results and has highlighted the need for scientists to make results available in a format ready for digestion by protected area managers and non-scientists. The forest management zonation therefore represents the recognition of the interests of a broad set of stakeholders.

2011-12-08 10:34 Alien predator ameliorates threat of invasive mesopredator on native prey in a pond metacommunity

Miyashita, T., *Department of Ecosystem Studies, University if Tokyo;* **Takeda, H.,** *Department of Ecosystem Studies, University if Tokyo;* **Kuroe, M.,** *Department of Ecosystem Studies, University if Tokyo;* **Osada, Y.*,** *Department of Ecosystem Studies, University if Tokyo;*

Many ecosystems today harbor multiple alien species that interact in various ways, making it difficult to control alien species to restore native communities. Mesopredator release is a typical example, which could bring unwanted outcome to native prey organisms. Here we report a novel case study showing that an apex predator (common carp) controls establishment of invasive mesopredator (bullfrog) and rescues native prey species in a network of numerous farm ponds. We investigated the distribution of the invasive bullfrog Rana catesbeiana, alien common carp Cypninus carpio, and native organisms in numerous farm ponds in Iwate prefecture, northern Japan. We constructed a structural model including pond connectivity, environmental variables, native organisms, and two species of aliens inhabiting each pond, and estimated parameters of these relationships by using a Bayesian analysis. Connectivity enhanced local abundance of the bullfrog, which decreased abundance of a native frog Rana rugosa. The presence of the common carp, however, prevented this negative effect by decreasing the local abundance of the bullfrog. Because R. rugosa is known to have chemical deterrent against Cyprinidae predator, the predation by the common carp on R. rugosa appeared to have been negligible and indirect positive effect of the common carp might have prevailed. This appears to be the first study demonstrating the possibility of the positive effect of alien predators in a metacommunity context.

2011-12-06 14:08 Habitat Preference Of An Elusive Bird Species - Sokoke Pipit (Anthus sokokensis) In Zaraninge Coastal Forest, Tanzania

Modest, RB*, *Sokoine University of Agriculture;* **Muganda, M,** *Sokoine University of Agriculture;* **Kitegile, A,** *Sokoine University of Agriculture;* **Sabuni, C,** *Sokoine University of Agriculture;*

Sokoke pipit is restricted to coastal forests of Tanzania and Kenya. While the Tanzania's population is not yet ascertained, only 13,000 individuals are reported in Arabu Sokoke forest, Kenya. The bird species is listed as Endangered because all over its range the habitat is declining due to agriculture and tree cutting. Having this in mind, we investigated the habitat preference of this bird species in Zaraninge forest-Tanzania, which is one of its prime home range remaining in the country. We used stratified random procedure, where we established transects in the forest edge and core. We walked along transects, and at each point we sighted or heard the bird we established a 15 m radius circle and recorded the bird-habitat relationship. Result showed that S. pipit preferred least disturbed habitats with tall trees that are less influenced by human activities. We concluded that S. pipit in Zaraninge forest avoided areas that experienced frequent human interference including places next to pineapple and maize fields. Since the local communities surrounding Zaraninge forest have a stake on the management of this forest, we recommend awareness raising and community participation for restoring the degraded areas of the forest to allow for recovery of the species lost habitats.

2011-12-06 15:00 Operational methods for prioritization of new protected areas, habitat maintenance, habitat restoration, and biodiversity offsetting

MOILANEN, A*, *University of Helsinki;*

Common needs of spatial conservation planning include prioritization of new protected areas, habitat maintenance, and habitat restoration. Other relevant applications include gap analysis, biodiversity offsetting, and evaluation of present conservation areas or proposed conservation scenarios. In this presentation I summarize how all these needs can be serviced with analyses that are feasible for large-scale high-resolution data using the Zonation v3 software for spatial conservation prioritization. Design of reserve networks or their expansions is the basic function of spatial prioritization software. Habitat maintenance or restoration can be targeted along with protection by entering extra layers of information that represent spatial distributions of maintenance or restoration potential and layers that describe the costs of these actions. Gap analysis and fixing of gaps is what prioritization software does when designing a reserve network expansion. Offsetting can be effected by forced exclusion of the impacted areas, following by design for reserve network expansion. Evaluation or protected areas or conservation scenarios can be implemented via the replacement cost technique, by comparing what is to what could ideally be.

2011-12-09 14:30 Conserving biodiversity under climate change: a 'next-generation' modelling approach

Mokany, K*, *CSIRO Ecosystem Sciences;* **Harwood, T,** *CSIRO Ecosystem Sciences;* **Ferrier, S,** *CSIRO Ecosystem Sciences;*

Planning conservation measures that best retain biodiversity under climate change is limited by the shortfalls in our knowledge of biodiversity. Modelling biodiversity at the community level can help to overcome shortfalls in our current knowledge, and predict climate change impacts for biodiversity as a whole. Here we present a novel semi-mechanistic community-level approach to predicting change in biodiversity over space and time. We demonstrate the utility of our approach in predicting the impacts of climate change on biodiversity by applying it to taxa in Australia and New Zealand. In addition, we show how our novel modelling approach can be used to identify priority areas for conservation and habitat configurations that best retain biodiversity under a changing climate. Fusing correlative and mechanistic community-level models can provide valuable information for biodiversity management agencies responsible for retaining biodiversity in the long term.

2011-12-08 15:00 Te Tiaki Mahinga Kai: Community-led research for protection and restoration of coastal ecosystems in Aotearoa / New Zealand

Moller, H*, *CSAFE, University of Otago, PO Box 56, Dunedin, New Zealand;* **Hepburn, C,** *Department of Marine Science, University of Otago, PO Box 56, Dunedin, New Zealand;*

Indigenous communities are important local sites of action for improving cultural-ecological resilience and natural resource management. Fierce defence of local governance and identity, and the application of TEK by Indigenous communities strengthen commitment and effectiveness to restore and protect resources. However isolation, small size and lack of resources make local Indigenous communities vulnerable to fragmentation and domination by centralised resource management agencies applying science models of resource management and research. Te Tiaki Mahinga Kai is a network of Māori kaitiaki (environmental guardians) and researchers which seeks to restore and protect customary fishing along New Zealand's coasts and rivers. Initial attempts to build a nationwide network of kaitiaki for more co-ordinated research had to be abandoned in favour of a more local and small scale coalition of communities and researchers. Sustainable networks of local communities for research, management and education must (1) never undercut local sovereignty, (2) select researchers with a collaborative and cross-cultural partnership philosophy, (3) plan to invest much more time and resources in communication and participatory processes than you at first might think as adequate, (4) actively manage participants' expectations to keep them realistic and matched to available resources, and (5) assert a long-term vision the need for patience and strength to not waiver from it.

2011-12-06 14:56 Ecological effects on the seroprevalence of Leptospira spp. and ectoparasite load in black-tailed prairie dogs (Cynomys ludovicianus) in Chihuahua, Mexico.

Montiel, A.*, *UNAM;* **Atilano, D.,** *UNAM;* **Ceballos, G.,** *UNAM;* **Acosta, R.,** *UNAM;* **Montiel, G.,** *UNAM;* **Suzan, G.,** *UNAM;*

The study of pathogens in endangered species like the black-tailed prairie dog (Cynomys ludovicianus) is critical to understanding host-parasite dynamics and the factors involved in its prevalence. This will give us more and better tools to develop conservation management plans and ensuring the maintenance of prairie dog populations in the long term. Therefore, this study aims to determine whether the seroprevalence of Leptospira spp and parasite load in black-tailed prairie dogs (PLCN) northwest of Chihuahua are associated with extension of colony, PLCN density, proximity to human settlements. We captured a total of 266 PLCN in eleven colonies sampled in 2009. We analyzed 248 serum samples with the microscopic agglutination test (MAT) for detection of Leptospira spp in twelve serovars. Almost 80% of sera tested positive for Leptospira spp (titer ≥ 1:80). The most seroprevalent serotypes were bratislava and canicola. Ectoparasite samples were obtained from 251 individuals, most were fleas (3,654): Pulex simulans (1,986), Echidnophaga gallinacea (1,340) and Oropsylla hirsuta (328). Species of mites found was Androlaelaps farenhoizi and ticks of Ornithodoros turicata. In each colony, we calculated the PLCN density, distance to nearest human settlement, species richness, composition and load fleas. An analysis of correlation between environmental variables studied seroprevalence of Leptospira spp and total load fleas. There was a negative trend between the extent of the colony and the density of prairie dogs with seroprevalence of Leptospira spp. On the other hand, in larger colonies the total load fleas was lower.

2011-12-08 14:15 Marine mammals and sea ice loss in the Pacific Arctic: challenges and opportunities during a period of rapid climage change

Moore, SE*, *NOAA/Fisheries S&T;*

Evidence suggests that recent extreme sea ice retreats affects the phenology of marine mammals in the Pacific Arctic. For example, more polar bears now den on land and scavenge for food along the coast, while walruses haul out in unprecedented numbers on land, resulting in the trampling of pups. Conversely, extensive sea ice retreats provide opportunities for seasonally migrant cetacean species. For example, summertime reports of harbor porpoise, humpback and fin whales in the Chukchi Sea suggest these temperate species now routinely occur there. In the case of gray whales, evidence is emerging that the southbound migration is delayed, feeding activity has expanded along the migration route and that some whales can over-winter in the Arctic. A summertime nearly ice-free Arctic is now predicted by mid-century. As icons of Arctic marine ecosystems and indigenous cultures, marine mammals provide a nexus for public engagement and cross-cultural dialogue. Predictive scenarios for marine mammal responses to climate change, at regional and seasonal scales, can provide a framework for scientific investigation and responsible management. Examples of ongoing national and international activities that support development of such scenarios and of long-term monitoring protocols will be presented.

2011-12-09 10:30 How does Eucalyptus wandoo decline influence reptile abundance and species richness?

Moore, T.L.*, *Murdoch University;* **Valentine. L. E.,** *Murdoch University;* **Craig, M. D.,** *Murdoch University;* **Hardy, G. E. St. J.,** *Murdoch University;* **Fleming, P. A.,** *Murdoch University;*

Large portions of the world's forests are currently impacted by declines in forest and woodland health, however the effects of these declines on faunal communities is largely unknown. Since 2002, patches of Eucalyptus wandoo woodlands in southwest Western Australia have demonstrated a decline in health. Such declines in E. wandoo health can potentially reduce habitat for reptiles; directly through the loss of resources and shelter provided by the canopy itself and indirectly through the changes in leaf litter and other environmental characteristics. Trapping in both healthy (stands showing little or few signs of canopy loss) and declining (stands demonstrating canopy loss and epicormic growth) patches of E. wandoo at 24 sites in Dryandra State Forest and Wandoo Conservation Park was conducted. Reptile abundance and species richness were compared with habitat characteristics (e.g. leaf litter and fire history). The health status of E. wandoo did not demonstrate

a significant relationship with reptile abundance and species richness; however, E. wandoo health and fire history showed a significant interaction. Patches of E. wandoo classified as declining did not demonstrate a lower abundance or diversity of reptiles than healthy sites unless the declining woodland had undergone a recent burn (<15 years since last fire). A greater understanding of the interactions between tree health and fire history will allow more informed management of the remnant E. wandoo woodland.

2011-12-06 14:30 Identifying climate change refugia and population extinctions using landscape genetic analysis and occupancy modeling of historical and resurvey data

Morelli, TL*, *U.C. Berkeley;*

Natural history collections provide an opportunity to understand how populations have responded to recent climate change. As part of the Grinnell Resurvey Project, my research capitalizes on high-quality historical field survey data and specimen collections to understand how species have responded to global change over the last century. Specifically, I used occupancy modeling, population genetics, and geospatial analysis to identify population shifts, landscape connectivity, and climate change refugia across the Sierra Nevada. Through surveys conducted in 2010 and 2011, I found that Belding's ground squirrels (Urocitellus beldingi) have disappeared out of nearly half of their historically surveyed California range. The extirpated sites were lower in elevation and had higher in mean annual temperature; populations maintained at hot, low sites were found in "anthropogenic refugia", such as irrigated county parks and agricultural fields. I then analyzed the genetic diversity of U. beldingi and identified barriers to gene flow across California. Finally, I used genetic and occupancy data to identify climate change refugia, areas that increase persistence of populations and, as a result, maintain higher genetic diversity. The results of this study will help to identify landscape features central to climate change refugia and thus aid land managers in allocating limited resources to develop climate change adaptation strategies, including increasing resilience on the landscape.

2011-12-09 12:00 Consumer effects on exotic plant invasions in native grasslands of south-eastern Australia

Morgan, JW*, *La Trobe University;* **Scott, AJ,** *La Trobe University;* **Schultz, NL,** *University of New England;* **Lunt, ID,** *Charles Sturt University;*

In many of the threatened native tussock grasslands of southern Australia, stock grazing is used as a management tool to reduce biomass and maintain plant biodiversity, despite Australian grasslands having evolved in the absence of congregating, hoofed grazers during the Holocene. Many annual Eurasian grasses that evolved in human-dominated ecosystems characterized by grazing of hoofed mammals and high nutrient supplies have been particularly successful at invading these grasslands. Hence, do current conservation management practices facilitate the persistence of exotic species in grasslands and potentially threaten native species? In this study, we used long-term grazing exclosures to determine how stock grazing impacts on invasions in grasslands being managed for conservation. The effects of consumers were strongly dependent on the existing invasion state. Exclusion of vertebrate herbivores appeared to maintain, or increase, exotic cover in highly invaded sites but reduced cover at sites initially less invaded. This result suggests frameworks necessary for interpreting consumer effects on exotic plant invasions in temperate Australian grasslands need greater testing.

2011-12-08 18:30 Predicting potential global distribution of amphibian pathogen Batrachochytrium dendrobatidis

Moriguchi, S*, *National Institute for Environmental Studies;* **Tominaga, A,** *University of the Ryukyus;* **Irwin, KJ,** *Arkansas Game and Fish Commission;* **Freake, MJ,** *Lee University;* **Suzuki, K,** *National Institute for Environmental Studies;* **Goka, K,** *National Institute for Environmental Studies;*

Amphibian population declines and extinctions have been reported worldwide, and the amphibian pathogen chytridiomycosis, caused by the fungus Batrachochytrium dendrobatidis (Bd), has been identified as one of the major threats in addition to habitat loss, over-exploitation, and climate change. In order to conserve wild amphibian populations, we constructed a potential risk map of chytridiomycosis based on occurrence data collected from both native and invasive range of the fungus. Potential distribution models, using MaxEnt maximum entropy approach, were created based on 200 occurrence data points. Eigenvector-based spatial filters were applied to the independent variables along with environmental variables to resolve spatial autocorrelation. Models with spatial filters predicted more accurately potential distributions than models without them. Among environmental variables, temperature was more effective at predicting the potential distribution of Bd than precipitation. Most of the suitable areas for Bd coincided with areas which experienced enigmatic amphibian declines. This study could help pinpoint the potential distribution of Bd better than previous studies.

2011-12-09 10:30 Contrasted ecological responses to scenarios for public agricultural policies

Mouysset Lauriane*, *CNRS - French National Museum;* **Doyen Luc,** *CNRS - French National Museum;* **Jiguet Frédéric,** *CNRS - French National Museum;*

Agricultural intensification was identified as a main driver of biodiversity loss in farmlands. Agri-environmental policies which have been implemented to limit theses negative impacts focused on land-use scenarios and neglected the economic dimension. We develop a bio-economic spatially-explicit modelling across 620 French small agricultural areas. We couple a public decision maker under budgetary constraint, regional economic agents in uncertainty context and bird dynamics. We analyse the impacts of economic scenarios of the Common Agriculture Policy on bird communities through 5 ecological indicators: the Farmland Bird Index (FBI), a Generalist Bird Index (GBI), the Shannon diversity index, a Community Specialization Index (CSI), a Community Trophic Index (CTI). Trends in the different indicators are significantly contrasted pending on policy scenarios. Promoting extensification appears essential for the sustainable management of biodiversity and agriculture. But we revealed more complex economic effects between public incentives which are interesting leverages to enhance the bio-economic effectiveness of agricultural policies. Reducing current incentives keeping beneficial effects for bird communities is possible and leaves many paths for a budget re-allocation to other environmental strategies. Finally we propose to combine 3 indicators (FBI, CSI, CTI) and bio-economic modelling as a relevant support for decision making about sustainable agri-environmental policies.

2011-12-09 18:00 Analysing the Chinese Black Market in Tiger Parts: A Transaction Cost Economics Approach

Moyle, B*, *Massey University;*

The threat to wild tigers includes intense poaching. It is agreed that reducing poaching is a necessary element to the strategy to conserve tigers. Nonetheless, reducing poaching has proved elusive and is compounded by the poor intelligence on the criminal networks that smuggle tiger parts. An important international market for tiger parts is China. Information on this black market was gathered using Chinese interdiction data and covert observations. This was analysed using a transaction-cost economics (TCE) approach. Interdiction data was analysed at a province-level using a Poisson regression. The evidence supports the black market being distinguished by geography and product type, with provinces proximate to range states having the highest observed black-market activity. The severe sanctions imposed on smugglers have caused them to employ small conspiracies, moving small volumes of high-valued parts (bones and skins), to lower arrest risk. The long supply chain and the risks of trading these parts constitute the majority of the smugglers' costs. The traffic in tiger parts appears limited to a recalcitrant core of consumers, indifferent to the costs and conservation threats to tigers. Measures of law enforcement success are proposed based on TCE insights.

2011-12-08 11:00 Where do national and local conservation actions meet? Modelling differences between local implementation and national conservation planning in Fiji

Ms. Morena Mills*, *James Cook University;* **Ms. Vanessa Adams,** *James Cook University;* **Prof. Robert L. Pressey,** *James Cook University;* **Dr. Natalie C. Ban,** *James Cook University;* **Dr. Stacy D. Jupiter,** *James Cook University;*

The marginal benefits of systematic over opportunistic establishment of protected areas are rarely measured, even though this information is crucial to investing limited conservation resources effectively. We took a predictive approach to comparing the outcomes of opportunistic and systematic selection of marine protected areas (MPAs) in Fiji, where ambitious national conservation goals for inshore marine waters rely on community-based actions for implementing the required management. We used data on established MPAs and key informant interviews to simulate the opportunistic expansion of community-based MPAs, and used Marxan with Zones to systematically design an optimal MPA network, both with the same constraints on location and extent of MPAs. The opportunistic approach achieved quantitative conservation objectives for half the habitats, while all objectives were achieved or nearly achieved with the systematic approach. Despite these differences, a merging of opportunistic and systematic approaches will be necessary to combine strategic perspectives with acceptance by communities.

2011-12-09 15:30 Habitat selection by brown bears in Deosai National Park, Pakistan, and implications for park management

Muhammad Ali Nawaz*, *Department of Wildlife and Ecology, University of Veterinary and Animal Sciences, Outfall Road, Lahore, Pakistan;* **Jodie Martin,** *Department of Ecology and Natural Resource Management, Norwegian University of Life Sciences, Post Box 5003, NO-1432 Ås, Norway;* **Jon E. Swenson,** *Université de Lyon, F-69000, Lyon ; Université Lyon 1 ; CNRS, UMR5558, Laboratoire de Biométrie et Biologie Evolutive, F-69622, Villeurbanne, France;*

The Himalayan brown bear is threatened and has a fragmented range in the Himalayas, yet its habit requirements are not known. We investigated habitat selection of brown bears and the impact of human disturbance factors in Deosai National Park, Pakistan. An Ecological Niche Factor Analysis indicated that bears avoided higher elevations and steeper slopes and selected more productive parts of the park (marshy, grassy, and stony vegetation types). Only 65% of the park area was vegetatively productive, with a standing crop of about 900 kg dry matter/km2. The marshy vegetation was the most preferred habitat, probably because it had the highest forage production and density of golden marmots. Brown bears tolerated human infrastructures, like roads and camps, but strongly avoided grazing areas with high livestock density. The habitat suitability map generally followed the biomass productivity patterns of the park. It indicated the central part as suitable, and classified half of the park, mainly peripheral areas, as not suitable for brown bears. The vegetation and habitat suitability maps provide an objective criterion for evaluating present and future developments in the park. Until recently, communities seem to have used the park's resources without significantly affecting the brown bear population. However in recent years a large influx of livestock by nomad grazers has become a major challenge, which needs urgent attention to continue the present brown bear population recovery and to secure its habitat. We recommend monitoring the livestock and a detailed inventory of the rangeland to understand grazing dynamics in the park and to maintain sustainable stocking rates.

2011-12-08 14:45 Stomped by seabirds or ripped by rats? How colonial seabirds and invasive rodents differ in selection filters they impose on island vegetation

Mulder, CPH*, *University of Alaska Fairbanks, USA;* **Bellingham, PJ,** *Landcare Research, Lincoln, New Zealand;* **Grant-Hoffman, MN,** *Bureau of Land Management, Grand Junction, USA;*

What traits allow seeds and seedlings to survive in the midst of a seabird colony? What traits make them vulnerable to non-native rodents? The filters placed on seeds and seedlings by native seabirds and invasive rodents will determine the characteristics of plant communities that emerge following the invasion of seabird islands by rodents and their subsequent eradication. We test the hypothesis that characteristics that make seedlings tolerant of burial and trampling by seabirds – such as large seed size and rapid seedling growth – also make them vulnerable to rat consumption. We focus on 12 woody plant species commonly found on New Zealand islands, and examine how morphological and chemical characteristics of seeds and seedlings relate to experimentally-determined measures of vulnerability to burial and trampling by seabirds and herbivory by rats. Species differed greatly in their vulnerability to these sources of mortality. Some, primarily those with tiny seeds (< 2 mg), were present in high numbers in the seed bank but negatively affected by seabird burial, a second set with medium-sized seeds was absent where rats are present but increased with seabird density, and a third group of primarily larger-seeded plants (> 500 mg) was unaffected by rats or seabirds. If, as results suggest, seabirds and invasive rodents impose filters of different shapes on plant communities, then the ability of seabird islands to recover naturally following rodent eradication may be limited.

2011-12-08 18:30 Evidence-based management of rhino conservation and tourism in Namibia's northwest communal lands

Muntifering, J.R.*, *Minnesota Zoo & Save the Rhino Trust;* **Loutit, R.,** *Save the Rhino Trust;* **Uri-Khob, S.,** *Save the Rhino Trust;* **Brell, B.,** *Save the Rhino Trust;* **Kasaona, K.,** *Save the Rhino Trust;* **Bakkes, C.,** *Wilderness Safaris;* **Beytell, P.,** *Ministry of Environment and Tourism;* **du Preez, P.,** *Ministry of Environment and Tourism*

In northwestern Namibia's communal lands, rhino-based tourism has emerged as a key mechanism to secure the world's largest free-ranging population of black rhino (Diceros bicornis bicornis) by providing incentives for local communities to trade-off valuable livestock pasture for rhino wilderness and sustainable financing to support anti-poaching and population monitoring efforts. However, unregulated tourism activities may alternatively result in unduly disturbed rhino becoming displaced into marginal, at-risk, and/or inaccessible habitat threatening sustainability. We piloted a rhino-based tourism model informed by an evidence-based adaptive management framework for rhino conservation and enterprise development objectives. Logistic models incorporating rhino viewing data produced a viewing protocol that resulted in only 10% of rhinos becoming displaced during tourist viewing events while 93% of paying tourists were more than satisfied with the experience. Patterns in population-level rhino movement illustrated displacement from areas used chronically by vehicles. A rotational use strategy was therefore implemented resulting in increased sighting success and fewer full days out searching for rhino. Findings suggest that the sustainability of rhino-based tourism as a dual conservation and rural development strategy will require a regional perspective to ensure rhino remain secure in suitable, low-risk and accessible areas and the commitment from communities for rhino conservation endures.

2011-12-07 18:15 The predictability of infection: weather-driven simulations of pathogen proliferation help explain patterns of endemic chytridiomycosis

Murray, K. A.*, *University of Queensland;* **Skerratt, L. F.,** *James Cook University;* **Garland, S.,** *James Cook University;* **Kriticos, D.,** *CSIRO Entomology and the Cooperative Research Centre for National Plant Biosecurity;* **McCallum, H.,** *Griffith University;*

The amphibian disease chytridiomycosis, which can cause species extinctions, is strongly influenced by environmental conditions. For this reason, climate change has been implicated in its global epidemic emergence. One hypothesis to explain this is that simple weather-driven pathogen proliferation is a major driver of disease dynamics, but explicit tests of this influential hypothesis are scarce. We thus developed a simple mechanistic model to simulate the growth of the pathogen under varying weather conditions to see how well it could predict infection patterns in wild amphibians. We found strong support for several predictions of the proliferation hypothesis when applied to our model species, Litoria pearsoniana, sampled extensively in the wild in south-eastern Queensland: the weather-driven simulations of pathogen growth potential were positively related to both the prevalence and intensity of Bd infections. This allowed much improved prediction of positive disease results. Hence, while intrinsic traits of the individuals sampled (species, sex) remain important for understanding infection patterns, our results strongly suggest that weather-linked pathogen proliferation plays a key role in the infection dynamics of endemic chytridiomycosis. Predictive applications of the model include surveillance design, outbreak preparedness and response, climate change scenario modelling and the interpretation of historical patterns of amphibian decline.

2011-12-06 15:30 Massive losses of intertidal mudflats in East Asia detected by remote sensing

Murray, NJ*, *University of Queensland;* **Clemens, R,** *University of Queensland;* **Fuller, RF,** *University of Queensland;*

Rapid urbanisation and expansion of aquaculture are driving reclamation

of intertidal wetlands throughout East Asia. Intertidal wetlands are of immense importance in this region as a key provider of habitat for threatened migratory species, as well as ecosystem services, economic opportunities and social values. Despite widespread coastal change and severe modification of the region's major river systems in recent years, the magnitude and distribution of intertidal wetland loss remains largely unquantified until now. We mapped the full extent of intertidal wetlands in East Asia in 1975 and 2010 using a supervised classification methodology on paired Landsat images. Regional tide models were used to identify landsat images acquired at low tide and to allow pairing of images according to tide height. We discovered that considerable areas of intertidal wetlands have been lost as a result of several threatening processes, and rates of loss are of a similar scale to deforestation of the world's tropical forests. Yet this critical ecosystem is overlooked in many conservation prioritisations. Coastal reclamation is the primary threat to intertidal habitats in Asia, and wetland loss is chiefly occurring in the rapidly developing countries of China and South Korea. Combined with the impacts of climate change and sea level rise, these threatening processes demand immediate research effort and conservation intervention.

2011-12-09 14:45 The importance of community-based involvement for managing cetacean watching in a developing country: Lovina (Bali) dolphin watching as a case study

MUSTIKA, PUTU LIZA *, *School of Earth and Environmental Sciences, James Cook University, Townsville 4811, Australia;* **Alastair Birtles ,** *School of Business, James Cook University, Townsville 4811, Australia;* **Helene Marsh,** *School of Earth and Environmental Sciences, James Cook University, Townsville 4811, Australia;*

Support and involvement from primary stakeholders are crucial in the management of community-based marine wildlife tourism in developing countries, particularly activities with potentially adverse impacts on target species. Dolphin watching tourism in Lovina (Bali) has been a lucrative industry for local boatmen with limited education since the late 1980s. The industry targets dwarf spinner dolphins that are predictably found close to shore in the early mornings. The fleet comprises 179 small traditional boats, presumably one of the largest dolphin tour fleets in the world. To understand the concerns of the primary stakeholders of this industry and to benefit from their insights, we conducted semi-structured interviews with 36 boatmen and subsequently discussed the results at local stakeholder workshops. The interviewees confirmed that the industry is essentially unregulated. The boatmen were concerned about the industry's long-term sustainability, especially with regard to encounter management practices and issues such as garbage and safety. The boatmen resisted limits on fleet size. However, they agreed in-principle to improve encounter management, including a minimum approach distance and turning off the engine in the presence of the animals. Transparent and consistent communications are essential to involving the boatmen in sustainable dolphin watching tourism in Lovina.

2011-12-09 16:45 Optimal restoration in a changing climate: trading off the benefits of connectivity and the risks of fire spread

Mustin, Karen*, *The Ecology Centre, University of Queensland;* **Possingham, Hugh,** *The Ecology Centre, University of Queensland;* **Wilson, Kerrie,** *The Ecology Centre, University of Queensland;*

Climate change will alter the strength and nature of threats to species persistence such as fire frequency and severity. Increasing connectivity in fragmented habitats is expected to make positive contributions to species persistence under climate change. However, increasing connectivity may also increase the frequency or severity of fires by increasing fuel loads and facilitating their spread, and thus negatively impact species persistence. These effects will be exacerbated by climate change if changed growing conditions increase fuel loads, drought causes drying of fuel and if climate change increases the occurrence of "fire weather". We modelled this trade-off between connectivity and fire risk for three species with different dispersal characteristics in a fire-prone landscape in south west Western Australia. Our scenarios of restoration were: corridor, stepping-stone and fragment expansion. We find that the optimal landscape restoration plan for our study area is dependent on both species life history and habitat requirements, and the interaction between climate change and fire risk. We conclude that in order to move from predicting the impacts of climate change to taking conservation action it is essential to understand how multiple threats, in this case climate change and fire, interact to affect species persistence.

2011-12-09 14:00 Valuation of protected areas in Uganda: case study of Murchison Falls Conservation Complex

Mwaura, FM*, *Economic Policy Research Centre ;* **Muramira, TE,** *National Environment Management Authority, Uganda ;* **Ogwal, FS,** *National Environment Management Authority, Uganda ;* **Guloba, M,** *Economic Policy Research Centre ;*

Although, it is widely accepted that protected areas (PAs) play important roles through provision of ecosystem services to humanity, PAs conservation in Uganda have been largely hindered by lack of statistical values. To establish the contribution of PAs in national economy a valuation study was undertaken in the Murchison Falls Conservation Complex in Uganda. A total economic valuation method approach was adopted where different valuation techniques were used to estimate different values from various ecosystem services. Valuation technique used were market price, avoidance/ replacement costs, travel cost method, modified contingent, benefit transfer, financial accounting and scenario building. Resources reconnaissance and socio-economic surveys, consultative meeting and existing information were used to collect the relevant data required for the study. The PAs are important habitat for conservation of wild flora and fauna, and also provides other ecosystem services including non-timber wood products, non-wood products (food), medicine, soil erosion control, aesthetic value, carbon sequestration, catchment services, opportunity costs and academic services that were valued at US$2.5M, 2.9, US$1.2M, US$72M, US$73, US$2 M, US$ 13.9M, US$ 13M and US$ 2474 respectively per annum. The bequest /existence value was estimated at US$16 billions while financial return for 2008 was US$ 0.6 million.

2011-12-08 14:40 CONSERVATION OF A RARE AND THREATENED PLANT Quassia bidwillii ON A COAL MINE SITE IN CENTRAL QUEENSLAND

NAIK, V.M.*, *Centre for Plant and Water Science, CQUnivesity, Rockhmapton, QLD 4702, Australia;* **Ashwath, N.,** *Centre for Plant and Water Science, CQUnivesity, Rockhmapton, QLD 4702, Australia;*

Quassia bidwillii (Family: Simaroubaceae), is a shrub listed as a vulnerable species under the Commonwealth EPBC Act 1999 and the Nature Conservation (Wildlife) Regulation 2006 (Queensland). This species occurs only at a few localities, including Anglo American Callide Mine in Central Queensland. The major threats to its conservation include habitat clearance due to extensive clearing of native vegetation in the region. Hence, mining companies are required to develop conservation strategies, in order to continue to undertake mining where these species occur. Conservation of Q. bidwillii on mine sites and their surrounds requires information on population ecology, habitat preference, seed biology, propagation strategies, and its ability to grow successfully on mine sites i.e. within conventional rehabilitation. Only three populations amongst the five known populations still exist at present. Initial assessment of herbarium records and recent field visits suggested varied flowering patterns and differing degrees of pest infestation by Atteva albiguttata, respectively. This extensive pest infestation has been reported for the first time on plant. Various other studies such as genetic variation and in situ conservation are being studied as part of research. This research will not only help to understand the biology of the species, but it will also be used to develop conservation procedures that could be utilised by the mining company for long term conservation planning.

2011-12-08 14:15 Ecological & Anthropogenic Covariates Influencing Gharial Distribution & Habitat Use; And The Feasibility Of Photo-Identification For Population Estimation.

NAIR, TARUN*, *Student, Post-Graduate Programme in Wildlife Biology and Conservation, National Centre for Biological Sciences;*

The critically endangered gharial faces severe anthropogenic threats across its range, including its stronghold, the Chambal River. Yet, there are no reliable population estimates for gharials and its ecology is poorly understood. This study describes a robust protocol for estimating gharial populations, and investigates factors determining their distribution

and abundance. We undertook row-boat surveys and stationary bank observations to record gharial encounters, ecological & anthropogenic covariates; and used photographic capture-recapture to estimate detection probabilities and abundance. Our results show that sandy banks adjacent to deep pools are the most critical factor affecting gharial abundance, and that gharials have a low threshold of tolerance for anthropogenic disturbance. We also demonstrate the conceptual, technical and logistic feasibility of applying photographic capture-recapture techniques for estimating gharial abundance in the wild, a technique that has never been used for crocodilians before. We suggest that gharial 'hot-spots' be identified, based on empirical data such as ours, to help prioritize conservation zones, and invest available resources in tackling known, specific problems. We are also of the opinion that without determining the current status of gharials, highly intensive strategies like egg-collection and captive-bred releases are unwarranted, and divert valuable conservation resources away from essential protection measures.

2011-12-09 17:30 Does inbreeding reduce fitness in a hatchery salmon population?

Naish, Kerry*, *University of Washington;* **Seamons, Todd,** *University of Washington;* **Hauser, Lorenz,** *University of Washington;* **Quinn, Tom,** *University of Washington;*

Changes in fitness related traits may affect population productivity. However, detecting the casual factors underlying a change in such traits is difficult in individuals that spend most of their time in natural environments, because genetic and environmental trends cannot be readily separated. It is particularly important to identify such factors in managed populations, because these populations may appear demographically healthy but practices can result in inadvertent reductions in genetic variation underlying phenotypes. Here, we investigate the effects of four generations of culture on the genetic diversity and fitness of an anadromous steelhead (Oncorhynchus mykiss) hatchery population. We constructed an extensive molecular pedigree on more than 6000 adult fish returning to the hatchery over a 14 year period. We used this pedigree to estimate the effective population size and the rate of inbreeding within the population. We also implemented an 'animal model', a form of mixed effects model, to determine the effects of inbreeding on fitness-related traits such as length, weight, fecundity and age and date at return to the hatchery. We found that hatchery practices led to inadvertent inbreeding, that effective size stayed small and constant despite an increase in the population size, and that inbreeding was related to a change in some fitness traits. This study provides guidance on possible improvements to management practices, and illustrates the value of ongoing genetic monitoring programs.

2011-12-08 18:30 An integrated avian habitat fragmentation assessment method using dispersal data and functional habitat categorization

Nan Lu*, *Key Laboratory of Animal Ecology and Conservation Biology, Institute of Zoology, Chinese Academy of Sciences;* **Chenxi Jia,** *Key Laboratory of Animal Ecology and Conservation Biology, Institute of Zoology, Chinese Academy of Sciences;* **Huw Lloyd,** *World Pheasant Association;* **Yuehua Sun,** *Key Laboratory of Animal Ecology and Conservation Biology, Institute of Zoology, Chinese Academy of Sciences;*

The ability to assess avian habitat fragmentation effectively requires ecologists to develop integrated methods that are truly representative of ecological systems across fragmented landscapes. Here we develop an integrated method for assessing avian habitat fragmentation that combines habitat suitability (MaxEnt) modelling with dispersal functional response data and functional habitat categorization models for two sympatric montane Galliforme species in China - Chinese Grouse Bonasa sewerzowi and Blood Pheasant Ithaginis cruentus. Twenty-four environmental predictor variables corresponding to three different data categories (bio-climatic, topographic and habitat) were selected to construct habitat suitability models for both species, with dispersal distance functions of 4 and 7 km, and functional habitat categorization models constructed using Matlab. The model fitting procedure provided habitat suitability models with good fit, with the ROC plots exhibiting high average test AUC for replicates for both Chinese Grouse (0.980 ± 0.007) and Blood Pheasant (0.964 ± 0.007). Five-fold cross-validation suggested that both models were robust with AUC values for both training data and test data > 0.95. Distribution ranges for both species in China were largely concentrated at the southeastern edge of Qinghai-Tibet plateau but that of the globally threatened Chinese Grouse was predicted to be significantly smaller (85,793 km2) than that of Blood Pheasant (267,774 km2). The majority of suitable areas identified for both species were very small, with only 29 and 12 areas identified as being > 100 km2 for Chinese Grouse, and 42 and 16 areas being > 100 km2 for Blood Pheasant. Habitat for the Chinese Grouse was more severely fragmented with fewer large areas that were also more degraded and functionally isolated. By combining habitat suitability models with the direct effects of habitat loss and degradation, and the indirect effects of reduced inter-patch dispersal our integrated assessment method enables conservation planners to consider different functional habitat categories for landscape conservation that would otherwise appear cryptic under more typical habitat suitability modelling approaches.

2011-12-07 16:54 Does human landscape perturbation impact genetic diversity on the guigna (Leopardus guigna, Mammalia, Felidae)? Insights from Chiloe Island, southern Chile

Napolitano, C*, *Laboratory of Molecular Ecology, Institute of Ecology and Biodiversity, University of Chile, Santiago, Chile;* **Sanderson, J,** *Small Cat Conservation Alliance;* **Johnson, W,** *Laboratory of Genomic Diversity, National Cancer Institute, Frederick, Maryland, USA;* **Ritland, K,** *Laboratory of Population Genetics and Genomics, Department of Forest Sciences, Faculty of Forestry, University of British Columbia, Vancouver, Canada;* **Poulin, E,** *Laboratory of Molecular Ecology, Institute of Ecology and Biodiversity, University of Chile, Santiago, Chile;*

Human landscape perturbation is the main cause of species extinction worldwide. Wild felids are one of the most threatened groups inhabiting a perturbated landscape, mainly because of their large home ranges, low population densities and highly territorial behaviour. The guigna (Leopardus guigna) is the smallest felid in the American continent and one of the smallest in the world. It has the most restricted geographic range of all the New World cat species, inhabiting only around 160,000 km2. It is highly associated with the temperate rain forests of southern South America and it is currently considered Vulnerable due to habitat loss and fragmentation and also human persecution. To assess the effects of human landscape perturbation over genetic diversity of guigna populations, we analyzed samples from guignas inhabiting landscapes with different degrees of human perturbation using genetic markers (mitochondrial DNA and 15 microsatellites) and explored genetic diversity, kinship and inbreeding levels. We found that genetic diversity decreases with landscape perturbation, and that kinship and inbreeding levels increase with landscape pertubation. We conclude that genetic diversity in guigna populations is therefore impacted by human landscape perturbation on Chiloe island, discuss the possible causes and how this situation could threaten the persistence of the species in the long term. These findings contribute to our knowledge of species responses to landscape alteration and will be used in the conservation and management of this and related species.

2011-12-07 14:45 Recovery Programme for Critically Endangered Pygmy Hog (Porcula salvania) through Conservation Breeding and Reintroduction in Restored Grasslands in Assam

Narayan, G.*, *EcoSystems-India and Durrell Wildlife Conservation Trust;* **Deka, P. J.,** *EcoSystems-India and Durrell Wildlife Conservation Trust;* **Oliver, W. L. R.,** *IUCN/SSC Wild Pigs Specialist Group;*

Critically endangered and world's most threatened wild suid, the pygmy hog (Porcula salvania), is on the path of recovery despite stiff challenges faced by attempts to reintroduce captive-bred hogs in partially restored grassland habitats in Assam. The main threats to these grasslands are extensive dry-season grass burning and livestock grazing. A conservation breeding project was started in 1996 by capturing six wild founders from the last surviving population of a few hundreds in Manas Tiger Reserve. The project was able to multiply the captive population by twelve times in five years and continues to provide animals for reintroduction. The process to restore the protection and management of some identified grasslands could however begin only after cessation of political disturbances in the region. The restoration process in Manas and three other Protected Areas of Assam was assisted by the local frontline protection staff members trained by the project. Under the reintroduction exercise a total of 35 pygmy hogs were released in Sonai Rupai Wildlife Sanctuary between 2008 and 2010. Each year three social groups

of hogs were 'pre-conditioned' under minimum human contact at a 'pre-release' facility with simulated natural habitat. Field surveys have revealed that up to two-thirds of the released hogs survived, and are breeding and dispersing successfully in the wild. Now, efforts are underway to release 13 similarly 'pre-conditioned' hogs in Orang National Park in 2011.

2011-12-07 15:00 Linking Landscape Connectivity, Source-Sink Dynamics, and Population Viability

Nathan H. Schumaker*, *US EPA;* **Allen Brookes,** *US EPA;* **Julie A. Heinrichs,** *University of Washington;*

The importance of connectivity and source-sink dynamics to conservation planning is widely appreciated. But the use of these concepts in practical applications such as the identification of critical habitat has been slowed because few models are designed to identify demographic sources and sinks, and popular methods for quantifying landscape connectivity tend to forgo realism in favor of tractability. Better linkages between connectivity and source-sink models, and greater biological and ecological realism are needed before landscape connectivity-based studies can more fully contribute to conservation planning. Here we illustrate how a new spatially-explicit population model (HexSim) addresses these challenges. HexSim is a versatile multi-species, multi-stressor life history simulator that can account for landscape change, road networks, landscape genetics, disease dynamics, and many other practical concerns. What distinguishes our new methodology is that source-sink dynamics and connectivity become emergent properties of HexSim simulations. It is not necessary to limit biological or ecological realism, to decompose landscapes into nodes or patches, or to identify sources, sinks, or dispersal corridors in advance. In this presentation, we will use a range-wide simulation of the Northern Spotted Owl (Strix occidentalis caurina) to illustrate the model and methodology, and to tie our landscape connectivity metrics to the identification of critical habitat.

2011-12-06 10:45 Advance, invading hordes: an experimental island invasion.

Nathan, HW*, *University of Auckland;* **Clout, MN,** *University of Auckland;* **Murphy, EC,** *Department of Conservation;* **MacKay, JWB,** *University of Auckland;*

The House mouse (Mus musculus) is an important mammalian pest species both in New Zealand and worldwide. This study follows the invasion of a small mammal-free island by mice. A founder pair of mice was released on Te Haupa (Saddle) Island in December 2009. An invasive population was allowed to establish and persist until August 2010 and was intensively studied throughout this period. Capture-Mark-Recapture methodology was used to estimate population size at regular intervals, allowing the population growth from the initial two individuals to be quantified. In addition, the hypothesis that mice would be less detectable at lower population density was tested using selected detection devices and strategies at regular intervals throughout the study period. Key findings were that the mouse population showed a logistic pattern of growth characteristic of many invasive species and that commonly used detection methodologies were adequate even at low population density. While there have been many studies investigating the population dynamics of existing populations of mice, those of a population in the initial stages of invasion have never been documented. As such this project represents an important advance in the study of the colonising behaviour of this prolific invader.

2011-12-08 10:42 Influence of Biotic Factors and Spatial Scale on Range Margin Dynamics Among Competing Species Under Climate Change

Naujokaitis-Lewis, I*, *University of Toronto;* **Fortin, MJ,** *University of Toronto;*

Determinants of species' range limits are a complex interplay between abiotic factors and biotic interactions that influence persistence. Understanding the ecological dynamics at species' range margins is critical for accurately predicting species' responses to climate changes and idenitification of conservation actions. However, our understanding of the relative influence of processes at the range margins remains unresolved, and likely varies as a function of scale. Thus it is important to evaluate whether accounting for biotic interactions improve the fit and predictive power of species distribution models (SDMs), and whether distribution patterns change with spatial scale. We developed SDMs for 10 closely related and competing bird species exhibiting variable patterns of sympatry along the range margins, and assessed past and future range dynamics under climate change scenarios using a consensus modelling framework. We applied variance partitioning approaches to estimate the relative influence of abiotic and biotic variables and related this to indices of species turnover and co-occurrences across multiple scales. We show that species ranges margins are temporally and spatially dynamic in the past, and under future predicted climate changes but the magnitude of changes were a function of spatial scale. Accounting for biotic interactions improved model predictive accuracy and was scale dependent. Our results underscore the need to consider biotic processes and spatial scale when examining range dynamics and predicting how species' ranges will shift with climate change.

2011-12-06 10:45 Applying Shark Attack Policy Responses to Carnivore Conservation Strategies

Neff, Christopher*, *University of Sydney;*

Shark attacks illustrate unique problems in carnivore conservation, but they also offer new insights for the management of endangered predatory species. With shark bites reported from Boston to Bangkok they represent the most broad-based human-wildlife conflict in the world. Shark bites garner public attention in unique ways and negative frames following these events make the killing of all sharks more publicly acceptable and conservation more difficult. The beach represents ground-zero in the education of the public regarding balanced approaches to protecting sharks and protecting beachgoers. A content analysis of media frames and public policy responses following shark bites on beaches in South Africa in 2004, Australia in 2000 and the United States in 2001 finds the emergence of a new policy trend that favors human-control measures in the U.S. and South Africa, even when sharks are identified as the problem and blamed for the incident. In these cases, punitive policies were not directed at sharks. These case-studies offer an applicable analysis for other carnivore conservation efforts, policy approaches and public education initiatives.

2011-12-07 11:45 Salt marsh as a coastal filter for the oceans: changes in function with increased nitrogen loading and sea-level rise

NELSON, JOANNA*, *University of California, Santa Cruz;* **Zavaleta, Erika,** *University of California, Santa Cruz;*

Coastal salt marshes are among Earth's most productive ecosystems and provide important ecosystem services, including interception of watershed-derived nitrogen (N) before it reaches nearshore oceans. N pollution and climate change are two dominant drivers of global-change, yet their interacting effects in salt marshes at the land-sea interface are poorly understood. We examined how sea-level rise and anthropogenic N additions affect salt marsh N uptake using a dual strategy: a) a field-based manipulative experiment in one marsh over the course of two years; and b) an observational experiment at nine sites throughout the estuary in Elkhorn Slough, California. We crossed simulated sea-level change and ammonium nitrate addition treatments in a fully factorial design. We found that N-addition had a significant, positive effect on aboveground biomass (a 315% increase at maximum), plant tissue N concentrations, N stock sequestered in plants – where marsh plants with added N sequestered more than four times as much N as controls – and shoot:root ratios. In the observational study, marsh elevation serves as the simulated sea-level proxy, and water quality monitoring quantifies the N treatment. Both our experimental and observational results suggest that coastal salt marsh plants serve as a robust N trap and coastal filter and that in Elkhorn Slough this function is not saturated despite high background annual N inputs from upstream agriculture. However, accelerating sea-level rise, and subsequent drowning of the marsh, restricts the capacity for buffering the coastal ocean from eutrophication.

2011-12-08 11:15 Conservation issues in Australian fisheries management: the application of the precautionary and ecosystem approaches in five case studies.

Nevill, J*, *Retired - University of Tasmania;*

The objective of this paper is to examine the ways in which the ecosystem and precautionary approaches are applied to Australian fisheries management,

and to discuss the implications for broad marine conservation policy issues. Australia was one of the first nations to adopt bioregional ocean planning, and an Australian fishery was the first worldwide to achieve Marine Stewardship Council certification. In many ways Australian strategic marine planning appears impressive. Five case studies of Australian fisheries management are examined. These indicate that (a) the integrity of the Australian government's fisheries accreditation process is seriously flawed, and (b) the application of the precautionary and ecosystem approaches within Australian fisheries is characterised by strong rhetoric but weak implementation. Case studies discussed cover the northern prawn trawl fishery, and fisheries for orange roughy, western rock lobster, South Australian abalone, and southern ocean krill. I reach a conclusion that implementation failures largely rest on management cultures – a finding which reinforces recommendations made in recent years by several prominent scientists for fundamental and far-reaching changes to the administration of marine fisheries worldwide.

2011-12-06 10:30 Modelling the response of the biosphere to global change (symposium keynote)

Newbold, T*, *UNEP-WCMC & Microsoft Research;* **Harfoot, M,** *UNEP-WCMC & Microsoft Research;* **Tittensor, D,** *UNEP-WCMC & Microsoft Research;* **Purves, D,** *Microsoft Research;* **Scharlemann, J,** *UNEP-WCMC;*

Biodiversity continues to be lost at an unprecedented rate, with associated declines in ecosystem function and the provision of ecosystem services. In order to stem these declines, we urgently need models that project how the biosphere will respond to future changes and, through effects on the provision of ecosystem services, how changes in the biosphere will impact human well-being and the economy. There are many such models currently in use, which I will summarize in the first part of the talk. Some focus on individual species, others on whole ecosystems, and others on the provision of goods and services by ecosystems to humans. The methods used include statistical analysis of observed patterns and process-based models that attempt to capture the ecology underlying the observed patterns. The functional traits of organisms, such as body size, reproductive rates, diet and mobility, can determine how they respond to environmental changes and also how the organisms contribute to ecosystem processes and to the delivery of ecosystem services. In the second part of the talk, I will present the results of a model showing that for tropical forest bird species large, slow-breeding non-migrants that feed primarily on fruit and invertebrates have declined more in response to land-use intensification than other species. These results can help identify the species most vulnerable to land-use change and have implications for the continued provision of important ecosystem processes.

2011-12-09 11:00 Does money grow on trees? Implications of livelihood heterogeneity for payments for environmental services in Amazonian extractive reserves.

Newton, P*, *University of East Anglia;* **Nichols, L.,** *Columbia University;* **Endo, W.,** *Norwegian University of Life Sciences;* **Peres, C.,** *University of East Anglia;*

Options for limiting tropical deforestation have included implementation of payments for environmental services (PES) programs that induce behavioural changes in local actors through financial incentives. We predict that heterogeneity in local economies and livelihood strategies may influence the ability of an undifferentiated reward structured PES to achieve reduced deforestation. During a two-year study, we collected socioeconomic and demographic data at the household and community levels across two large Amazonian extractive reserves encompassing a vast mosaic of unflooded (terra firme) and seasonally flooded (várzea) forest. Communities with greater access to terra firme forest were more agricultural, and strongly committed to manioc production, whereas communities surrounded by flooded forest showed a greater dependence on extractivism. A spatially extensive PES program, the Bolsa Floresta, is being introduced across this region but pays equal financial incentives to all households. Since manioc cultivation is the primary driver of local primary forest conversion, households most engaged in agriculture incurred the greatest opportunity costs. The relative incentives of cash payments and development investment therefore varied widely according to households' and communities' demographic and socioeconomic status. We show that avoided primary forest conversion could be greatly increased with differentiated payment structures that are adjusted for local differences in opportunity costs and livelihood strategies, and present two metrics that could help to achieve that goal.

2011-12-08 18:30 The potential for cougar recolonization of Midwestern North America

Nielsen, Clayton*, *Southern Illinois University;*

Cougars (Puma concolor) were extirpated from Midwestern North America by the turn of the 20th century. However, since 1990, >300 confirmations of cougars have been recorded in the region, which indicates a potential recolonization event. Herein, I summarize the first research efforts regarding cougars in the Midwest. I created a model of potential cougar habitat in the 11-state region using geospatial data, expert-opinion surveys, and a GIS. About 8% of the region contains highly suitable habitat for cougars; 6 large, contiguous areas of highly suitable habitat for cougars were identified. The habitat suitability map was used for a population viability analysis that projected cougar occupancy 50 years into the future. Of 136 total suitable patches available to be recolonized, 35 will be occupied in 50 years. Cougar occupancy will be higher in patches closer to current cougar range and female dispersal drives recolonization potential. A mail-in survey was sent to residents of urban and rural counties of North Dakota (with breeding cougars) and Kentucky (without breeding cougars) to assess attitudes regarding cougars and management. Given the differences between states and especially between rural vs. urban respondents, conservation agencies will have to develop diverse educational and management strategies for cougars. Overall, these findings suggest that cougar recolonization potential in the Midwest is high and that humans are generally supportive of their return.

Date 14:45 The role of human decision-making for the sustainability of trophy hunting

Nils Bunnefeld*, *Imperial College London;*

Trophy hunting has been widely advocated as conservation tool and is now operating throughout the world, albeit with varying success. Wildlife populations exploited for trophy hunting are decreasing in many parts of the world. The reason for the failures of trophy hunting might be rooted in the following assumptions that are often made in conservation and management programmes for trophy hunting; perfect implementation through top down control by an all powerful and knowledgeable manager and full compliance with the management plan by hunting companies and local people. However, management plans often disregard both the cultural, social and economic needs of local people and the economic interests of hunting companies. We explore these issues using the example of the Mountain nyala in Ethiopia, and suggest a new framework for management that incorporates human behaviour into management decision-making and that takes into account uncertainty in the process of monitoring and implementation of the management plan. This approach can reveal new insights into the management of trophy hunting under multiple objectives of conservation, economic and social viability and under various forms of uncertainty.

2011-12-06 15:00 Estimating the turnover of Hemipteran assemblages from the phylogeny of their host plants: a tool for conservation planning?

Nipperess, DA*, *Macquarie University;* **Beattie, AJ,** *Macquarie University;* **Faith, DP,** *Australian Museum;* **Kitching, RL,** *Griffith University;* **Hughes, L,** *Macquarie University;*

Insects, despite forming a very large proportion of the terrestrial biota, are omitted from conservation planning because patterns of spatial turnover among insect faunas are largely unknown. Because of the high effort associated with insect surveys, there is a need to be able to predict the turnover of insect faunas from other, more easily measured, variables. We here report results investigating a relationship between the phylogenetic relatedness of plant species and the turnover of their associated Hemipteran assemblages. Using pyrethrum knockdown techniques, we collected Hemipterans from 76 plant species across three localities in sclerophyll woodland in the temperate, subtropical and tropical climate zones of eastern Australia. Phylogenetic relationships of the host plants were determined by constructing an informal supertree with branch lengths estimated from divergence times available in the literature. Distance-based linear modelling indicated that plant phylogeny explained 12% of the variation in Hemipteran assemblage composition ($p=0.001$), being just as important as the spatial separation of the plants. Our results suggest that: 1) conservation planning based on maximizing phylogenetic diversity of plants will also tend to preserve herbivorous insect diversity; and 2) information on plant phylogenetic diversity can and should be employed in planning for the

conservation of herbivorous insects.

2011-12-07 11:15 The influence of spatial scale on landscape and local drivers and perceptions of human-wildlife conflict in the Nilgiri Biosphere Reserve, S. India.

Nisha Owen*, *University of Leeds;* **Sumin G. Thomas,** *Keystone Foundation;* **Anita Varghese,** *Keystone Foundation;* **M.D. Madhusudan,** *Nature Conservation Foundation;*

Human-wildlife conflict continues to undermine conservation of large mammals and inhibit sustainable development of rural communities in shared landscapes. Livestock depredation, crop raiding, and threats to life or property are major causes of conflicts. There is recognition that conflict is often localized, yet there have been few comparative studies on how drivers and perceptions change at different spatial scales. Understanding the influence of scale both on conflict and on mitigation decision-making is fundamental, as landscape-level management may not recognize local individuality or intensity, while local schemes may not contextualize conflict and often simply divert conflicts onto neighboring areas. The Nilgiri Biosphere Reserve, 10,000 sq. km. of the Western Ghats in South India, is a mosaic of human use and protected areas, where some of the largest remaining populations of endangered Asian mammals interact with a growing rural human population. We studied socio-ecological drivers of loss and perceptions of threat at both village and household levels. 62 village interviews and 300 household interviews (in a sub-set of 18 villages), were conducted from May 2009 to January 2011. Results indicate that socio-ecological drivers of loss and perception do differ significantly by scale, and that addressing ecological drivers should take priority in landscape management, while socio-economic drivers should be of concern when decision-making is made at local scales.

2011-12-07 15:30 Predicting and managing trophic cascade by removal of alien apex predators: the importance of alternative resources to mesopredators

Nishijima, S*, *The University of Tokyo;* **Takimoto, G,** *Toho University;* **Miyashita, T,** *The University of Tokyo;*

Growing evidence reports that removal of alien apex predators often augments abundance of alien mesopredators (i.e., mesopredator release), which decreases abundance of native prey of the mesopredators (i.e., trophic cascade). However, decreasing apex predators does not always cause a mesopredator release and/or a trophic cascade. By mathematical modeling, we develop a theoretical framework that can predict the outcome of controlling apex predators, and propose a novel restoration strategy. We demonstrate that a model with alternative resources sustaining mesopredators can create all of the previously observed outcomes induced by removing apex predators, whereas a model without alternative resources cannot. Using the model with alternative resources, we also show that whether a trophic cascade occurs is determined by (1) predation rate of apex predator, (2) predation rate of mesopredator, and (3) bottom-up effect of alternative resource to mesopredator. These three factors can explain observed variations in the effects of reducing apex predators. Finally, the model shows that removing the alternative resource enhances the population size of native prey. These results suggest that considering alternative resources supporting mesopredators is important to predict the outcomes of removing alien apex predators, and controlling alternative resources to mesopredators can be effective for the management of ecosystems invaded by multiple alien predators.

2011-12-07 14:45 Local perspectives on Ebiil Marine Protected Area through socio-economic study

Noelle Wenty Oldiais*, *Palau International Coral Reef Center;* **Supin Wongbusarakum,** *The Nature Conservancy ;* **Adelle Lukes Isechal,** *Palau International Coral Reef Center;* **Dawnette Ulimang Olsudong,** *Palau International Coral Reef Center;*

The success of Marine Protected Areas largely depends on people's perceptions and attitudes, yet few efforts have focused on socio-economic assessment. In Palau, as in many other places in the Pacific, most of the work on MPAs is focused on ecological monitoring. A socio-economic study was conducted in 2010 by the Palau International Coral Reef Center at Ngarchelong State in Palau, where Ebiil Marine Protected Area is located, to better understand how the local people perceived its management and effectiveness. Surveys of all Ngarchelong households who use marine resources in Ngarchelong regardless of their place of residency in Palau and key informant interviews were used to collect data. The result showed that 95% of the people of Ngarchelong supported Ebiil being a legislated MPA and 78% supported additional MPA(s). Comparing this study to a socioeconomic study done 5 years prior, economic benefits are now perceived to be more equally shared and perception of the management and effectiveness of Ebiil had improved since. The changes in perceptions were most likely caused by awareness building through many of the community meetings and consultations since the prior study. However, the threats of illegal entry/fishing/poaching and suggestions to strengthen surveillance and enforcement still remained. It is crucial to continue the efforts in doing socioeconomic studies in all other MPAs in Palau to ensure that the management of protected marine areas is effective.

2011-12-06 11:00 Vicariance and endemism in a Neotropical savanna hotspot: distribution patterns of Cerrado squamate reptiles

Nogueira, Cristiano*, *Universidade de Brasília;* **Ribeiro, Síria,** *Faculdades Integradas do Tapajós;* **Costa, Gabriel,** *Universidade do Rio Grande do Norte;* **Colli, Guarino,** *Universidade de Brasília;*

The South American Cerrado region is recognized as a significant biodiversity hotspot. However, biogeographical patterns and processes in the Cerrado savannas remain largely unstudied, hampering representative conservation action. We used detailed and revised data on the distribution of Squamate reptiles to describe biogeographical patterns and test predictions of the vicariance model, using biotic element analysis. Clusters of co-ocurring species were compared to putative areas of endemism harboring at least two restricted-range species. Distribution patterns corroborated predictions of the vicariance model, revealing regional groups of species with significantly clustered ranges. An analysis of endemic species recovered six biotic elements, corroborating results including non-endemics. Sympatric restricted-range taxa delimited 10 putative areas of endemism, largely coincident with core areas of biotic elements detected with endemic taxa. Distribution patterns were associated with major topographical and vegetational divisions of the Cerrado. Endemism prevailed in open, elevated plateaus, whereas faunal interchange, mostly associated with forest habitats, was more common in peripheral depressions. Vicariant speciation has strongly shaped Cerrado squamate diversity, but has been poorly represented in previous conservation analyses. Although still largely undocumented due mostly to lack of adequate data compilations and analyses, effects of vicariant speciation may be prevalent in a large fraction of Cerrado and Neotropical biodiversity.

2011-12-07 12:15 Status of New Zealand's forests

Norton, David*, *University of Canterbury;* **Manley, Bruce,** *University of Canterbury;*

New Zealand's forests have undergone dramatic change over the 750 years since first human settlement. Widespread fires during the early phases of Polynesian settlement resulted in the replacement of about one third of these forests with grassland and shrubland, mainly in drier eastern areas. More rapid deforestation associated with European settlement saw another third of the original forest cover lost, as well as extensive areas of shrubland, with the remaining native forest now biased towards upland and higher-rainfall areas. While the majority of native forests are now legally protected, most are still declining because of the pervasive impacts of introduced animal pests. Notwithstanding this, changing agricultural policy and more recently the introduction of the Emissions Trading Scheme have seen an increase in the area of regenerating native forest, especially in lowland areas where old-growth native forest is scarce. New Zealand also has a long-established plantation forest estate based on the exotic radiata pine. Initially established to meet the countries timber needs as native forest timber production declined, plantation forests are now an important export earner. The Emissions Trading Scheme has started to shift the focus of new plantations, with a diversification in species and silvicultural systems.

2011-12-06 16:45 Restoring denuded, post-bleached reefs in Tanzania: testing the second phase of the Gardening Concept

Nsajigwa Emmanuel Mbije*, *Sokoine University of Agriculture;* **Ehud Spanier,** *Haifa University;* **Baruch Rinkevich,** *Israel Limnology Institute;*

The worldwide decline in coral reefs have prompted search for effective and approved-to-use restoration protocols. Based on the 'gardening concept' that guides the transplantation of nursery farmed corals, we transplanted 6912 and 7110 corals (Acropora muricata, A. nasuta, A. hemprichii, Pocillopora verrucosa, Porites cylindrica, Millepora sp.) in Changuu reef, Zanzibar and Kitutia reef, Mafia, respectively. In each site we randomly established 12 lots (each 36 m2); three that were transplanted with a mix of the three Acropora spp. (Treatment 1; T1), three with a mix of all six scleractinians (Treatment 2; T2), and six controls. Transplants were monitored for 12 months for survivorship, growth rates and coral recruitment. Within one month of transplantation, an outbreak of Acanthaster planci in Changuu reef caused about 50% mortality while at Kitutia reef; illegal fishing activities caused 25% death. Thereafter, survivorship of transplants in T1 and T2 at Kitutia reached 66.4% and 62.5%, respectively, significantly higher than at Changuu site ($p<0.05$; t-test). Species-by-species comparisons revealed lower survivorship of P. verrucosa, P. cylindrica, A. muricata, and A. nasuta in Zanzibar as compared to Mafia ($p<0.05$; t-test) and no significant differences for A. hemprichi and Millepora sp. ($p>0.05$; t test). After one year, while no significant difference was observed between EV of T1 & T2 in each site ($p>0.05$; one way Anova), EV differed significantly between sites ($p<0.05$; one way Anova). Multivariate analysis on density data revealed significant separation in fish assemblage for density data between treatments in Kitutia but weak in Changuu. A within treatment one-way ANOSIM comparing initial and last three months for each treatment showed strong separations for Kitutia than was for Changuu site. For the invertebrate assemblages, multivariate analysis revealed weak separation between treatments for Kitutia site while the same was very strong for Changuu site. One-way ANOSIM comparing large invertebrate on density data between initial and last three months for each treatment in Kitutia revealed weak separations for T1, no separation for T2 and strong for T3 in Changuu site. There were significant differences between initial and last three months in coral recruitment in T1 and T2 central empty plots, reduced recruitment in Kitutia central empty T3 plots and no recruitment in Changuu central empty T3 plots. Cumulatively the results and economic evaluation revealed that the transplantation of nursery-grown colonies might uphold critical ecosystem functions, and promote reef re-colonization.

2011-12-06 11:00 Evaluating Law Enforcement Through Independent Measures; Surveying Snares in Seima Protection Forest, Eastern Cambodia

O'Kelly, H.J.*, *Imperial College London, Centre for Environmental Policy & Division of Biology, Silwood Park, Buckhurst Road, Ascot, SL5 7PY, United Kingdom, Wildlife Conservation Society - Global Conservation Program, 2300 Southern Boulevard, Bronx, 10460, NY, USA, Inst;* **Milner-Gulland, E.J.,** *Imperial College London, Centre for Environmental Policy & Division of Biology, Silwood Park, Buckhurst Road, Ascot, SL5 7PY, United Kingdom;* **Rowcliffe, J. M.,** *Institute of Zoology, Zoological Society of London, Regent's Park, London, NW1 4RY, United Kingdom;* **Durant, S.M. ,** *Institute of Zoology, Zoological Society of London, Regent's Park, London, NW1 4RY, United Kingdom;* **Stokes, E. J. ,** *Wildlife Conservation Society - Global Conservation Program, 2300 Southern Boulevard, Bronx, 10460, NY, USA;*

The effectiveness of Southeast Asian PAs depends critically on the efficiency of law enforcement efforts at controlling illegal hunting. In Seima Protection Forest (SPF), Eastern Cambodia, hunting with wire snares constitutes a significant threat to the persistence of mammal populations. Estimating the prevalence of such a covert activity is challenging and, although law enforcement records are currently used to monitor snaring, these data are subject to numerous sources of bias which must be corrected for. We developed a new approach to obtaining an independent measure of snaring levels across the SPF. Our sampling design takes into account the unique properties of snares, insofar as they are common but often highly aggregated in space, with an inherently low detection probability. We present preliminary results of the snare survey which allow us to a) examine the extent and intensity of snaring across SPF and b) identify factors which determine these patterns, including potential responses to law enforcement activities. These results also c) provide a means of calibrating patrol data, thus increasing the utility of law enforcement records and d) establish a baseline of illegal hunting levels across the site against which the effectiveness of ongoing management actions can be evaluated. We contend that the occurrence of snaring activities is dictated by both site attributes and external factors, and that it is appreciably influenced by varying levels of patrol effort.

2011-12-09 12:00 Is river regulation a problem for frogs in Australia?

Ocock, JF*, *Australian Wetlands and Rivers Centre, University of New South Wales;* **Kingsford, RT,** *University oAustralian Wetlands and Rivers Centre, University of New South Walesf Wollongong;* **Penman, TP,** *University of Wollongong;* **Rayner, T,** *Australian Wetlands and Rivers Centre, University of New South Wales;* **Rowley, JJR,** *Australian Museum;*

The effects of river regulation (e.g. building of dams and diversion of water) are widespread and reasonably well known for their impacts on hydrology, flood frequency and geomorphology. There is also increasing understanding of severe impacts on the abundance, diversity and breeding events of waterbirds, native fishes, dependent vegetation and microinvertebrates. Frogs are predicted to be similarly affected because of dependencies on flow regimes but effects are poorly known. Strategies to reduce these impacts in Australia's wetlands, particularly in the Murray-Darling Basin, focus on the purchase and delivery of environmental flows. We investigated the responses of 15 species of frogs in the Macquarie Marshes to an environmental flow, a natural flood and rainfall to determine the likely impacts of river flow reductions on frog populations. We identified three 'guilds' of responsiveness to flow regime. The most responsive guild was likely to be directly affected by river regulation. Even though less responsive, the other guilds were indirectly affected by reduced flooding. Frogs are an important component of the biodiversity in inland waterways and a major element in the transfer of energy through aquatic food webs and so impacts we detected are likely to be far reaching, affecting consumers such as waterbirds and fish.

2011-12-06 11:00 Host-pathogen disease dynamics between New Zealand's threatened frogs (Leiopelma spp.) and the fungal pathogen, Batrachochytrium dendrobatidis (Bd)

Ohmer, ME*, *Department of Zoology, University of Otago, 340 Great King St, Dunedin, New Zealand;* **Speare, R,** *Anton Breinl Centre for Public Health and Tropical Medicine, James Cook University, Townsville 4811, Australia;* **Herbert, SM,** *Department of Zoology, University of Otago, 340 Great King St, Dunedin, New Zealand;* **Bishop, PJ,** *Department of Zoology, University of Otago, 340 Great King St, Dunedin, New Zealand;*

The spread of chytridiomycosis, an emerging infectious disease caused by the fungal pathogen Batrachochytrium dendrobatidis (Bd), is one of many threats facing amphibians globally. In New Zealand, Bd has been detected in threatened native (Leiopelma spp.) and widespread introduced (Litoria spp.) anuran species, and many questions concerning its potential impact remain. Previously, we assessed the susceptibility of two native species, Le. pakeka and Le. hochstetteri, to chytridiomycosis, utilizing the susceptible introduced species, Li. ewingii, as a positive control. Native species demonstrated low susceptibility and all individuals cleared Bd infection, while Li. ewingii experienced 100% mortality. To investigate further, we measured potential host infectiousness by comparing the longitudinal shed of zoospores in these species. Frogs were exposed to Bd and then rinsed with artificial pond water at increasing intervals, which was tested for Bd with real-time quantitative PCR. Mean infectiousness increased over time in Li. ewingii, but was low in the native species. However, in comparison to the susceptibility trial, the mortality rate was only 20% in exposed Li. ewingii. These findings indicate that host auto-reinfection may be critical for Bd to reach lethal levels, and rinsing may have removed these zoospores. Overall, we suggest that the risk of Bd for Leiopelmatids in captivity is low, but care needs to be taken when extrapolating these results to natural populations.

2011-12-06 14:36 Effectiveness of the bird repellents on the endemic New Zealand parrot Nestor notabilis

Orr-Walker L, *Kea Conservation Trust;* **Adams N*,** *Unitec Institute of Technology;* **Roberts L,** *Unitec Institite of Technology;* **Kemp J,** *Department of Conservation;*

Toxins are widely used to control introduced mammalian pests in New Zealand. By kill of non target native species, particularly birds, does occur including that of the endemic New Zealand parrot, the Kea (Nestor notabilis). In large scale control operations the toxin (1080)is normally presented within cereal pellets by aerial application. This occurs after prefeeding with non toxic pellets providing the opportunity of introducing bird specific repellents to these pellets to reduce by kill. We tested the effectiveness of a secondary repellent anthraquinone and a primary repellent d-pulegone in deterring consumption of pellets by kea. Birds were initially presented with pellets containing no repellents followed in sequence, with pellets containing both repellents, the primary repellent only and finally with no repellents again. The repellent combination at the trialled concentration was effective at repelling kea from ingesting cereal pellets with the learned aversion developing rapidly. Continued use of primary repellents was required to maintain the aversion response on subsequent exposure to pellets. Introduction of these repellents into prefeed and toxin laced pellets may reduce by-kill of kea and other vulnerable or threatened native birds during pest control operations.

2011-12-08 18:30 Oil and gas development in the World Heritage and wider protected area network in sub-Saharan Africa

Osti, M*, *Environmental Change Institute, University of Oxford; United Nations Environment Programme World Conservation Monitoring Centre (UNEP-WCMC);* **Coad, L,** *Environmental Change Institute, University of Oxford; United Nations Environment Programme World Conservation Monitoring Centre (UNEP-WCMC);* **Fisher, JB,** *Environmental Change Institute, University of Oxford;* **Bomhard, B,** *United Nations Environment Programme World Conservation Monitoring Centre (UNEP-WCMC);* **Hutton, JM,** *United Nations Environment Programme World Conservation Monitoring Centre (UNEP-WCMC);*

More than 25% of natural World Heritage (WH) sites worldwide are estimated to be under pressure from existing or future mining and energy activities (IUCN 2008; UNESCO 2009). However, that 'pressure' has yet to be quantitatively defined and assessed for many regions of the world. We conducted a GIS-based analysis of overlap and proximity between natural WH sites and areas allocated to oil and gas concessions as well as pipelines and oil wells for all of sub-Saharan Africa. We found that oil and gas concessions were located within 27% of the WH sites, though no currently active oil wells were operating directly within the WH sites. A proximity-based assessment of oil and gas concessions within 5 km of WH site boundaries included only one additional WH site, suggesting that sites susceptible to indirect impacts from oil and gas development are likely to be those already overlapped by concessions. Our findings indicate that activity from oil and gas development in sub-Saharan WH sites has to date been limited; however, future pressure cannot be ruled out, due to continued presence of concessions within more than one quarter of the network, and projected expansion of oil and gas exploration within the region. Our results may be used to inform the inclusion of new sites into the WH network.

2011-12-09 15:30 Local People Perception and Involvement in Biodiversity Conservation in some National Parks in Nigeria

Osunsina I. O.O*, *Department of Forestry & Wildlife Mgt, University of Agriculture, Abeokuta;* **Ogunjinmi, A. A.,** *2Department of Wildlife and Environmental Resources Management, College of Agriculture, Osun State University, Osogbo;* **Jayeola O. A.,** *Department of Forestry & Wildlife Mgt, University of Agriculture, Abeokuta;* **Oduntan O.,** *Department of Forestry & Wildlife Mgt, University of Agriculture, Abeokuta;* **Yisau M. A.,** *Department of Forestry & Wildlife Mgt, University of Agriculture, Abeokuta;*

Despite the fact that for a long time many local communities contributed to the conservation and protection of biological resources, only recently has their importance in natural resources protection and the need for deriving benefits from protected areas has been recognized. The perception and involvement of local people in conservation around some National parks in Nigeria were investigated. Questionnaires were administered to elicit information from the villages around the parks viz: CRNP(985 respondents); GGNP(1079 respondents); KLNP(1134 respondents) and OONP(1013 respondents). The respondent in CRNP(54%) and KLNP(63.8%) stated that they were involved in the management of the Park, while respondents in GGNP(51.3%) and OONP(83.1%) respectively indicated that they were not involved in the management of the Park. Majority of the respondents in CRNP(82.9%), GGNP(61.80%), KLNP(84.50%) and OONP(60.10%) indicated that they were in support of the Park. Chi-square results showed that there was significant relationship ($X2 = 395.934$, $p<0.01$) between the financial status of the people and their support for the Park. The need to involve the local people in conservation cannot be over-emphasized, any conservation effort must involve the local people, based on their interests' skills, self reliance traditions and it must initiate programs that offer them spiritual and economic benefits.

2011-12-07 17:30 Identification of Areas of Conservation Importance as MPA Candidates Through the Analysis of Dolphin Critical Habitats, Golfo Dulce, Costa Rica

Oviedo, L*, *The Swire Institute for Marine Science and School of Biological Sciences, The University of Hong Kong, Cape d'Aguilar, Shek O, Hong Kong.;* **Karczmarski, L,** *The Swire Institute for Marine Science and School of Biological Sciences, The University of Hong Kong, Cape d'Aguilar, Shek O, Hong Kong.;*

Golfo Dulce is a tropical fjord-like embayment located in the southern Pacific coast of Costa Rica; it is among the best preserved marine habitats in the Osa Peninsula ecosystem. We focus on the key areas/habitats of high conservation importance due to the role they play in the day-to-day needs for two dolphin species (bottlenose dolphin, Tursiops truncatus; pantropical spotted dolphin, Stenella attenuata) in their year-round presence in the inner basin of Golfo Dulce. Two complementary analytical approaches were used: (a) assessment of relative densities and identification of frequently used areas by means of the near neighbor index and kernel density maps, and (b) identification of predominant behaviors and their spatiotemporal environmental correlates. Based on the information provided by the mapped relative density and the behavior observations, particularly the spatially localized foraging, in Golfo Dulce, the drainage of Tigre and Esquinas River should be designated as candidate Marine Protected Areas for bottlenose dolphins; while the central-east inner basin of the gulf should receive a similar status for spotted dolphins as the focal conservation species, with the thresholds of Primary Key Areas and Secondary Important Areas as the basis for the establishment of core and buffer zone structure.

2011-12-07 14:30 The influence of small-scale variation in habitat structure on invertebrate diversity in mixedwood forests

Oxbrough, A*, *University of Alberta; University College Cork;* **Spence, J,** *University of Alberta;* **O'Halloran, J,** *University College Cork;*

Invertebrates are a key component of forest biodiversity fulfilling functional roles in food webs as herbivores, predators, as a food source for mammals and birds, but also as decomposers and pollinators. Maintaining biodiversity is a primary goal of forest policy, however forest management plans are typically applied at stand or landscape levels whereas invertebrates are also influenced by factors acting at much smaller scales. We aim to examine the relationship between habitat parameters, particularly small-scale structural components of the litter, and invertebrate diversity, and ultimately link these patterns to processes acting at larger scales, which are more applicable to current sustainable forest management policy. Invertebrates from a range of functional groups (spiders, Carabid and Staphylinids beetles, Collembola (springtails), mites) were collected using pitfall traps and Berelese funnel extraction from litter samples in the boreal forest of Northern Alberta, Canada. Eighteen stands were examined from three forest types: deciduous dominated, conifer dominated and a mix of these. Invertebrate diversity was related to litter depth and type as well as factors at the stand scale such as forest structure. Forest management should aim to promote a range of canopy conditions to support a diverse litter structure. This will support a range of functional groups which are key to ecosystem function.

2011-12-07 15:45 Territorial Competition and Landscape Ecology in Yellow Warblers (Dendroica petechia)

OZELSKI, ASHLEY*, *CUNY Graduate Center;* **Manne, Lisa,** *CUNY Graduate Center;* **Nott, Philip,** *The Institute for Bird Populations;*

At higher population densities, territorial birds may be distributed according to an ideal-despotic model, in which more competitive individuals occupy and secure the best territories. Since more competitive individuals often occupy larger territories and exclude others from the area, this may skew measures of habitat quality assessed via population density or occupancy. Here, we test the scales at which despotism can be detected in Yellow Warblers (Dendroica petechia) of the Midwest United States by utilizing available data from the Monitoring Avian Productivity and Survivorship (MAPS) program. We characterized sites as competitive and non-competitive based on bird size and age parameters and tested for environmental differences between sites. Proportions of habitat differed significantly between competitive and non-competitive sites; in many cases, more competitive individuals were found in landscapes with smaller proportions of suitable habitat. This supports the hypothesis that older, larger males occupy the best territories and exclude less competitive males when habitat types are limited. Future studies will determine if reproductive output also correlates with these detectable competitive site differences. Identifying how landscapes and social dynamics interact with reproductive success provides further insight on how land management decisions can be used to conserve territorial species.

2011-12-07 12:15 Hunted Felids: Too Protected To Survive?

Palazy, L, *University Lyon, France;* **Bonenfant, C,** *University Lyon, France;* **Gaillard, J.-M.,** *University Lyon, France;* **Courchamp, F*,** *CNRS - University Paris Sud, France;*

Trophy hunting is one of the most controversial issues in conservation biology. In particular, proponents and opponents debate fiercely over its innocuousness for hunted populations. Contrarily to common belief, trophy hunting concerns an outstanding economic market and a surprisingly high number of species. Focusing on felids, we show that trophy hunting could constitute an overlooked threat to threatened species. Because humans value rarity, protected species are disproportionately hunted, thereby become even more vulnerable, which risks pushing them to extinction. With the example of the ten different felids species that are hunted for their trophies, we evidence that (i) the number of killed individuals increase with time, in several cases exponentially, despite population declines, (ii) the price of trophies is strongly dependent on species protection status, (iii) changes of protection status result in counter-intuitive changes of hunting pressures: protection increase leads to exacerbated hunting effort, while protection relaxation generates relative disinterest; (iv) the increase of hunting observed for the last 40 years cannot go on indefinitely, as exemplified by our estimation of extinction times with simple mathematical models. The value of rarity in trophy-hunted species implies specific management requirements to avoid overexploitation if we are to sustainably use this recreational activity as an income source for conservation.

2011-12-08 18:30 Motives and preferences for trophy hunting: who, why and which ones?

Palazy, L.*, *UMR CNRS 5558, Lab BBE, Université Lyon 1, VIlleurbanne, France ;* **Bonenfant, C.,** *UMR CNRS 5558, Lab BBE, Université Lyon 1, VIlleurbanne, France ;* **Gaillard, J.M.,** *UMR CNRS 5558, Lab BBE, Université Lyon 1, VIlleurbanne, France ;* **Courchamp, F.,** *UMR CNRS 8079, Lab ESE, Université Paris-Sud, Orsay, France;*

Trophy hunting is of major relevance to conservation biology, both as a significant source of financial outcomes and as a potential threat to many species. There are however several major gaps in our understanding of this considerable economic market. Notably, neither the motivations of hunters (either related personal satisfaction, social interests or conservation concern) nor the criteria driving species preferences are well understood. Until recently only the trophy size and animal body mass were allegedly driving the hunter's choice of a species, but novel work highlighting species rarity as a key preference criteria has raised new conservation concerns for the biodiversity affected by this activity, supposing that hunters value species differently. Estimating the value given by hunters to various species is, however, difficult. The classically used trophy price is a good but indirect indicator of species attractiveness and can thus be biased. Considering those gaps and difficulties, we assessed the drivers of trophy hunting by interviewing trophy hunters directly. With an online questionnaire targeting the largest trophy-hunting club and trophy-hunting provider websites, we characterized the motivations for hunting, the preferred hunted species and the main criteria of choice for these species worldwide. Statistical analyses were then conducted to assess the link between trophy hunting and species threat.

2011-12-07 10:30 Disrupted seasonality by dams drives population declines and range-wide losses of California river-breeding frogs

Palen, WJ*, *Simon Fraser University;* **Kupferberg, SJ,** *University of California-Berkeley;* **Lind, AJ,** *US Forest Service;* **Bobzien, S,** *East Bay Regional Parks;* **Catenazzi, A,** *Gonzaga University;* **Drennan, J,** *Garcia and Associates;* **Power, ME,** *University of California-Berkeley;*

Alteration of natural hydrology by large dams combined with peak demands for power and water in summer have resulted in frequent aseasonal flow conditions in rivers of western North America. Native species in these ecosystems have evolved with predictable annual flood-drought cycles, and are vulnerable to disruption of the seasonal match between stable low-flow conditions and the timing of life history. Here we evaluate the impact of altered river flow regimes for a native frog in California at four scales: changes in species distributions over the past half-century, differences in current population abundance between regulated and unregulated rivers, temporal trends among populations with different hydrologic histories, and annual patterns of survival with seasonal hydrology. Foothill Yellow-legged Frogs (Rana boylii) are absent downstream of large dams more often than in unregulated rivers, and breeding populations are 4-5 times smaller in regulated rivers. Time series data from five R. boylii populations across a gradient of natural to highly artificial conditions suggest that variability of flows in spring and summer result in high mortality of eggs and larvae. Both models and field data suggest that such mortality can cause population-level declines. Mitigation to stem biodiversity loss downstream of dams will benefit from management that better mimics the natural flow regime.

2011-12-08 18:30 Effects of human and protected area impact on freshwater ecosystem services of Nepal

Pandeya, B.*, *King's College London;* **Mulligan, M.,** *King's College London;*

We have assessed human influence and the protected area (PA) impact on freshwater ecosystem services (ES) of Nepal. The study has analysed the globally best data of bio-physical, environmental and socio-economic properties available at 1km and 1ha spatial resolution. We applied advance hydrological modelling tools that include Co$ting Nature tool and the WaterWorld-Policy Support System (WW-PSS) to assess the quality and quantity of freshwater ES. With the exception of PA catchments, increased human footprint on freshwater ES is clearly noticed across the country. However, low to minimal impact on freshwater ES is seen within, and immediate downstream of, the PA catchments. The PA catchments are supplying nearly 100% filtered freshwater. The reforestation and improved management of PA catchments have resulted in better quality of freshwater supply, although the water availability is slightly diminished because of increased evapotranspiration ratio of the catchments. The research concludes that the PA catchments are the major source of improved freshwater ES in the region. Thus, the freshwater ES of PA catchments must be understood for their primary role in providing better quality of freshwater supply to people within the PA catchments and their immediate downstream areas.

2011-12-06 14:00 Patterns of local resource use by the Waorani in Yasuní National Park, Amazonian Ecuador

Papworth, SK*, *Imperial College London;* **Slocombe, K,** *University of York;* **Bunnefeld, N,** *Imperial College London;* **Milner-Gulland, EJ,** *Imperial College London;*

Mapping resource use is important in conservation for the development of appropriate no-take areas or reserves, defining land ownership and measuring extraction sustainability. Mapping resource use often involves one of two approaches: interviews and drawn maps, or researchers accompanying individuals, either while they are extracting or afterwards.

When interviewing and drawing maps, inaccuracies can occur due to recall, miscommunication or a lack of clearly defined landmarks in areas such as dense neotropical forest. When accompanying individuals, researchers may alter their behaviour, for example, by slowing normal activities. A simple alternate method was used to study patterns of local resource use in a Waorani community within Yasuní National Park, Ecuador. Members of the community were trained in the use of an inexpensive GPS receiver loaded with the program Cybertracker which provides a straightforward user interface. The receiver tracked the path of individuals when carried into the forest and a simple questionnaire was conducted before and after a forest trip to provide context. Borrowing from studies of animal movement behaviour, net squared displacement was used to understand resource use in the community by comparing hunting trips with other uses of the forest. This approach benefits the researcher, but also allows the community to develop GIS skills and gives greater ownership of investigations.

2011-12-09 12:15 PROJECT ECHO: An Initiative Aimed At Engaging Urban Society In The Conservation Of Cryptic Long-Tailed Bats (Chalinolobus tuberculatus)

PARIS, BEN*, *Project Echo;* **Le Roux, Darren,** *Department of Conservation;*

The threatened long-tailed bat (Chalinolobus tuberculatus) is one of only two endemic bat species in New Zealand which are the only native terrestrial mammals in the country. This species is widely distributed but it is only recently that bats have been discovered to use human-dominated ecosystems including cities like Hamilton and even Auckland. The main threat facing cryptic local populations is ongoing destruction and fragmentation of habitats used by foraging and roosting bats (e.g. old-growth native and exotic trees). Project Echo is a grassroots multi-organisational bat conservation initiative with three main objectives: 1.) Public bat education and involvement; 2.) Development of a comprehensive bat distribution database with ongoing acoustic bat monitoring; and 3.) Undertaking innovative bat research. Through Project Echo we have successfully increased local awareness of bat conservation efforts through media coverage, a factsheet, interactive website and social networking as well as holding regular talks and bat sighting tours. Trials of artificial bat houses at select habitats are also underway. Here we present some research findings undertaken through Project Echo and demonstrate how a collaborative multi-agency approach can engage an urban society in the conservation of this cryptic species.

2011-12-06 14:40 Role of Free-Ranging Mammals in the Deposition of Escherichia coli into a Texas Floodplain

Parker, ID*, *Texas A&M University;* **Lopez, RR,** *Texas A&M University;* **Padia, R,** *Texas A&M University;* **Gallagher, M,** *Texas A&M University;* **Karthikeyan, R,** *Texas A&M University;* **Cathey, JC,** *Texas A&M University;* **Silvy, NJ,** *Texas A&M University;* **Davis, DS,** *Texas A&M University*

The role of wildlife in fecal pollution of water bodies (deposition of Escherichia coli (E. coli)) is not well understood. Although water quality studies incorporate wildlife data, it often lacks a clear connection between wildlife density and E. coli deposition. Our goal for this research was to determine the impact of free-ranging mammals (in general and species-specific) on E. coli loads in a floodplain. Objectives of this research were to determine the density of important free-ranging wildlife in the study area, estimate fecal deposition rates, and determine fecal E. coli loads for each species. We conducted a comprehensive literature review to determine fecal deposition rates for important mammals. We conducted mark-recapture and mark-resight population density estimates (2008–2009) for meso- and large mammals in the study areas. We found that raccoons (Procyon lotor) contributed the most E. coli load into the floodplain followed by feral hogs (Sus scrofa), Virginia opossums (Didelphis virginiana), and white-tailed deer (Odocoileus virginianus). Raccoons, Virginia opossums, and white-tailed deer are complicated to manage for water quality. As a highly destructive invasive exotic species, feral hogs are the natural choice for intensive management.

2011-12-07 11:30 Advocacy, Opportunities and Challenges; Engaging the Public in Conservation Translocations

Parker, K.A.*, *Massey University;* **Saunders, A.J.,** *Landcare Research;*

Despite frequent use as a tool for the management of threatened and endangered wildlife, the full benefits of conservation translocations often go unrealized. Here, we demonstrate how translocations provide a means for increasing public engagement in conservation along with meeting management and scientific objectives. The prospect of reintroducing a species is a strong motivator for community based restoration projects. It provides a goal to work towards, an immediate and tangible outcome for their efforts and a means for intimate involvement in practical conservation. There is no denying the impact on people of close contact with wildlife but community involvement also facilitates the communication of conservation science, and the wide dissemination of conservation issues, good and bad. We use a variety of restoration and translocation projects to illustrate how this is occurring, along with discussing the challenges and opportunities inherent in public participation in conservation.

2011-12-09 18:00 An Integrated Approach for Predicting Fates of Reintroductions using Demographic Data from Multiple Populations

Parlato, EH*, *Massey University;* **Armstrong, DP,** *Massey University;*

It is crucial to develop reliable models for reintroduced populations. Here, we present a novel approach whereby demographic data collected from multiple reintroductions are integrated into a Bayesian model. This integrated approach allows more precise projections to be made for existing populations, especially those with sparse data, and allows a priori projections that account for random site-to-site variation to be made before new reintroductions are attempted. We used data from 10 reintroductions of the North Island robin (Petroica longipes), an endemic New Zealand passerine, to restoration sites where exotic mammals are controlled. Comparison of candidate models showed that rat tracking rate (probability of a rat passing through a baited tunnel in 24 hours) was a useful predictor of fecundity and adult female survival, that two landscape variables were useful predictors of apparent juvenile survival (probably due to differential dispersal out of the reserves), and that there was unexplained random variation among sites in all demographic rates. Using the two best supported models, we obtained distributions for the finite rate of increase of the 10 populations under different levels of rat control, and for a proposed reintroduction site. The methods can be easily applied to other species with similar threats and biological characteristics, but can also be adapted to any species where post-release data on demographic rates are available.

2011-12-07 11:00 Big tropical floodplain forest systems around the world – what do we know?

Parolin, Pia*, *University of Hamburg, Biodiversity of Plants;*

Floodplain forests bear immense species diversity and are major resources for water and food. However, despite the extreme value of big freshwater floodplains around the world, very little is known about their functioning, which makes conservation issues difficult. Our understanding of floodplain forest ecology and main ecological parameters, such as tree regeneration, growth and physiology, seedling establishment, or triggers for phenological events, is very limited. The present contribution aims at highlighting the state of our knowledge of tropical freshwater floodplains in three big tropical systems across continents, i.e. Amazonia in South America, the Okavango Delta in Africa, and the Mekong River in Asia. These floodplains are dominated by a characteristic flood-pulse with predictable natural inundations to which the organisms are adapted. The little available data – especially for the African and Asian wetlands – show that many functional traits and responses to the flood follow similar patterns in the diverse ecosystems, e.g. many species reduce growth and productivity in the flooded period, and shed leaves. For urgently needed floodplain conservation, more information is needed using reproducible comparative methods. In the light of climatic change, with increasing drought events, decreased groundwater availability and flooding periodicities, and human impacts such as overpopulation, dam-building, logging, etc., this knowledge is needed ever more urgently to facilitate fast and appropriate management responses.

2011-12-07 17:15 Predicting the effect of urban noise on acoustic communication in birds

Parris, KM, *University of Melbourne;* **McCarthy, MA*,** *University of Melbourne;*

Continuing urbanisation of the planet is changing the physical structure of habitats for non-human species, but also markedly changing their acoustic environment. Urban noise interferes with acoustic communication in a range of animals including birds, with potentially profound impacts on fitness. However, a general, mechanistic theory to predict which species of birds will be most affected by urban noise, and the magnitude of any effects, is lacking. We will present a model to predict the decrease in communication distance experienced by birds when moving from natural to urban habitats (or when natural habitats are urbanised). The model predicts that the magnitude of the decrease is largely a function of signal frequency; however, the relationship between the former and latter is not monotonic. A meta-analysis of observed changes in birdsong in urban noise supports this prediction for signals in the frequency range of 1.5 – 4 kHz. The model can be used to assess the likely impacts of urban noise on bird assemblages around the globe, including which species will suffer the greatest acoustic interference, and which will show the greatest behavioural and population-level responses to urban noise.

2011-12-09 16:30 Mate preference and genetic rescue of the critically endangered Mountain Pygmy Possum (Burramys parvus)

Parrott, M*, *Department of Wildlife Conservation and Science, Zoos Victoria, Victoria 3052, Australia ;* **Watson, P,** *Threatened Species Department, Healesville Sanctuary, Victoria 3777, Australia;* **West, M,** *Threatened Species Department, Healesville Sanctuary, Victoria 3777, Australia;* **Koch, J,** *Threatened Species Department, Healesville Sanctuary, Victoria 3777, Australia;* **Weeks, A,** *CESAR, Bio21 Institute, University of Melbourne, Victoria 3010, Australia ;*

The Mountain Pygmy Possum (Burramys parvus) has undergone a dramatic decline in population size in the past decade. In particular, the isolated population on the summit of Mt Buller, Australia, has not only significantly decreased in number, but has experienced the most rapid loss of genetic diversity documented for any mammal species. In order to conserve this species, Mountain Pygmy Possums are being bred by Zoos Victoria to produce animals for augmentation of the Mt Buller population. One crucial aim of the captive colony is to hybridise possums from Mt Buller with individuals from a genetically distinct population to increase their genetic diversity and perform a 'genetic rescue'. Research was conducted using olfactory cues from males to determine the mate preference of females and examine their interest in males of differing genetic provenance. Animals were placed in breeding groups based on their preferences and genetic background. This, and concurrent research into hibernation and diet requirements, has resulted in the successful production of young in captivity, including the first hybrids between different evolutionary significant units of the Mountain Pygmy Possum. Hybridisation has lead to the production of fertile offspring and a significant increase in genetic diversity of Mt Buller derived animals. This is an important breakthrough in the conservation of Australia's only hibernating marsupial.

2011-12-06 11:30 Nothing new under the increasingly hot sun: challenges and success in mainstreaming climate change adaptation in local municipalities

Pasquini, L*, *Nelson Mandela Metropolitan University;* **Cowling, R.M.,** *Nelson Mandela Metropolitan University;* **Ziervogel, G.,** *University of Cape Town;*

Ecosystem-based adaptation options are necessary in the face of climate change, and local municipalities can play an important role in the design and implementation of adaptation policies, as the tier of government closest to where the impacts of climate change will be felt. We present a case study exploring the external and internal factors behind decision-making of local municipalities within the Western Cape Province, South Africa, with regard to mainstreaming climate change adaptation. Research also addressed where, why and how different understandings of climate change adaptation filter down to affect policies and then practices. Different scales and contexts of local governance were investigated using a mixed-methods approach. Municipalities face numerous constraints to adaptation mainstreaming, including a generalised lack of understanding of climate change, adaptation options and the role of ecosystem services in adaptation; backlogs in service delivery; funding constraints; political pressures and interference; and limited scope of control on environmental management. However, in a few municipalities certain factors interacted to enable the mainstreaming of climate change adaptation, and it is these factors that higher levels of government and stakeholders need support with different interventions: the presence of dedicated environmental champions, political stability, experience with severe weather-related disasters, and access to a knowledge base on climate change.

2011-12-09 12:00 Growth rates of juvenile Broad-snouted caiman at Pirapitinga Ecological Station, Southeast Brazil.

Passos, L. F*, *Puc Minas;* **Coutinho, M.E.,** *RAN/ICMBio;*

The broad-snouted caiman (Caiman latirostris) is widely distributed in the Atlantic Forest and Cerrado biomes in Brazil. Few studies have dealt with the status and or dynamics of populations in the wild, and the lack of information imposes serious constraints to the development of broader conservation and management plans for the species. Since 2006, we are investigating the dynamics of a natural population of broad-snouted caimans in an artificial reservoir located in the upper São Francisco river basin, southeast Brazil. The knowledge obtained by this study shall be applied to establish new conservation units in trough the São Francisco River Basin. We conducted night surveys and all animals spoted were captured ,their cloacal, air and water temperature, SVL and body mass were also measured. All animals were marked and released at the site of capture. We also monitor the water level, temperature and precipitation trough the year. The data collect on field were analyzed trough multiple regressions .Through the data analysis we concluded that the growth rates are affects not only by the animal size, but also by different environmental variables in special with the reservoir water level. The environmental variables directly affect caimans´ growth making it relevant to monitor those conditions in order to complete understand the growth dynamics of this species.

2011-12-08 18:30 Does translocation work? Monitoring translocated Asian elephant males in Sri Lanka with GPS collars

Pastorini, J*, *Centre for Conservation and Research;* **Prasad, T,** *Department of Wildlife Conservation;* **Leimgruber, P,** *Smithsonian Conservation Biology Institute;* **Fernando, P,** *Centre for Conservation and Research;*

Asian elephant management is largely driven by the need to mitigate human-elephant conflict. Across the range, translocation of elephants into protected areas has been the mainstay of management. However, few elephant translocations have been monitored. We studied translocation of elephant bulls by monitoring them with GPS radiotelemetry. We collared 14 adult males who were captured across Sri Lanka over the last five years. They were all individuals identified as 'problem elephants' and were removed largely because of public pressure. They were transported and released in National Parks at varying distances from the capture site. Three males were translocated more than once. All the elephants showed abnormal ranging behaviour after translocation and they all left the National Parks into which they were released. In three instances translocated elephants returned to their original home range. Five bulls that were translocated died within a few months of release due to conflict with people. Two bulls settled in new areas outside the National Parks released to and as far as is known did not cause conflict. At least five people got killed and five others were injured by the translocated elephants. The results suggest that translocation of 'problem elephants' is not effective in mitigating conflict or conserving elephants.

2011-12-07 16:30 Can novel species functionally replace extirpated species? A case study of compensation in pollination from New Zealand

Pattemore, D*, *Princeton University;*

Losses of native pollinator populations worldwide have led to concerns about potential consequent declines in pollination rates; both for crop plants as well as natural plant communities. We investigated whether compensation maintains pollination for three New Zealand plant species in the face of the loss of almost all native vertebrate pollinators, by comparing pollination on an island reserve that retains a full complement of endemic vertebrate pollinators to sites on the adjacent North Island where these species are locally or functionally extinct. We found that that in the absence of native birds and bats, the recent-colonist silvereye (Zosterops lateralis)

and the invasive ship-rat (Rattus rattus) are now regular flower-visitors, and the experimental exclusion of these novel pollinators led to high pollen-limitation for all three species. When managing invaded ecosystems, it is important recognize the compensatory role that invasive species may be playing. The critical role of native birds and bats as pollinators in New Zealand may have been underestimated because of the compensatory role of novel species, and reintroductions of these native species should be a priority at sites where invasive novel species are being actively controlled or eradicated.

2011-12-07 17:30 De-stocking seral grassland/shrubland ecosystems leads to biodiversity gains but alters suites of invasive mammals

PECH, R*, *Landcare Research, PO Box 40, Lincoln 7640, New Zealand;* **Byrom, A,** *Landcare Research, PO Box 40, Lincoln 7640, New Zealand;* **Whitehead, A,** *Landcare Research, PO Box 40, Lincoln 7640, New Zealand;* **Clayton, R,** *Landcare Research, PO Box 40, Lincoln 7640, New Zealand;* **Norbury, G,** *Landcare Research, PO Box 282, Alexandra 9340, New Zealand;* **Wilson, D,** *Landcare Research, Private Bag 1930, Dunedin 9054, New Zealand;*

Abandonment of traditional pastoralism is occurring in many alpine and sub-alpine ecosystems throughout the world. In the eastern high country of the South Island of New Zealand large areas of seral non-forest grazing land are being de-stocked and returned to the conservation estate. We compared sites where livestock grazing ceased 10-30 yr ago with paired sites where grazing has continued. Ungrazed sites had significantly higher native vegetation richness and lower exotic richness than grazed sites. Ungrazed sites also had significantly more native shrubs than grazed sites, and higher shrub cover. These differences were reflected in the invasive mammal community; grazed sites were typically associated with higher abundances of European rabbits and European hedgehogs whereas brown hares, brushtail possums and house mice were dominant in ungrazed sites. The low abundance of weed species following de-stocking indicates little need for active weed management. However, invasive mammals found on conservation land, especially re-generating shrubland, were often generalist species attracted to structurally complex and diverse habitats. Thus, seral transitions following de-stocking resulted in positive outcomes for conserving native plant communities. But these benefits may be compromised by increased abundance of some invasive mammal species, such as rodents, that are known to have serious adverse impacts on native invertebrate and reptile fauna.

2011-12-08 11:30 Improving MPA management efficiency through collaboration between managers and scientists: the PAMPA project

Pelletier, D.*, *IFREMER;*

Marine Protected Areas (MPA) are a key instrument for biodiversity conservation. MPA management goals include conservation of marine biodiversity, and of corresponding ecosystem services such as provision of fish resources and livelihood for coastal human populations. MPA management must maintain or restore biodiversity, while ensuring social acceptance and benefits for local human populations. The MPA performance to attain each of these goals must be rigorously assessed, so that trade-offs can be safely evaluated by managers. This may be achieved through the construction and validation of operational indicators for orienting management actions. This requires that a) scientists and managers collaborate actively throughout the process; and b) scientists from several disciplines work together on issues related to biodiversity, resources, uses and governance. I present the approach and findings of the PAMPA project for selecting, testing and validating indicators of MPA performance. The project involves eight case studies from the Mediterranean and from French coral reef areas in the Atlantic, Indian and Pacific Oceans. Results show that it is possible to implement the same scientifically rigorous approach in contrasted contexts with several disciplines, while being committed to account for MPA managers needs and constraints.

2011-12-08 18:30 The application of infrared camera in monitoring animal biodiversity in Guanyinshan Nature Reserve, Shaanxi

Pengfeng WU, *College of Biological Science, China Agricultural University, Beijing 100193, China;* **Xuehua LIU*,** *School of Environment, Tsinghua University, Beijing 100084, China;* **Xiaoming SHAO,** *College of Biological Science, China Agricultural University, Beijing 100193, China;*

Biodiversity has always been one of the hot topics of ecology. Guanyinshan Nature Reserve (GNR) is located in the middle of the Qinling Mountains in Shaanxi Province. In this paper, 18 spots were carefully chosen for setting up infrared cameras across the two hotspot area of the whole reserve, namely Liangfengya area and Xigou area. We discussed the daily activity pattern by dividing the time period with 2 hour intervals, and thus activity level of a species was measured by the percentage of the total processed photograph data. After 19 months of continuous photographing, twenty-four species of animals are detected and the top six by photographic rate are takin (Budorcas taxicolor), common goral (Naemorhedus goral), tufteddeer (Elaphodus cephalophus), golden pheasant (Chrysolophus pictus), wild boar (Sus scrofa), mainland serow (Capricornis sumatraensis). The activity patterns of the six species are not the same, which mostly exhibit two peaks. For takin, common goral and tufteddeer, the two peaks arrive at 6:00-8:00a.m and 18:00-20:00p.m; for wild boar, it goes to the peak at noon; for golden pheasant, records more concentrating during the daytime and for mainland serow, during the night. Further, the method proposed by Carbone et al. (2001) was attempted to estimate the population density of takin, which mainly consider the relationship between photographic rate and population density. In the future, it should be highlighted to strengthen conservation and to promote the restoration of forest, in order to rehabilitate a better area for pandas and other animals and to increase effectively the biodiversity of the reserve.

2011-12-08 11:45 Moving Beyond the CBD'S 2010 Target - A Review on the Effectiveness of Fauna and Flora Protection Ordinance in Protected Area Establishment in Sri Lanka

Perera, Nishanthi*, *PhD Candidate,, Department of Zoology, University of Colombo, Sri Lanka;* **Kotagama, S.W,** *Proffessor of Environmental Science, Dpeartment of Zoology, University of Colombo, Sri Lanka;*

This paper present the results of a review undertaken with the objective of evaluating the effectiveness of the Fauna and Flora Protection Ordinance No 2 of 1937 (FFPO) and its amendments, as a framework legislation for Protected Area (PA) establishment in Sri Lanka. Over the years, FFPOs emphasis has shifted from that of the preservation of wildlife to protection of biodiversity for the benefit of present and future generations. It has introduced eleven categories of PAs, of which five are in existence on ground. 93 PAs covering 943,595 ha has been established, representing 14% of land cover and 0.63% of the EEZ. 62% of the PAs are below 5,000 ha in size, an indication to increasing human-animal conflicts. FFPO is presently being supplemented by several other sectoral enactments in PA establishment. As the demand for development are underpinning the establishment of new PAs and maintaining the existing ones, it is now vital to look at the possibility of consolidating relevant enactments under single legislation, or to develop a coordination mechanism under one institution, which is specifically designed for PA establishment and management. Further a long-term scientific plan that includes a significant role for civil society and private sector is needed.

2011-12-08 18:30 Effects of pond and landscape characteristics on amphibian abundance in the context of an invasive plant species

Perez Amélie*, *Institut de Recherche en Biologie Végétale, Département de Sciences Biologiques, Université de Montréal, Montréal, QC, Canada;* **Mazerolle Marc.J.,** *Centre d'étude de la forêt et Département des sciences appliquées, Université du Québec en Abitibi-Témiscaminque, Rouyn-Noranda, QC, Canada;* **Brisson Jacques,** *Institut de Recherche en Biologie Végétale, Département de Sciences Biologiques, Université de Montréal, Montréal, QC, Canada;*

The implication of alien animal species in the context of declining amphibian populations is well studied. Nevertheless, invasive plants may also substantially modify wetland structure and animal patterns. We

hypothesized that invasion by an exotic plant could influence amphibian habitat use. We evaluated the influences of the exotic common reed establishment (Phragmites australis) and of landscape characteristics on amphibians at different life stages. We conducted visual, call, and trapping surveys to compare amphibian assemblages in 50 ponds invaded by reed at different degrees (0-64%). We estimated site occupancy and abundance of amphibian species after accounting for the probability of detection. We found no association between presence of any species and wetland characteristics or landscape structure. However, abundance was associated with landscape variables in 6 out of the 8 taxonomic groups and life stages tested. The percent cover of water within 500m was the variable most often affecting amphibian abundance, whereas common reed establishment only influenced Green Frogs (Lithobates clamitans). Detection covariates (temperature, sampling effort and hydroperiod) had a strong positive effect on detectability in both occupancy and abundance analyses. We conclude that the landscape surrounding breeding ponds had a greater influence on amphibian patterns than the establishment of common reed.

2011-12-06 14:45 Using functional diversity to prioritize biodiversity projects

Perry, Neil*, *University of Western Sydney;*

A higher level of functional diversity – the diversity of ecological functions – improves the resilience and stability of a conservation area and is the appropriate conservation objective when allowing for uncertain climate change impacts. In economics, many objectives have been suggested for prioritizing conservation projects including taxonomic diversity, the charismatic value of species, and the broader concept of direct utility. I develop a model of the economic value of functional diversity to add this objective to the list. While theoretically these objectives could be combined into a single monetary value for the purpose of prioritization, this is neither practical nor morally satisfactory and conservation decision makers must choose amongst the objectives. Based on a model of adaptation policies under uncertain policy outcomes and climate change impacts, I argue that functional diversity is the appropriate target because it provides insurance and minimizes the maximum regret of ecosystem collapse. In essence, the precautionary principle favors functional diversity. The main hurdle to this approach derives from the consequentialist ethic underlying orthodox economics in which species are seen as distinct and separate objects providing utility, an ethic which has been diffused into broader policy settings. This undervalues the processes supporting biodiversity, and must be changed to an ethic focused on processes rather than outcomes for particular species.

2011-12-07 11:45 Rewilding of the South China Tiger (Panthera tigris amoyensis)

PETRI VILJOEN*, *Wildlife Consultant;* **Jim Sanderson,** *Wildlife Conservation Network ;* **Gary Koehler,** *Independent Advisor;*

The South China tiger (Panthera tigris amoyensis) is the most endangered of the remaining five living tiger subspecies and precariously close to extinction. No recent sightings of this tiger subspecies in its natural range in China have been reported. The captive population, all in Chinese zoos barring 9 individuals in South Africa, number approximately 90. The only South China tigers available for possible free release into protected areas are from the existing captive-born population. Five young South China tigers were relocated from Chinese zoos to Laohu Valley Reserve in South Africa as part of an ex situ rewilding strategy to teach captive-born tigers to hunt independently prior to their planned free-release into suitable areas within the species' historic range in China. This program also allows ex situ breeding of the subspecies. South Africa was selected for the rewilding program, particularly because of the ready availability of potential wild prey species and local wildlife management expertise. The captive-born tigers successfully hunted 82 blesbuck (Damaliscus dorcas) of all age- and sex classes during a six-month period. The average kill interval was 2.7 days, while prey density ranged between 0.03 and 0.70 blesbuck/ha in two game-proof fenced enclosures of 40 and 100 ha. It was demonstrated that young, captive-born tigers quickly learn basic hunting skills and can therefore become self-supportive provided that an adequate prey density is maintained.

2011-12-08 11:15 Using normalized difference vegetation index (NDVI) to predict the impact of environmental change on biodiversity

Pettorelli, Nathalie*, *Institute of Zoology, Zoological Society of London;*

As the human population and its resource requirements increase exponentially, major environmental changes are occurring at increasingly faster rates. Our ability to anticipate the effects of such changes is fundamental to designing appropriate adaptation and mitigation strategies. In order to assess and anticipate environmental change effects on biodiversity and ecosystem services, we require, among other things, a good understanding of how trophic interactions are impacted by such changes. Remote sensing data and NDVI (Normalised Difference Vegetation Index) have recently given ecologists a promising way to couple climate, vegetation and animal populations. NDVI has been shown to be highly correlated with plant canopy absorbed photosynthetically active radiation and carbon assimilation, allowing monitoring of vegetation photosynthesis through space and time. Using examples from mammalian populations in temperate, alpine, arctic, tropical and arid environments, I will illustrate how NDVI can help predict the impact of environmental change on biodiversity, by highlighting the links between satellite-based information on vegetation dynamics and animal movement, distribution, survival and density. Results demonstrate that satellite-based data approaches offer a cheap, verifiable way to identify areas of concerns at a global scale, supporting managers in their effort to design and apply adaptive management strategies.

2011-12-08 18:30 Developing community-based management of Podocnemis population in the Lower Amazon, Brazil

Pezzuti, J.C.B.*, *NAEA/UFPA, Brazil;* **Félix-Silva, D.,** *UERJ, Brazil;* **Lima, J.P.,** *INPA, Brazil;* **Rebêlo, G.H.,** *INPA, Brazil;* **Begossi, A.,** *Unicamp, Brazil;* **NcGrath, D.G.,** *Woods Hole Research Center, EUA;*

In spite of extensive research documenting local knowledge, few studies have addressed the linkage between local knowledge, academic knowledge, biological conservation and ecosystem management. For Amazon River turtle species conservation and management goals, this linkage is critically important due to a combination of widespread habitat availability and the animals' secretive behavior. Based on Participatory Rural Appraisal (PRA) techniques conducted with rural floodplain communities in the Lower Amazon of Brazil, we constructed maps of the main migratory routes, seasonal habitat uses and specific critical situations for three turtle species, from the point of view of local perception of these phenomena. Conflicts and illegal commercial turtle poaching along the migration routes in specific seasons were discussed. We conducted a mark-and-recapture fishing effort using local river turtle fishing techniques to evaluate their potential for population ecology studies and community-based management. In lakes where legal agreements regulating fisheries have been implemented, turtle populations are more abundant and represent a significant food item for local inhabitants. Results also indicate that the puça, a local fishing gear used as a small, surface trawl adaptable for very small motor boats, could be employed for both population studies and resource stock monitoring. Such monitoring could aid in the establishment of quotas of animals to be used as food at a sustainable harvesting level.

2011-12-08 18:30 Nest-parents needed! Adopt-a-nest to save Austria's only native turtle Emys orbicularis

Pfistermueller, Regina*, *Zoo Vienna;* **Schinder, Maria,** *Danube flood-plain National Park;* **Weissenbacher, Anton,** *Zoo Vienna;*

Creating awareness in public and at the same time funding the in-situ conservation program of the European pond terrapin (Emys orbicularis) in the Danube wetlands is the focus of this project. It is carried out in a co-operation between the Vienna Zoo and the Danube-floodplain National park. Symbolic adoptions of clutches for € 100,- by private persons or institutions are promoted at both institutions. They fund essential protection measures on the egglaying-sites and accompanying monitoring, as well as genetic research. Each nest-parent receives a documentary of its nest's fate and a guided tour with the project leader to learn about the biology of this native animal, its threats and what is and can be done for its conservation, often creating a long-lasting relationship between the nest-parent and the program. Through this wide-spread promotion valuable media contacts could be established and maintained resulting into repeated reporting. In

addition, the infrastructure and knowledge at the Zoo is used to incubate eggs from damaged clutches and take care of injuded animals. Sound research and protection measures are carried out by the Emys conservation program of the Danube-floodplain National park. In the season before the project initiation only eight nests could be protected due to the limitation of resources compared to 78 nests in the fourth year of the project. More than 1000 hatchlings could be documented out of protected nests since 2007.

2011-12-06 11:00 Applying adaptive conservation planning to conserve biodiversity and improve livelihoods in Africa

Philip Muruthi*, *African Wildlife Foundation ;* **Helen Gichohi,** *African Wildlife Foundation ;* **David Williams,** *African Wildlife Foundation ;* **Jef Dupain,** *African Wildlife Foundation ;*

African conservation landscapes face critical threats including rapid irreversible land use change, growing impacts of climate change coupled with loss of habitats, species, ecosystem goods and services; the very basis for socioeconomic development. The African Wildlife Foundation (AWF) has developed and applied a landscape-scale conservation planning methodology, part of the Heartland Conservation Process (HCP), in nine conservation landscapes across Africa; areas we call African Heartlands. HCP planning helps AWF and partners develop shared vision, strategies and actions that address critical threats to ecological viability of these landscapes, and to specific biodiversity conservation targets, while contributing to livelihood improvement. Land use zoning based on analyses of conservation targets, threats including climate change, goals, and actions allows the envisioning and prioritizing of conservation, integrating it with socioeconomic development and reduces conflicts. To strengthen local implementation embedded Heartlands, AWF has supported development of specific tools including the Protected Area Planning Framework and the Community Conservation Planning Framework. AWF is learning and documenting the benefits and limitations of planning and implementation at the landscape-scale. Central to this are the merits of balancing a systematic science-based and pragmatic approach to landscape-scale conservation planning while addressing the needs and aspirations of local people.

2011-12-07 16:30 Estimating vegetation expansion in the Arctic under climate change using machine learning

Phillips, SJ*, *AT&T Labs-Research;* **Pearson, RG,** *American Museum of Natural History;* **Beck, PSA,** *Woods Hole Research Center;* **Loranty, MM,** *Woods Hole Research Center;* **Goetz, SJ,** *Woods Hole Research Center;* **Damoulas, T,** *Cornell University;*

Recent satellite observation of widespread 'greening' in the Arctic indicates that tundra plant productivity has increased with temperature in recent decades. This Arctic greening has important implications for arctic biodiversity and for the global climate system, as increased vegetation cover potentially sequesters more carbon from the atmosphere and reduces albedo. Here we apply multi-class machine learning algorithms to estimate the potential redistribution of the vegetation classes defined in the Circumpolar Arctic Vegetation Map under climate change. Projections are based on three general circulation models, two emissions scenarios, and three scenarios of species' dispersal ability. The machine learning algorithms show good predictive performance, with 85% correct classification under present-day conditions. We demonstrate the algorithms' ability to generalize to different times or regions by partitioning the arctic into checkerboards with a range of granularity, training on black squares and testing on white. Future projections point toward the expansion of large shrubs and trees, although expansion is limited by the lack of land at the higher latitudes, causing declines in the area occupied by some vegetation classes. Our results have important implications for the global climate system, through changes in Arctic carbon cycling and albedo, and for conservation of biodiversity and ecosystem services in the Arctic.

2011-12-09 15:15 Valuing biocultural conservation: can ecological economics assist coastal forest restoration in northern Aotearoa/New Zealand?

Phipps, H, *Landcare Research, PO Box 40, Lincoln, 7640, New Zealand;* **Akins, A,** *Centre for the Study of Agriculture, Food & Environment, University of Otago, PO Box 56, Dunedin, 9025, New Zealand;* **Moller, H*,** *Centre for the Study of Agriculture, Food & Environment, University of Otago, PO Box 56, Dunedin, 9025, New Zealand;* **Lyver, PO'B,** *Landcare Research, PO Box 40, Lincoln, 7640, New Zealand;* **Kahui, V,** *Department of Economics, University of Otago, PO Box 56, Dunedin 9025, New Zealand;* **Towns, D,** *Department of Conservation, Private Bag 68908, Newton, Auckland, 1145, New Zealand;*

Ecological economic valuation tools have potential to identify cross-cultural differences and common purpose from which strategies for improved partnership and accelerated conservation might emerge. We investigated the values assigned by 26 kaitiaki (Māori environmental guardians), conservation managers and community members to prospective ecological restoration of coastal forests in northern Aotearoa New Zealand. Kaitiaki primarily emphasised the importance of 'Cultural stewardship / kaitiakitanga' in the restoration process, yet this was not valued by the non-Māori interviewees. Otherwise all stakeholders shared common purpose and enthusiasm for five inter-related value bundles which we called (i) Use / Ahi kaa roa, (ii) Personal Engagement / Rangatiratanga, (iii) Connection / Whakawhanaungatanga, (iv) Knowledge / Mātauranga, and (v) Ecological integrity / mauri. Therefore cultures in our case study had much in common and shared a passion to get on with ecological restoration, even though they differed sharply on how the process of restoration should best unfold. Many of the values assigned to ecological restoration by indigenous cultures are subtle, complex, intangible, and inter-related. This will make it very difficult to quantify cross-cultural differences in values, a necessary first step before ecological economic choice models can safely assist partnership and environmental co-management.

2011-12-09 11:00 The use of population viability analysis to inform small-scale monitoring projects

Pickett, EJ*, *University of Newcastle;* **Stockwell, MP,** *University of Newcastle;* **Pollard, CJ,** *University of Newcastle;* **Garnham, JI,** *University of Newcastle;* **Clulow, J,** *University of Newcastle;* **Mahony, MJ,** *University of Newcastle;*

Small-scale population monitoring programs are restricted in their capacity to conduct rigorous demographic studies, and must usually focus upon certain aspects of a population's ecology. We suggest that it is the role of larger-scale projects which can afford the use of population viability analysis to determine the most important aspects for population viability, and then inform project managers for the most efficient and focused methods to evaluate their target population. We have undertaken this process for the green and golden bell frog (Litoria aurea) at Sydney Olympic Park. Population viability analysis was undertaken within the Brickpit population, and female survival to maturity was found to be the most important demographic factor. Using this information, we designed a monitoring regime for small-scale projects which focused upon the ratio of mature females to immature females. This was then validated on three populations of L. aurea, where it was found that a difference in this maturity ratio was linked to an increase in growth rate of individuals between populations. We recommend this extra step of designing small-scale monitoring regimes is used for any species where population viability analysis has been conducted on one of many populations to better enhance the conservation prospects of the species throughout its range.

2011-12-08 18:30 Frequent colonization of burned forests results in high gene flow across the boreal forests of North America

Pierson, Jennifer C.*, *University of Montana; CSIRO;* **Allendorf, Fred W.,** *University of Montana;* **Michael K. Schwartz,** *USDA Forest Service;*

Disturbance-dependent species have evolved with a natural mosaic of shifting habitat patches. As anthropogenic disturbance increasingly changes this mosaic, ecologists need to consider how this may affect connectivity for disturbance-dependent species. We estimated spatial

patterns of genetic structure of black-backed woodpeckers, a fire specialist and then compared these patterns to hairy woodpeckers, a common generalist. The black-backed woodpecker showed no spatial structure across a vast spatial scale (3500 km) whereas the hairy woodpecker showed a strong pattern of isolation by distance. This led us to simulate two basic models of dispersal: frequent colonization of new patches and stable migration among static patches to understand the mechanisms that created the observed patterns of genetic structure. The simulation results suggested that frequent colonization of newly created habitats at intermediate dispersal distances provide a mechanism for producing a pattern of low genetic differentiation and no isolation by distance across vast spatial scales, consistent with the empirical results on black-backed woodpeckers. This research exemplifies the need to consider dispersal behavior when interpreting empirical patterns of genetic structure across large spatial scales.

2011-12-07 10:30 Seeing the Forests Through the Trees: A Big Picture View of Tropical Rainforests

Pimm, SL*, *Duke University;*

Tropical moist forests hold the greatest variety of terrestrial species. Just how extensive they are and how many species they contain are not well-documented. Much depends on how one defines them, of course. Without clear definitions estimates of how fast tropical forests are shrinking and how much carbon their destruction emits into the atmosphere are also uncertain. Even with estimates of where the forests are, estimates of their species richness begs the question of how many species are not-yet known to science. I will synthesize and compare existing estimates of these key parameters.

2011-12-06 11:30 Connecting the General Public to the Science of Saving Tropical Species

Pimm, SL*, *Duke University;*

I will relate two stories. First: just over a decade ago, there was still considerable scepticism in some quarters about whether tropical forests were indeed shrinking — and at the alarming rate the scientific community claimed. The ready availability of GoogleEarth imagery changed all that, but those images became available almost certainly because of a concerted effort on the part of the conservation community to make Landsat images widely and cheaply available. Second is the issue of how one can engage the public on a subject that is so unrelentingly depressing as species extinction. I shall present an example of a restoration project, entirely motivated by the need to prevent the maximum number of extinctions as cost effectively as possible. What has made this project compelling to its donors is the ability to see the forest restoration taking place — again, using readily available remote sensing imagery.

2011-12-09 18:00 Interaction Biodiversity Underpins a Novel Parasitic-Mutualism Between Black Rhinoceros and Red-billed Oxpeckers

Plotz, RD*, *Centre for Biodiversity & Restoration Ecology, School of Biological Sciences, Victoria University of Wellington, NZ & Centre for African Conservation Ecology, Department of Zoology, Nelson Mandela Metropolitan University, Port Elizabeth, R.S.A.;* **Linklater, WL,** *Centre for Biodiversity & Restoration Ecology, School of Biological Sciences, Victoria University of Wellington, NZ & Centre for African Conservation Ecology, Department of Zoology, Nelson Mandela Metropolitan University, Port Elizabeth, R.S.A.;*

Ecosystems and communities are structured by interspecific relationships, but most are poorly understood. Long-term biodiversity conservation may be achieved better by focusing on the maintenance of these relationships, rather than the biodiversity involved. We quantified the complex relationship between the red-billed oxpecker (Buphagus erythrorynchus) and the critically endangered black rhinoceros (Diceros bicornis) that is mediated by specialized rhinoceros ecto- and endo-parasites and large predators of rhinoceros, particularly humans. We show experimentally that (1) rhinoceros with large haemorrhaging lesions caused by a parasitic filarial nematode (Stephanofilaria dinniki) were a critical food source for oxpecker, (2) oxpecker exacerbated lesions size and severity but that (3) oxpecker also acted as sentinels for rhinoceros against human predatory threat. Thus, we demonstrate that a conditional parasitic-mutualism relationship between black rhinoceros and oxpecker, is made possible by other parasitic and predator biodiversity relationships. Here strong evidence is provided that a critically endangered flagship species is the keystone in a network of biodiverse interactions among multi-trophic coexisting species. The first step to conserving interaction biodiversity requires a better understanding of the complex dynamics within which they occur.

2011-12-06 14:28 Developing an adaptive management framework for the conservation of an endangered amphibian

Pollard, CJ*, *The University of Newcastle;* **Stockwell, MP,** *The University of Newcastle;* **Garnham, JI,** *The University of Newcastle;* **Pickett, EJ,** *The University of Newcastle;* **Clulow, J,** *The University of Newcastle;* **Mahony, MJ,** *The University of Newcastle;*

The once common green and golden bell frog (Litoria aurea) began to experience large-scale population declines in NSW during the 1970s, and is now listed as endangered in this state. One of the largest remaining L. aurea populations in NSW is situated at Sydney Olympic Park, where it has been continually monitored since its discovery in the early 1990s. One of the aims of this study was to evaluate the effectiveness of a range of management actions that have been implemented for the conservation of L. aurea at this site throughout the past two decades, using the data collected during this long-term monitoring regime. One such action was the draining of ponds to temporarily remove a predatory fish, which was found to significantly increase the reproductive success of L. aurea. The second aim of the study was to develop an adaptive management framework based on the assessment of the effectiveness of previously implemented actions. By incorporating the results of previous management actions into the decision making process for the selection of future actions, the adaptive management process has the potential to improve management success in the long-term.

2011-12-08 14:30 Challenges for detecting and projecting climate change impacts on marine mega fauna

Poloczanska, E.S.*, *Climate Adaptation Flagship, CSIRO Marine and Atmospheric Research;* **Richardson, A.J.,** *Climate Adaptation Flagship, CSIRO Marine and Atmospheric Research;* **Marine Climate Change Impacts Working Group,** *National Centre for Ecological Analysis and Synthesis;*

While impacts on ecological systems consistent with climate change are increasingly apparent, it can be difficult to rigorously ascribe these to climate change to underpin policy and conservation responses. Identifying the mechanisms driving change is especially challenging with biological data, which are inherently noisy because of short-term biotic and abiotic influences superimposed upon natural decadal climate cycles in the ocean-atmosphere system that can mask or interact with climate change. This may be even more challenging for marine mega-fauna with long and complex life history and migratory movements among feeding, breeding and nursery grounds. We compiled a database of >3000 observations of climate change impacts on marine biology and found <2% of observations comprised turtles, polar bears, seals, whales and dolphins. We discuss the challenges to understanding climate change impacts on these mega-fauna. We provide here a set of guidelines for detecting and understanding climate impacts in ecological data based on the application of robust statistical approaches and the clear reporting of metrics of change. Evidence to develop expectations can be drawn from several sources: ecological and evolutionary theory, analogy to past condition, and manipulative experiments and can inform monitoring programmes.

2011-12-09 16:30 Marine mammals global distribution patterns: implications for conservation

Pompa, S.*, *Laboratorio de Ecología y Conservación de Fauna Silvestre, Instituto de Ecología, Universidad Nacional Autónoma de México.;* **Ehrlich, P.,** *Center for Conservation Biology, Biology Department. Stanford University; Stanford, California, USA.;* **Ceballos, G.,** *Laboratorio de Ecología y Conservación de Fauna Silvestre, Instituto de Ecología, Universidad Nacional Autónoma de México.;*

20 global key conservation sites were indentified based on the geographic ranges of all marine (123) and freshwater (6) mammal species. Patterns of species richness, endemism, and risk were variable among all species and species groups. Key conservation sites were determined either by their

species richness or by their irreplaceability (i.e. irreplaceable because the presence of endemic species) in a global geographic grid. Nine key conservation sites, comprising the 2.5% cells with highest species richness, were found in all oceans and freshwater bodies of all continents, mostly in temperate latitudes, and hold 74% of marine mammal species. In addition, we found 11 key conservation irreplaceable sites, six of which were found in freshwater and five in marine regions. The combination of species rich and irreplaceable key conservation sites allows the representation of all marine mammal species in priority cells providing new criteria and guidance for their conservation. Species richness across the oceans has a strong correlation with human impacts, indicating the urgency of global conservation strategies.

2011-12-07 15:30 Modeling temporal impacts on habitat suitability and population persistence for endangered species

Poos, M.S.*, *Fisheries and Oceans Canada;* **Curtis, J.,** *Fisheries and Oceans Canada;* **Grinnell, M.,** *Fisheries and Oceans Canada;* **Koops, M.,** *Fisheries and Oceans Canada;*

Developing quantitative estimates of critical habitat of endangered species often requires knowledge of how species relate to habitat conditions through space and time. However, in many cases the relationship between habitat suitability can change due to temporal differences in the duration and magnitude of population impacts. For example, there are often time lags between the time when a habitat has been perturbed and when the population responds. Additionally, rates of catastrophic events, which occur under very small temporal scales, but have large population-scale impacts, are often unknown. Here, we examine the influence of time lags and catastrophes for altering habitat suitability and population persistence in an endangered species in Canada, the Redside Dace (Clinostomus elongatus). We model differences in population persistence and habitat suitability using: 1) species-specific projections from historical data, 2) population viability analyses using life history information, and 3) by incorporating natural versus anthropogenic rates of catastrophes into population viability analyses. In all cases, we found that rates of population persistence and habitat suitability of Redside Dace populations were greatly altered by incorporating temporal impacts. Models which fail to incorporate temporal impacts from habitat fragmentation or catastrophes are likely under-estimating rates of degradation, suggesting current habitats may be more suitable then they actually are.

2011-12-08 18:30 The Return of the Salt Marshes: Cultivating an Ecosystem while Cultivating Awareness

Porcheddu, Jennifer*, *CUNY Graduate Center/ College of Staten Island;*

Salt marshes are among the most productive ecosystems on earth, and the health of inshore marshes directly influences the offshore fishery. Because humans so heavily populate our coasts, salt marshes have been subject to centuries of insult. Despite measures to reduce water pollution, protect fisheries, and limit building on wetlands, the health of salt marshes has continued to decline. Thus, restoration efforts have begun in many locations along our coasts. These restoration methods need to be evaluated for success. My goals are to establish which methods work best, clarify the sequence in which new marshes are recolonized by flora and fauna, and determine how soon ecological function is returned to acceptable levels. I census vertebrate and invertebrate abundance and habitat usage, assess water and soil quality and analyze succession of vegetation at restored and natural marshes. I will compare these data with data collected twenty and forty years ago in this region. This research will inform continued restoration efforts of estuaries along all of our coasts. Additionally, my findings will enhance our understanding of salt marsh dynamics, as well as giving us further insight into the factors causing marsh loss. Further, I have coordinated my research with local high school groups who assist me in data collection. The impact on these students of early exposure to conservation and restoration efforts is considered.

2011-12-09 10:45 Interacting edge effects around abandoned cattle corrals in an African savanna

Porensky, Lauren McGeoch*, *UC Davis;*

Habitat edges can impact biodiversity conservation and the provision of ecosystem services. In fragmented or complex landscapes, edge effects may be altered by the presence or proximity of other nearby edges. This phenomenon –edge interaction– is increasingly recognized as a driver of landscape pattern and process. I investigated edge interactions in an African savanna. In this landscape, abandoned cattle corrals develop into treeless, nutrient-rich, preferentially grazed "glades" with unique plant communities. Glades persist for decades, and glade densities are increasing in East Africa. I compared less isolated glades (<150m from a second glade) with more isolated glades (>250m from another glade). Compared with isolated glade edges, edges between adjacent glades had almost twice as many trees, half as much wildlife dung, and substantially different plant and Acacia-ant communities. In general, results did not indicate a convergence or merging of glade edges. To learn more about the development of these patterns, I worked with managers to establish sites containing either one corral, two corrals separated by 100m, or two corrals separated by 200m. Eighteen months after abandonment, corral density and proximity began to affect both plant and wildlife communities. These findings indicate that 1) edge effects may be very sensitive to patch configuration, and 2) the spatial configuration of management activities can have large and sometimes non-intuitive ecological impacts.

2011-12-07 14:45 Integrating tourism within fishing communities: A grassroots effort to create a beneficial industry for the user and a non-extractive use of the marine resource

Porter, BA*, *NZTRI Auckland University of Technology;*

Rural poverty is a major concern in coastal areas of developing nations and the current approach to poverty alleviation includes maximizing existing economies such as fisheries. The majority of fisheries development projects are inclusive of a resource management strategy, although the resource may already be in decline and the environmental sustainability of such plans is questionable as many developing countries lack experience with the necessary fisheries management tools (eg. maximum sustainable yield, marine protected areas). The World Tourism Organization suggests tourism as a means for diversifying economies of depressed rural communities and marine tourism should be considered a viable alternative economy for fishing communities. Sustainability and long-term implications of resource exploitation must be considered by the community when exploring alternative economies as tourism may occur at the expense of the host community and community-based planning within tourism integration processes is an activity that is discussed more often than applied. An integration model combining elements of phenomenological inquiry and a participatory methodology is suggested to measure a community's willingness to engage in tourism and strengthen their role within the tourism integration process. Centralizing the community in the integration will allow environmental and ethical risks to be addressed thus minimizing potential risks.

2011-12-07 12:00 Conservation is where the heart is

Possingham, H.P.*, *The University of Queensland;*

Conservation lobbying and campaigns occur at all spatial and temporal scales. Each of us has the most ability to act and achieve conservation outcomes close to home, although the gains are generally small. Global conservation outcomes require many people and are highly uncertain. I will describe my involvement in achieving conservation outcomes on the ground from the local scale, a neighbourhood park, through to issues of continental and global significance. Some common features of success are: timing, persistence and partnerships.

2011-12-09 15:00 Dealing with risk, uncertainty and dynamics in setting spatial conservation priorities

Possingham, H.P.*, *The University of Queensland;* **Wilson, K.A.,** *The University of Queensland;* **Watts, M.,** *The University of Queensland;* **Beger, M.,** *The University of Queensland;* **Carwardine, J.,** *CSIRO;* **Carvalho, S.,** *Centro de Investigação em Biodiversidade e Recursos Genéticos da Universidade do Porto;* **Segan, D.,** *The University of Queensland;* **Game, E.,** *The Nature Conservancy*

The field of conservation planning now embraces the generic problem of what to do, where and when. There is the misconception that risk and uncertainty are major impediments to spatial conservation planning. In

this paper we show how risk and uncertainty can be accommodated in making optimal spatial conservation decisions. We illustrate these ideas with examples of conservation plans that deal with: uncertainty about cost, uncertainty driven by expert opinion or imprecise statistical models, uncertainty driven by climate change and risk driven by catastrophic events. We show how risk aversion can be readily accommodated in the prioritization process using mathematical concepts and modifications to the software, Marxan.

2011-12-06 15:15 Phylogeography of the brachyotis group of rock-wallabies identifies two regions to focus conservation management in northern Australia

Potter, S*, *The University of Adelaide;* **Eldridge, MDB,** *Australian Museum;* **Taggart, DA,** *Conservation Ark, Royal Zoological Society of South Australia;* **Cooper, SJB,** *South Australian Museum;*

Northern Australia in recent times has been exposed to human impacts including increased fire frequency and intensity, introduction of the cane toad, mining, cattle grazing and introduction of feral animals. Such issues have cause for concern, with declines in the faunal species and their distributions. A major challenge for implementation of conservation management is understanding the biogeographical processes that have lead to current distributions of genetic diversity without knowledge of past climatic and environmental fluctuations. Utilization of molecular data to answer phylogeographical questions for taxa has been a major development in tackling some of these difficult questions. Here, we used the brachyotis group of rock-wallabies to assess the historical evolutionary and biogeographical processes in northern Australia. Multiple biogeographic barriers across the monsoonal tropics were identified from sequencing three mitochondrial and two nuclear loci. Our results have identified two main regions of past refugia which require focus for future conservation management across this biodiversity hotspot within Australia. In addition, other minor barriers were identified where localized management could be put in place. These results, when compared to previous knowledge, indicate a shared biogeographical history amongst diverse taxa and significant regions for future biodiversity conservation.

2011-12-08 18:30 Genetic Status of 2 Isolated Populations Following a 96% Population Decline

Powell, Christopher P*, *Central Michigan University;* **Nelson, Eric,** *Minnesota Department of Natural Resources;* **Swanson, Bradley J,** *Central Michigan University;*

Sharp-tailed Grouse have declined precipitously throughout their range in the mid-western USA. The species is almost extirpated in Wisconsin and Michigan. Between 1980 and 1995 the Sharp-tailed Grouse in Minnesota declined 95% (n=60,000 to n=2,500) and exists in geographically isolated eastern and western populations. This type of dramatic decline can increase inbreeding and threaten the longevity and adaptability of a population. Using 6 microsatellite loci we evaluated the genetic status of the Sharp-tailed Grouse following their recent bottleneck. We found genetic evidence for only 1 population in Minnesota. FIS is significantly higher (W=21, p=0.03) in the smaller eastern population (0.29) than in the larger western population (0.04). Observed heterozygosity was high for both populations (east=0.58, west=0.73) and the west was significantly higher than the east (W=0, p=0.03). The program Bottleneck indicated that a bottleneck occurred in the eastern population (p=0.007) but not the western (p=0.05) despite retaining an L-shaped distribution of allele frequency. Our results suggest that the populations have not yet differentiated but likely face genetic difficulties in the near future. We recommend surveys of suitable habitat between populations to assess whether or not individuals are moving. If no movement is found, we recommend reciprocal translocations between populations to prevent differentiation and reduce inbreeding levels.

2011-12-06 11:15 Effect of Forest Age and Burn History on the Recovery of Avian Capture Rates: When is Secondary Tropical Rainforest No Longer a Barrier?

Powell, LL*, *School of Renewable Resources, Louisiana State University;* **Stouffer, PC,** *School of Renewable Resources, Louisiana State University;* **Johnson, EI,** *School of Renewable Resources, Louisiana State University;*

Due to large-scale regeneration following deforestation, Brazil now has more secondary growth than all other tropical countries combined, yet the value of this secondary growth to wildlife remains poorly understood. From 1992—2009, we captured 3534 birds of nine foraging guilds along borders of 1—100 ha rainforest fragments near Manaus, Brazil, with the goal of understanding how birds in the secondary growth/fragment interface recover to pre-isolation capture rates (CRs). Along 0—4 year-old borders, CRs of army ant-followers and terrestrial insectivores were only 1% of pre-isolation levels. Hummingbirds and non-forest species, however, were caught more frequently within four years of cutting; CRs then declined to pre-isolation at 7.0 (+ 6.3, –2.4 SE) and 13.0 years (+5.9, –3.6 SE), respectively. Among the most sensitive guilds, obligate mixed-flock species recovered quicker along borders of larger fragments—6.4 (+14.0, –10.7 SE) years adjacent to 100-ha fragments and 33.0 (+11.0, –8.4 SE) years around 1-ha fragments. After 27 years of forest regeneration at our study site, terrestrial insectivores have yet to recover—we estimate recovery at 46.9 (+20.4, –20.7 SE) years with cutting only, and 54.9 (+45.7, –20.4 SE) years with borders cut and burned. Only 20 years after borders were cut and burned, eight of nine guilds recovered to pre-isolation CRs, but terrestrial insectivores and other species not included in this analysis (because they do not occur at all in forest fragments) probably take decades longer. The largely unbroken primary rainforest surrounding our study site provides a steady source of new colonizers, so we consider these estimates conservative (i.e. optimistic) relative to more fragmented parts of Amazonia.

2011-12-06 11:00 Implications of process-based modelling for biodiversity conservation in a changing world

Prentice, IC*, *Macquarie University and Imperial College;*

Modelling assumptions are important in assessing risks to biodiversity and framing conservation policies. Two findings of the past decade are (a) alarming projections of species losses, and (b) that species are already on the move. The first is a pure model result—an untested hypothesis. The second is an observation that tends to refute it. Natural climate changes, similar in magnitude and rate to projected anthropogenic changes, have occurred repeatedly and species' geographic ranges responded rapidly. Many species showed unexpected persistence through millennia of unfavourable climate. Models must allow for rapid migration (even for sessile organisms) and the role of environmental heterogeneity in species' survival. Dynamic global vegetation models (DGVMs) could make predictions testable against the palaeoecological record. They could explicitly model e.g. range restrictions by exceedance of drought or heat thresholds, or range extensions by overcoming cold limits. They also include effects of atmospheric CO2 concentration on water use and productivity. But current DGVMs were developed for carbon and water cycle applications. Their simplistic treatments of plant biodiversity and habitat heterogeneity severely limit their applications to conservation science. More realistic treatments on the horizon build on major informatics efforts. Meanwhile, hybrid approaches that combine species distribution data with modelling of impact processes may be useful.

2011-12-06 10:30 The plan of the day: managing the dynamic transition from regional-scale conservation design to local-scale conservation action

Pressey, R.L.*, *James Cook University;* **Mills, M.,** *James Cook University;* **Weeks, R.,** *Wildlife Conservation Society;*

Systematic conservation planning involves sequential transitions. Late in the process, conservation areas on paper or computer screens must be turned into actions on the ground or in the water. This transition has been difficult for conservation planners, demanding reconciliation of two scales of decision-making and even two world views. Like all transitions, the one from regional design to local action should be dynamic. Adjustments to designs will be necessary as new information emerges from the action stage, in turn altering areas of interest for action; but coverage of this dynamic feedback in the literature is remarkably rare and brief. Lacking is a comprehensive discussion of why and under what circumstances the dynamic transition from design to action is necessary. Also lacking are guidelines for managing this transition in practice. The premise of this presentation is that conservation planning will be more effective if regional-scale design and local-scale action are better integrated to capitalize on their respective strengths and minimize their respective weaknesses. We review the reasons why designs must change in anticipation of action or as action proceeds, and how these reasons play out differently depending on the purpose and constraints of different

planning situations. We then explore the conceptual, operational, policy and institutional implications of the dynamic interaction between design and action, and what these mean for our approaches to planning.

2011-12-09 17:10 Predicting the fate of farmland bird communities under agriculture and climate change scenarios

Princé, K.*, *Muséum national d'Histoire naturelle - CERSP UMR7204;* **Jiguet, F.,** *Muséum national d'Histoire naturelle - CERSP UMR7204;*

Climate and land use drive biodiversity patterns at large scales. Besides, agricultural intensification in recent decades is a major cause of the high current rates of biodiversity loss. Understanding and predicting the responses of biodiversity to climate and agricultural policies changes are crucial to manage the ecological consequences adequately. To that end, we developed scenarios of biodiversity taking into account climate niche predictions and changes in farmland use, as well as possible developments of agricultural policies in France. We created four scenarios of agricultural change: 1) continuing current trends (i.e. overall intensification), 2) biofuel development, 3) return to grasslands and 4) overall agricultural extensification. Using the French Breeding Bird Survey's data, we assessed the impacts of these scenarios on different indicators: the Farmland Bird Indicator, reflecting abundance changes of a group of species identified as specialist in farmland community; the Species Specialization Index, reflecting the proportion of specialist species in a community, and other indicators linked to phylogenetic or functional diversity. The various indicators provide insight the responses of the different elements of community (e.g. species richness, their trophic link), as well as dynamics of biodiversity as a whole. It is anticipated that declining species or/and species with small ranges will be especially vulnerable to agriculture evolution and climate change.

2011-12-08 18:30 How to mitigate the impacts of the deforestation on the vertebrate fauna in the Brazilian Amazon?

Prist, P.*, *Sao Paulo University;* **Michalski, F.,** *Amapa Federal University;* **Metzger, J.P.,** *Sao Paulo University;*

Deforestation in the Brazilian Amazon occurs creating two distinct landscape configurations: the fish-bone pattern, common to small properties, and the large property pattern, common to livestock farmers. We have analyzed 14 deforested landscapes with similar proportion of forest (~25%) and 7 control areas (~100% of forest cover) to evaluate the effects of these different landscape configurations on vertebrate richness. We linked interview data (n = 150) with forest patch metrics extracted from Landsat images. We found a similar number of species and specialist species and a similar community composition for control areas and large property sites. The overall number of vertebrate species and the number of forest specialist species within the units were negatively affected by the number of fragments and by the isolation age, that were higher in the fish-bone sites. Our results support the idea that in landscapes with low habitat cover landscape configuration is an important predictor of species persistence. To mitigate these impacts we support the current legislation that obliges the maintenance of 80% of forest areas inside private properties. Additionally, we propose the reforestation of degraded areas, connecting forest fragments, and encourage a planned deforestation, allowing the maintenance of forest remnants in aggregated blocks, and thus favoring the maintenance of biodiversity.

2011-12-07 17:45 A portrait of a protected area in distress: insurgency, wildlife decline and local antagonism towards conservation in Similipal Tiger Reserve, India

Priya Davidar*, *Department of Ecology and Environmental Sciences, Pondicherry University;* **Sasmita Sahoo,** *Department of Ecology and Environmental Sciences, Pondicherry University;*

Many protected areas in the Central India-Eastern Ghats region with large indigenous populations suffer from insurgency and local antagonism towards conservation. We conducted a questionnaire survey of 217 men and women from indigenous communities in 16 villages within the core and buffer zones of Similipal Tiger Reserve to assess local perceptions of wildlife decline, as indicated by frequency of sightings of tiger and the elephant 20-years, 10-years ago and at present, and attitude towards conservation. About 53% of the respondents supported conservation on the grounds that it was a common heritage of the people, but their support was contingent upon limited (28%) or no cost (80%) to themselves. Among those that opposed conservation, 42% felt that it had been imposed on them. About 64% wanted the PA to be managed by local communities and not by state agencies. Overall, 90% of the respondents agreed with the statement that the tiger and the elephant had disappeared from Similpal, and whereas tiger or elephant were frequent 20-years ago, an average of 90% had not sighted these species recently. They also agreed that the large trees had disappeared over a 20-year period. The problems of conserving forests and wildlife in a hostile landscape should be addressed in greater detail.

2011-12-06 14:15 Modeling highway crossing patterns of red wolves along US 64, North Carolina

Proctor, Christine, *Dept. of Fish and Wildlife Conservation, Virginia Tech;* **Kelly, Marcella,** *Dept. of Fish and Wildlife Conservation, Virginia Tech;* **Vaughan, Michael*,** *Dept. of Fish and Wildlife Conservation, Virginia Tech;* **Esson, Thomas,** *Dept. of Fish and Wildlife Conservation, Virginia Tech;* **Trent, J. Andrew,** *Dept. of Fish and Wildlife Conservation, Virginia Tech;*

Road-related effects on wildlife are a growing concern, particularly for endangered species. Listed as critically endangered by the IUCN, red wolves (Canis rufus) have a current population of ~ 120 individuals. Major roadways heavily bisect the red wolf recovery zone, leading to vehicle collisions and fragmentation. Any current road effects may be amplified by the planned widening of US 64 along 27 miles within the recovery zone. Using GPS collar data from 30 red wolves, we used Brownian bridge movement models to identify which habitat variables best-predicted red wolf crossing locations. Model results were validated through comparison to known crossing sites identified by counting crossings in 0.16 km segments from intensive GPS locations (collected every 30-minutes). Individual crossing rates were compared between sexes and among age classes via a 2-factor ANOVA to determine which sex and/or age is more vulnerable to road related impacts. Brownian bridge models indicated that the presence of agricultural land, upland forest, and a canal crossing structure (i.e. dike) best predicted where a red wolf chooses to cross US 64. While no difference in crossing rates were found between sexes, sub-adults were found to cross roadways at a higher rate compared to other age classes. These results can guide the placement of mitigating structures during highway expansion and identify which land uses will increase the success of road crossing structures.

2011-12-09 11:15 The win-win services of Australia's vulnerable top predator, the dingo

Prowse, TAA*, *Environment Institute, University of Adelaide, South Australia, 5005, Australia;* **Brook, BW,** *Environment Institute, University of Adelaide, South Australia, 5005, Australia;* **Lacy, RC,** *Chicago Zoological Society, Brookfield, Illinois, 60513, USA;* **Johnson, CN,** *School of Zoology, University of Tasmania, Hobart, 7001, Australia;*

Australian small mammal populations are declining. Dingoes, classified as 'vulnerable' in their own right, indirectly benefit small mammals by controlling feral mesopredators but they are baited throughout Australian cattle country because of the perceived threat they pose to young calves. In this regard, conservation goals are seemingly at odds with economic interests. Without a top predator, however, inflated kangaroo abundances can reduce cattle condition and fecundity through competition for pasture, despite an annual kangaroo harvest of 15-20%. Healthy dingo populations can substantially reduce kangaroo density and may actually improve profit margins. Assuming typical cattle stocking and management scenarios, we constructed a dynamic 'meta-model' consisting of stochastic, individual-based population models for dingoes, kangaroos and cattle, linked through realistic functional responses, and underpinned by a climate-driven model of pasture growth. The cattle model was built on established metabolic relationships between pasture biomass and rates of growth, maintenance and pregnancy. Through a combination of scenario testing and sensitivity analysis, we show that the cessation of dingo baiting should increase the profitability of beef production. This conclusion is robust to uncertainty in the rate of dingo predation on calves as well as in climate change scenarios. Dingoes may represent a net benefit to the twin goals of beef production and mammal conservation.

2011-12-08 10:30 Climate change, Variability and conservation impacts in Australia

Prowse, TAA, *University of Adelaide;* **Brook, BW*,** *University of Adelaide;*

Australian conservation scientists, managers and decision makers must come to grips with anthropogenic climate change, imposed upon an already variable regional climate system. Pre- and post-instrumental records and climate proxies indicate that Australia has experienced wet and dry cycles over intra-decadal to millennial time scales. Precipitation variation across Australia is correlated with different climate features but reliable tools for seasonal rainfall prediction are still some years away. Atmosphere-Ocean General Circulation Models predict a widening of the Hadley circulation and strengthening of the Southern Annular Mode, which should result in reduced cool season rainfall over southern Australia. Shifts in the Australian climate over the Holocene epoch, most notably increased ENSO variability after 5 000 years ago, are associated with substantial vegetation change and indicate the speed at which ecosystems may be altered. The CO2 fertilization of plant biomes may mitigate increasing aridity to some extent but, in general, climate change is expected to negatively affect native vegetation and agricultural productivity. Sea-level rise is predicted to be substantial over this century and, when coupled with increased storm intensity, poses threats in the form of erosion, salinization and flooding. The best chance of building adaptable ecosystems and preserving ecosystem services requires the extension, integration and possibly optimization of reserve systems, in concert with improved management of other threatening processes (habitat loss, invasive species, overexploitation, pollution and disease). In addition, a price on carbon dioxide emissions would provide incentives for privately funded reforestation schemes, but additional incentives promoting mixed species over monoculture plantings would be required to assure maximum biodiversity benefits.

2011-12-09 11:00 Conservation Management of Complex Edge Effects

Pryke, J. S.*, *Stellenbosch University;* **Samways, M.J.,** *Stellenbosch University;*

Understanding edge effects between transformed landscapes and conservation areas is critical to conservation planning. As conservation areas in landscape mosaics are often composed of linear corridors, there are more edges than would occur naturally. To determine minimum width of corridors, we would first need to determine the extent of edge effects. Plantation forestry has transformed much of the South African grasslands, with ecological networks (ENs) currently being used to mitigate this biodiversity loss and to maintain ecosystem processes. We compare arthropod biodiversity along transects that ran from within plantation blocks or indigenous forest patches (as a natural reference) into indigenous grassland corridors. Two types of exotic commercial trees and various tree age classes were studied. We found a 32 m edge zone from plantation blocks into grassland corridors. Few significant edge effects from plantation blocks occurred at greater distances than this, suggesting that grassland corridors with a width <64 m are mainly edge. This situation is complex, with different taxonomic groups responding differentially to these edges. Indigenous forest supported many additional species, not just within the forest, but also with associated grassland corridors. This means that natural edges are important for maintaining biodiversity, while edges between transformed habitats need to be considered, particularly the widths of linkages.

2011-12-08 14:30 How Policy Makers Can Distinguish Junk Science from Science That Is Tried, True and Trustworthy for Policy Making and Enforcement.

Pullin, AS*, *Collaboration for Environmental Evidence;*

The quantity of scientific data that could inform policy is huge and rapidly increasing. The quality of science ranges from the highly objective and rigorous to the biased and plain bad. Policy makers need reliable syntheses of the best available science that will not be undermined by rigorous examination by third parties when conflict arises. Trustworthy assessments of the quality of science and evidence can be provided by employing established systematic review methodology that is transparent, repeatable and independently validated. Systematic reviews have provided the appropriate methodology across applied disciplines from medicine to social justice and are now being commissioned by many national and international conservation bodies. Experience of undertaking systematic reviews suggests that the methodology provides a rigorous core framework, but there are a number of problems that may undermine the broader process of synthesis. Issues of timescale, independent conduct, access to data, stakeholder engagement and communication of uncertainty all require more than a scientific methodology. All of these issues require the formation of collaboration between scientists, practitioners, policy formers, statisticians and information scientists to develop an infrastructure that is respected, reliable and trustworthy as well as inclusive of current actors (individuals and organisations). This talk will outline current progress toward such a Collaboration for Environmental Evidence.

2011-12-09 11:14 Involving participation of local community in conservation: an effective strategy for endangered bird conservation in Assam, India

Purnima Devi Barman*, *Aaranyak;*

Assam population of the Greater Adjutant Leptoptilos dubius is considered as the last stronghold for this endangered bird. Out of its global population of 800, about 600 birds could find in Assam. Almost all of this population resides outside the State owned protected area network and mainly nests on the privately owned trees and future of this bird completely depends on the wishes of private nest tree owners. Community conservation initiatives taken in a major nesting habitat using various conservation awareness and actions and found to be very effective for this colonial nesting large bird, once hated for making the area dirty by the leftover food materials. The villagers now feel "proud ownership" of this bird in the villages and now committed for its long term conservation. Villagers now tried to bank on the presence of this bird in their villages and started producing innovative ideas for conservation of this globally endangered species.

2011-12-08 18:30 Survey of Native Plant Species Related to the Afro-Brazilian culture in the Urban Parks and Botanical Garden of Salvador

Queiroz, EP*, *Jardim Botânico de Salvador;* **Santos, LS,** *Jardim Botânico de Salvador;* **Oliveira, MZA,** *Empresa Baiana de Desenvolvimento Agricola ;*

This paper aims to survey indigenous plant species associated to the Afro-Brazilian culture from 2004-2009, and contribute to the promotion of the traditional knowledge and conservation. The species selection was done by bibliography and consulting from representatives of terreiros (Afro-Brazilian religion temples), who indicated the species employed in their rituals. The collecting area were the Urban Parks and the Botanical Garden of Salvador, Brazil. The species were georeferenced, their botanical material treated and determinated in the RADAMBRASIL Herbarium (HRB-IBGE), using specific identification keys and/or compared with the HRB exsiccates. A list was organized by taxonomic features, habit and collecting place. The taxa organization in accordance with APGIII and MOBOT W3 Tropicos database. In this work, 3590 individuals (106 species in 96 genera and 48 families) were registered. Among them, some are threatened, rare, endemic and applied in folk medicine, without still having scientific verification. From the achieved results, a report, book and a Sacred Plants' Garden in the Salvador Botanical Garden were created. It is necessary expand this study, essential to the conservation, because of the variety of terreiros and species, allied to the loss of native areas, which have forced the African cult representatives to seek plant matrices in distant places.

2011-12-09 15:15 GIS Marine Connectivity Modeling for Protected Area Conservation Planning

Raber, George*, *The University of Southern Mississippi;* **Schill, Steven,** *The Nature Conservancy;*

Planning for marine protected area conservation zones requires an understanding of marine connectivity including ocean currents. Some species (e.g. corals) depend on dispersion of passive particles as part of their life cycle. In order to include the ocean currents as connections in the marine conservation planning, a GIS tool was being developed for this purpose within existing framework of the Protected Area Tools (PAT). PAT is an ArcGIS extension written in Python and Microsoft Visual Studio that has a module for preparing inputs to the Marxan decision support tool. PAT is extended in this project to incorporate the ability to utilize ocean current models such as the Hybrid Coordinate Ocean Model (HYCOM) and Aviso global geostrophic currents. The ocean current model outputs are used to modify the connections between planning units in Marxan by adjusting the boundary length modifier parameter. The new functionality was created by

building on the Marine Geospatial Ecology Tools (MGET) developed at the Nicholas School of the Environment at Duke University, which allow for batch-downloading the individual ocean current datasets and include tools for creating averages. This presentation includes a demonstration of the capabilities of the new tool and a discussion of the limitations.

2011-12-08 18:30 The effects of moose over-browsing on forest bird communities in Gros Morne National Park, Newfoundland and Labrador, Canada

Rae, LF*, *Memorial University of Newfoundland;* **Whitaker, DM,** *Parks Canada;* **Warkentin, IG,** *Memorial University of Newfoundland;*

Habitat loss is regarded as a major factor contributing to the decline of songbirds in North America. The boreal forest provides important breeding habitat that allows songbirds to meet specific requirements for vital activities such as foraging and nesting. However on the island of Newfoundland in eastern Canada, over-browsing by introduced moose (Alces alces) can alter the pattern of forest regeneration following disturbance, leading to the conversion of densely stocked balsam fir (Abies balsamea) forests to habitat dominated by grasses and shrubs. Such impaired forest regeneration is particularly prevalent in Gros Morne National Park (GMNP), where moose greatly exceed typical population densities due to a lack of natural predators and prohibition of hunting. To evaluate the impact of moose-induced habitat change on songbird communities, we conducted point counts (n=604) across GMNP during the 2010 breeding season. We compared species abundance and richness across sites having varying degrees of moose disturbance. A similar number of species were observed at severely impaired (9.0±2.4, mean±SD) and healthy (8.5±2.2) regenerating sites. While some species showed a strong association with healthy regenerating balsam fir forest (e.g. Magnolia Warbler) others showed an increase in abundance associated with moose-disturbed habitat (e.g. Mourning Warbler).

2011-12-07 11:14 Communicating about Conservation: Endangered Species Conservation on the US Gulf Coast

Ragland, CJ*, *Dept. Wildlife and Fisheries Sciences, Texas A&M University;* **Bernacchi, LA,** *Dept. Wildlife and Fisheries Sciences, Texas A&M University;* **Barbour, JB,** *Dept. of Communication, Texas A&M University;* **Peterson, TR,** *Dept. of Wildlife and Fisheries Sciences, Texas A&M University;*

This study examines how society lives with and conserves endangered species, focusing on the case of Whooping Cranes (Grus americanus) on the U.S. Gulf coast using a network analysis framework to examine structures of communication about crane and habitat conservation among actors involved in decisions that affect crane management. The analysis is based on data obtained from 36 semi-structured interviews which were transcribed, coded, and analyzed using a network algorithm to investigate the relationships between individual actors in terms of how they communicate about crane conservation in a socio-political context. Because meaning is actualized through communication, how people communicate about conservation reflects the likelihood of positive movement towards successful management. Communication network analysis is especially useful for clarifying how relations are developed and revealed through different societal functions. Network ties between pairs of individuals represent shared intensity of communication within each societal domain. Network density was used as a measure of integration and network cohesion. By examining stakeholder perceptions, we identified barriers to conservation that can be addressed by specific management options that simultaneously provide opportunities for local voices to influence development and planning in the region, and engage in joint learning about the biological needs of the species.

2011-12-08 15:00 Conservation genetics and management of the Mauritius parakeet (Psittacula echo)

Raisin, C.*, *DICE, University of Kent, University of Kent, Canterbury, Kent. CT2 7NR. UK;* **Jones, C. G.,** *Durrell Wildlife Conservation Trust, Les Augres Manor, Trinity, Jersey. JE3 5BP;* **Greenwood, A.,** *Wildlife Vets International, Keighley Business Centre, South Street, Keighley, West Yorkshire BD21 1AG. UK;* **Zuel, N.,** *Mauritian Wildlife Foundation, Grannum Road, Vacoas, Mauritius, Indian Ocean.;* **Groombridge, J. J.,** *DICE, University of Kent, University of Kent, Canterbury, Kent. CT2 7NR. UK;*

As the number of threatened species worldwide continues to increase, conservation management programs are being implemented in more and more cases. One example of such a managed species is the endemic Mauritius parakeet (Psittacula echo). A management program implemented in the 1980s has seen the population recover from less than 20 individuals to over 500. The species was intensively managed from the year 2000 until 2005, when the emergence of an infectious disease caused many of the interventions to be ceased, although less invasive management continues today. A population genetic assessment of the species indicates that intensive management has redistributed genetic diversity between two previously isolated sub-populations. In addition to this, both molecular and pedigree measures have revealed varying levels of inbreeding in the recovered population and birds that that test positive for PBFD have been found to be significantly more inbred than those that test negative. Although the intensive management doubtlessly contributed to the recovery of the population it is also likely to have contributed to the spread of the disease. As such, conservation practitioners must consider the range of potential consequences of intensive management and make management decisions accordingly.

2011-12-07 14:45 Achieving wildlife corridors in densely populated and fragmented landscapes: the experience from "Elephant Corridors" in India

Raman Sukumar*, *Indian Institute of Science;* **Vivek Menon,** *Wildlife Trust of India;*

Wildlife corridors serve important ecological functions such as permitting the movement of species across their natural range of habitat, maintaining gene flow, population viability and evolutionary potential, as well as in recent times the anticipated migration needed in order for species to adapt to a changing climate in the future. Corridors for large-bodied, long ranging and charismatic vertebrates such as the elephant also serve as passages for a host of smaller animals that share its habitat. Protecting or strengthening existing corridors, or restoring old corridors, present numerous challenges – ecological, social, legal and political. In this talk we discuss these challenges with respect to our experience with a large number of "elephant corridors" in India. After presenting the landscape-level picture of elephant distribution and corridors across fragmented habitats, we go to discuss the "real world" issues of establishing corridors with illustrations from our work at several places in the country. We also explore the various options available for strengthening corridors, from acquisition or purchase of land, to community-based incentives (conservation easements) and using carbon credit mechanisms under the climate change conventions.

2011-12-08 18:30 Distribution and status of the Mindoro Bleeding Heart Pigeon (Gallicolumba platenae) on Mt. Siburan, Sablayan, Occidental Mindoro, Philippines

Ramayla, SP*, *Phil. Science High School-Central Visayas Campus;* **Rico, ELB,** *FFI;* **Dimaranan, JE,** *WCSP;* **Dimas, JC,** *WCSP;* **Alviola, PA,** *UPLB;*

The Mindoro Bleeding Heart Pigeon Gallicolumba platenae (IUCN: Critically Endangered) is an endemic species found only on the island of Mindoro, Philippines. Preliminary information on the ecology of the species is rudimentary and only based from anecdotal reports. Thus, this study aimed to obtain and provide ecological information of the target species which is needed to draw up a plan of action for the protection and conservation of these birds. A combination of Point-Count Transects, purposive searches and interviewing key informants were employed to gather primary data. The habitat of each sighting was assessed following Heaney's habitat description form. Presence of MBH was correlated to the type of micro-habitat and to severity of anthropogenic disturbance in the area. Among the five sampling sites, MBH were observed in Siburan, Malate and Tandacan only. A nest with two newly laid eggs was found in Tandacan area. Habitat destruction and trapping/hunting were the primary threats to the MBH population in the area, e.g two MBH were ensnared through a 'silo' during the study period. As a result, it was recommended that trapping be regulated and an intensive information and education campaign be mounted to ensure the protection of the species.

2011-12-09 11:15 Using genomics to manage inbreeding effects in New Zealand's rarest kiwi

Ramstad, KM*, *Allan Wilson Centre, Victoria University of Wellington;* **Robertson, HA,** *New Zealand Department of Conservation;* **Colbourne, RM,** *New Zealand Department of Conservation;* **Kay, D,** *New Zealand Department of Conservation;* **Daugherty, CH,** *Allan Wilson Centre, Victoria University of Wellington;* **Ryder, OA,** *Institution for Conservation Research, San Diego Zoo;* **Allendorf, FW,** *University of Montana;*

Kiwi (Family Apterygidae) are flightless ratite birds endemic to New Zealand. All kiwi species have experienced a significant reduction in their native range and struggle with small population size, recent bottleneck effects, and ongoing isolation. We are using genomic techniques to develop genetic markers and assess inbreeding depression in the rarest kiwi species, rowi (Apteryx rowi), which comprise only a single population of approximately 350 individuals. This effort presents a number of challenges common among species of conservation concern. For example, few numbers of individuals mean we are not able to cost-effectively use SNPs, low levels of polymorphism and strong linkage disequilibrium necessitate the screening of large numbers of markers, and the most closely related reference genomes are separated from kiwi by approximately 130my of evolution. Regardless, a single run of sequencing on a Roche 454 Genome Sequencer Junior resulted in nearly 90 thousand sequence reads (mean length 285bp) containing more than 300 putative microsatellite loci that can be screened for polymorphism. Alignment of these sequences with other avian genomes may also help identify functional candidate genes under selection in kiwi. Resultant markers will be critical for assessing relatedness and inbreeding depression among rowi, and will help managers select distantly related individuals for founders of new populations and captive rearing programmes.

2011-12-08 18:30 Conservation of the marbled murrelet in the Pacific Northwest, USA

Raphael, MG*, *USDA Forest Service, Pacific Northwest Research Station;*

The Marbled Murrelet (Brachyramphus marmoratus) is a small, diving seabird in the alcid family that forages within nearshore marine waters and nests on limbs of old coniferous trees. The species is federally listed as Threatened in the USA in the states of Washington, Oregon and California. As part of the regional effectiveness monitoring program in support of the Northwest Forest Plan, my colleagues and I have been surveying murrelets along coastal waters from year 2000 to present. These surveys indicate that murrelet numbers are declining at an annual rate of about 3.7%. Concurrent modeling of murrelet nesting habitat indicates an overall decline in amount of suitable nesting habitat of about 0.5%/yr, due mostly to logging on non-federal lands and wildfire on federal lands. Furthermore, the spatial distribution of murrelets is strongly correlated with amount of adjacent suitable nesting habitat. Population decline could be due to losses of nesting habitat, but marine conditions could also be responsible. If marine conditions are the driver of population change, then I would expect other marine birds with similar foraging ecologies to experience similar population declines but I found no comparable declines among other alcid species. Circumstantial evidence leads me to conclude that the conservation and restoration of nesting habitat are keys to recovery of this species.

2011-12-06 14:30 Integrating species conservation landscape models into setting management priorities for Nam Kading National Protected Area, Lao PDR.

Rasphone, A*, *Wildlife Conservation Society Laos;* **Bryja, G,** *Wildlife Conservation Society ;* **Hallam, C,** *Wildlife Conservation Society Laos;* **Johnson, A,** *Wildlife Conservation Society Laos;*

Spatial Models based on primarily expert information are commonly used in species habitat modeling where empirical data is lacking. Landscape species modeling approach was used in the process to highlight significant areas where management of the Nam Kading National Protected Area (NKNPA) in Lao PDR can ensure an efficient use of limited resources. This paper presents species conservation landscape modeling process and the use of the models in defining management interventions. The preliminary results from field data from the NKNPA are also incorporated to update the models for two of the Landscape species, Eurasian wild pig (Sus scrofa) and northern white-cheeked crested gibbons (Nomascus leucogenys). The results are used to better focus management priorities on these two species within the NKNPA.

2011-12-06 14:24 Return of Rhinoceros unicornis in Manas National Park of India

Rathin Barman, *Wildlife Trust of India;* **Bhaskar Choudhuri,** *Wildlife Trust of India;* **Phulmoni Boro,** *Wildlife Trust of India;* **NVK Ashraf,** *Wildlife Trust of India;* **Vivek Menon*,** *Wildlife Trust of India;*

For the first time in the history of rhino conservation in India, three rescued orphan greater one horned rhinoceros have been rehabilitated in another habitat which used to be a good rhino bearing area in the past. This has made a successful comeback of Rhinoceros unicornis to Manas National Park, a World Heritage Site in India. This is the first ever rehabilitation of hand-raised calves of Rhinoceros unicornis in a natural habitat. Calves were hand reared at Centre for Wildlife Rehabilitation and Conservation (CWRC) with a aim to rehabilitate them to their natural habitat. Feeding with human milk formula till the age of two years, the calves then fed with concentrates and greens in paddocks in CWRC. At the age of about three years the calves were translocated to Manas National Park, which is about 500 km away from Kaziranga and placed them in a pre-released area with an area about 600 acre. This pre-release area is fenced with electric fence and calves are free to roam and forage in this area. After spending about two years in this pre-release area the calves were released and to the wilderness. Radio monitoring shows that calves has established their own home ranges.

2011-12-07 15:15 Network-theoretic approaches for evaluating critical habitat: confronting trade-offs between habitat quality and connectivity

Rayfield, B*, *Department of Biology, McGill University, Montreal, Canada;* **Pelletier, D,** *Département de Géographie, Université de Montréal, Montreal, Canada;* **Cardille, J,** *Département de Géographie, Université de Montréal, Montreal, Canada ;* **Gonzalez, A,** *Department of Biology, McGill University, Montreal, Canada;*

Land use change threatens biodiversity by altering habitat area and quality but also by reducing habitat connectivity. The creation of networks of habitat fragments and corridors is expected to maintain biodiversity by facilitating an exchange of organisms, energy, and nutrients among fragments. From this perspective critical habitat fragments should be identified that contribute both connectivity and additional attributes, such as unique biodiversity. We present and apply a method to guide conservation planning in fragmented landscapes that uses network models to balance the trade-off between fragment quality and connectivity. This network-theoretic approach delineates multiple, efficient pathways through the landscape matrix which collectively form potential corridors between habitat fragments. Network metrics can quantify the independent contribution of each fragment to network connectivity structures (e.g., purely topological metrics) or can provide integrated measures of both fragment quality and connectivity (e.g, weighted centrality metrics). We apply this approach in a highly fragmented, multi-use landscape (1.5 million ha) in south-eastern Canada. We identify threshold distances at which habitat fragments are minimally aggregated into subnets and produce a spatial prioritization of fragments based on their contributions to network quality and connectivity. We demonstrate and quantify the importance of conserving critical habitat fragments that are of lower quality to protect connectivity across the network of fragments. Our method contributes to the integration of connectivity into systematic conservation planning.

2011-12-08 18:30 Designing walls as ecosystems in urban environments

Reay, SD*, *Auckland University of Technology;*

This project that provides a unique opportunity to use an inter-disciplinary collaborative approach to explore a range of potential design solutions by bringing technology and science (in particular the fields of biology and ecology) together with design to increase the awareness and understanding of issues centred on sustainability, framed in the context of understanding ecological systems. Urban development has resulted in a loss of connection with nature, and as a consequence, a loss of ecosystem processes. Consequently, we fail to see ourselves as part of nature. This loss of 'cultural biodiversity' has given way to the idea that nature is provided for our use and exploitation. The challenge to develop sustainable futures is to have

long-term planning that interrupts the decreasing importance of natural environment in the lives of urban people. Urban societies need to be encouraged to develop an awareness and understanding of the importance of ecosystem services and the role they play in urban environments, and ultimately human well-being. Enhancing natural biodiversity in urban environments and engaging urban dwellers with nature may help natural heritage be integrated with valid cultural values. This poster describes the design and development of prototype ceramic tile concepts to be used as a boundary structure to support the establishment of living walls for large concrete facades on city buildings, by establishing a complex 3D substrate to support early colonising species and act a substrate for continued biological invasion by a diverse range of plant and animal species. Over the longer-term the product should require no general maintenance to ensure continued functional integrity. The ultimate success of the product would result in the establishment of ongoing ecosystem processes. The proposed design exploits the potential to provide an internal cavity that is able to 'house' plant and animal species. This 'living' substrate will not likely require seeding of initial colonisers, but as a substrate will provide habitat for a range of species (while excluding urban animal pests i.e. mice/rats etc), that may colonise when ecological requirements are satisfied by prior successional colonising organisms. In its initial installed state the ceramic tile will represent an aesthetically clean and simple structure. Over time this structure will weather, require minimal or no maintenance and will start to 'wear' as biological entities adhere and develop. Over time it is anticipated that the structure will transform to become a dynamic structure that harbours and supports on-going biological (ecological) activity. A novel aspect of the proposed ceramic product is that the ecological requirements of invertebrates are considered.

2011-12-08 15:30 Migratory patterns of humpback whales in Colombia and the selection of areas included in the Corredor Marino del Pacífico Oriental Tropical

Recalde-Salas, Angela *, *Fundación Yubarta. Cali, Colombia - The University of Queensland, Cetacean Ecology and Acoustics Laboratory. Gatton, Australia.;* **Flórez-González, Lilián,** *Fundación Yubarta. Cali, Colombia.;* **Wilson, Howard,** *The University of Queensland, The Ecology Centre. St Lucia, Australia;* **Noad, Michael,** *The University of Queensland, Cetacean Ecology and Acoustics Laboratory. Gatton, Australia.;* **Capella, Juan,** *Fundación Yubarta. Cali, Colombia;* **Tobón, Isabel,** *Fundación Yubarta. Cali, Colombia;*

The presence or absence of a species was one of the points taken into account to select areas or regions included in the "Corredor Marino del Pacífico Oriental Tropical (CMPOT)". However, for migratory species such as humpback whales, presence is not enough to select one area over other. Quantitative analysis of the migratory patterns of the southeast pacific humpback whale population, were performed for two areas in the Colombian Pacific Coast: Gorgona National Natural Park (GI) and Málaga Bay (MB). The analysis performed using probabilistic methods, showed low connectivity between the areas both within a season and between the seasons, and a higher rate of return to MB. Analysis also showed differences in habitat use; MB is mainly a destination and nursing area, and GI a transit and courtship one. Based on these differences, it is possible to consider MB as the main breeding area in Colombia and should be considered as an additional area for the CMPOT, which already includes GI. We also conclude that for humpback whales, ecological aspects such as return and movements should be considered as well as presence or absence in the selection of areas included in marine corridors.

2011-12-06 15:30 Giving Equal Conservation Priority to Ecosystems Protects Low Levels of Biodiversity

Redding, DW*, *Manchester Metropolitan University;* **Marsden, S,** *Manchester Metropolitan University;*

A 'Convention for Biodiversity' target set in 2004, asked governments to work together to ensure that at least 10% of each major ecoregion was protected by 2010. We ask: Was giving equal conservation priority to each ecoregion an approach that was going to maximise biodiversity protection? Using data from only those bird species abundant enough to be conserved at each of our 400 neotropical study sites, we found giving different weights to each ecoregion conserved up to 10 times as many species, compared to giving each ecoregion equal priority. We compare those ecoregions that were found to be consistently high priority, irrespective of the geographical area considered, and compared them to the current levels of protection, to identify high priority targets in the neotropics.

2011-12-08 10:45 Defining the Burden of Proof in Conservation

REDFORD, KENT H.*, *Wildlife Conservation Society;* **Salafsky, Nick,** *Foundations of Success;*

Conservation practitioners often must take action in the face of uncertainty about the costs and benefits of different options. For example, should a critically endangered frog population be managed in the wild, or brought into captive breeding? Or, should a land trust facilitate a conservation easement on a wetland owned by a large oil company? In each case, although the decision makers cannot wait for absolute certainty before taking action, is there some standard "burden of proof" that they need to meet so that it can be said that they acted in good faith and are "blameless" for the results of their decision? Conservationists are not the only professionals facing these situations. Medical doctors deciding on treatment options for an ill patient, judges making sentencing decisions, and soldiers and police officers following rules of engagement for using deadly force all have to meet burdens of proof established within their profession. We examine these other professions and use the findings to propose a taxonomy of issues based on the level of risk associated with an incorrect decision and suggest ways that these issues be given higher profile in the practice of conservation.

2011-12-06 12:00 Hunting for solutions to problems of predator management in UK

Redpath, S.M.*, *ACES, Aberdeen University;*

Birds of prey are still illegally killed in the UK by game managers and this presents conservation with a real challenge. I will examine approaches taken to managing this issue in the specific example of the UK uplands, where I have worked for 26 years. I will highlight the alternative perspectives of those involved and summarise the natural and social science that has been done to understand this fascinating and revealing problem. I will then explore the alternative approaches taken to finding solutions, consider the variety of solutions that have been proposed and the barriers that have prevented resolution. I will end by considering the role of science, legislation and dialogue in finding a solution to this problem, and the broader implications for conservation.

2011-12-09 11:30 Conservation Science Expertise for Local Land Use Planning and Residential Development

REED, SE*, *Colorado State University/Wildlife Conservation Society;*

High rates of land development around the world, the gap in funding available for land protection, and the need for dynamic conservation strategies in a changing climate all make this a critical time to examine new approaches for incorporating conservation objectives into development practices. Conservation development (CD) is an alternative approach to the site design of a development property that protects or restores its ecological resources and clusters housing on the remainder of the site. Although CD accounts for a growing proportion of residential development and private land conservation activity, design standards for how to implement CD were developed with limited involvement of conservation scientists, and the resulting CD projects are rarely evaluated for their conservation effectiveness. We will review guidelines and incentives for CD in local land use regulations and the resulting land use and conservation patterns in CD projects that are implemented through these regulations. We will discuss how conservation biology theory and research—specifically, the principles of reserve design, conservation planning, and protected area management—can be used to improve the conservation effectiveness of CD projects. We conclude with recommendations for how SCB and its member scientists can engage in regional land use policy and local development projects to shape future development patterns and improve the outcomes for conservation.

2011-12-08 18:30 Patterns and potential costs of nesting migrations in the tuatara, an endemic island reptile

Refsnider, Jeanine M., *Iowa State University;* **Daugherty, Charles H.,** *Victoria University of Wellington;* **Godfrey, Stephanie S.,** *Flinders University;* **KEALL, SUSAN N.*,** *Victoria University of Wellington;* **Moore, Jennifer A.,** *Victoria University of Wellington;* **Nelson, Nicola J.,** *Victoria University of Wellington;*

Preservation of all necessary resources and habitat components is critical for the conservation of island species that are unable to disperse. Migrations between residence and nesting habitat can exact high costs on individual females, and may have population demographic consequences in cases where female mortality during nesting migrations is high. Tuatara are the sole representatives of the reptilian order Rhynchocephalia, and natural populations are restricted to 32 offshore islands in New Zealand; thus, conservation of this unique species requires precise knowledge of habitat use and requirements on these islands. We examined patterns in nesting migrations of the largest tuatara population, occurring on Stephens Island, New Zealand, over five years. We found that only about 7% of female tuatara lived in the rookery in which they nested, with most females instead migrating to a nesting rookery from their residential area. However, most females minimized the distance travelled on nesting migrations by nesting in a rookery adjacent to their residential area. Females that travel further to nest likely incur greater energetic costs. Moreover, because nesting habitat on Stephens Island is not limited but high-quality home territories likely are, we hypothesize that female tuatara nest in the closest available nesting habitat to minimize the likelihood of losing their territory to conspecifics while on nesting migrations.

2011-12-06 12:15 Evaluation of assisted colonization strategies under climate change for a rare, fire-dependent plant

Regan, HM*, *Biology Department, University of California Riverside, CA 92521, USA;* **Syphard, AD,** *Conservation Biology Institute, San Diego, CA, USA;* **Franklin, J,** *School of Geographical Sciences and Urban Planning, Arizona State University, Tempe, AZ, USA;* **Swab, R,** *Biology Department, University of California Riverside, CA, USA;* **Flint, AL,** *United States Geological Survey, Sacramento, CA, USA;* **Flint, LE,** *United States Geological Survey, Sacramento, CA, USA;* **Zedler, PH,** *Nelson Institute for Environmental Studies, The University of Wisconsin, Madison, WI, USA;*

As a clear consensus is emerging that suitable habitat for many species will dramatically reduce and/or shift with climate change, attention is turning to adaptation strategies; assisted colonization is one such strategy. The success or failure of assisted colonization will depend on a range of population-level factors on which the climate change literature has been relatively silent—the quality of recipient habitat, the number and life stages of translocated individuals, establishment of translocated individuals in their new habitat and whether the recipient habitat is subject to ongoing threats all will play an important role in population persistence. We link a population model with dynamic bioclimate envelopes to investigate expected changes in populations with climate change, the impact of altered fire regimes on population persistence, and how much assisted colonization is necessary to minimize risk of population decline in Tecate cypress, a rare endemic tree in the California Floristic Province. We show that when there are large source populations that are expected to decline dramatically due to habitat contractions, multiple nearby sites predicted to contain suitable habitat, minimal natural dispersal, high rates of establishment of translocated populations, and the absence of more serious ongoing threats, assisted colonization may be a risk-minimizing adaptation strategy. However, when serious ongoing threats exist, assisted colonization is ineffective.

2011-12-09 14:28 Conflicting Management Mandates and Ecological Impacts of Bison: Implications for Cross-Jurisdictional Wildlife Management

Reimondo, EL*, *School of Earth Sciences and Environmental Sustainability, Northern Arizona University;* **Theimer, TC,** *Department of Biology, Northern Arizona University;* **Sisk, TD,** *School of Earth Sciences and Environmental Sustainability, Northern Arizona University;*

State and federal agencies must work cooperatively on wildlife management issues to balance human and conservation values with ecological impacts and management costs. Conflicts arise when agency goals and mandates do not coincide. The focus of this research is conflict over a herd of bison, a species symbolic of the American West and of the conservation movement, which has moved from state to federal lands on the Kaibab Plateau of Arizona. The state values the herd as a wildlife game species, while the federal agency considers bison nonnative and a potential threat to the health of critical resources like the region's springs and ponds. I quantified the effects of bison grazing around these water sources and found that bison significantly reduced vegetative cover, increased exposed soil, and decreased above-ground biomass across forb, grass, and sedge functional groups. These results likely qualify as resource impairment and would empower the federal government to take management action without state consent. The high monetary, social, and political costs of removing bison from the region will likely necessitate a compromise where a smaller population is allowed to persist. I present a conceptual model that illustrates how this research can inform that process and other conflicts in wildlife management.

2011-12-08 18:30 Elevated Islands – urban conservation potential on living roofs

Renee Davies*, *Unitec Institute of Technology;* **Robyn Simcock,** *Landcare Research Ltd;* **Richard Toft,** *Entecol Ltd;* **Graham Ussher,** *Tonkin & Taylor Ltd;* **Cris de Groot,** *Unitec Institute of Technology;* **Martin Boult,** *Unitec Institute of Technology;*

New Zealand's landscape heritage is inextricably linked to the concept of an islanded nature. Its distinctive flora and fauna has been influenced by our ancient Gondwanaland separation and subsequent biodiversity reduction and extinction through habitat loss and predation/competition from invasive species has instigated a conservation tradition focused on protective enclaves situated within predator free offshore or fenced mainland islands. Such conservation concepts are limited in their ability to address biodiversity loss in our urban environments. Living roofs offer an opportunity to bring the conservation island concept into a contemporary context integrated within our urban landscapes. This would see the once neglected and un-used landscape realm of buildings creating managed and monitored biodiverse islands of indigenous flora and fauna - reservoirs for less common local species and an extension of habitat within urban environments. Microhabitat variables required for New Zealand's indigenous skinks, including temperature, humidity, refuge/shelter and prey were studied on New Zealand's first fully indigenous extensive living roof over four years. Comparison with a terrestrial site identified the relative suitability of the living roof as skink habitat. This data provided an interdisciplinary team of ecologists, landscape architects and product designers with the parameters needed to develop, prototype and field-test a prosthetic habitat that provides enhanced conditions on the living roof to facilitate skink conservation efforts in a predator free and managed urban environment.

2011-12-09 17:45 Conservation and climate change adaptation: identifying synergies and tensions

Rickards, L.*, *Uni Melb;*

Like conservation biology, climate change adaptation is an ever-more salient field. Engagement between the two areas to date has largely focused on a narrow conceptualisation of how climate change will likely impact biodiversity. While important, there are other significant parallels and potential interlinkages that need to be considered if we are to effectively pursue the goals of both fields in the face of their multiple shared threats. This paper begins this task by outlining major areas of shared conceptual and practical import. Some of these points of intersection are synergistic, including the potential for lessons to be shared between the fields. For example, it is argued that adaptation can be thought of as 'conservation of the human species' and that many of the lessons learned in conservation biology over previous decades, particularly following the rise of disturbance ecology, are applicable to the climate change adaptation field. Likewise, work in climate change adaptation has started to interrogate the implications of adopting different definitions of adaptation, resilience, vulnerability and transformation: insights that have relevance for conservation biology. Considering radically different futures is also an approach in adaptation that conservation could learn from. Other points of intersection between the two fields are less synergistic than antagonistic. For example, climate change adaptation may reinforce a strongly anthropocentric worldview and some conservation actions may prove maladaptive in the long term. Addressing

these and other implicit points of conflict is essential for the success of both conservation and climate change adaptation.

2011-12-09 11:30 THE AFRICAN LION (Panthera leo leo): A CONTINENT-WIDE SPECIES DISTRIBUTION STUDY AND POPULATION ANALYSIS

Riggio, Jason S.*, *Big Cats Initiative, National Geographic Society; Duke University;* **Jacobson, Andrew,** *Big Cats Initiative, National Geographic Society; Duke University;* **Pimm, Stuart,** *Duke University;* **Dollar, Luke,** *Big Cats Initiative, National Geographic Society; Duke University; Pfeiffer University;*

Human population growth and land conversion across Africa makes the future of wide-ranging carnivores uncer-tain. For example, the African lion (Panthera leo leo) once ranged across the entire continent – with the exception of the Sahara Desert and rainforests. It now lives in less than a quarter of its historic range. Recent research estimates a loss of nearly half of the lions in the past two decades. Some sources put their numbers as low as 20,000 individuals. Given these declines, conservation organizations propose to list the African lion as "endangered" under the U.S. Endangered Species Act and to upgrade the species' CITES protections from Appendix II to Appendix I. To establish the lion's current conservation status, I analyzed the size, distribution, and potential connections of populations across its range in Africa. I compile the most current scientific literature, comparing sources to identify a current population estimate. I also use these sources to map known lion populations, potential habitat patches, and the connections between them. Finally, I assess the long-term viability of each lion population and determine which qualify as "lion strongholds." The lion popu-lation assessment in this study has shown that over 30,000 lions remain in approximately 3,000,000 km2 of Africa. Lions are distributed across a total of 78 habitat patches in 27 countries. More than half of the remaining lions in Africa reside in 11 viable populations contained within protected areas that have stable or increasing lion population trends (lion strongholds). Therefore lions are not currently threatened with extinction and it is unlikely that the total population of free-ranging lions in Africa will drop below 20,000 individuals.

2011-12-09 10:30 Gender, Social Capital and Participation in Sea Turtle Conservation in NE Brazil

Rinkus, MA*, *Michigan State University;*

Fishermen have historically been identified as the prime threat to sea turtles, and therefore the prime target of conservation programs. Although fishing in the open ocean is primarily male-dominated, women exert agency in other spheres that are likely to affect conservation initiatives. This study explores the role gender and social capital play in access to resources, perception, and decision-making in relation to sea turtle conservation along the northern coast of the state of Bahia, Brazil. Using a mixed-methods approach to data collection, this research presents social capital profiles for men and women based on levels, networks and nodes of participation in the community. By examining differences in participation this research deconstructs the role of gender relations on household and community-level decision-making, and the direct and indirect effects this may have on sea turtle conservation, as well as the differential effects of sea turtle conservation programs on local communities. Preliminary findings suggest that men's networks provide more access to economic incentives from resource use and protection. An evidence-backed assessment of the relationship between gender, social capital and decision-making could be very beneficial in reshaping conservation programs and increasing participation and understanding among men and women.

2011-12-09 14:30 Participatory research in honey production and fisheries in a protected area under pressure by RR soybean and forestry plantations in Uruguay

RIOS M*, *Vida Silvestre Uruguay;* **Zaldúa N,** *Vida Silvestre Uruguay;* **Carrasco-Letelier L.,** *Programa de Producción y Sustentabilidad Ambiental. INIA La Estanzuela, Uruguay;* **Santos C,** *Extensión Universitaria, Universidad de la República. Uruguay;* **Teixeira de Mello F,** *Grupo de Ecología y Rehabilitación de Sistemas Acuáticos, Departamento de Ecología y Evolución, CURE, Universidad de la República. Uruguay.;*

Uruguay is undergoing a huge land use change, mainly by an increment of RR soybean and tree forestry, in landscapes with natural grasslands. Land cover changes increases both the dose and frequency of pesticide's use and theirs environment pollution risk. Esteros de Farrapos National Park (EFNP) is a RAMSAR wetland in the River Plate basin; with important conservation values such as exceptional fish and birds´ diversity and a complex wetlands and lagoons system. However, this area is surrounded by plantations (RR soybean and Eucalyptus) that can affect the protected area and local productions (honey production and local fisheries). The aim of this work was to carry out a citizen-based research with local producers to evaluate pesticides impacts in EFNP and its basin. Methodology was based on a research process with a big involvement of bee-keeper, fishermen and local educational centres, as well as a manager task developed by the NGO; complemented by the collaboration of researchers from the academy and local and national government. Results showed the presence of pesticide in fishes, beehives, and in massive death events of fishes and bees. Endosulfan was found in 4 out of 8 fish species analyzed. The highest death bees rate was found in areas surrounded by RR soybean crops (RS 0.59, $p<0.05$) and with the lower productivity of honey per apiary (RS 0.17, $p<0.05$). This work improved the local producers' capacities to confirm if their productions were affected by pesticides and confirmed impacts in EFNP by the current pesticides pollution. Moreover, it showed a promissory way to approach environmental researches and monitoring based on local participation for a better understanding of protected areas and sustainable use of resources.

2011-12-08 18:30 Migration of captive-bred released Asian Houbara bustards from West-Kazakhstan

Riou Samuel, *NARC - IFHC;* **Rautureau Pierrick,** *NARC - IFHC;* **Judas Jacky*,** *NARC - IFHC;*

Captive-breeding programs of endangered migratory bird species can be successful only if the individuals produced are able to survive and migrate, yet this is currently very little documented in the literature. Here we used satellite tracking to monitor the migratory movements and survival of ten wild juvenile and seven captive-bred released (CBR) Asian Houbara bustards from breeding grounds in West-Kazakhstan. One CBR and two wild birds died on the breeding grounds. All the others left Kazakhstan between late September and early November and migrated south with most birds wintering in Iraq and Eastern Iran. Two CBR birds survived the winter and returned the following spring to Kazakhstan within 30 km of their release site. Despite many wild and CBR birds having succumbed to poaching on the wintering grounds, this study clearly shows that Houbara artificially bred in captivity are able to migrate normally, survive and return to their breeding grounds the following spring. We discussed the possible mechanisms involved (endogenous genetic programme versus social learning process), further experiments and implications for the conservation programme of Asian Houbara populations.

2011-12-08 10:50 Modeling Habitat Suitability for Specialized Woodpeckers: Toward Quantitative Conservation Targets

Roberge, J.-M.*, *Dept. of Wildlife, Fish and Environmental Studies, SLU, Sweden;* **Angelstam, P.,** *School for Forest Management, SLU, Sweden;* **Mikusinski, G.,** *Dept. of Ecology, SLU, Sweden;* **Stighäll, K.,** *Swedish Society for Nature Conservation;* **Edman, T.,** *Metria AB;*

Several woodpeckers (Aves: Picidae) having specialized habitat requirements are endangered due to anthropogenic land use. Due to their large requirements for resources that have become scarce in intensively managed forests, some have been proposed for use as umbrella species for the conservation of wider biota. Our studies performed in different parts of the Baltic Sea region (northern Europe) show that: (1) Widely available remote sensing data can be used to model habitat suitability of the white-backed woodpecker (Dendrocopos leucotos) both at the scale of local territories and in larger landscapes, (2) simple models based on the total area of suitable forest tend to overestimate the habitat potential for that species, while metapopulation models accounting for the quality of the landscape surrounding perform much better, (3) for several species of specialized woodpeckers, thresholds can be identified as regards the minimum amounts of critical habitat attributes – e.g. dead trees and large deciduous trees – required for occurrence. These findings provide crucial information for setting quantitative targets for the conservation and restoration of forest

landscapes for specialized woodpeckers and associated species.

2011-12-06 14:00 Results of the International Wildlife Crossing Infrastructure Design Competition

Robert Ament*, *Montana State University - Western Transportation Institute;* **Anthony Clevenger,** *Montana State University - Western Transportation Institute;* **Angela Kociolek,** *Montana State University - Western Transportation Institute;*

One key area that the rapidly emerging discipline of road ecology is grappling with is the mitigation of surface transportation systems to reduce their negative impacts on wildlife mortality and habitat connectivity. One of the most effective highway mitigation measures to address this issue is wildlife crossings (overpass/underpass) with wildlife exclusionary fencing. On average this wildlife mitigation method reduces collisions by approximately 80-90% and provides safe passage not only for large mammals, but many medium and smaller sized species as well. The cost of such infrastructure has dramatically increased in the past several decades. As a result, the ARC: International Wildlife Crossing Infrastructure Design Competition (ARC) was launched to bring together teams of experts from the fields of ecology, transportation, engineering, architecture and landscape design to spur the next generation of wildlife crossings. This juried competition sought innovation in feasible, context-sensitive and compelling design solutions for safe, effective, cost-efficient, and ecologically responsive wildlife crossings. The finalists were chosen from 36 team submissions from nine countries, representing over 100 firms worldwide. A presentation of the ARC competition and the five finalist teams' designs will offer the new methods, new materials and new thinking elicited by the competition, including the winning design that was announced in January 2011. Subsequent efforts that seek to implement the designs will be described, including the winner which is estimated to reduce costs by 50 percent.

2011-12-09 15:30 Identification of Putative Wintering Areas and Ecological Determinants of Population Dynamics in Trans-saharan migrant birds

Roberto Ambrosini*, *Department of Biotechnology and BiosciencesDepartment of Environmental and Landscape Sciences, University of Milano-Bicocca ;* **Valerio Orioli,** *Department of Environmental and Landscape Sciences, University of Milano-Bicocca;* **Dario Massimino,** *Department of Environmental and Landscape Sciences, University of Milano-Bicocca;* **Luciano Bani,** *Department of Environmental and Landscape Sciences, University of Milano-Bicocca;*

The identification of the causes of population decline of migratory birds implies assessing the relative contribution to population dynamic of environmental changes in the breeding and wintering grounds, and en route. This is problematic when the wintering areas of specific populations are unknown. Here we first identified the putative wintering areas of the populations of 17 migratory species breeding in Northern Italy as those areas, within the wintering ranges of these species, where winter Normalized Difference Vegetation Index (NDVI), that may affect winter survival, best predicted annual variation in population indices observed in the breeding grounds in 1992-2010. In these analyses we also controlled for the potentially confounding effects of environmental and climatic variables that may affect reproductive success and survival to migration. We could identify the African putative wintering areas for 10 of the 17 species. A few recoveries of ringed individuals were available for only 2 of these species, and in both cases recoveries occurred within the areas identified by our method. We also assessed the relative contributions to the population dynamic of each species of all environmental variables considered. Albeit these results must be further validated, currently they are the only hypotheses on the wintering grounds of Italian populations of these migratory bird species as, for some species, no individuals ringed in Italy were recovered in their wintering ranges.

2011-12-08 14:00 Artificial Insemination Allows Genetic Management Of The Kakapo Strigops habroptilus

Robertson, BC*, *Department of Zoology, University of Otago, Dunedin, 9054 New Zealand;* **Blanco, JM,** *Aquila Foundation, C/ General Dı´az Porlier 15, 4 D, 28001 Madrid, Spain;* **Adams, SL,** *Cawthron Institute, Nelson, New Zealand;* **Eason, DK,** *National Kakapo Team, Department of Conservation, Nelson, New Zealand;* **Vercoe, DA,** *National Kakapo Team, Department of Conservation, Nelson, New Zealand;* **Moorhouse, RJ,** *National Kakapo Team, Department of Conservation, Nelson, New Zealand;*

Artificial insemination (AI) allows for the manipulation of matings, which is crucial for genetic management of endangered species where the aim is to mitigate further loss of genetic variation and inbreeding depression. For example, by manipulating matings, the contribution of individuals under-represented in the population can be boosted, thereby decreasing reproductive skew and hence increasing effective population size. However, for AI to be beneficial, conservation managers must possess knowledge of the genetic relatedness of individuals to avoid inbreeding. Recently, artificial insemination was trialled on wild females of the critically endangered kakapo Strigops habroptilus resulting in live progeny. Male sperm donors were identified as relatively unrelated to AI candidate females; candidate females had already naturally mated, but not yet laid. Relatedness of individuals was determined using 30 kakapo specific microsatellites markers and compared with known genealogical relationships (e.g. parent-offspring, half-siblings). Paternity analysis of progeny of AI females indicated that the artificial inseminations were successful. An ability to manipulate kakapo matings allows less desirable natural matings (i.e. between close relatives) to be redressed with sperm from unrelated males. Kakapo managers are now able to manage matings to an unprecedented level with a view to maximising the retention of genetic variation in the population.

2011-12-06 17:00 The decline of Mexico's cloud forests because of climate change

Rocio del Carmen Ponce Reyes*, *Ecology Centre, UQ;* **James E.M. Watson,** *Global Conservation Programs, Wildlife Conservation Society;* **Victor Hugo Reynoso,** *Instituto de Biología, UNAM;* **Jeremy VanDerWal,** *Centre for Tropical Biodiversity and Climate Change Research, JCU;* **Robert L. Pressey,** *ARC Centre of Excellence for Coral Reef Studies, JCU;* **Hugh P. Possingham,** *Ecology Centre, UQ and ARC Centre of Excellence for Environmental Decisions;*

Despite cloud forests' (CFs) high vulnerability to changes in climate due to restricted climatic conditions, the spatial extent of this threat hasn't yet been mapped. We estimated the extent of Mexican CF that will survive in 2080 and its overlap with current protected areas. To perform our analyses we used an additive consensus model of seven different species distribution models with a different global circulation model on the SRES A1b emissions scenarios outlined by the latest IPCC report. We found that by 2080, around 70% of Mexican CF will vanish because of climate change only. If we consider that CFs outside of current protected areas will also disappear because of land use change, 99% of current CF could be lost. This last figure could lead to an extinction of 76% of Mexican CFs' restricted vertebrates species. Immediate action is required to arrest this trajectory. The expansion of the protected area estate is urgent. One of the priory areas for CF conservation in Mexico is the Sierra de Juarez, Oaxaca. This area is home to a high percentage of endemic species and contains larger fragments of CFs predicted to remain in 2080.

2011-12-09 15:00 The need for adaptive management of collaborative approaches to conservation: A case study from the Cordillera Azul National Park, Peru

Rodriguez, E. I.*, *School of Geography, Environment and Earth Sciences, Victoria University of Wellington, New Zealand;* **Gavin, M. C.,** *School of Geography, Environment and Earth Sciences, Victoria University of Wellington, New Zealand;*

Conservation is not one event, but an iterative process with many steps (planning, implementation, monitoring) repeated over time each with an opportunity for different levels of participation. That participation can vary among management stages has significant repercussions when we consider that local participation can add great value to conservation action. We use a case study from the Cordillera Azul National Park (PNCAZ) to examine changes in local community participation in the conservation process over time. For the purposes of our case study, we divided the PNCAZ's management into three different stages. Our study focused on the perspectives of three main stakeholders: CIMA (a Peruvian NGO involved in PNCAZ management), INRENA (a Peruvian government agency responsible for national parks), and local communities. We conducted 11 semi-structured interviews with Park's officials and surveyed 73 community

members. Our results indicate that levels of community involvement in conservation management varied across different management stages in the PNCAZ. We conclude that to achieve a more effective conservation management, long-term adaptive management approaches are needed that clearly define local participation, and monitor levels of participation across all stages of project management.

2011-12-09 11:00 Conservation Status of the Terrestrial Ecosystems of Venezuela

Rodriguez, JP*, *Instituto Venezolano de Investigaciones Cientificas and Provita;* **Oliveira-Miranda, M A,** *Provita;* **Huber, O,** *Fundacion Instituto Botanico de Venezuela;* **De Oliveira-Miranda, R,** *Provita;* **Rodriguez-Clark, KM,** *Instituto Venezolano de Investigaciones Cientificas;* **Zambrano-Martinez, S,** *Instituto Venezolano de Investigaciones Cientificas;* **Rojas-Suarez, F,** *Provita;* **Giraldo-Hernandez, D,** *Provita*

Building on the success of the IUCN Red List of Threatened Species, the International Union for Conservation of Nature (IUCN) recently launched the development of the Red List of Ecosystems. In the first major test of this system, we applied proposed categories and criteria to the terrestrial ecosystems of Venezuela, by analyzing 1:2,000,000 maps of the 18 major vegetation types (published in 1988 and 2010), and by using these data to project their remaining extent in 2038 (to satisfy the requirement of a 50-yr window). We also combined the 2010 vegetation map with a map of perturbation intensity due to human activities. These metrics allowed us to apply the categories and criteria to the 18 vegetation types at the national and state level, and to examine 10 case studies in greater detail, using primarily temporal series of satellite images. Declines in extent >90% were predicted nationally for deciduous forests and ~70% for open savannas, leading to their classification as Critically Endangered and Endangered, respectively, but when the degree of perturbation was also considered, all other major forest and savanna types were threatened as well. Because human populations are concentrated along the northern coast, vegetation types restricted to the south are relatively safe, but effective conservation priority setting will need to combine risk assessment with other variables such as degree of endemicity, protected areas status, and provision of ecosystem services.

2011-12-06 16:45 Predicting wildlife friendly landscaping preferences among urban residents

Rodriguez, S. L.*, *North Carolina State University;* **Peterson, M. N.,** *North Carolina State University;* **Thurmond, B.,** *North Carolina State University;* **McHale, M.,** *North Carolina State University;* **Cook, M.,** *North Carolina State University;* **Grove, M.,** *USDA Forest Service;*

Sprawl and urbanization mean residential landscaping choices can influence vast areas of wildlife habitat. However, little research has addressed how residents make landscaping decisions. While turf grass landscaping provides poor wildlife habitat, alternatives using native plants can provide high quality habitat for many wildlife species. Most previous research on landscaping preferences has focused on socio-economics in contexts of park landscaping, but emerging work has addressed how ethnicity, neighborhood norms and lifestyle influence residential landscaping preferences. We report on a case study of landscaping preferences in Raleigh, NC. We use a multivariate approach to evaluate the influence of socio-economics, ethnicity and neighborhood norms on residential preferences for native plant landscaping. Respondents (n = 179) preferred 50% native plant landscaping over 100% turf grass or 75% and 100% native plants, and significantly overestimated their neighbors' preference for 100% turf grass. These results suggest that correcting erroneous assumptions about neighborhood preferences may alleviate normative pressure against adopting native plant landscaping. Although landscaping choices were best predicted by residents' perceptions of neighbors' preferences, ethnicity, income, and home ownership were also related to preferences. African American ethnicity and income were negatively related to preference for native plant landscaping coverage. Environmental justice concerns linked to urban vegetation should be considered given the finding that African Americans preferred turf grass dominated landscaping. These results suggest middle income neighborhoods may be the most receptive to initiatives aimed at increasing the use of native plant landscaping, and therefore may be the key to increasing wildlife habitat in residential areas.

2011-12-08 18:30 Population Genetic Structure of Liparis loeselii (Orchidaceae) in the Coastal Wetland of the Dutch Wadden Sea Islands

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Liparis loeselii is a self-pollinating orchid of early successional wet dune slacks that has very short-lived populations. The species has a relatively large geographic range covering Europe and the Northeastern United States. However, it has declined considerably all over Europe and therefore is a high priority species in the European Union conservation program. The aim of this study was to infer the spatial genetic structure of this orchid in its highly dynamic ecosystem. Genetic variation was assessed for 569 individuals representing 23 dune slack populations of Dutch Wadden Sea islands using AFLP markers. AMOVA showed that 51% of the total genetic diversity was found within populations, 20% among populations and 29% among islands. Genetic differentiation between populations was large (PhiPT = 0.490), and positively correlated with geographical distance. Given that L. loeselii is a selfing species, the amount of genetic variation within populations is considerable. This could result from colonization of new dune slacks from multiple source populations. A Mantel test showed an isolation-by-distance structure, suggesting that colonization events mainly occur from the closest source populations. We suggest that to maintain the existing level of genetic diversity, formation of new dune slacks should be promoted. Management practices such as mowing are also helpful to prolong population life span. This will facilitate stepping-stone gene exchange among populations.

2011-12-08 14:00 Estimating the value of two Marine Reserves in New Zealand via public Willingness To Pay

Rojas-Nazar, UA*, *Centre for Marine Environmental and Economic Research, Victoria University of Wellington;* **Cullen, R,** *Department of Accounting, Economics and Finance, Lincoln University ;* **Gardner, JPA,** *Centre for Marine Environmental and Economic Research, Victoria University of Wellington;* **Bell, JJ,** *Victoria University of Wellington;*

Marine reserves (MRs) are an important spatial management tool for biodiversity protection in New Zealand. Currently, MRs protect over 10 % of New Zealand's territorial seas. Despite the importance of MRs, little is known about their perceived value to the public. The aim of this study was to estimate the value of two marine reserves based on the public's willingness to pay to maintain the MR via an environmental levy. The study focused on two MRs in New Zealand; Taputeranga MR (TMR), on Wellington's south coast and Kapiti MR (KMR), on the Kapiti coast. In order to estimate the monetary value of the MRs two surveys were carried out using contingent valuation. Respondents, all from the Wellington region, were asked to fill out questionnaires via e-mail. From the responses we calculated the mean and median amounts a household was willing to pay to maintain each marine reserve. To identify the reasons for differing willingness to pay, we correlated the responses with socio-demographic information, such as sex, age, household income, and recreational interests. Results indicate that more than 50% of the respondents are willing to pay to maintain each MR. The average amount that people were willing to pay was higher for TMR than for KMR. This study provides information that will improve public policies in marine conservation and inform government about management of MRs in NZ.

2011-12-08 18:30 Marine Reserve effects on Catch Per Unit Effort (CPUE) of rock lobster (Jasus edwardsii)

Rojas-Nazar, UA*, *Centre for Marine Environmental and Economic Research, Victoria University of Wellington;* **Gardner, JPA,** *Centre for Marine Environmental and Economic Research, Victoria University of Wellington;* **Bell, JJ,** *Victoria University of Wellington;*

Because rock lobsters (RL) are one of the most valuable commercial species in New Zealand (NZ) their stock assessment and protection are important. Although NZ's marine reserves (MRs) are created for conducting scientific research, where human-induced disturbance is minimised, they are indirectly protecting many populations of commercially species, including RL. In this study, we investigated MR effectiveness in the Wellington region by comparing RL population sizes inside and outside two MRs, of different ages. The study was conducted at the Taputeranga MR (TMR), established in 2008, and the Kapiti MR (KMR), established in 1992. By using commercial craypots each MR was sampled inside its boundaries, at the boundaries, and outside the MR to calculate the CPUE for 2010 to 2011. RL size and weight inside and outside the Taputeranga MR were similar. However, CPUE was markedly higher inside TMR compared with sites outside and there was a dramatic decrease with increasing distance from the centre of TMR. Kapiti MR did not show differences in CPUE inside and outside the boundary, despite the reserve being much older. However, we found larger sizes and greater weights of RL at KMR than at TMR. The higher CPUE results in TMR suggest that it is responding positively and rapidly to the protection during the early years of its establishment. We suggest that the low CPUE at the boundaries and outside the TMR could be explained by high levels of fishing pressure, and areas outside KMR are difficult for the public to access.

2011-12-07 16:45 Modeling range boundaries of birds and butterflies to test effects of climate-change

Roll, U.*, *Tel-Aviv University;* **Stone, L.,** *Tel-Aviv University;* **Solow, A.,** *Woods Hole Oceanographic Institution;*

Many studies show poleward shifts of ranges as a consequence of global warming. However, many of works treat edges of distributions arbitrarily. This fails to account for the fact that our observations are merely a sample of species' true distributions. We aimed at formally modeling the edges of a spatial distribution along a north-south axis using a flexible parametric model. The model estimates a spatial distribution based on presence/absence grid-cell data; the distribution's parameters were estimated using an optimization procedure. Likelihood ratios were used to conduct a statistical test between the null -no shift in range between two time frames - and alternative -possible shift in range. We first tested the model on simulated data and then applied it to data on British bird and butterfly distributions in two time frames. Most species did not show a significant change in their edges; those that did were not more supportive of the predictions of global warning than the converse. We therefore conclude that our method does not support the notion of climate induced directional range shifts. This work emphasizes the importance of carefully formulated statistical models when estimating distributions of organisms in space, as for example, is needed in testing the effects of climate change. Effects of global climate change can be more complex than previously recognized and affect species ranges differently from what would be expected by mean annual temperature alone.

2011-12-06 10:45 The conservation management of the kakapo: Flogging a dead parrot?

Ron Moorhouse*, *Department of Conservation;* **Daryl Eason,** *Department of Conservation;* **Jo Ledington,** *Department of Conservation;* **Graeme Elliott,** *Department of Conservation;* **Deidre Vercoe,** *Department of Conservation;*

The kakapo is a flightless, ground nesting parrot endemic to New Zealand. Widespread and abundant before human colonisation, habitat loss and the introduction of a variety of mammalian predators drove the kakapo to the brink of extinction. In 1995 just 51 kakapo were known to survive, all on offshore island sanctuaries with a total area of just 5,000 ha. A programme of intensive management implemented in 1995 successfully has resulted in the population more than doubling to reach 120 birds. Management included the strategic concentration of females on islands where the right conditions for breeding were present, intensive managment of nests and, more recently, the use of artificial insemination and DNA fingerprinting to improve hatching success and the genetic health of the population. Young birds hatched on offshore island sanctuaries now outnumber the original founders rescued from Stewart Island and are expected to live for 80 years or more. The implementation of stoat control programmes on Resolution (20,000 ha) and Secretary (8,140) Islands in Fiordland have the potential to reclaim sufficient habitat for several thousand kakapo. Despite its small population size, the kakapo's adaptability, extreme longevity and "management friendly" characteristics suggest that its prospects for survival are good.

2011-12-09 14:30 The current and future distribution of mammalian habitat

Rondinini, C, *Global Mammal Assessment program, Department of Biology and Biotechnologies, Sapienza University of Rome;* **Di Marco, M*,** *Global Mammal Assessment program, Department of Biology and Biotechnologies, Sapienza University of Rome;* **Visconti, P,** *Global Mammal Assessment program, Department of Biology and Biotechnologies, Sapienza University of Rome;* **Boitani, L,** *Global Mammal Assessment program, Department of Biology and Biotechnologies, Sapienza University of Rome;*

Habitat destruction is the primary cause of decline in mammals globally, therefore accurate knowledge of the distribution of mammalian habitat is paramount for effective conservation. We assess the geography and extent of current and projected future suitable habitat for terrestrial mammals. We use the information from the IUCN Red List of Threatened Species as a baseline for developing current and projected future habitat suitability models for 5027 out of 5330 known terrestrial mammal species, based on their habitat relationships in terms of land cover, elevation and hydrological features. Models are limited to within species' known geographic ranges, and developed at a resolution of 300 m (current) and 10 km (projected future, based on four global scenarios of human development). Current habitat suitability models suggest that habitat availability limits the distribution of mammals especially in tropical and subtropical regions in South America, Africa and Southeast Asia that are not covered by dense forest. Projected future habitat suitability models identify the countries most affected by habitat loss by 2050, assuming that no additional conservation actions other than those described in the scenarios take place. With some exceptions, most of the countries with the largest predicted losses of suitable habitat for mammals are in Africa, North and South America, and central Asia. These results suggest that current and future habitat constraints to mammal distributions overlap only partially, therefore the spatial priorities of reactive and proactive conservation efforts may differ significantly.

2011-12-08 14:15 Tolerance or Translocation: How Best to Ensure the Genetic Diversity of Leopard in southern Africa?

Ropiquet, A*, *University of Stellenbosch;* **Born, C,** *University of Stellenbosch;* **Matthee, CA,** *University of Stellenbosch;* **Knight, AT,** *University of Stellenbosch;*

The leopard (Panthera pardus) is a severely persecuted carnivore in areas where it predates livestock and threatens human well-being. To resolve human-leopard conflict, conservation programs often employ translocation strategies of problem animals. Unfortunately, these interventions are rarely informed by genetic knowledge. Designed in the absence of genetic data, translocations may unintentionally compromise the genetic diversity, and hence the long-term viability, of the species. Analysis of fine scale genetic data derived from mitochondrial and nuclear DNA confirm that the Southern African leopards comprise a single population and indicates that the primary natural process shaping the spatial genetic structure of this population is isolation-by-distance. Based on this finding, the effective gene dispersal ( ) index is proposed to empower conservation agencies to apply evidence-based management by providing a maximum translocation distance. This finding highlights the importance of adopting a strategy coupling genetic data with social learning of land managers.

2011-12-08 18:30 Are the Brazilian Conservation Units effective in protecting endangered species of the genus Callicebus (PRIMATES; PITHECIIDAE)?

ROSÁRIO, NA*, *Departamento de Ciências Biológicas, Universidade Estadual de Santa Cruz;* **ASSUNÇÃO, AC,** *Departamento de Ciências Biológicas, Universidade Estadual de Santa Cruz;* **CAMPIOLO, S,** *Departamento de Ciências Biológicas, Universidade Estadual de Santa Cruz;*

Callicebus coimbrai, Callicebus melanochir e Callicebus barbarabrownae occur in southeastern and northeastern Brazil and are appointed by the IUCN as endangered species. In this study we generated models of potential distribution for these three species to verify whether these are in locations protected by the Brazilian System of Conservation Units (SNUC). To model the potential distribution, we use the algorithm Maxent, GARP and the Bioclim from 19 climate variables. Then, the distribution maps

are superimposed on the Brazilian map full of Conservation Units. Our results showed that in all the models generated, the three species studied are not inserted or near protected areas. Thus, we conclude that the Brazilian system of protected areas is still inefficient when it comes to guarantee the future of these species.

2011-12-07 16:45 Genetic analyses reveal congruence between biogeographic and genetic boundaries in the New Zealand endemic little-necked clam, Austrovenus stutchburyi.

Ross, PM*, *University of Waikato;* **Hogg, ID,** *University of Waikato;* **Pilditch, CA,** *University of Waikato;* **Lundquist, CJ,** *NAtional Institute of Water and Atmospehric Research;* **Wilkins, RJ,** *University of Waikato;*

The identification of subpopulations of harvested or threatened species is a prerequisite for stock assessment, sustainable exploitation and conservation management. In the marine environment where many organisms disperse as pelagic larvae the identification of subpopulations has been problematic due to difficulties associated with determining the distances and pathways over which larvae disperse. Instead, indirect methods must be used to assess the spatial elements of stock structure. One such method is biogeography in which community biodiversity is used to define biologically distinct regions for population management. However, it is uncertain whether species spanning biogeographic regions should be managed as units delineated by biogeographic break points, as this method may artificially impose population boundaries on widespread species based on the distribution of species with restricted distributions. In this study we document the population genetic structure of a widespread New Zealand endemic estuarine clam, based on an analysis of mitochondrial and nuclear genetic markers. We examined the spatial arrangement of genetic lineages identifying six genetically distinct subpopulations. Boundaries between regions were congruent with biogeographic boundaries, with analysis of molecular variance suggesting that the biogeographic classification adequately describes the geographic distribution of genetic diversity in this species. These results suggest that in the absence of genetic data, biogeographic classification may provide a useful proxy for the definition population management units.

2011-12-07 15:15 A Review of Large-Scale Conservation Corridors in South Africa: From Design to Implementation

Rouget, M*, *University of Pretoria, South Africa;* **Knight, AT,** *Stellenbosch University, South Africa;* **Cowling, RM,** *Nelson Mandela Metropolitan University, South Africa;* **Lötter, M,** *Mpumalanga Tourism and Parks Agency, South Africa;*

Over the last 10 years, several strategies have been proposed for conserving large-scale biodiversity corridors in South Africa with various degrees of success providing a great opportunity to document lessons learned. Here we review their policy framework, spatial design and implementation. Early initiatives were developed in the absence of a strong regulating framework. However, explicit consideration of landscape connectivity and corridors in recent biodiversity and land use policies should facilitate the implementation of corridors in the future. In most cases, corridors were designed in order to limit habitat fragmentation, maintain species migration routes and allow adaptation to climate change. Most corridors were aligned with the freshwater network and/or major climatic gradients. We found that a variety of spatial design methods was used integrating terrestrial and freshwater connectivity measures. Although the methodological complexity varied, we could not relate it to implementation levels. Implementation mechanisms ranged from improved management practices to protected area expansion. However the extent to which implementation took place varied considerably. Several factors contributing to success were identified: explicit links between strategy, design and implementation, integration of freshwater and terrestrial connectivity, integration of land use and biodiversity planning, and alignment of different policies. We also identified several limiting factors such as: late regulation, delay in implementation, lack of transdisciplinary approach, and limited involvement of key stakeholders.

2011-12-08 18:30 Losing Money and Species due to Illegal fishing

Royalty, Winden*, *Tarleton State University;*

Hurricanes and oil spills are not the only things that can make the price of seafood rise. Many countries lose large amounts of fish to illegal activity. The Japanese fishing industry comes into other countries waters looking for fish and do not follow the laws that are in place to prevent the loss of endangered animals. However, Japan is not the only country which fishes in others waters without following regulations. Ships from China among others have been found violating the same international laws. Money is going out of each country as they lose resources to Asia. While it may not be practical to ban these fishermen completely from every section of the ocean, a few stricter laws and stronger enforcement of the ones in place could prevent significant economic losses.

2011-12-08 18:30 Habitat requirements and spatial occurence patterns of specialist and generalist beetle species in a managed boreal forest landscape

RUBENE, DIANA*, *Swedish University of Agricultural Sciences;* **Wikars, Lars-Owe,** *Swedish University of Agricultural Sciences;* **Ranius, Thomas,** *Swedish University of Agricultural Sciences;*

Wild-fires are today scarce in Fennoscandian forests and species associated with sun-exposed dead wood largely depend on clear-cuts. We have investigated occurrence patterns and habitat requirements of five beetle species in repeated surveys 2003-2004 and 2010, in a managed boreal forest landscape in Sweden. Two of the species are habitat specialists and also included in the Swedish red list. All species inhabit sun-exposed dead birch logs, but have to some extent different habitat requirements. Occurrence of the species is strongly dependent on amount of dead birch wood on clear-cuts and time since clear-cutting. The most threatened species, Upis ceramboides, showed a clear decline in occupancy between 2004 and 2010, while the other species seemed to have a stable or even increasing occupancy. A possible explanation for the decline is habitat degradation, if the species respond with a time lag to decreasing amounts and quality of dead wood, or decreasing proportion of deciduous trees in the managed forest landscape. It appears that generalist species are able to quite well utilize the resources in the managed forests, while for some of the specialist species the habitat amount and quality might be insufficient.

2011-12-06 11:30 Conservation on African Landscapes: Can Understanding Wildlife Behavior Make Human Behavior Sustainable?

Rubenstein, DI*, *Princeton University;*

One of the first principles of behavioral ecology is that features of the environment shape the behavior of animals. Thus as humans alter landscapes, some features of animal repertoires are likely to change in ways that allow species to cope with environmental changes. But there will be limits to the types and degree of behavioral flexibility that animals exhibit. By identifying the behavior of animals that is malleable, strategic changes to human behavior can be instituted so that subsequent environmental change induces naturally adaptive responses of threatened species. The behavior of equids is diverse, flexible and well characterized; the way ecological forces mold behaviors to meet the demands of particular habitats is well understood; and most equid populations today share landscapes impacted by people. Thus equids represent an ideal group of species for examining the degree to which changes in animal behavior can identify the types of changes in human behavior that can foster wildlife conservation and sustainable human development.

2011-12-08 12:00 Disentangling the effects of different sources of uncertainty on the projected decline of an epixylic moss population

Ruete, A*, *Department of Ecology, Swedish University of Agricultural Sciences (SLU). ;* **Yang, W,** *Swedish Meteorological and Hydrological Institute (SMHI), ;* **Bärring, L,** *Swedish Meteorological and Hydrological Institute (SMHI), ;* **Stenseth, NC,** *Centre for Ecological and Evolutionary Synthesis (CEES), Department of Biology, University of Oslo;* **Snäll, T,** *Department of Ecology, Swedish University of Agricultural Sciences (SLU). ;*

Assessment of future ecosystem risks should account for as many uncertainty sources as possible. This means accounting for the joint effects of climate variables, and using modelling techniques that allow proper treatment of uncertainties. We investigate the influence of five uncertainty sources on projections of future abundance of a bryophyte of conservation concern. Bryophytes have a key role in ecosystem processes and constitute a large

proportion of the biodiversity of many biomes. Here we address the whole chain from global climate model (GCM), regional climate model (RCM), to population dynamics model. We show that the most likely population decline towards the end of this century is drastic: a reduction of 78% compared to the reference period. Moreover, there is a more than 50% risk for the Buxbaumia viridis population to be halved. The conclusion is valid for all IPCC SRES greenhouse gas emission scenarios investigated. The uncertainty depends on both natural and model-related sources, in addition to the three emission scenarios investigated. Ignoring the uncertainties gives an unwarranted impression of confidence in the results. Our quantification of probabilities of changes to different population levels is straightforward to apply in conservation planning and decision making.

2011-12-06 17:15 Using a state-and-transition model to guide cost-efficient decision making for woodland restoration

Rumpff, L*, *University of Melbourne;* **Vesk, P.A,** *University of Melbourne;* **Duncan, D.H.,** *Arthur Rylah Institute, Department of Sustainability and Environment;* **Keith, D.A.,** *Office of Environment and Heritage NSW;* **Wintle, B.A.,** *University of Melbourne;*

Despite significant investments in native vegetation management, there remains substantial uncertainty surrounding the effectiveness and efficiency of management options. There are increasing demands on natural resource management (NRM) agencies to demonstrate the environmental benefits of management to justify the level of investment. Given time and funding constraints, uncertainties often go unresolved, and NRM agencies continue to make decisions based on assumptions about best-practice management. Adaptive management underpinned by quantitative process models can help test assumptions, and improve cost-efficient decision making as new information emerges. In this study we present a quantitative state and transition model (STM) for grassy woodland vegetation dynamics to be used in an adaptive management strategy. The STM was developed with NRM practitioners and ecologists, and implemented as a Bayesian network. We illustrate how the model can be used to identify cost-efficient management strategies given a set budget, under scenarios of varying land-use history and climatic conditions. Our experience in developing this model in collaboration with NRM practitioners indicates that it is a practical approach to capturing and characterizing expert knowledge about system dynamics that is useful in setting restoration priorities.

2011-12-08 18:30 Species Distribution Modelling for predicting migration patterns

Runge, C*, *University of Queensland;* **Possingham, H,** *University of Queensland;* **Fuller, R,** *University of Queensland;*

Migrants across the globe face increasing risks to persistence, as habitat loss and climate change alter migration routes and phenology. Accurate mapping of existing and predicted migration patterns is critical for management of these species, however this is rarely done. We assessed the usefulness of Species Distribution Models (SDMs) for mapping migration patterns in Australian land-birds using data sourced from a large volunteer-collected database. Species Distribution Models are a potentially useful tool in mapping and predicting ecological information, but data unreliability can limit the applications of this technique. We report on the advantages and dangers of using Species Distribution Models to make management decisions.

2011-12-08 12:45 Using the expected value of information to identify critical uncertainties for adaptive management in the face of climate change.

Runge, M.C.*, *United States Geological Survey;*

Uncertainty clouds discussions about climate change, not simply by making it difficult to predict future outcomes, but also by distracting dialogue away from the substantive decisions at hand. In political discussions about how to respond to climate change, all sides use uncertainty to their advantage (by suggesting different risk tolerances and insisting on different burdens of proof), with the common outcome that true action is delayed while more information is gathered, and vague notions of adaptive management are advanced. The field of decision analysis does provide explicit and useful tools for analysing and understanding uncertainty, notably a technique known as the expected value of information. The value of information is the expected increase in the outcome of a decision if uncertainty is resolved; uncertainty that has a high value of information is uncertainty that impedes a decision-maker's ability to choose the best course of action. The calculation of value of information, however, requires a decision-maker to clearly frame the decision and explicitly articulate uncertainty. For management of natural resources in the face of climate change, these are constructive and healthy challenges because they ground the discussion of uncertainty in the practical context of how it affects decisions, and they lead to development of adaptive management that focuses on relevant learning. The use of value of information to understand uncertainty and design an adaptive management approach is illustrated in the context of managed relocation, a climate adaptation strategy for moving species threatened with habitat loss.

2011-12-06 14:44 Behavioral determinants of pathogen transmission in wild Ugandan chimpanzees

Rushmore, Julie*, *University of Georgia;* **Matamba, Leopold,** *University of Georgia;* **Stumpf, Becky,** *University of Illinois, Urbana-Champaign;* **Altizer, Sonia,** *University of Georgia;*

In recent decades, infectious diseases have threatened the health and persistence of Africa's endangered apes. Social contacts are known to affect the spread of infectious diseases in humans; however, for wild primates, data on variation in contact rates among individuals are needed to predict how social interactions affect pathogen transmission. Our work uses field-collected behavioral data to quantify contact rates and to provide a social network structure necessary for modeling disease transmission. Over a 10-month study period, we recorded the frequency and type of social interactions for a community of wild chimpanzees (N=50) in Kibale Forest, Uganda. Using generalized linear models and social network analysis, we examined contact variability (for group, close-proximity, and touching behaviors) among community members and evaluated the importance of both individual and environmental explanatory variables. Results show a high degree of heterogeneity in contact rates among community members and significant effects of age and relatedness on contact between chimpanzees. Our next step is to simulate transmission dynamics by combining social network data with infectious disease models. Overall, this work represents a multi-disciplinary approach to understanding how primate behavior affects pathogen transmission and will provide information needed to develop intervention strategies for protecting Africa's great apes in the event of a future epidemic.

2011-12-09 11:45 Gene flow barriers for the endangered Northern Prairie Skink (Plestiodon septentrionalis) in disjunct populations in Canada

Rutherford, PL*, *Brandon University;* **Sui, J,** *Queen's University;* **McFadden, WCJ,** *Brandon University;* **Hoysak, DJ,** *Brandon University;* **Lougheed, SC,** *Queen's University;*

Habitat loss, fragmentation and degradation increase geographic isolation of populations with concomitant reduction in gene flow, and a decrease in population size with diminution of genetic diversity and reduced probability of persistence. Northern Prairie Skinks (Plestiodon septentrionalis) exist in a highly fragmented landscape in southwestern Manitoba, Canada in a disjunct population at the northern periphery of the species range. The objective of this study is to determine gene flow barriers in the endangered Northern Prairie Skink. Animals were captured by hand, measured, sampled for DNA, and released at their capture location. DNA microsatellites were amplified by PCR, and six amplified loci showed polymorphism. Data for 91 individuals were analyzed using both Bayesian assignment and spatial autocorrelation. Spatial assignment revealed two genetic clusters, north and south of the Assiniboine River implying that the river is a barrier to gene flow. The spatial autocorrelation analysis implied viscosity of gene flow at fine geographical scales.

2011-12-07 15:45 Approaches for recruiting and training undergraduate conservation leaders

Ryan, ME*, *Western Washington University;* **Manolis, J,** *Minnesota Department of Natural Resources;*

Conservation biology has grown through the work of great leaders, and our field's continuing relevance depends on our ability to recruit and train a new generation of leaders. An explicit discussion of and training in leadership

concepts and practice are key to enhancing the leadership capacity of our field. We focus here on approaches for recruiting and training conservation leaders at the undergraduate level. First, we present survey data on factors that draw undergraduates into conservation science and motivate them to remain engaged. We also look at how students' views on conservation change over the course of their education. Next, we present techniques for incorporating leadership training into undergraduate science education and data on how these techniques influence students' enthusiasm for conservation as a potential career. Our results yield insights into how, as educators, we can encourage students' natural affinity for conservation while providing them with tools to be effective leaders. Our hope is that, by understanding what motivates students to enter and remain engaged in conservation, understanding the pitfalls that impede students' pursuit of conservation as a career, and by developing our own capacity as educators to train students in leadership, we can best facilitate the development of a new generation of conservation leaders ready to hit the ground running as they exit the university system.

2011-12-08 11:15 The value of fragments: extending park boundaries, dwindling resources, or sourcing crop raiders?

Ryan, Sadie*, *SUNY-ESF;* **Hartter, Joel,** *University of New Hampshire;*

Kibale National Park in western Uganda represents one of the last pieces of intact East African mid-altitude forest. Located in the Albertine Rift, it is in the top five of the list for poverty and conservation conflict in the 31 world biodiversity hotspots, and land surrounding the park is in high demand for small-scale agriculture. Despite this, the park boundary has remained stable since its establishment, and forest within the park is stable, with previously logged areas reverting to older forest. However, the surrounding landscape has become steadily more fragmented, with both forest and wetland patches being used and converted. In this work we combine results from social survey data, remote sensing and conservation ecology to create a whole-landscape approach for describing the juxtaposition of resource scarcity and damage to local farms by wildlife, and what this means for the future of the park and the neighboring communities. We suggest that the continued stability of this park, and the goals of preservation and conservation in this biodiversity hotspot are inextricably tied to the perceived and actual food and resource security of the communities surrounding the park.

2011-12-06 16:30 Identification of hotspots of genetic diversity: Overlaying multiple phylogeographic information of endangered wetland plants in central Honshu Island, Japan

Saeki, I*, *Yokohama National University;* **Koike, F,** *Yokohama National University;* **Murakami, N,** *Tokyo Metropolitan University;*

The concept of "hot spots" is often a key issue in conservation of biological diversity. Its application, however, rarely targets genetic-level diversity although such diversity is directly linked to evolution, migration history, and future extinction of species. We determined hotspots of genetic diversity by overlaying multiple phylogeographic information of the six endangered plants, which grow in discrete wetland ecosystems of central Honshu Island, Japan. Leaf samples were collected at 58 wetland sites, and one to six non-coding regions of chloroplast DNA were sequenced. For each species, 3 to 15 haplotypes were identified. The average haplotype diversity was high (0.75 per species) although most species have small geographic ranges. Based on the haplotype data, we calculated probability of occurrence of rare haplotypes per site, created interpolation maps by GIS, and overlaid them to make an integrated hotspot map. Two hotspots were identified: Atsumi Peninsula and Tono District. The former is located near southern coastal margin, and thus rare haplotypes have likely remained by geographic isolation and perhaps with relatively warm climate during the glaciated time. The Tono District is a highly-elevated inland area where relatively large wetlands still remained. This method, as indicated by our results, can be applied in planning preserves which focus on conservation of genetic diversity.

2011-12-09 11:15 Prioritising conservation areas using species surrogate measures: consistent with ecological theory?

Saetersdal,M*, *Norwegian Forest and Landscape Institute;* **Gjerde,I,** *Norwegian Forest and Landscape Institute;*

Surrogate species measures of biodiversity (SSB) are used worldwide in conservation prioritisations. We address the important question if the ideas behind SSB are consistent with current knowledge on distribution patterns of species, as reflected in theories of community assembly. We investigated if assumptions necessary for successful functioning of SSB (nested species assemblages, cross taxon congruence, spatio-temporal consistency) were supported by predictions from either niche or neutral community models. We found a general mismatch between ideas behind SSB and ecological community theory, except that SSB based on complementarity may be consistent with niche-based theory when gradients in species composition are strong. The lack of a necessary scientific foundation may explain the disappointing results of empirical tests of SSB. We argue that site selection should be based on costs and opportunities within complementary environmental/land units, rather than expensive inventories of unfounded surrogate species.

2011-12-06 14:20 Analysis of Food and Feeding Aiding Conservation of Asian Elephant in Manas National Park, Assam, India

Saikia, B.P.*, *Centre for Animal Ecology and Wildlife Biology, Department of Zoology, Gauhati University, Assam,India;*

The present study was done on the food and feeding patterns of Asian elephant in Manas National Park (MNP), Assam. In MNP information on food plants was gathered by direct observation on feeding-behaviour, patterns (Browzing or Grazing). Dawn to dusk scan animal sampling, Ad. Libitum sampling along with seasonal variation of time spent on feeding different food plants species were done to record staple food, food selectivity, dietary spectrum of Asian elephant . Study showed that elephant grazed mostly, followed by browsing and debarking and selects 38 plants species as food throughout the year constituting maximum portions of annual diet budget in MNP. Among these 38 plant species, most were grasses. They selected tree followed by shrub and herb as staple food respectively. The study showed that up to the level of 10 top ranking food plant species constituted major portion annual diet of Asian elephant. These has been seen that in MNP, area where the grass extraction, cattle grazing is more the near by fringe village receives maximum human-elephant conflict. Hence the management and abundance of grass is essential for conservation and authority of MNP practicing grassland management which results increasing number of Asian elephant in MNP.

2011-12-08 11:45 New Performance Measures for US State Fish and Wildlife Agencies Lead to Archetypal Effectiveness Measures for All Conservation Actions

Salafsky, N*, *Foundations of Success;*

The US State Wildlife Grants program is a major vehicle for funding implementation of Congressionally-mandated State Wildlife Action Plans across 56 US States and Territories. In this era of increasing budget scrutiny, it is imperative that State Fish and Wildlife Agencies demonstrate short-term performance to decision makers even though it may take decades to achieve results for even a single species. To this end, the Association of Fish and Wildlife Agencies convened a working group that used the Conservation Measures Partnership's Open Standards for the Practice of Conservation to develop a set of generic results chains, intermediate and long-term objectives, and performance measures for 13 of the most common actions funded by State Wildlife Grants. These measures were then extensively pilot-tested and reviewed and are now being rolled out as part of Wildlife TRACS, an information system being developed by the US Fish and Wildlife Service. This work provides a real-world example of how government and other funding agencies can develop practical performance measures for conservation work. More importantly, it is also the foundation for a global initiative to develop a library of archetypal results chains and effectiveness measures for all conservation actions that can be the basis for true cross-project learning and collaboration.

2011-12-06 10:30 Animal behavior in conservation: are we stalled?

Saltz D*, *Ben Gurion University;*

The behavior of animals enhances their ability to cope with a constantly changing environment (including the presence of other animals). As such, behavior is no different than any other components of biodiversity (e.g. genetic), and the ability of an organism to track environmental changes behaviorally is one of the elements contributing to the viability of populations. Thus, the importance of animal behavior in conservation

management appears as self evident. Yet, in the past decade claims have been put forth that theoretical advances in animal behavior do not contribute to conservation and that the focus on behavior in conservation biology has been, and still is, limited. This, in turn, has generated an ongoing debate on the importance of animal behavior in conservation. I argue that the importance of animal behavior in managing wildlife has been recognized for nearly a half century. Furthermore, because conservation biology is an interdisciplinary science, the seemingly low number of papers published does, in fact, reflect an adequate volume within the field of conservation. I believe that the debate has ensued because of the lack (until recently) of an adequate framework that would lend structure to this interdisciplinary field enabling the formation of generalizations, identification of areas where knowledge is lacking, generation of new hypotheses, and the incorporation of new cutting edge behavior studies into management plans.

2011-12-08 10:45 Using Traditional Ecological Knowledge to Design an Ecological Study – a case study of the Admiralty cuscus (Spilocuscus kraemeri) in Papua New Guinea

Samson, MJ*, *Wildlife Conservation Society - Papua New Guinea;* **Whitmore, N,** *New Zealand Department of Conservation;*

Despite cuscus (Phalangeridae) being a major source of protein throughout Papua New Guinea (PNG) there is a paucity of western scientific knowledge on them but an unknown and presumably vast Traditional Ecological Knowledge (TEK). TEK encompasses observations and interpretations by indigenous peoples of their natural environment and the interrelationships of people, plants, animals and the physical and sometimes metaphysical world. The Admiralty cuscus (Spilocuscus kraemeri) is a marsupial endemic to the Admiralty Islands, PNG, and is heavily harvested for subsistence consumption and sale. Village hunters have expressed concern that cuscus numbers are declining and asked us to assist them in developing a management plan, which is the overall goal of this project. As a preliminary step towards this we wanted to understand the life history of Admiralty cuscus so surveyed TEK of the species in three villages on the north coast of Manus Island. We present a summary of the extensive TEK of Admiralty cuscus, identify the gaps in this knowledge, and show how this generated a research plan. This project illustrates how TEK can accelerate the design process and we advocate other researchers use a similar approach to work with indigenous people and their TEK.

2011-12-08 12:00 Biases in biodiversity conservation research and uptake

Sandbrook, CG*, *UNEP-WCMC;* **Hoffmann, M,** *IUCN;*

What conservation research is used to inform international science / policy processes? This study investigated (1) factors influencing where conservation research is carried out globally, and (2) whether international policy processes are making best use of all available research, based on patterns of publications cited by the Millennium Ecosystem Assessment (MA). Using multivariate statistical analysis, we found that while the number of studies published in key international conservation journals is positively linked at the country level to indicators of biodiversity wealth, it is also biased towards places with good governance and where English is widely spoken. Similarly, analysis of literature cited by the MA revealed a bias towards English language journals. Consequently, research informing an influential, international science / policy document is based mainly on studies which may not be relevant to countries which are non-English speaking and where it is more difficult for scientists to work, many of which are of critical concern for biodiversity conservation. We conclude that (1) greater efforts should be made to undertake and publish research from a broader range of highly biodiverse countries in the international conservation literature, and (2) a key goal of the new Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services should be to build capacity for such research and ensure that it is used by the platform

2011-12-07 14:00 Why the Poor Matter: Searching for Sustainability in Conservation

Sanjayan, M*, *The Nature Conservancy;*

The biggest challenge facing conservation managers today is how best to ensure that our efforts will be sustainable over the long run. What will happen to our life's work, in remote far away places, when our attention wavers? The sneaking suspicion is that without sustainability built in, our projects will last only as long as there are external inputs (most often financial) to buoy our efforts. This is a major detriment to scaling up our work; each new project places an additional burden on all others. Unless conservation can be defined in ways that benefit local communities, often the rural poor, it will remain heavily reliant on external funding. Little data exists for demonstrating the value of conservation to the needs of the poor. Much of what we have to go on are just-so stories. However, recent studies, some reviewed here are providing us with empirical data on how much and under what conditions conservation of nature, in a variety of habitats from tropical reefs to grasslands, are benefits local communities. We look at different models based on community management, valuation of service, commerce, security etc., that are proving to be most useful and ask, whether the inclusion of the rural poor into our strategies for conservation is not just the right thing to do, but also the essential thing to do.

2011-12-09 15:00 Nature's last Edens: Why some landscapes have escaped the extinction crisis

Sanjayan, M, *The Nature Conservancy;* **Samberg, L*,** *The Nature Conservancy;* **Boucher, T,** *The Nature Conservancy;* **Newby, J,** *University of Montana;*

Earth is currently experiencing its sixth mass extinction event. In the pursuit of efficient allocation of conservation focus and funding, biodiversity hotspots and other high-priority regions have been identified based on their diversity, irreplaceability, and vulnerability to extinction threats. However, none of these triage strategies accounts for regions which have proven thus far resistant to the extinction crisis. We collected historical and current range distributions for vertebrate species, and identified 22 regions around the world which have not experienced a vertebrate extinction in the modern era. We find that many of these regions cannot be predicted based on measures of human impact, and that only 20% of them fall within current protected area networks. Our results suggest a need to increase conservation attention on some of the world's remaining faunally intact landscapes, as well as indicate that successful conservation can occur in working landscapes throughout the world.

2011-12-06 14:00 Nest boxes: a successful management tool for the conservation of the Mediterranean storm petrel at Benidorm Island (Spain).

Sanz-Aguilar, A*, *Biometry and Population Biology Group, Centre d'Ecologie Fonctionelle et Evolutive (CEFE-CNRS) ;* **Libois, E,** *Biometry and Population Biology Group, Centre d'Ecologie Fonctionelle et Evolutive (CEFE-CNRS) ;* **Minguez, E,** *Serra Gelada Natural Park (Alicante, Spain);* **Oro, D,** *Population Ecology Group (IMEDEA, CSIC-UIB);* **Pradel, R,** *Biometry and Population Biology Group, Centre d'Ecologie Fonctionelle et Evolutive (CEFE-CNRS) ;* **Gimenez, O,** *Biometry and Population Biology Group, Centre d'Ecologie Fonctionelle et Evolutive (CEFE-CNRS) ;*

Studies investigating the effectiveness of interventions are highly relevant to practitioners but few studies actively test or review conservation actions. We evaluated the effectiveness of nest-boxes on the conservation of a vulnerable Mediterranean seabird breeding at Benidorm Island (East Spain): the Mediterranean storm petrel (Hydrobates pelagicus melitensis). An intensive demographic monitoring program including the capture-recapture of breeding adults and the estimation of reproductive parameters is developed at the study area since 1993. In November 1996, 39 nest boxes were installed in a small storm petrel colony (50-120 pairs) that showed a decreasing tendency in breeding numbers. We monitorized breeding numbers at the colony from 1993 to 2010 and compared the breeding success and local survival of individuals breeding at nest boxes and natural nests by means of generalized linear models and multistate capture-recapture models. By the increased amount of safe nesting habitat provided by artificial nest-boxes, population numbers of the species at the colony greatly increased. Both the mean breeding success (BS) during the study period and the mean local survival (S) were higher for birds breeding in nest boxes (BS: 0.73, S: 0.90) than for birds breeding in natural nests (BS: 0.51, S: 0.80). These differences may respond to higher susceptibility to predators (Yellow-legged gulls) and intraspecific interferences at natural nests. High adult survival rates and reproductive success of nest-box breeders may compensate the low breeding success and survival of natural-nest breeders. Conservation measures carried out may guarantee the long-term viability of this endangered population.

2011-12-08 18:30 Is forest disturbance always harmful to forest ecosystem? Evidence from Sal (Shorea robusta) forests in Nepal Terai

Sapkota, IP*, *Ministry of Forests, Nepal Government;*

Forest management strategy in Nepal has been guided by the assumptions of either conservation or utilization; and till date very little research has been made into how these both assumptions can go together, or utilization related disturbances can be a part of forest management. Disturbances such as selective logging and illicit felling have been widely practiced in Sal forests since the inception of the timber and fuel-wood trade in the region. Increasing rural demand for leaf fodder has increased grazing and browsing pressure in the forests. Cutting and lopping for fuel-wood and fodder, and the collection of ground litter for livestock feed and bedding materials have occurred widely in Sal forests. Such diverse uses of Sal forests signify that these forests are exceptionally disturbed. Witnessing their inherent association with the forest system, disturbances are something that cannot be avoided in Sal forests, but rather are something to deal with. Therefore, multiple and simultaneous disturbances occurring in Sal forests need a thorough study; and their synergistic effects on each component of ecosystem of Sal forests should be assessed so that the forest management policy and institutions can be made more realistic in terms of achieving both goals of ecosystem based forest management- conservation and sustainable use of forests. Methodology: The nexus between a set of existing disturbances of varying intensities and the diversity and regeneration of Nepalese Sal forests was examined. In addition, the effects of a single disturbance factor – tree fall gaps – on species diversity, regeneration and early growth of Sal forest were assessed. The intensity of the combined disturbances in each of the studied forests was calculated using a relative impact of each individual disturbance. Key findings: The study found out that the total stem density of saplings and poles increased with increasing disturbance intensity, to a certain level, while most of the tree species in the community showed changing dispersion patterns along the disturbance gradient. Socially preferred tree species displayed high regeneration performance in forests subjected to moderate level of disturbance. Tree fall gaps favored regeneration by increasing the density of seedlings of some socially preferred tree species and promoted the maintenance of high species diversity. However, neither overall species diversity nor regeneration positively correlated with gap size; but the maintenance of species diversity and regeneration in gaps are related more strongly to several other attributes of gaps than gap size. The conclusions: Generally, forests subjected to moderate level of disturbance maintained species diversity and enhanced regeneration performance, which in turn was coupled with the regeneration strategy of key species – in line with the Intermediate Disturbance and Recruitment Limitation Hypotheses. In other words, the species of Sal forests collectively embrace both functional phenomena of ecosystem while they regenerate in a disturbed environment. Some of them show prolific regeneration pattern upon receiving a mild level of disturbances (e.g. Sal); and some of them lower their regeneration as they do often encounter a high level of exploitation (e.g. several fodder species) and lack their propagules in the regeneration process. Policy conclusions: - Mild disturbance with limited public and herbivore access to the forests does not necessarily hinder the overall stand regeneration and species diversity, but may enhance them. - Since the rural population is highly dependent on these forests for their subsistence needs, strict protection is neither feasible, nor does it result in higher forest regeneration. - Ecosystem-based management, focusing simultaneously on optimization of the consumptive forest products for human populations and enhancement of species' regeneration and diversity, would be a viable management strategy for Sal forests in Nepal. The study signifies that moderate level of disturbance may be touted as a management tool for Sal forests.

2011-12-09 15:15 Multi-criteria analysis in the design of conservation area networks

Sarkar, S.*, *University of Texas;*

This paper treats the prioritization of conservation areas as a goal that must simultaneously icorporate multiple goals that may be in conflict and require trade-offs. It shows how these goals can be achieved through the analysis of an objectives hierarchy, the construction of an implicit or explicit value function, and tradeoff estimation. The methodology can be incorporated through a variety of heuristic, metaheuristic, and exact algorithms. In particular, tabu search has proved to be an efficient metaheuristic framework for the solution of these problems. The framework so developed is used to design a conservation area network for a forestry concession in the Merauke region of Papua province in Indonesian New Guinea.

2011-12-08 18:30 Sustaining conservation on private lands- a case of Bhimashankar Wildlife Sanctuary from North Western Ghats, India

Sarnaik, JP*, *Applied Environmental Research Foundation(AERF);* **Godbole,AJ,** *Applied Environmental Research Foundation(AERF);* **Punde,SP,** *Applied Environmental Research Foundation(AERF);*

The alarming rate of biodiversity loss and growing realisation about the crucial role of biodiversity in climate change adaptation has forced proponents of conservation across the world to constantly devise innovative strategies to address these complex environmental challenges simultaneously. It has been widely accepted that the inadequacy of protected area approach in conserving and sustaining biodiversity has been the root cause of biodiversity loss in the countries rich in biodiversity. Conservation on private lands through incentives is one such new approach for halting deforestation and subsequent loss of biodiversity. Our efforts in implementing this conservation strategy in the Bhimashankar Wildlife Sanctuary in North Western Ghats – a global biodiversity hotspot- have provided some insights with respect to sustainability of this approach. Conservation agreements implemented by AERF have minimum duration of five years. Our findings indicate that change in behaviour of private landowner in favour of conservation can only be guaranteed if a) the benefits sufficiently address most of his immediate needs b) a steady stream of income is assured from the land under conservation agreement c) a constant effort is made in building skills of the private landowner for sustaining the strategy during the tenure of agreement by the implementing agency.

2011-12-07 11:15 Demo-genetic processes and evaluation of Conservation Translocation outcomes

Sarrazin, Francois*, *University Pierre and Marie Curie;* **Jamieson, Ian G.,** *University of Otago;* **Robert, Alexandre,** *Muséum National d\'Histoire Naturelle;*

The goal of translocation is to establish long term viable populations. Thus interactions between life history traits, local environment and release strategy should minimize stochastic extinction risk, drift and inbreeding loads and loss of evolutionary potential. Successfully translocated populations should follow settlement, growth and regulation that determine their long term viability. We address these demo-genetic issues to discuss the importance of spatio-temporal designs of translocation strategies as well as the choice and numbers of individuals to release that are necessary to preserve acceptable levels of genetic diversity in various ecological scenarios. We also propose a general framework to define success criteria accounting for demo-genetic processes. We used population modeling to test whether IUCN criteria for remnant populations (particularly the relation between extinction risk and threshold number of mature individuals) may be relevant to assess translocation success. From a demographic viewpoint threshold number of mature individuals is a conservative proxy of extinction risk since only populations having the most high and stable growth rates can reach these threshold numbers. However, both selected and neutral genetic variations may be influenced by translocation strategy with subsequent effects on long-term viability as compared with remnant populations of the same size.

2011-12-08 18:30 An evolutionary perspective of anthropocentric versus ecocentric approaches of conservation

Sarrazin, Francois, *University Pierre and Marie Curie;* **Lecomte, Jane*,** *University Paris-Sud 11;*

Conservation issues are generally seen as present and future urgencies. However past human evolutionary history might explain our inertia to change relationship between human and biodiversity. Human traits have been selected though comparative gains in fitness, similarly to most function now used for the welfare of our phenotypes through our ability to master our environments. Human interactions with biodiversity are thus mostly anthropocentric as exhibited through ecological services. However their impact on genetic and cultural information - i.e. on evolution of both human and biodiversity traits - is rarely considered. We propose five main basic scenarios: i) a "darwinian scenario" with no anticipation in human actions and retroactions of selective pressures on environment on human fitness ; ii) a "human fitness centered scenario" where biodiversity is totally

constrained to maintain human fitness; iii) a "human phenotype centered scenario" where biodiversity is selected to provide short term benefits to all phenotypic functions that humans use beyond and sometimes against their own fitness; iv) a "sustainable development scenario" combining scenarios ii) and iii); v) an "ecocentric scenario" placing scenario iv) in a larger vision of biodiversity intrinsic values. It might then be possible to put human intrinsic value on individual phenotypes, and biodiversity intrinsic value on fitness processes and thus evolutionary trajectories. This last scenario is not only ethically but evolutionary challenging since this major transition would make homo sapiens the very first species accepting to "laisser faire" evolution beyond its own interests and despite its ability to control biodiversity's evolutionary trajectories.

2011-12-08 14:00 Island restoration in the 21st century: building a future based on the past

Saunders, AJ*, *Landcare Research;* **Towns, D,** *NZ Department of Conservation;* **Jones, HP,** *University of California, Santa Cruz;*

A biological extinction crisis on islands has resulted largely from the effects of invasive species. Progress in eradicating such species has led to conservation outcomes and created restoration opportunities few could have dreamed of just a few decades ago. As a result institutional, political and financial support is growing for national and regional island restoration programmes. The biggest challenges now are on large inhabited islands that have multiple invasive species. Integrated multi-disciplinary approaches to ecological, social and economic problems will be required, including mechanisms to ensure stakeholder and community perspectives are appropriately reflected in restoration objectives. These are new dimensions for many conservation managers. Greater effort will also be required to understand ecological interactions and to predict the consequences of management interventions. If we are able to achieve restoration outcomes that meet the social and economic needs of island residents, we will be in a much stronger position to more effectively conserve biodiversity on very large islands and on continents. We present some case studies to illustrate the importance of integrating ecological, social and economic objectives, the need for cooperation at local, national and international levels, and the use of science-based approaches to generate further support, improve the efficiency, and increase the pace of global restoration activities.

2011-12-08 18:30 Cultural, environmental, and socioeconomic influences on crop genetics: tartary buckwheat (Fagopyrum tataricum) landrace diversity in Yunnan, China

Saunders,Mary*, *University of Wisconsin-Madison;* **Posner, Josh,** *University of Wisconsin-Madison;*

The global loss of crop genetic diversity threatens the future adaptability of agricultural systems. Traditional farming communities are crucial reservoirs of crop genetic material and practical farmer knowledge. Our research examines in-situ genetic diversity and conservation of traditional tartary buckwheat (Fagopyrum tataricum) landraces on farms in the crop center of origin: Yunnan Province, China. Yunnan features a highly heterogeneous landscape, home to a myriad of ecosystems and 25 officially recognized ethnic groups. Tartary buckwheat farming in Yunnan is often associated with the Yi ethnic group. Our research compares Yi and non-Yi communities in an attempt to clarify the relationship between cultural and agricultural diversity. The study combines household surveys, spatial environmental data, and molecular genetics in a landscape genetics framework to investigate multiple factors affecting farmers' planting decisions and crop genetic diversity. Preliminary results indicate complex relationships between crop diversity and cultural, environmental, and economic factors, as well as substantial variation across Yi communities. Our study suggests a combination of features associated with high tartary buckwheat diversity, which may be useful in identifying priority areas for in-situ conservation.

2011-12-09 14:30 New Insights into the Feeding Ecology and Home Range Patterns of the Critically Endangered Cross River Gorilla

Sawyer, Sarah*, *University of California, Berkeley;*

The Cross River gorilla (Gorilla gorilla diehli; hereafter: CRG), found only in Cameroon and Nigeria, is one of Africa's least studied, most threatened primates. Less than 300 individuals remain today in this hotspot of biodiversity, distributed in 11 separated subpopulations. A lack of understanding of the relationship between CRG ecology and available habitat plagues conservation decision-making, and assessment of CRG habitat use and requirements is desperately needed (Berg et al in press). This study characterizes both home range and feeding ecology of a CRG population to better understand the species' current patchy distribution, and to inform conservation actions. Results indicate that Local Convex Hull home range models may be the most useful to elucidate limiting factors influencing a species distribution and that CRG avoid human-impacted areas within subpopulation home ranges. Ultimately, however, model choice will depend on conservation goals, and the promotion of large areas for conservation may be best supported by Kernel Density home range methods. Results also indicate that CRG select their home range for high availability of preferred foods and show feeding and ranging ecology similar to distantly related mid-elevation gorilla populations rather than their Western Lowland gorilla neighbors. Both anthropogenic impacts and resource availability seem to limit this critically endangered species and should therefore be used to inform effective conservation decisions.

2011-12-08 18:30 Modeling dispersion dynamics effects on spatial patterns of Melocactus conoideus Buin. & Bred. (Cactaceae)

Sá-Neto, RJ, *Universidade Estadual do Sudoeste da Bahia (UESB), Departamento de Ciências Naturais, Estrada do Bem Querer, Km 04, CEP 45083-900, Vitória da Conquista - BA;* **Corrêa, MM*,** *Universidade Estadual do Sudoeste da Bahia (UESB), Departamento de Ciências Naturais, Estrada do Bem Querer, Km 04, CEP 45083-900, Vitória da Conquista - BA;* **Brito-Kateivas, KS,** *Universidade Estadual do Sudoeste da Bahia (UESB), Departamento de Ciências Naturais, Estrada do Bem Querer, Km 04, CEP 45083-900, Vitória da Conquista - BA;* **Cruz, LC,** *Universidade Federal da Bahia (UFBA), Instituto Multidisciplinar de Saúde, Av. Olivia Flores, 3000, CEP 45055-090, Vitória da Conquista - BA, Brazil;* **Freitas, LM,** *Universidade Federal da Bahia (UFBA), Instituto Multidisciplinar de Saúde, Av. Olivia Flores, 3000, CEP 45055-090, Vitória da Conquista - BA, Brazil;* **Castro, LM,** *Universidade Estadual do Sudoeste da Bahia (UESB), Departamento de Ciências Exatas, Estrada do Bem Querer, Km 04, CEP 45083-900, Vitória da Conquista - BA;* **Miranda, JGV,** *Universidade Federal da Bahia, Instituto de Física, Departamento de Geofísica Nuclear, Campus de Ondina, Pituba, CEP 40210-340, Salvador - BA, Brazil ;*

Melocactus conoideus is a critically endangered endemic cactus species, restricted to a habitat strip of 10km2 in the southwest region of Bahia state, Brazil. This species is facing intense habitat destruction due to extraction of its substrate compound by quartzite gravel for use in civil construction. M. conoideus is a long lived species with very low rates of germination and growth, which difficult the monitoring of the population dynamics of this species. Modeling in conservation biology is useful to predict dynamics of threatened populations under several scenarios, a difficult task in empirical studies. Thus, modeling of population dynamics of threatened species could increase the chances of the conservation of the species. This study aims to answer if one single short dispersion event could explain the multi-scale spatial pattern of natural metapopulation of M. conoideus. The multi-scale spatial structure of the metapopulation was determined using Ripley's K function and compared with agent model built in NetLogo 4.1, both simulation using field and literature data of dispersion process of the species at short distances. At all replicates produced in model, the spatial pattern showed stronger clumped distribution relative to empirical data, but similar shapes. This suggests that a dispersion system at short distances cannot explain by itself the spatial pattern observed in the population, an important result to the advance in the conservations programs of M. conoideus.

2011-12-08 15:15 Conservation genetics of the Asiatic half ass (Equus hemionus): accessing genetic diversity and geographic structure in the Northern Chinese population

Sónia Rosenbom*, *CIBIO – Research Centre in Biodiversity and Genetic Resources - Campus Agrário de Vairão, R. Padre Armando Quintas 7, Vairão, Portugal;* **Vânia Costa,** *CIBIO – Research Centre in Biodiversity and Genetic Resources - Campus Agrário de Vairão, R. Padre Armando Quintas 7, Vairão, Portugal;* **Shanyuan Chen,** *CIBIO – Research Centre in Biodiversity and Genetic Resources - Campus*

Agrário de Vairão, R. Padre Armando Quintas 7, Vairão, Portugal; **Ablimit Abdukadir,** *Xinjiang Institute of Ecology and Geography Chinese Academy of Sciences, Urumqi 830011, Xinjiang, China;* **Albano Beja-Pereira,** *CIBIO – Research Centre in Biodiversity and Genetic Resources - Campus Agrário de Vairão, R. Padre Armando Quintas 7, Vairão, Portugal;*

In historic times the Asiatic Wild Ass had a wide distribution, ranging from Mongolia in to Syria and northern Arabic Peninsula and as far south as Pakistan and northwestern India. Approximately 12,000 years ago, during a mass extinction, equids, as well as many large-bodied mammals, vanished from numerous biogeographic regions. Concerning the Asiatic half asses, their number has continued to decrease over the last centuries, mainly due to Human-mediated actions that lead to habitat loss and fragmentation. Currently, the most abundant subpopulation of this species is circumscribed to the southern part of Mongolia and adjacent northern China. We have collected faecal samples from two populations (n=66) in the Chinese province of Xinjiang, less than 200 km from the Mongolian border. In order to access genetic diversity levels and the existence of geographic structure in these populations, we used a panel of 10 polymorphic microsatellite markers and a 400 bp fragment of the mtDNA. Results showed a high level of overall microsatellite diversity (He=0.724; MNA=8), which is slightly lower than previously reported values for Mongolian wild ass populations in the Gobi region. Ongoing sampling across the border in Mongolia will allow us to compare diversity levels across populations from a wide distribution range, as well as detect the existence of gene flow between populations, calculate the effective population size and infer past demographic events such as bottlenecks.

2011-12-07 17:00 Power poles and tall trees adjacent to sunflower fields increase pest damage caused by the invasive Rose-ringed Parakeet in Israel

Schäckermann, Jessica*, *Leuphana University Lüneburg;* **Klein, Alexandra-Maria,** *Leuphana University Lüneburg;* **Mandelik, Yael,** *Hebrew Universtiy of Jerusalem;*

The Rose-ringed Parakeet, Psittacula krameri, an invasive cavity-nesting bird species, harms native bird populations by using their nesting places and reduces their breeding success in many regions throughout the globe. The Rose-ringed Parakeet is also known to be a pest to various agricultural systems such as sunflowers, pomegranate, pecan nuts and maize. In Israel, the Parakeets visit sunflower fields in big flocks and destroy large parts of the harvest. Some sunflower farmers report massive damage while others do not. We hypothesize that the availability of birds-standing-points (SP) such as electric poles and lines, fences and trees adjacent to sunflower fields increases the damage caused by the Parakeet. We compared the damage at sunflower plants closest to SPs with sunflower plants more distanced to SPs across 20 fields. Bird SP within a range of 50m in the surrounding landscape of the sunflower fields increased the damage to harvest by an average of 16 % with a maximal damage of up to 57 %. If the next SP was further than 50m we found on average less than 0,3 % damage. To reduce pest damage caused by birds, farmers should avoid growing crops attractive for the Parakeet closer than 50m to the next SP. By spreading this information across farmers, pest damage, as well as habitats for Parakeets can be reduced with the long-term conservation goal to control the populations of this invasive bird species.

2011-12-08 15:15 Assessing cumulative effects: It is important to include many taxa.

Schieck, Jim*, *Alberta Biodiversity Monitoring Institute;* **Huggard, Dave,** *Alberta Biodiversity Monitoring Institute;* **Boutin, Stan,** *University of Alberta;*

There is a great deal of literature exploring how to choose species and species groups as ecological indicators. Focusing on a few highly responsive indicators is advocated to both reduce costs and to facilitate targeted research. However, it is poorly understood whether using a few indicators will effectively track cumulative ecological changes in a region. During the past 15 years government, industry, and academia in Alberta, Canada have implemented a program to monitor biota, habitats, landscapes and human disturbance using a grid of 1656 sites spaced throughout the province. Ecological intactness is determined for each species (0=degraded, 100=intact) by comparing the species observed abundance to the abundance expected if no human development had been present. Since the intactness scale is consistent among species, information can be integrated to determine a single measure across species. In the boreal forest, a region with little cumulative human development, mammals, birds, vascular plants, and mites all had high intactness. In the prairies, a region with high cumulative human development, intactness of vascular plants closely reflected the degree of human disturbance whereas intactness for mammals, birds and mites did not respond as greatly. In prairie wetlands, intactness of vascular plants did not track disturbance. Given the variation in results among taxa and among regions, the cumulative effects of human disturbance are not well monitored by focusing on a few taxa.

2011-12-06 16:30 Impacts of the expansion of sugarcane on freshwater communities in biodiversity hotspots

Schiesari, L*, *University of Sao Paulo;*

The prospect of a global adoption of biofuels is driving a continuous expansion of agroindustrial production worldwide, particularly in megadiverse tropical countries where suitable agricultural land is comparatively abundant. Using algae, anuran larvae, and their predators as the study system, I tested the hypothesis that the expansion of sugarcane in a cerrado/semi-deciduous seasonal Atlantic Forest landscape in Brazil is associated with significant changes in freshwater community composition, diversity and structure, and that part of these changes are consistent with agrochemical contamination. There was a strong signal of land use on freshwater communities. Overall, there was an impoverishment of amphibian and predator faunas as one moved from forests to pastures to plantations. Certain species, however, were more frequent, more abundant and presented higher biomass in plantations than in any other land use form. Of the 62 active ingredients of pesticides registered for use in sugarcane in Brazil, at least 8 were employed at the study site. Residue analysis indicated some pesticide and metal contamination in field-caught animals, and we witnessed tadpole dieoffs in ponds adjacent to plantations. We are now conducting experiments testing the direct and indirect effects of contaminants and other stressors in freshwater communities to test the mechanisms mediating species loss and replacement across gradients of environmental degradation in agroindustrial landscapes.

2011-12-09 11:22 Long-term Planning for Marine Sustainability in Southwest Haiti

Schill, Steven*, *The Nature Conserancy;* **Zenny, Nathalie,** *The Nature Conservancy;* **Dominguez, Elianny,** *The Nature Conservancy;* **Kleiberg, Marianne ,** *The Nature Conservancy;*

The coastal islands and associated shallow marine zone surrounding île la Vache in southwest Haiti harbor some of the most intact reefs and marine resources in Haiti. These resources are highly threatened from overfishing and growing tourism and in urgent need of management via a multi-objective framework that will enable long-term sustainability. In support of the UNEP-led Cote Sud Initiative, a team from The Nature Conservancy gathered baseline information on coastal habitats and fisheries using satellite mapping techniques and fisher surveys. Results were reviewed and verified through a community-led process, providing the basis for developing a long-term plan that responds to the pressures and impacts on the integrity of coastal and marine ecosystems. This effort is part of a larger twenty-year multi-thematic program designed to address the underlying drivers of poverty and environmental degradation, while maintaining national ownership, private sector engagement and building the institutional capacity of the government and local partners. Ultimately, the hope is to strengthen the resilience of coastal communities and protect biodiversity, while effectively managing fisheries, tourism and recreational activities for the long term.

2011-12-08 18:30 Dispersal and translocation of the endangered Pygmy Bluetongue Lizard (Tiliqua adelaidensis)

Schofield, JA*, *Flinders University of South Australia;* **Ebrahimi, M,** *Flinders University of South Australia;* **Gardner, MG,** *Flinders University of South Australia;* **Bull, CM,** *Flinders University of South Australia;*

One conservation tool for endangered species, translocation, has had limited success, because translocated individuals tend to move away from

their release site. Thus it is important to understand the dispersal behaviour of the source populations. This project investigates whether it is possible to select individuals that are more likely to translocate successfully and times when translocation may be more successful. We studied the pygmy bluetongue lizard (Tiliqua adelaidensis), a small endangered skink found in fragmented grassland habitat in South Australia, and for which translocation is a suggested management strategy. We deduced natural dispersal from both regular drift fence trapping, and from microsatellite DNA allelic distributions. We found lizards were relatively sedentary for much of the year, but there was male biased breeding dispersal between September and November. We recommend translocation of females can occur at any time, but males should be translocated after the breeding season to increase the chance that relocated individuals will remain in the population.

2011-12-08 18:30 Biomimicry Inspires Conservation: Why biologists need to engage with engineers, designers, and entrepreneurs

Schuknecht, M*, *Biomimicry Group;* **Stier, S,** *Biomimicry Group;*

For conservation efforts to truly succeed and endure across generations and through changing economic, political, and climatic circumstances, generating renewed respect for the natural world and engaging youth are essential. Biomimicry is a new discipline that is based on what we can learn from the biological world to inform sustainable human design rather than on what we can extract from the natural world to create human products, systems, and cities. When engineering students learn that more efficient wind farms have been developed by applying lessons learned from schooling fish, or industrial design students learn that the most efficient fans and impellers on the market arose after a biologist's vortical observations of flow in nature, they begin to take an interest in the biological world as a source of inspiration and to develop a conservation ethos. With the briefest of introductions to biomimicry, students of all disciplines understand that healthy ecosystems hold the key to truly sustainable design and that it is essential to conserve those ecosystems, and all the myriad organisms within, in order to unlock the lessons that can help us live more sustainably on this planet. We will provide an introduction to biomimicry, offer suggestions on how conservation biologists can engage students of many disciplines and find broader interest in their work, and supply information on additional tools and training opportunities for educators.

2011-12-07 17:45 Contribution of land use types to regional plant diversity in temperate Australian agricultural landscapes

Schultz, Nick*, *School of Environmental & Rural Science, University of New England, Armidale NSW 2351, AUSTRALIA;* **Reid, Nick,** *School of Environmental & Rural Science, University of New England, Armidale NSW 2351, AUSTRALIA;* **Lodge, Greg,** *Department of Trade & Investment, Regional Infrastructure and Services, Primary Industries, Tamworth Agricultural Institute, Calala NSW 2340, AUSTRALIA;*

Plant diversity is threatened in Australia's agricultural landscapes. While there is a good understanding of the effects of grazing and agricultural management on plant diversity at the site scale, our understanding of diversity patterns across multiple spatial scales is less developed. On the North West Slopes of New South Wales, Australia, we compared species accumulation curves and habitat specificity indices of three major land uses in the region; native pastures, woodlands grazed by livestock, and woodlands not grazed by livestock. Despite similar species densities at local scales (i.e. 400 m^2), regional species accumulation and habitat specificity were highest in ungrazed woodlands and lowest in native perennial grass dominated pastures. Native species that persisted in native pastures were largely a subset of the suite of species found elsewhere in the landscape. We propose that tree removal and livestock grazing have both reduced habitat heterogeneity in the landscape. Therefore conservation efforts should focus on the protection, restoration and regeneration of ungrazed patches of woodlands in the landscape. Our results contrast with some other studies in Australian agricultural landscapes that showed that native pastures grazed by livestock support a suite of species not found elsewhere in the landscape. Hence, it is likely that not all agricultural landscapes are similar in their landscape diversity patterns.

2011-12-08 10:30 Managed Relocation for Conservation: Issues and Concerns

Schwartz,M.W.*, *University of California, Davis;* **Hellmann, J.J.,** *Notre Dame University;* **McClachlan, J.S.,** *Notre Dame University;* **Sax, D.F.,** *Brown University;*

Climate change poses real and imminent threats of extinction. Managed relocation, or assisted migration, of species has emerged as a plausible adaptation strategy of last resort. As a strategy, conservation ecologists must look to evaluate the strengths, weaknesses, costs, benefits and risks of managed relocation. A managed relocation working group consisting of thirty ecologists, social scientists, conservation practitioners, and policymakers has convened four times in order to identify the critical, ethical, legal, policy and scientific considerations. We report on a suite of recommendations of the working group for moving forward. Although many concerns are raised, perhaps the largest current concern is a lack of guidelines to discourage the inappropriate movement of species by concerned citizen groups. Despite broad scale discomfort among conservation ecologists for managed relocation, proposals to move species on behalf of their conservation brings two issues into sharp focus: 1) we lack a clear framework for managed relocation under realistic levels of uncertainty that will provide the context for these decisions; and 2) we need a public discourse on goals of conservation and the ethical foundation for species preservation before we can, as a society, take on the risks that moving species will impose.

2011-12-07 17:00 Drought-driven changes in koala distribution and numbers: a reflection of things to come under climate change?

Seabrook L*, *The University of Queensland;* **McAlpine C,** *The University of Queensland;* **Baxter G,** *The University of Queensland;* **Rhodes J,** *The University of Queensland;* **Bradley A,** *The University of Queensland;* **Lunney D,** *4Department of Environment, Climate Change and Water NSW;*

Climate change will lead to increased climate variability, with more frequent drought and heatwaves in many regions. This will affect the distribution and numbers of wildlife populations, particularly at the contracting edge of their range. Monitoring population dynamics under conditions that mimic climate change will help us manage these impacts. We compared koala distribution and numbers in SW Queensland following a severe drought with pre-drought estimates from 1995. We used community and faecal pellet surveys to assess distribution. We estimated population density using a Faecal Standing Crop Method. Koala numbers across the study region were estimated from interpolating densities in 10 habitat units. We examined climate data and land clearing as possible explanations for changes in koala numbers. There was a minor change in distribution, but an 80% decline in numbers, from a mean population of 59,000 in 1995 to 11,600 in 2009. Most summers between 2002 and 2007 were hotter and drier than average. Land clearing was greatest in the eastern third of the study region. We concluded that drought significantly reduced koala populations and they contracted to critical riparian habitat. This concurs with predicted range shift patterns for trailing edge populations. The increase in hotter and drier conditions expected with climate change will adversely affect koala populations in SW Queensland and may have similar effects on other wildlife species in arid and semi-arid regions.

2011-12-08 18:30 Restoration linkages

Seabrook-Davison, M*, *Massey University;*

New Zealand is implementing a number of experimental methods in an attempt to restore its degraded ecosystems and threatened biodiversity. New Zealand's unique and largely endemic biota contributes to the entire archipelago being designated a biodiversity hotspot. New Zealand split early from Gondwanaland (80 mya) and was the last large land mass to be colonised by humans (700 yrs bp). Anthropogenic modification of New Zealand has been extensive with all terrestrial megafauna extinct, three quarters of primary vegetation removed and 3,000 species in 14 taxonomic groups listed as threatened with extinction. New Zealand's critically threatened species have been extirpated from the main islands and remain as refuge populations on offshore islands under intensive conservation management. Conservation agencies, regional councils and community conservation groups are coordinating a joint effort to restore the ecological linkages on the main islands to allow the translocation of species back to

their former distribution.

2011-12-08 10:58 Regional spore rain in a bryophyte genus – implications for nature conservation

Sebastian Sundberg*, *Dept Plant Ecology & Evolution, Uppsala University;*

Patterns of long-distance dispersal (LDD) in bryophytes and other organisms with minute diaspores (spores, dust seeds) are virtually unknown, although circumstantial evidences suggest that these organisms may regularly disperse far. LDD patterns may affect the design and distribution of nature conservation areas. To test LDD, I used peat mosses (Sphagnum) which have characteristic spores and large regional spore output from well defined sources. Spore rain was sampled with cotton cloths during two seasons at ten sites, from within a large source and up to 800 km away from the nearest sources. To test the fraction of Sphagnum spores that is available for LDD (reaching above the surrounding forest canopy), volumetric samplers were used at different heights over an open peatland with the aid of helium-filled zeppelins. Regional spore rain amounted to about 3% of that within the source. Spore rain declined only slightly between 40 m and 3 km from the nearest source. At 800 km, still about 2% of the regional rain remained (which may approximate the relative strength of intercontinental dispersal). The volumetric sampling indicated that 5-10% of the spores reached a height of 30 m and were available for LDD. In species with minute diaspores and scattered populations, connectivity may not be crucial. It may instead be more important to improve the regional source strength.

2011-12-08 18:30 Evidence of inbreeding depression in a self-pollinated thistle

SEFTON, LEAH*, *Central Michigan University;* **McCann, Kelly,** *Central Michigan University;* **Dannenhoffer, Joanne,** *Central Michigan University;* **Swanson, Bradley,** *Central Michigan University;*

Hill's Thistle (Cirsium hillii) is a rare species growing only in the Midwestern United States in small, scattered populations. It is a polycarpic perennial capable of self-pollination, and the rarity and isolation of the populations limit opportunities for cross-pollination. Self-pollination often results in less fit individuals and may limit the recovery of Hill's thistle. In three populations we selected two groups of plants covering one with nylon mesh bags to ensure self-pollination while leaving the others to cross pollinate naturally. At the end of the reproductive period, seeds from both groups were germinated in a greenhouse. The mean weight of open-pollinated ovules/seeds (1.56 mg) was significantly greater ($t=4.6$; $df=59$; $p<0.001$) than that of self-pollinated ovules/seeds (0.69 mg). We also found that the probability of a seed containing a viable embryo was significantly higher ($t=-4.9$, $df = 34$, $p<0.001$) in open-pollinated seeds (78.0 ± 22%) than in self-pollinated seeds (40.0 ± 22%). Lastly, the percent survival of open-pollinated seedlings (0.490) was significantly higher ($t=3.9$; $df=14$; $p=0.002$) than self-pollinated seedlings (0.154). Our results show that self-pollination is not a viable form of reproduction for Hill's thistle due to the effects of inbreeding. Conservation plans for Hill's thistle should focus on maintaining larger populations and the translocation of seeds to minimize the likelihood of inbreeding.

2011-12-08 18:30 The WCS Albertine Rift Climate Assessment Project: A strategic initiative to implement climate change adaptation in a global biodiversity hotspot

Seimon, A*, *Wildlife Conservation Society;* **Picton Phillipps, G,** *Wildlife Conservation Society;* **Plumptre, A,** *Wildlife Conservation Society;* **Watson, J,** *Wildlife Conservation Society;*

The lack of precedent on how to engage climate change is especially problematic in tropical Africa, where climatological data is general absent and chronic threats related to population pressure, natural resource extraction and landscape conversion ensure that conservation attention is occupied with short-term needs and, frequently, crisis management. Such is the case in the Albertine Rift, a global priority for biodiversity conservation where climate change has emerged as a threat to the long-term persistence of plant and animal species and the human livelihoods that depend upon them. Working with government and NGO partners, local communities and a range of stakeholders responsible for managing this crucial ecosystem for people and wildlife, the Wildlife Conservation Society developed a strategy to generate the requisite knowledge for effective conservation planning for a climatically changed future. The program has three stages: building knowledge of current climatology and modeling future ecological states; establish monitoring networks to detect climate change and associated ecological response; and stakeholder consultation through a high-level conference and associated follow-up activities. Our multi-step approach provides a comprehensive strategy designed to build critically needed knowledge and capacity to make climate change adaptation of conservation management effective in a data poor region of high conservation concern.

2011-12-08 15:00 Africa's Albertine Rift: Planning for protected area connectivity in a global biodiversity hotspot under a changing climate

Seimon, A*, *Wildlife Conservation Society;* **Picton-Phillipps, G,** *Wildlife Conservation Society;* **Plumptre, A,** *Wildlife Conservation Society;* **Watson, J,** *Wildlife Conservation Society;*

The Albertine Rift of Uganda, Rwanda, Burundi, Tanzania and the Democratic Republic of Congo is a global priority for biodiversity conservation containing 19 major protected areas interspersed across a landscape where approximately 50 million people live. Chronic threats related to population pressure, natural resource extraction and landscape conversion have for decades ensured conservation attention is occupied with short-term needs and, frequently, crisis management. Climate change has recently emerged as a new threat to the long-term persistence of plant and animal species and the human livelihoods that depend upon them. The Wildlife Conservation Society's Albertine Rift Climate Assessment project is currently evaluating the long-term viability of potential conservation corridors between protected areas, taking into account known anthropogenic stresses as well as projected changes in climate and associated ecological responses. The objective is to develop methods for identifying where conservation investments could be most effectively applied to maintain and fortify connectivity in the face of unprecedented stresses to species and their habitats. This presentation will outline the nature of the challenge and initial results developed by GIS modeling, and will highlight how local experience and expertise might be applied in the evaluation of modeled products to inform the planning process.

2011-12-06 17:15 Predicting how the world's largest fish will fare under climate change

Sequeira, Ana *, *The Environment Institute and School of Earth & Environmental Sciences, University of Adelaide, South Australia 5005;* **Mellin, Camille,** *Australian Institute of Marine Science, PMB No.3, Townsville MC, Townsville, Queensland 4810;* **Meekan, Mark G.,** *Australian Institute of Marine Science, Crawley, Western Australia;* **Bradshaw, Corey J. A.,** *The Environment Institute and School of Earth & Environmental Sciences, University of Adelaide, South Australia 5005 and South Australian Research and Development Institute, PO Box 120, Henley Beach, South Australia 5022 ;*

Whale sharks seasonally aggregate at certain well-known coastal locations within warm and temperate waters worldwide. Under the current projections for climate change, sea surface temperature increases will occur and possibly affect current whale shark distribution, migration patterns and abundance. We developed multivariate distribution models of whale shark distribution at the Indian Ocean scale to test the hypothesis that whale sharks use a narrow range of temperatures and that change in water temperature will affect their distribution. We used opportunistically logged data of whale shark sightings derived from tuna fisheries, a series of satellite image composites for sea surface temperature, indices of global climatic signals, and climate change scenario predictions as input data to our models. Seasonal whale shark habitat suitability in the Indian Ocean depends mainly on temperature - only a narrow range (26 to 30˚C) is used. We found that whale shark distribution at the Indian Ocean scale shifts with variation in the Indian Ocean dipole, and sea surface temperature rises will push the general distribution polewards and away from current aggregation sites, possibly reducing overall abundance.

2011-12-08 18:30 Long term monitoring in a biodiversity hotpot of India: use of autonomous data collection protocol to monitor anurans.

SESHADRI, KS*, *ATREE;* **Ganesh, T,** *ATREE;*

Long term monitoring has gained importance in context of climate change. Anurans are particularly sensitive to environmental changes arising from climate change or selective logging. Canopies are the first layers interacting with atmosphere and climate change is viewed to impact these zones drastically. Conventional area based anuran surveys are resource intensive and often not feasible for repeated sampling over prolonged periods, especially in canopies. In this ongoing study, in southern Western Ghats of India, we document impacts on anuran assemblages over a vertical gradient in a selectively logged and unlogged forest using a novel combination of automated sound recorders and visual encounter survey. Protocols are developed using this to set up a long term program which could aid large spatio-temporal scale monitoring. Diversity and abundance were found to be marginally lower in selective logged forests. Of the 12 species detected, 3 were unique canopies and 3 others to unlogged forest. Of six variables, temperature and humidity had highest influence on assemblages. Assemblages in selective logged forests do not show convergence with unlogged forest even 40 years after logging ceased. A long term monitoring program in relation to microclimate will thus help document and detect amphibian declines under climate change scenarios.

2011-12-08 18:30 Biological Diversity in a Brazilian Hotspot

SEVILHA, AC*, *James Cook University and Embrapa Genetic Recources & Biotechnology;* **Williams, SE,** *James Cook University;* **Pressey, RL,** *James Cook University;* **Colli, GR,** *Universidade de Brasília;* **Constantino, R,** *Universidade de Brasília;* **Marinho-Filho, J,** *Universidade de Brasília;* **Marini, M,** *Universidade de Brasília;* **Tidon, R,** *Universidade de Brasília*

The characterization of biodiversity to monitor changes and assess its status is essential in conservation planning and management. In the Paranã River Basin (PRB), within the Brazilian Cerrado biodiversity hotspot, biological information was collected to inform a conservation plan for the region. The data gathered was based on a Rapid Assessment Program and georeferenced information from biological collections. Plants, mammals, birds, amphibians, reptiles, termites, and drosophilid flies were sampled in 110 points distributed across four different areas. The sample areas encompassed the habitat and geographic diversity of the PRB. Savannas were dominant in three areas while dry forest was dominant in the other. The species richness and community composition and structure were determined for all sites. In total, 52,599 individuals from 1,893 species were recorded. Among them, there were 16 new species, 38 regionally endemics, 19 rare and 109 endangered species. Ordination analyses showed that each vegetation type has a distinct composition and structure across the PRB. These patterns were also mirrored by animal distributions as well as by richness and diversity patterns. Thus, to preserve biodiversity in the PRB with maximum efficiency and minimum cost, it is necessary to consider the complementarity, irreplaceability, and vulnerability of habitats and species in the planning process, otherwise only a proportion of local biodiversity will be preserved.

2011-12-08 18:30 Integrating conspecific attraction and conservation practice: lab rats as lures for invasive Norway rats

SHAPIRA, IDAN*, *Ecology and Conservation Group, Massey University, Auckland, New Zealand;* **Shanas, Uri,** *School of Biology, University of Haifa at Oranim, Tivon, Israel;* **Raubenheimer, David,** *Nutritional Ecology Research Group, Massey University, Auckland, New Zealand;* **Brunton, Dianne,** *Ecology and Conservation Group, Massey University, Auckland, New Zealand;*

Detection and control of invasive rodents might prove as a puzzling task, albeit one of importance for management decisions. We tested whether live laboratory rats (males and females) are efficient lures (compared with food baits) for the detection of invasive Norway rats Rattus norvegicus at high and low population densities on three wetland sites near Auckland, New Zealand. At high population density, lure rats significantly increased the probability of trapping wild R. norvegicus compared to lure controls. Similar numbers of R. norvegicus were caught with lure rats and food baits, but traps efficiency, as indicated by captures per trap, was significantly higher using lure rats and signs of wild rat activity were detected only around lure rats traps. At low population densities, lure rats were significantly more attractive to wild R. norvegicus then controls, most notably at a site where rats weren't caught in the last three years using food baits but three males were caught using our lure rats in only 15 days. Animal behaviour can be a strong tool to aid conservation practice. Here we show that laboratory rats are highly efficient as lures for their invasive wild conspecifics and suggest that they should be considered as a detecting tool in future management plans.

2011-12-08 10:30 Can Agroforestry Conserve the Biodiversity? Study on four contrasting agroforestry land-uses in tropical forests of Bangladesh

Sharif Ahmed Mukul*, *Faculty of Life Science, Copenhagen University, Denmark;* **Narayan Saha,** *Shahajalal University of Science and Technology, Sylhet 3114, Bangladesh;*

Deforestation across the tropics nowadays is a major concern amongst the governments, environmental policy makers and conservationists. Agroforestry, due to its' complex structure and multi-strata systems sometimes believed to be more suitable for conserving biodiversity, particularly in the tropical landscapes where rural population depends largely on nature for sustaining their livelihoods. We conducted an exploratory survey on four contrasting agroforestry systems; viz., betel-vine (Piper betel) based agroforestry, lemon (Citrus limon)/horticulture based agroforestry, pineapple (Ananas comosus) based agroforestry, and short-rotation shifting cultivation in a tropical forest patch of Bangladesh to assess the structural and functional diversity of plants, and to compare them with undisturbed forest. We recorded a total of 188 plant species (66 trees, 48 shrubs, 49 herbs, 20 climbers and 5 orchids) from fifty 10m x 10m plots established in four agroforestry land uses and in forests. Surprisingly, tree diversity was higher (46 species) in betel-vine based agroforestry system followed by in forests (37 species), lemon/horticulture agroforestry system (27 species) and in short-rotation shifting cultivation system (14 species). The number of planted/cultivated species (planned biodiversity!) was higher in the short-rotation swidden agriculture system (9 species) followed by in pineapple agroforestry system (5 species) and in betel-vine agroforestry system (4 species). The Shannon-Weiner biodiversity index (H) calculated was higher for betel-vine agroforestry system (3.3), followed by 2.9 for lemon/horticulture agroforestry system, 2.7 for forest, 2.2 for pineapple agroforestry and 1.9 in swidden agricultural system. Species evenness index (E) for tree was also higher in betel-vine agroforestry system (0.79) followed by in lemon/horticulture agroforestry (0.68), in forest (0.65) and in others. The numbers of tree plus sapling (1,670 individuals/ha) was also higher in betel-vine agroforestry system than in forest (1,490 individuals/ha), even though the number of tree seedlings was highest in the undisturbed forest floor (19,375 individuals/ha) than in other land-uses. Our study concluded that plant biodiversity is highly sensitive to management intensification, and the interests of the land owner (i.e. agroforestry practitioners), and not all agroforestry systems contributing equally for conserving biodiversity. Only those that are using long rotation native species and evolved through indigenous innovations is suitable for conservation (here betel-vine agroforestry), and could offer a sound basis for sustainable forest management.

2011-12-06 13:00 Marine Protected Area planning in the Ross Sea region, Antarctica, under a Systematic Conservation Planning framework

Sharp, BR*, *New Zealand Ministry of Fisheries;*

The Convention for the Conservation of Antarctic Marine Living Resources (CCAMLR)has agreed that Marine Protected Areas (MPAs) are one appropriate means of achieving a balance between ecosystem protection and rational use (harvest) of marine resources , as required under the Convention. The New Zealand government is committed to this process. This presentation will describe work by New Zealand to design of a system of MPAs in the Ross Sea region. Management in high seas regions of the CCAMLR Area is by consensus in a complex multilateral setting, requiring a balance between diverse and potentially competing interests, for which the Systematic Conservation Planning (SCP) process is ideally suited. The New Zealand-led SCP process to date has involved: i) analysing available data to generate spatial input layers to the SCP process; ii) defining conservation objectives, priority areas, and protection targets with reference to input layers; iii) defining the 'cost' to fishery interests of MPA designation in different areas, using spatially resolved fishery data; and iv) designing MPA boundaries to achieve multiple conservation objectives

while minimising costs. This presentation will focus on the SCP methods employed in the latter step. This step was accomplished in a series of open stakeholder workshops, with the aid of a custom-designed MPA planning tool in ArcGIS, facilitating rapid transparent evaluation of alternate MPA scenarios against agreed performance metrics. The custom planning tool sacrifices automated optimisation capability (as in applications such as MARXAN) in favour of a user-driven boundary adjustment process that circumvents the need for stakeholder agreement regarding appropriate objectives and protection targets, and acceptable costs. MARXAN was used retrospectively to demonstrate the extent to which the user-driven process identified an optimal spatial solution. The resulting MPA boundary scenario is described; this scenario is the basis for the current New Zealand position within CCAMLR.

2011-12-09 16:58 Introduced species and ecosystem restructuring on a sub-Antarctic World Heritage Island

Shaw, J.D.*, *Australian Antarctic Division;* **Terauds, A.,** *Australian Antarctic Division;* **Bergstrom, D.M.,** *Australian Antarctic Division;* **Possingham, H.P.,** *Spatial Ecology Lab, University Queensland;*

Introduced species have altered biodiversity and transformed the landscape of sub-Antarctic islands which all have high conservation status. The landscape of World Heritage Macquarie Island has been transformed by mammals, introduced by humans over 150 years ago. Fluctuations in cats and rabbits populations have occurred over the last 30 years due to trophic interactions, management control programs and eradication initiatives. This has resulted in ecosystem restructuring of the island terrestrial environment. We examine the distribution and abundance of alien plants on Macquarie Island over the last 30 years in response to these mammalian fluctuations. Despite all established alien plants having a similar residence time, the change in distributions and abundances over time varied between species. The alien grass Poa annua has greatly expanded and increased in abundance, and now in many areas the species dominates. We contrast the invasion and management of Macquarie Island with those of other sub-Antarctic islands. We examine how these novel ecosystems have arisen and discuss the impacts on terrestrial biodiversity and examine direction forward for island conservation.

2011-12-08 12:00 Fishers, Conservation and Marine Parks

Shaw, Sylvie*, *The University of Queensland;*

The economic and ecological future for commercial fisheries in Queensland is under a cloud. The threat stems from cheap overseas imports, rising fuel costs and the increasing use of regulations, including marine protected areas (MPAs), to ensure the long-term viability of the industry. At stake are jobs and the cultural coastal heritage built over generations including the fishers' long-term and heartfelt relationship with the sea, the resource and contribution to the community. This paper reviews the impact of fisheries decline in Queensland garnered through interviews with fishers and fishing families about the industry's future. It also reviews the impact of marine parks designed to protect the biodiversity of the marine environment. Fishers are supportive of the need for MPAs and the conservation measures designed to protect fish and other marine species, however, they raise a number of concerns associated with the MPA implementation process. Prime amongst these is their perception that their long-term expertise, experience and local knowledge of the sea and fish behaviour have been overlooked in management processes. The paper highlights the fishers' viewpoints, reviews structural adjustment schemes associated with fisheries change, and proposes ways to better involve the fishers in MPA planning, monitoring and evaluation.

2011-12-09 16:42 Return of the fauna: Brown Treecreeper reintroduction in eucalypt woodland

Sheean, V.*, *Australian National University;* **Lindenmayer, D.,** *Australian National University;* **Manning, A.,** *Australian National University;* **Doerr, V.,** *CSIRO Ecosystem Services;* **Doerr, E.,** *CSIRO Ecosystem Services;*

Species reintroductions are increasingly important tools to redress population declines and improve biodiversity by establishing self-sustaining populations, particularly when natural recolonisation is unlikely. We reintroduced 43 Brown Treecreepers, Climacteris picumnus, within seven social groups into two eucalypt grassy woodland nature reserves in Canberra, Australia. The Brown Treecreeper is one of many ground-foraging woodland birds that are rapidly disappearing, chiefly in small degraded remnants. We released individuals within an experimental framework, which allowed for assessment of the reintroduction process and also the effectiveness of restoration efforts through analysis of micro-scale and territory-scale habitat use. Brown Treecreeper individuals were radio-tracked for three months. We examined patterns of behaviour and substrate use across the environment, which showed lower than expected use of the ground layer for foraging activities. We also investigated the search patterns of released individuals, whether areas settled preferentially contained key habitat attributes, and whether environments containing these key habitat attributes led to higher survival and reproductive rates. The movement patterns and habitat attributes of chosen environments varied depending upon the social group and had mixed influences on survival. The results of this project provide a unique insight into the condition of an ecosystem through the eyes of a model woodland bird.

2011-12-09 11:45 Discovering variable DNA markers for plants: does next generation sequencing hold the key?

Shepherd, LD*, *Massey University;* **Atherton, RA,** *Massey University;* **Cox, SJ,** *Massey University;* **de Lange PJ,** *Department of Conservation;* **Lockhart, P,** *Massey University;*

Finding sufficient variable genetic markers to address questions in molecular ecology and evolution can be a challenge. Plants often exhibit extremely low levels of genetic variation, both within and between species. Next-generation sequencing technology has improved our ability to obtain large quantities of DNA sequence data quickly and cheaply and potentially offers advantages over traditional marker discovery methods. We are investigating the pre-European domestication by Maori of three endemic New Zealand plant species. Domestication is a process often accompanied by a significant loss of genetic diversity, a feature shared with many endangered species. We compared chloroplast SNP discovery through Illumina GAII sequencing with traditional sequencing methods. The results varied with considerable variation detected in one species through traditional sequencing. In contrast, in another species, which exhibited extremely low levels of genetic diversity, sufficient variable markers were only found through whole and partial chloroplast genome sequencing. We suggest performing preliminary pilot studies using universal chloroplast primers before investing in next-generation sequencing. Screening the SNPs for these species has revealed their domestication histories, including the number of times and locations where each species was brought into cultivation.

2011-12-08 18:30 Integration of Habitat and Metapopulation Models to Investigate the Potential Impacts of Climate Change on Triunia robusta (Proteaceae)

Shimizu, Y*, *The University of the Sunshine Coast, Australia;* **Accad, A,** *Queensland Herbarium, Department of Environment and Resource Management, Queensland, Australia;* **Warrick, R,** *The University of the Sunshine Coast, Australia;* **Burnett, S,** *The University of the Sunshine Coast, Australia;* **Powell, M,** *The University of the Sunshine Coast, Australia;* **Shapcott, A,** *The University of the Sunshine Coast, Australia;*

Climate change is already affecting plant distributions, and the species predicted to be the most vulnerable are the ones that have small, isolated populations and low genetic diversity. Many studies have modelled the potential impact of climate change on plant distributions, however, the majority are based on geographical and a-biotic factors and often ignore the potential effects on species population demographics. This research focuses on investigating the potential long-term viability and extinction risk of the endangered rainforest shrub Triunia robusta under projected climate change scenarios through an integration of habitat and metapopulation models. Triunia robusta is endemic to the Southeast Queensland, Australia, and its habitat is restricted to small subtropical rainforest fragments. Triunia robusta populations previously surveyed in 2000 were re-surveyed to obtain population growth measurements and new plant population surveys were conducted at recently discovered populations to obtain demographic structure data. Additional field studies were undertaken to identify potential seed dispersers and to quantify local dispersal behaviour and distances as well as obtaining estimates of seed predation. Flower production and seed

production were also recorded to enable estimates of reproductive output, seedling production and growth rates determined over successive years. Initial metapopulation models will be presented based on the field data.

2011-12-06 16:54 Understanding Needs to more fully integrate ecosystem-based management into the seafood industry

Short, K.M*, *Imperial College;* **Milner-Gulland, E.J,** *Imperial College;* **Agnew, D,** *MRAG;* **Martin, D,** *Seaweb;*

The 1992 collapse of Newfoundland cod alerted those who care about the future of marine fisheries internationally to act. Since then this international community, in government and non-government organisations, the fishing industry, academia and beyond, have developed policies, management systems, fishing techniques, closed areas, independent ecolabelling schemes and even new responsible sourcing policies to enable improvement. Ecosystem-based management is a widely accepted policy and operational approach underpinning this fisheries improvement. However, obstacles to its effective implementation exist such as a gulf between the science of marine conservation and fisheries management and the need for new tools to empower the seafood sector. Through experience, a focused literature review and a targeted questionnaire of a cross section of stakeholders, this study charts the uptake of the ecosystem-based approach and assesses the perspectives and needs of a range of stakeholders in applying it. It seeks to understand how to address these obstacles so that those with the power to influence change can be further engaged and empowered to bring about greater marine conservation outcomes.

2011-12-08 18:30 Variation in baseline corticosterone levels of Tree sparrow (Passer montanus) populations along an urban gradient in Beijing , China

Shuping Zhang*, *Minzu university of China;*

Rapid urbanization is a major anthropogenic pressure on bird species that rely on vegetation for food and shelter. Since the baseline corticosterone concentration (BCC) in some bird species has been found to increase slightly in response to environmental challenges, we hypothesized that urbanization could also induce an increase in BCC. To test this hypothesis we compared the BCC of Tree sparrow populations in five urban and two rural habitats and analyzed the relationship between BCC and the degree of urbanization. Here we show that the BCCs of Tree sparrow populations were strongly and positively correlated with the degree of urbanization of the habitat. Average BCC of sparrows from high-rise residential areas and a university campus were significantly higher than those from rural areas, suggesting that Tree sparrows living in highly urbanized areas have greater environmental challenges than those in rural areas. However, the average BCC of birds from an urban park was not significantly different to that of birds at rural sites and also differed significantly from that of birds at two of the other urban sites. These results suggest that urbanization could pose environmental challenges for Tree sparrows, a species that appears relatively well-adapted to human-modified environments. The marked variation in BCC between different urban sites indicates that conclusions drawn from data collected at single sites must be interpreted with caution.

2011-12-09 17:45 Efficacy of field data for calculating emissions reductions from above and below ground in a miombo dry land Forest

Sibanda, M*, *Geography Dept., University of Cambridge ;* **Kapos, V,** *UNEP WCMC, Cambridge;* **Miles, L,** *UNEP WCMC, Cambridge;* **Coomes, D,** *Plant Sciences, University of Cambridge ;*

Climate Change is the major development and environmental challenge of the 21st Century. Forests provide a cost effective means of sequestering carbon. Despite this an estimated 17% of global emissions come from forest degradation and deforestation. Poor forest stewardship, agriculture and other land use changes are the reasons for this. Reduced Emissions from Deforestation and Forest Degradation (REDD+) has emerged as an attractive proposal encouraging emissions reduction and carbon sequestration (conservation, management and enhancement of carbon stocks). National REDD+ plans and pilot projects have been developed in various developing countries. A key challenge for REDD+ from the onset is the accuracy and affordability of measuring, verifying and reporting baseline and subsequent emissions reductions (ERs) from above ground and below ground carbon sequestration. This research focuses on the efficacy of using field data to calculate carbon values instead of using IPCC default values for soil, below ground biomass and or above ground carbon. The difference of using local or regional values for biomass and /or soil using field data from Zambia. Zambia is a UN-REDD country and its miombo dryland forests also occurs in eleven countries in southern Africa. The policy implications of this will be explored.

2011-12-06 15:00 A new way of promoting wildlife conservation among Dutch municipalities: benchmarking urban bird habitats

Sierdsema, H.*, *SOVON Dutch Centre for Field Ornithology;* **Louwe Kooijmans, L.H. ,** *Birdlife Netherlands;* **Kwak, R.G.M.,** *Birdlife Netherlands;*

Birds are an important indicator for the quality of life in urban areas. Citizens enjoy birds in their neighbourhoods and often spend time and money to facilitate bird survival and reproduction in their gardens. However, 'public green' areas may, due to their size and habitat type, contribute more to urban birds than the green in private gardens. Municipalities, responsible for the public green, are therefore an important party to address urban bird conservation. Birdlife Netherlands & SOVON have developed the 'Urban Bird Indicator', in order to facilitate the use of bird data as indicators for the habitat quality of urban areas. This indicator consists of two parts: information on trends of urban birds and a benchmark function. The benchmark compares counts of birds in a specific urban area with reference values. Through point count schemes, both in the breeding season and winter, data is collected on bird occurrence. Citizens can easily join the program by counting their own neighborhood. These observations are benchmarked with reference values for a range of urban habitats like city centres, housing estates (varying in age and openness), urban parks and industrial areas. The benchmark provides not only insight at the species level, but also at the level of ecological guilds. Information on the habitat requirements of the species and guilds is then used to provide the municipality with clear guidelines for the conservation of urban birds and habitats.

2011-12-09 11:45 Land-use change in the face of global climate change: a win-win solution for the environment and farming communities of the Eastern Cape, South Africa

Sigwela, A.M.*, *Nelson Mandela Metropolitan University;* **Cowling, R.M.C.,** *Nelson Mandela Metropolitan University;* **Mills, A.M.,** *Stellenbosch University;* **Marais, C.,** *Department of Environment Affairs*

Climate change and variability is already affecting Africa, although it affects different countries differently. The Eastern Cape Province in South Africa is typically vulnerable to droughts accompanied by high losses of livestock to farmers. Climate forecast and climate change scenarios predict more severe and frequent pattern of such drought. Yet contingency planning for adaptation to climate change has not shown significant progress. In 2010 this province experienced the worse drought in 130 years, such that the government declared some areas "drought disaster areas". Many of these areas fall in the heartland of the Subtropical Thicket, a "stunted forest" vegetation with high levels of endemism. Thicket has been shown to be a relic of ancient vegetation types and has survived various climatic changes through geological periods. Its adaptation mechanism is its ability to maintain a constant microclimate in the under-canopy environment. Due to human-induced vegetation degradation, the opening of the thicket canopy alters its microclimatic environment, and that leads to cascading degradation effects. The Natural Resource Management Programmes then administered by the Department of Water Affairs (now Department of Environment Affairs) initiated the Subtropical Thicket Restoration Program in the Eastern Cape, South Africa. This program is providing information on opportunities for landowners to convert from pastoral farming, which, if poorly managed, is the key driver of degradation, to farming for carbon by re-establishing indigenous vegetation on degraded land. In return for planting trees and sequestering carbon from the atmosphere, carbon credits can be earned and sold on the carbon exchanges of developing nations. The species used is Portulacaria afra, an indigenous leaf and stem succulent tree that demonstrates exceptional efficiency in drier, xeric, environments. It is highly adapted with its unique, water efficient system whereby it can switch between CAM and C3 photosynthetic pathways. Its excellent method of carbon sequestration makes P. afra not only an excellent carbon pump and ecosystem stabilizer, but also an important provider of forage for herbivores. Furthermore, it can be established from cuttings without the need for watering. Although there is growing interest in this change in land-use from pastoral operations to

carbon farming, landowners are still watchful and somewhat skeptical of entering the market because of the considerable uncertainties and the large investment costs needed. Although this program is the first of its kind in South Africa, it is successful in raising awareness about climate change and variability not only amongst rural communities of the Eastern Cape, but also among the higher echelons of government. The initial phase of this project has been able to demonstrate the value of this activity and potential entry into the carbon trade, although private landowners need to weigh up costs against expected returns. Even if carbon credits are earned only after the carbon has been sequestrated, the short-term valuable advantage of this land-use change is in converting dysfunctional degraded landscapes into healthy ecosystems. In rehabilitated ecosystems the capture of carbon comes with a host of other benefits such as improved soil conditions (both in terms of soil carbon and soil temperature), increased topsoil and filtration rates (therefore reduced soil erosion) and improved potential for successive natural rehabilitation. The additional returns in rehabilitated ecosystems include altering dysfunctional systems to those where simultaneous income opportunities can be ensured, e.g. medicinal plants, tourism, game farming, and bee keeping. This project is successful in showing, not only the recovery of biodiversity of degraded ecosystems but also improved socio-economic conditions of local communities through job creation. The rehabilitation program is aligned with the government's poverty alleviation program. To date more than 2000 ha of land has been planted with P. afra cuttings with an average of $1500 per ha. This money is earned by communities that are employed in this program. The plan is to plant about 10 000 ha in the next 10 years which can be translated into millions of dollars which will accrue to local communities. This income is even before the financial returns that could be earned by the sale of carbon credits. This project demonstrates the full potential of the green economy by aligning climate change projects with poverty alleviation programs.

2011-12-09 12:00 Soil microbes as a restoration tool to improve degraded landscapes

Sikes, BA*, *University of Texas at Austin;*

Soil biota can play critical roles in ecosystem functioning and resilience to disturbances such as invasions. Manipulations of soil biota may provide a novel pathway to achieve aboveground results, and have the potential to substantially broaden our conservation and restoration toolkit. I will present early results from an experiment using amendments of different groups of soil fungi to enhance restoration of degraded Florida scrublands including invaded pastures and disturbed native scrub. Thus far, soil microbes have important consequences for germination of several native plant species and these effects can differ based on the origin of the fungi added. We also incorporated a conventional restoration treatment (herbicide) which appears to interact with fungal additions to affect plants. Apart from plant effects, we are examining how microbial amendments alter soil nutrients and the invasion (or re-invasion) of these sites. Our preliminary data shows the potential for native soil microbe amendments to alter plant-soil feedbacks and change the outcome of plant germination. Our goal is to create a predictive framework for the use of native soil microbes by incorporating microbial ecology with traditional ecology and management. Because microorganisms dominate our own bodies and the many biological systems we hope to maintain, incorporating them into our science can provide a foundational link between human and ecosystem health.

2011-12-06 11:00 Translocation of Island Scrub-Jays to Santa Rosa Is., California: an Opportunity for Proactive Species Management and the Restoration of an Insular Ecosystem

Sillett, TS*, *Smithsonian Institution;* **Royle, JA,** *USGS Patuxent Wildlife Research Center;* **Chandler, R,** *USGS Patuxent Wildlife Research Center;* **Bakker, VJ,** *James Madison University;* **Kéry, M,** *Swiss Ornithological Institute;* **Morrison, SA,** *The Nature Conservancy;*

Aphelocoma insularis currently exists only on Santa Cruz Island in Channel Islands National Park (CINP), and with a total population size < 3000, is one of the rarest birds in North American. Here, we present a conservation framework for the reintroduction of A. insularis to nearby Santa Rosa Island (SRI) in CINP. Recent evidence suggests that scrub-jays existed on SRI into the late 1800s and were likely extirpated by widespread destruction of vegetation by sheep. Although some vegetation has recovered since sheep were removed in the 1950s, hundreds of non-native deer and elk minimize regeneration of chaparral habitat. After all ungulates are removed in 2011, the regeneration of SRI would be hastened by A. insularis, which through their acorn and seed caching behavior are important ecosystem engineers. Re-establishing A. insularis on SRI would also increase population size and hence species viability. Based on a hierarchical model for predicting habitat-specific abundance of A. insularis, we estimate that SRI could support a small but viable population of jays now, and a population of several thousand when native vegetation has fully recovered.

2011-12-09 10:34 Incipient, but efficient? Ecological outcomes of fishers' involvement in co-management of floodplain lakes in the Tocantins River, Brazilian Amazon

Silvano, RAM*, *Dep. Ecologia, Universidade Federal do Rio Grande do Sul, Porto Alegre, RS, Brazil;* **Hallwass, G,** *Pós-graduação em Ecologia, Universidade Federal do Rio Grande do Sul, Porto Alegre, RS, Brazil;* **Lopes, PF,** *Depto. Botânica, Ecologia e Zoologia, Centro de Biociências, Universidade Federal do Rio Grande do Norte, Natal, RN, Brazil;* **Juras, AA,** *Centrais Elétricas do Norte do Brasil S.A - Eletronorte, Brasília, DF, Brazil;* **Ribeiro, AR,** *Dep. Ecologia, Universidade Federal do Rio Grande do Sul, Porto Alegre, RS, Brazil;* **Lima, RP,** *Dep. Fisiologia, Instituto de Biociências, Universidade de São Paulo;* **Begossi, A,** *Fisheries and Food Institute (FIFO), ECOMAR, UNISANTA and Universidade Estadual de Campinas (Unicamp), Campinas, SP, Brazil;*

We addressed the ecological outcomes of fisheries co-management in the impounded Lower Tocantins River (Brazilian Amazon). We analyzed 590 fish landings (6.7 t of fish) from five fishing communities, plus 48 fish samples using gillnets (10,378 fish from 101 species) in 12 floodplain lakes (three per region) in four regions: two not managed, one informally managed (by fishers) and one formally co-managed (limited governmental support). The mean number of fish and the mean fish species richness did not differ among regions, but lakes of the two managed regions had higher mean fish biomass (2.5 ± 1.5 and 3.2 ± 3.4 g x m2 gillnets -1 x h -1) and larger fish (23 ± 4 and 18.3 ± 3 cm). Lakes in the two managed regions showed also a higher mean proportion of reproductive fish (44.7 ± 0.4 and 41.2 ± 7.7 %) during the high water season: local fishers acknowledged the importance of these lakes to fish spawning. Fishers from two communities with managed lakes had a higher mean catch per unit of effort (CPUE) (1.4 ± 1.6 and 1.5 ± 2.3 kg x fisher -1 x h -1) and the lakes showed a higher mean CPUE (1.3 ± 2 kg x fisher -1 x h -1) than other aquatic habitats. The studied co-management systems have thus provided positive ecological (fish abundance) and economic (fish catches) outcomes, by protecting a critical fish habitat (floodplain lakes). Despite their importance in large rivers impacted by impoundment and fishing pressure, these local initiatives may go unnoticed and risk to be disrupted.

2011-12-08 18:30 Cherry-picking parrots: can the field of eco-immunology help managers to select individuals for release programs?

Simon Tollington*, *DICE, University of Kent;* **Jim Groombridge,** *DICE, University of Kent;* **Carl Jones,** *Durrell Wildlife Conservation Trust, Mauritian Wildlife Foundation;* **Andrew Greenwood,** *Wildlife Vets International;*

Many populations of endangered species require some form of human intervention to ensure survival and viability. Species which have recovered from severe population bottlenecks are likely to suffer inbreeding depression owing to low numbers of founder individuals. Loss of genetic diversity has been shown to decrease individual fitness and immune function efficiency, putting many of these species at risk from disease. Many studies of avian eco-immunology employ a single measure of immune function as an indicator of an individual's overall immunocompetence. In contrast, we sample a free-living, recovered population of Mauritius parakeets to (i) simultaneously assess individual innate cellular and humoral immune function performance using several methods, (ii) confirm individual parasite prevalence and (iii) calculate individual inbreeding coefficients in order to determine relationships between inbreeding, immunocompetence and disease. Preliminary data suggest that individuals from remnant populations are more immunocompetent and display fewer parasitic infections than those from intensively-managed, released populations. In addition, meteorological data suggests that rainfall during the hatching period has an effect on nestling immunocompetence. The results from

this research will enable managers to select individuals with which to create new populations; 'cherry-picking' those which reflect the species' genetic diversity and are best equipped to deal with disease.

2011-12-09 17:00 Into the arms of the devil: unintended consequences of churches and schools for conservation in Papua New Guinea

Sinclair, J Ross*, *Wildlife Conservation Society, Papua New Guinea Programme;*

For many of those people for whom traditional beliefs still dictate their interactions with nature, greater access to formal education and to the outside world are seen as development priorities. Churches, missionaries and other outsiders are therefore welcomed, and newly established schools well attended. The resulting process of transformation as a traditional culture faces modernity is immensely complex and difficult to understand. There are, however, unintended consequence for conservation resulting from a loss of practices that promote sustainable hunting and harvesting, a breakdown in the transfer of Traditional Ecological Knowledge (TEK) between generations, and a change in the relationship between nature and people. These points are illustrated from studies in Papua New Guinea. The argument is then made that converting people from traditional to Christian beliefs, and educating them in a formal western manner, are important drivers in species declines and environmentally destructive development. An approach to addressing these issues is outlined where an ecological imperative replaces a spiritual one for protecting some species or places, and where TEK is integrated into formal education.

2011-12-09 18:00 Cumulative impacts to ecosystem services: a review of frameworks and decision tree for practical application

Singh, Gerald G.*, *Institute for Resources, Environment and Sustainability, University of British Columbia;* **Martone, Rebecca G.,** *Institute for Resources, Environment and Sustainability, University of British Columbia;* **Chan, Kai M.A.,** *Institute for Resources, Environment and Sustainability, University of British Columbia;*

To be effective, ecosystem-based management must address how human activities influence the provision of ecosystem services. Frameworks for addressing cumulative impacts are necessary to highlight linkages between multiple activities, their inputs and impacts to important aspects of the ecosystem, the stakeholders likely to be affected, and the environmental and political boundaries that define scales of governance. Many frameworks have been proposed, but the abundance of these frameworks and the lack of clarity of when each is appropriate limits their appeal. We reviewed and synthesized frameworks to account for cumulative impacts, and developed a decision tree structured by data availability and the scale of impacts to provide a tool for practical application of the components of these frameworks. As some examples of broad insights from this decision tree, we show that understanding impacts to human well-being is an important step in integrating socio-ecological thinking, eliciting expert judgment is an effective approach for addressing data limitations, mechanistic models can be applied when relationships between activities and ecosystem functions are known, and Bayesian belief networks can be employed to explicitly deal with high levels of uncertainty. In ecosystem-based decision-making, different contexts call for different approaches, and this study provides a roadmap for matching approaches to contexts.

2011-12-08 12:00 Microsatellite DNA Markers as Tools to Prevent Illegal Substitution of Wild Babies for Captive Elephants

SIRIPUNKAW, CHOMCHEUN*, *Mahidol University at Nakornsawan, Thailand;* **Chalita Kongrit,** *Department of Biology, Faculty of Science, Mahidol University, Thailand;* **Varaporn Akkarapatumwong,** *Institute of Molecular Biosciences;* **Sompoad Srikosamatara,** *Department of Biology, Faculty of Science, Mahidol University, Thailand;* **Warren Y. Brockelman,** *Department of Biology, Faculty of Science, Mahidol University, Thailand;*

Baby elephants are known to be popular and highly prized in Thai tourism business. In order to prevent illegal substitution of wild babies for captive elephants, we constructed the Asian elephant microsatellite enriched DNA libraries and provided a set of markers (15 loci) for individual identification and verification of maternity. We found the probability that two siblings would be identified as the same individual was two out of million where as the probability to assign a fake mother as true mother was twelve out of thousand. We proposed to the public that our markers could be used for identification of all captive elephants. If genetic identification of every newborn would be added to the database as well, we will be able to separate captive from wild individuals. We are improving our molecular tools to the level that they could exclude siblings from true mothers. With the collaboration among scientists, government agencies, non-government organizations as well as the public at national and international level, we hope that the management of captive elephant would no longer disturb the living and the well being of those in the wild.

2011-12-07 10:30 The role of pathogen pollution in wildlife disease: the case of chytridiomycosis

Skerratt, LF*, *James Cook University;* **Berger, L,** *James Cook University;*

Pathogen pollution is an increasing threat to the conservation of biodiversity. Several factors are driving this such as increasing globalisation and wildlife trade without adequate biosecurity. Concurrent factors that decrease the resilience of wildlife populations to threatening processes such as decreasing population size, genetic diversity and range are magnifying this threat. We use the case of chytridiomycosis, which is a pandemic disease that has caused the extinction of approximately 100 amphibian species and the severe decline of 100 more, to demonstrate these issues. Many amphibian species in protected, relatively pristine habitats dramatically declined and became extinct from the late 1970's onwards. A team of scientists conducted an outbreak investigation and showed that the anthropogenic spread of the novel disease chytridiomycosis has caused widespread amphibian extinctions and declines in the Americas, Australia, Europe and Africa. It has also been shown that species with large population sizes that are distributed through a range of climates and habitats are more resilient to the impacts of chytridiomycosis. The global community is now responding to the threat to chytridiomycosis through improvements to amphibian biosecurity, ex situ conservation and research. However, more importantly the lessons learned for amphibians need to be applied to other wildlife taxa.

2011-12-06 11:30 Informing management: the determinants of distribution for the Purple-crowned Fairy-wren Malurus coronatus coronatus, a threatened riparian specialist

Skroblin, A*, *Research School of Biology, Australian National University, Canberra, ACT, 0200, Australia;* **Legge, S,** *Australian Wildlife Conservancy, Mornington Wildlife Sanctuary, PMB925 Derby, WA, 6728, Australia;*

The correlates of persistence for populations that are distributed across small and isolated habitat patches forms a central theme in conservation biology. Species' distributions however, are influenced by environmental conditions across a multitude of scales. This study utilizes an integrative approach to inform conservation of the western Purple-crowned Fairy-wren (Malurus coronatus coronatus), a threatened and patchily-distributed riparian habitat specialist of northern Australia. We conducted a comprehensive on-ground survey across 14 river catchments and mapped riparian vegetation along almost 4000 km of waterway, to identify and model the determinants of distribution across multiple scales. We identified five sub-populations of the Purple-crowned Fairy-wren, which were primarily located on pastoral lands. The distribution of the species appears to be constrained by three factors: 1) fine-scale vegetation structure, 2) presence of threatening processes, and 3) the extent and spatial pattern of habitat across the landscape. We identify populations most in need of conservation intervention and suggest a regional plan that outlines management recommendations for each sub-population. Although reserves play a vital role in ecosystem conservation, landscape-scale environmental management must occur across properties of varying tenure to manage widely dispersed species that occur at low density across vast landscapes.

2011-12-08 18:30 A landscape-scale study of woodland moths: collecting scientific data with the help of corporate volunteers

SLADE, E.M. *, *WildCRU, University of Oxford, UK;* **MERCKX, T. ,** *WildCRU, University of Oxford, UK;* **RIORDAN, P. ,** *WildCRU, University of Oxford, UK;* **BEBBER, D. ,** *Earthwatch Institute, Oxford, UK;* **MACDONALD, D.M. ,** *WildCRU, University of*

Oxford, UK;

Temperate woodlands have become increasingly fragmented, resulting in reduced core woodland habitat, increased edge habitats, and reduced connectivity between patches. Using a mark-release-recapture study of macro-moths we looked at how this affects species abundance, diversity, composition and movement on a landscape-scale. Citizen scientists were crucial to the success of the project, enabling us to conduct the first landscape scale study of moth movement patterns in the UK. 14,719 individual moths from 87 species were marked and released and the overall recapture rate was 5.2 %. Both woodland size and connectivity were important. Woodland species, in particular, were dependent on large fragments of woodland. Single trees functioned as 'stepping stones'; however, the higher their landscape connectivity (i.e. hedgerow trees) the higher their 'stepping stone' capacity.

2011-12-06 11:00 European Bird Declines: Assessing the Importance of Land Use Change in Africa

Small, R.*, *Department of Geography, University of Cambridge;* **Adams, W.,** *Department of Geography, University of Cambridge;* **Atkinson, P.,** *British Trust for Ornithology;* **Hewson, C.,** *British Trust for Ornithology;* **Sutherland, W.,** *Department of Zoology, University of Cambridge;* **Vickery, J.,** *Royal Society for the Protection of Birds;*

The decline of migratory birds is a key conservation problem in Europe. Approximately 2.1 billion passerines breeding in Europe migrate to sub-Saharan Africa each year, many concentrating in the arid and sub humid savannahs of the Sahel and Sudan-Guinea zones of West Africa. Most of these 'Afro-Palearctic' migrant bird species are declining. One in ten of Europe's migratory bird species is now considered to be of global conservation priority. The causes of these declines remain unclear but are likely to be complex and include changes on breeding grounds, flyways and wintering grounds. At Sahelian wintering grounds declines have been widely attributed to environmental degradation due to land use change, drought and unsustainable use of rural environments driven by human population increases. We report a systematic review of the literature on Afro-Palaearctic migrants in the Sahel and identify the importance given to different such changes. We compare these findings with the outputs of expert led workshops that identified 'change pathways' for tree management, livestock management and farming practice in the Sahel. These pathways explore the links between macro-scalar causations of environmental change and populations of Afro-Palaearctic migrant birds. We discuss the potential for this work to contribute to the development of policies that support sustainable livelihoods in the Sahel whilst achieving positive outcomes for conservation.

2011-12-06 17:00 A role for anthropomorphism in motivating community participation in wildlife conservation

Smith, AM*, *Monash University;* **Smith, L,** *Monash University;* **Weiler, B,** *Monash University;*

With an ever-growing number of wildlife species in need of conservation actions, it becomes increasingly important to find ways to heighten public concern for these species to motivate community participation. Concern for a species arises from holding positive attitudes toward the species and experiencing a connection with the species (e.g., perceiving the species as similar to self). Traditionally, science has considered such attributions of human characteristics to nonhuman species (i.e., anthropomorphism) inappropriate because it lacks objectivity. This study aims to explore the merits of using anthropomorphism as a tool to promote concern for a species (and ultimately conservation actions). In a semi-structured interview, 40 adult zoo visitors were asked to (1) identify local Australian species they (a) like most and least, (b) perceive to be most and least like them, and (c) are most and least concerned about and (2) justify their responses. Content analysis of responses revealed that a lack of concern for a species arose from two key beliefs related to perceiving the species as dissimilar to self: (1) "I have no connection with the species" and (2) "it does not belong [in my habitat]." These findings suggest that a lack of anthropomorphic thought decreases the likelihood for concern and suggests that anthropomorphism may have a place in wildlife conservation as a means to heighten concern for a species that can lead to wildlife conservation behaviours.

2011-12-06 14:45 Reintroducing a migratory raptor to the edge of its former range: are we just feeding a sink?

Smith, DHIV*, *Centre for Conservation Research, Calgary Zoo;* **Everest, T,** *Centre for Conservation Research, Calgary Zoo;* **Moehrenschlager, A,** *Centre for Conservation Research, Calgary Zoo;*

Reintroduction of migratory birds to areas of former extirpation requires breeding at release sites, and site fidelity of released birds and their progeny following winter migration. Burrowing owls (Athene cunicularia) are extinct in British Columbia, Canada, their former north-western range limit. Efforts to restore them involve artificial burrow construction and reintroductions. Following release birds breed and then fly south to overwintering grounds. Data from 19 years of burrowing owl reintroductions in the Nicola Valley, British Columbia, showed released owls breed successfully, with breeding tripling the summer population in some years. However, the number of birds returning following migration is low (≤12%). To describe the relationship between summer population size and the return rate the following year we used two curves (one using an asymptotic exponential function and the other a Michaelis-Menten function). AIC showed these curves to have similar support with both having R2 ~0.88. They suggest even if a summer population of 1000 birds could be produced through releases and breeding (the largest has been 336) only 20–30 birds would return the following year. This is insufficient to create a self-sustaining population. Given the range contraction of this species, released birds may be returning to breeding grounds further south meaning these reintroductions may be feeding a sink. Restoration of migratory species requires continental scale recovery strategies.

2011-12-08 11:45 Determining Location and Design of Cost Effective Wildlife Crossing Structures along US 64 in North Carolina

Smith, DJ*, *University Of Central Florida;*

A primary transportation route from the Outer Banks of North Carolina is US Highway 64. The road bisects a network of Federal, State and privately managed conservation areas that provide habitat for black bear, red wolf (Federally endangered species), migratory birds, a diverse assemblage of herpetofauna and numerous other species. Wildlife surveys were conducted from April 2009 to July 2010 to assess potential impacts and to make recommendations for wildlife crossing structures and other measures to reduce adverse effects of the proposed widening of the road. Road-kill and track surveys provided data on successful and unsuccessful road crossings. Mark-recapture studies were performed at roadside and control locations in differing habitat types for small mammals and herpetofauna to determine presence-absence and potential road avoidance. Road-kill data included 27,877 individuals of 113 species. From 31 track stations, 18 different species or taxa from 7,477 tracks were recorded. Total individual animals captured in control and roadside traps included 362 and 1,094, respectively. Diversity of species captured included 20 amphibians, 23 reptiles and 10 mammals. Spatial analysis of road-kill and track data revealed significant hotspots of wildlife activity. Results of field surveys and landscape analysis were used to determine candidate locations for wildlife crossings including the design and type of structure according to site specifics and target species requirements.

2011-12-06 14:45 Investigating the response of animals to temperature shifts at a variety of temporal scales

Smith, Felisa A.*, *University of New Mexico;* **Murray, Ian W.,** *University of New Mexico;*

Arguably the most pressing environmental issue facing society today is that of anthropogenic climate change. Considerable debate centers around the magnitude, timing and nature of biotic responses to such changes. The increasing availability of fine-scale historical information has led both to an appreciation for the rapidity and frequency of past shifts in the earth climate system, as well as an interest in exploring past biotic responses. Here, we examine the response of small mammals to late Quaternary climate fluctuations at a variety of temporal scales. We focus on Neotoma (woodrats) because they construct middens, which can be preserved for thousands of years. Paleomiddens yield information on morphology, genetics and diet. We integrate this historical record with museum specimens and modern studies to characterize climatic thresholds leading to species extirpation and/or range alterations rather than in situ adaptation. Our results demonstrate remarkable congruence across

the geographic range at a variety of temporal scales. Chronosequences demonstrate woodrats respond as expected on the basis of Bergmann's rule: colder climatic conditions select for larger body size and warmer conditions select for smaller body size. For this genus, morphological adaptation is the dominant mode in coping with changing climatic regimes. Our work documents the entire range of responses – phenotypic adaptation, migration and species replacements, and local extirpation.

2011-12-08 18:30 Wildlife Responses to Black Rat Control in Sydney Harbour National Park

Smith, HM*, *The University of Sydney;* **Banks, PB,** *The University of Sydney;*

The Black Rat Rattus rattus is a major threat to biodiversity, and, is particularly devastating on islands where endemic fauna and flora have not evolved defence mechanisms. The Black Rat has successfully colonised suburban and rural regions of Australia, and has caused a significant decline in Australian native fauna and flora through competition, predation pressures and disease. Complex population interactions post-eradication may upset the ecological balance beyond repair. Furthermore, the reintroduction of native fauna, specifically the Bush Rat Rattus fuscipes, may result in incomplete niche overlap and subsequent ecological changes. It is therefore imperative to consider the impacts of Black Rats post-eradication, in order to assess the removal success, and to stop future reinvasions. Specifically, we will report on four ecological systems in response to Black Rat control: seedling survival, bird egg predation, bat survival, and the presence of lungworm. Furthermore, we will report on the ecosystem health when the native Bush Rat has re-established. This research will inform management authorities of the primary post-eradication affects of Black Rat removal, and will help authorities to use management techniques that promote ecologically sustainable bushland reserves.

2011-12-07 18:00 Post-fire potoroo hide and seek

Smith, J K*, *Department of Zoology, The University of Melbourne;* **Coulson, G,** *Department of Zoology, The University of Melbourne;*

Although many animals are able to survive fire events, immediate post-fire survival is threatened by reduced food and habitat resources, and increased predation. The long-nosed potoroo, Potorous tridactylus, is a threatened native Australian small mammal, inhabiting densely vegetated fire-prone forest in southeast Australia. Following a planned burn in southwest Victoria, which left a mosaic of burnt and unburnt patches of vegetation, eleven long-nosed potoroos (6 males/5 females) were radio-tracked to investigate their survival and use of the post-fire environment. Results show a clear reliance on habitat provided by remaining unburnt vegetation patches. Diurnally, tracked potoroos nested exclusively in unburnt vegetation within the burn area. During nocturnal foraging activities, 66.5% of records were in unburnt vegetation. There was no difference between sexes. This study indicates the importance of unburnt patches within burn areas for providing refuge habitat to long-nosed potoroos, which is likely to assist in continued post-fire survival. Fire management in forests with populations of long-nosed potoroos, should aim to retain unburnt vegetation at a scale appropriate to the species.

2011-12-08 18:30 Grey Nurse Shark (Carcharias taurus) Diving Tourism: Tourist Compliance, Shark Behaviour & Environmental Knowledge & Attitudes At Fish Rock, Australia

Smith, KR*, *Victoria University;* **Scarpaci, C,** *Victoria University;* **Scarr, M,** *Victoria University;*

Satisfactory (80% or greater) compliance of tourists with a voluntary code of conduct and mandatory legislation for diving with grey nurse sharks was exhibited during this preliminary study from December 2008 to January 2009. Grey nurse shark school behaviour during interactions with tourist divers significantly altered from milling to more active swimming when more than six divers were present. Initial observations of individual shark behaviour types were also recorded. Significant improvements to tourists' grey nurse shark knowledge and environmental attitudes were documented post-dive experience; however, the majority of improvements occurred within tourists already deemed to be in possession of strong environmental knowledge and attitudes pre-dive experience. Provision of educational talks to alternating diver groups significantly improved their environmental knowledge but not their environmental attitudes. This research highlighted factors that may promote compliance to wildlife tourism management strategies. It demonstrated that satisfactory compliance does not always facilitate protection of target species from behavioural changes during tourist-wildlife interactions; hence, consideration of reducing the number of divers allowed per interaction was suggested. Finally, the potential for this industry to benefit conservation by encouraging people to adopt more pro-environmental attitudes may be further realised by targeting alternate demographics.

2011-12-06 17:00 Can site prioritisation for one taxonomic group conserve other taxonomic groups?

Smith, R*, *Ecosystem Management, School of Environmental and Rural Science, University of New England ;* **Reid, N,** *Ecosystem Management, School of Environmental and Rural Science, University of New England ;*

Does conservation value for one taxonomic group predict value for another? How can we efficiently conserve the most biodiversity in an agricultural landscape? We measured the value of five vegetation communities under different management for vascular plant and bird conservation in an agricultural region (12 000 km2) in northern NSW. By ranking sites according to overall species richness and the number of rare (i.e. infrequently observed) species present in each taxonomic group, our results showed that in the top 30% (16 of 54) of sites ranked according to conservation value, only five sites were valuable for both plant and bird conservation. River red gum gallery forests were ranked highest for vascular plant and bird conservation value. However, for both taxonomic groups, all five vegetation communities were included among the top 30% of sites of highest conservation value. Increasing livestock grazing intensity severely diminished both plant and bird conservation value as a result of the loss of rare species. Taken together, these results suggest that conservation value for one taxonomic group does not predict conservation value for another taxonomic group and confirms the need for a range of sites with different vegetation types and different management to conserve the greatest amount of vascular plant and avian biodiversity in agricultural regions.

2011-12-09 14:00 Moving out of the shallows: getting to grips with trade-offs between conservation and development

Smith, RJ*, *DICE, University of Kent;* **Abram, NK,** *DICE, University of Kent;* **Metcalfe, K,** *DICE, University of Kent;* **Davies, ZG,** *DICE, University of Kent;*

Successful conservation has to account for a range of social, economic and political factors, so we need a better understanding of resulting trade-offs when dealing with the interactions between conservation and development. However, these issues have become increasingly complicated, as more areas are impacted by anthropogenic activities and as conservationists develop increasingly sophisticated and varied approaches for reducing biodiversity loss. Here, we review these trade-offs and show how an interdisciplinary approach is vital if we are to avoid simplistic interpretations and responses. We then illustrate some of these trade-offs with case studies from South Africa, Borneo and The English Channel and show that the anthropogenic factors that influence conservation outcomes are often idiosyncratic, unpredictable and/or beyond the control of local stakeholders. Despite this uncertainty, and the difficulty of predicting how natural systems will respond to our interventions, we argue that research on trade-offs remains important, partly because it encourages conservationists to take a wider perspective. However, we will also argue that this research and monitoring must be part of social learning institutions, as this will provide a better understanding of the different factors involved and help broaden support for conservation action.

2011-12-06 15:30 Involving the business sector in conservation with (bird) habitat development at business districts and industrial areas

Snep, RPH*, *Alterra - Wageningen UR;* **Louwe Kooijmans, J,** *Birdlife Netherlands;* **WallisDeVries, MF,** *Butterfly Conservation Netherlands;*

Business sites, the areas where companies are located, are currently not within the scope of conservation organisations. If - however - more engagement of society in conservation is demanded, and business life is generally recognized as a key player in human society, the places where people work may be

an interesting area to explore. In 2004-2011 we studied the actual and potential value of Dutch business sites and industrial areas for biodiversity conservation and experience. As published in a series of papers, we were able to identify main drivers for utilizing conservation opportunities at these economic areas, using empirical data (e.g. bird counts), modelling studies and stakeholder enquiries. Existing international corporate conservation practices thereby served as reference. From 2007 on, we got involved in actual business site practices. Cooperating with entrepreneurs, employees, project developers, (landscape)architects, local governments and NGOs learned us about opportunities and pitfalls in the process of (re) connecting business society with local nature. Birds appeared as a trigger to get companies interested in conservation. However, it requires a whole different perspective and attitude from involved conservationists, to get companies to the point that they will actually develop habitat at their own land. We conclude that targeting business sites could become a promising strategy to get conservation (back) in the mind of people, even business people.

2011-12-08 10:45 Evaluating the effectiveness of road mitigation measures for wildlife: how much monitoring is enough?

Soanes, K*, *Australian Research Centre for Urban Ecology;* **van der Ree, R,** *Australian Research Centre for Urban Ecology;*

Monitoring programs have a poor record of evaluating the success of wildlife restoration projects. Study design, duration and sampling methods are often reduced to save cost, limiting the ability of these programs to detect an effect. For example, millions of dollars are spent worldwide on wildlife crossing structures in an attempt to mitigate the negative impact of roads on wildlife. Despite the high cost of these structures, research on their effectiveness in increasing population viability is currently lacking. Before-after-control-impact studies which address population level effects are urgently required. This project aims to evaluate the effectiveness of crossing structures for arboreal mammals along a major highway in south-east Australia using results from two BACI monitoring programs. Pre-mitigation data on the population density, survival rates, movement and gene flow of two species of arboreal mammal have been collected, and post-mitigation data collection is currently underway. Preliminary results from radiotelemetry and crossing structure monitoring indicate that structures facilitate movement of arboreal mammals across the road. Further analysis of population density, survival rates and gene flow will determine if this movement has resulted in increased population viability. Upon completion this project will compare the information costs of using more limited study designs in an attempt to identify an optimal monitoring effort.

2011-12-09 10:45 Using the theory of planned behaviour to assess the effectiveness of training on cultivation of over-harvested species

Sophie Williams*, *Bangor University and Royal Botanic Gardens, Kew;* **James Gibbons,** *Bangor University;* **Julia Jones,** *Bangor University;* **Colin Clubbe,** *Royal Botanic Gardens, Kew;*

Cultivation of wild harvested products has been proposed as a way of reducing over-exploitation of wild populations. However this will only be effective if it changes individual's behaviour. Using the theory of planned behaviour as a framework, we assessed the impact of a community training programme aiming to encourage cultivation of an over-harvested palm species (xaté - Chamaedorea ernesti-augustii). We surveyed untrained and trained participants, focusing on three primary predictors of behaviour: attitudes, subjective norms and perceived behavioural control. Regardless of training, participants perceived xaté cultivation as a profitable use of land. However, participants reported two barriers to cultivation; access to seeds and lack of local markets. Increased knowledge and perceived behavioural control among trained participants resulted in increased cultivation. Our results demonstrate training can facilitate development of skills and technical knowledge required to initiate cultivation of a new species. Training also increases perceived behavioural control. However, behavioural changes are unlikely to occur if limitations to implementing the behaviour remain. We suggest the potential barriers to implementing a new behaviour should be assessed prior to initiating a conservation intervention such as training.

2011-12-08 14:32 Do sweat the small stuff: why we should pay attention to "rare" species in biodiversity studies

South, Paul*, *University of Canterbury;* **Schiel, David,** *University of Canterbury;*

Measuring biodiversity through time is a complex business because it depends on numerous spatial and temporal factors involving the appearance and disappearance of many species. There are few ways to be "common" but many ways to be "rare" in communities. Our experimental studies in rocky intertidal communities of New Zealand show that the great majority of species are rare, cryptic or ephemeral in space or time. Unfortunately, the functional roles of most of these species are difficult to ascertain and usually overlooked. We therefore know little about the ecological or functional roles of the bulk of species that comprise communities. Here, we consider what it means to be common and rare in the marine environment, categorising species according to known functional roles, obligate associations or "neutral" species which, individually, appear to have little "function". We discuss why such considerations are important to those who collect, use and manage ecological data.

2011-12-08 11:45 Conservation implications of ecotypic differentiation in a changing climate

Souther, Sara*, *West Virginia University;* **McGraw, James B.,** *West Virginia University;*

Ecotypic differentiation of populations within a species' range can occur with respect to various environmental factors, as well as to complex gradients of these variables present in ecosystems. When ecotypic differentiation occurs such that populations are adapted to local climatic conditions, persistence of even widespread species may be threatened by climate change. We examined the effect of climate change on extinction risk of one locally climatically adapted species, American ginseng (Panax quinquefolius L.). Demographic data were collected over a 13-year period from populations that occurred across an extensive portion of ginseng's range. In total, 74 transition matrices were used to parameterize a population viability analysis of ginseng response to warming. Viability was calculated over a 70-year period for 4 warming levels, ranging from no warming to a 1.0°C increase in temperature that corresponded to a mid-range IPCC climate change scenario. Warming decreased viability and increased extinction risk. Minimum viable population size (MVP) was 300 individuals, a size greater than 84% of the 30 ginseng populations that we currently monitor. Because ginseng populations have specialized to local climatic conditions, a relatively small degree of warming increased extinction risk for all populations throughout ginseng's range. For species that form climatic ecotypes, managed relocation may be necessary to prevent climate change driven extinctions.

2011-12-08 15:15 Bringing together the aspirations of Indigenous people and conservation biologists in the vastness of arid Australia

Southgate, RI*, *Envisage Environmental Sciences;* **King, Z,** *Kanyirninpa Jukurrpa;*

Arid Australia is vast covering millions of square kilometers but people are few and dispersed mainly among Indigenous communities, mining and pastoral operations. To achieve positive conservation outcomes, it is critical to engage the residents and bridge traditional knowledge with western science. A framework is suggested in which the view of the environment held by local people is clarified and mapped. Methods to investigate and monitor need to be culturally appropriate and simple to implement resulting in meaningful information that can be compared across regions. Forms of management need to meet local expectations with the right people looking after the right land and leading to low intensity manipulative or custodial approaches. This presentation brings together two perspectives, one developed from working primarily with the Martu Indigenous people in northwest Western Australia with a focus on the needs of Traditional Owners, the other from working primarily within the world of western science.

2011-12-08 18:30 Bounded rationality and the design of protected areas systems: a case study from Uruguay

Soutullo, A*, *Museo Nacional de Historia Natural;* **Bartesaghi, L,** *Dirección Nacional de Medio Ambiente;* **Mejía, P,** *Dirección Nacional de Medio Ambiente;* **Nin, M,** *Museo Nacional de Historia Natural;* **Ríos, M,** *Museo Nacional de Historia Natural;*

The process of taking decision is constrained by the information available, the analytical capability of processing that information, and the amount of time available for making decisions. Thus, decision-makers are often satisficers, seeking for a satisfactory solution rather than an optimal one. The process of designing a system of protected areas requires making decisions over three main questions: 1) where new protected areas are to be created, 2) what should be the objectives and the spatial design of each of these areas, and 3) how should they be managed to meet their goals. A different set of information is needed to provide proper answers to each of these questions. Here we suggest a planning approach to the design of protected areas systems based on the concept of bounded rationality and systematic conservation planning principles, and apply it to the design of Uruguay's national system of protected areas (NSPA). Conservation objectives for each of the 12 extant protected areas are identified, as well as the location of the 24 new areas that are to be created to meet the objectives of the NSPA.

2011-12-08 18:30 Linking national and local objectives in the design and management of protected areas: three case studies from Uruguay

Soutullo, A*, *Museo Nacional de Historia Natural;* **Bartesaghi, L,** *Dirección Nacional de Medio Ambiente;* **Mejía, P,** *Dirección Nacional de Medio Ambiente;* **Nin, M,** *Museo Nacional de Historia Natural;* **Ríos, M,** *Museo Nacional de Historia Natural;*

The management of protected areas that integrate a system of reserves should seek to ensure that system-level objectives are met. If protected areas systems are designed following systematic conservation planning principles, each of the areas that integrate the system have a unique role to play in order to fulfill the system' objectives. Thus, the process of designing these areas, setting their conservation objectives, and planning their management has to ensure that by meeting the targets of the areas' management plans the system's objectives are properly met. Here we describe the process, tools and principles applied to the design and planning of three reserves that integrate Uruguay's national system of protected areas (NSPA), and the lessons learnt. These areas include both public and private lands, and encompass a range of habitat types, including woodlands, grasslands, wetlands, and coastal and marine ecosystems.

2011-12-06 10:45 Functional Connectivity and the Resistance Surface

Spear, SF*, *The Orianne Society;* **Balkenhol, N,** *Leibniz-Institute for Zoo and Wildlife Research;* **Fortin, M-J,** *University of Toronto;* **McRae, BH,** *The Nature Conservancy;* **Scribner, K,** *Michigan State University;*

Resistance surfaces are an increasingly common method to measure functional connectivity. Resistance surfaces represent hypothesized relationships between landscape features and functional connectivity, and are based on underlying biological functions such as relative abundance or movement probabilities in different land cover types. The biggest challenge for calculating resistance surfaces is assignment of resistance values to different landscape features. We discuss the biological assumptions and considerations that influence analyses using resistance surfaces, such as the relationship between gene flow and dispersal, how habitat suitability may influence animal movement, and how resistance surfaces can be translated into estimates of functional landscape connectivity. Finally, we outline novel approaches for creating optimal resistance surfaces using either simulation or computational methods. These approaches have the potential to improve corridor analysis, but they also create new challenges. We conclude that no single approach for using resistance surfaces is appropriate for every situation. We suggest that researchers carefully consider objectives, important biological assumptions and available parameterization and validation techniques when planning biological corridors.

2011-12-09 17:00 A Global Conservation Assessment of Dung Beetles: Sampled Red List Approach

Spector, SH*, *American Museum of Natural History;* **Nichols, ES,** *Columbia University;* **Davis, ALV,** *University of Pretoria;* **Forgie, S,** *Landcare Research;* **Josso, JF,** *l'Association Catharsius;* **Frolov, A,** *Zoological Institute Russian Academy of Science;* **Krell, FT,** *Denver Museum of Nature and Science;* **Larsen, T,** *Princeton University*

We present the results of a global conservation assessment of Scarabaeine dung beetles, a widely proposed focal taxon for biodiversity inventory and monitoring. A randomly selected sample of 1500 species (24.7% of the 6060 valid, described species) were assessed using the IUCN Red List Categories and Criteria, Version 3.1. For each species, historical range, current distribution, habitat requirements, and threat vectors were determined. Globally, 10.6% of dung beetle species are threatened with extinction. This is likely an underestimate given the additional 5.9% of species that are known to be on trajectories toward threatened status, and the significant proportion of previously widespread species for whom recent population or distribution information is unavailable. Narrow-range endemic, host-specialist, and tropical forest-inhabiting species were threatened at higher rates than the total fauna. Also of concern are projections that the functional consequences of dung beetle declines may be non-linear and more severe than the proportion of threatened species would suggest.

2011-12-08 18:30 Evaluation of the fruit production of three arecacea species in different amazon floodplain environments

Sposito, RC*, *Instituto de Desenvolvimento Sustentável Mamirauá;*

Palm trees are one of the largest plant families of the world and represent an important source of products that can be used in several ways by the man. This study aimed to compare the fruit production of three Areacacea species, Euterpe precatoria; Scheelea pharelata and Astrocaryum murumuru, between two environments, high and low floodplains found in Mamirauá Reserve, Amazonas, Brazil. We randomly selected 10 individuals per specie distant at least 100m from each other in each floodplain type. We collected, counted and weighed their bunch and fruits/seeds. In the high floodplain E. precatoria presented an average of 2.7 bunches with 16.7kg each one and 8,404 fruits/bunch. In low floodplain, the values were, respectively 2.4; 12.4kg; 6,454. S. pharelata presented in the high floodplain an average of 1.8 bunches and the mean weight of 10 seeds was 0,570kg with an average of 171 fruits/bunch. In low floodplain the values were, respectively 2.1; 0,568kg; 163. In the same way the values encountered to A. murumuru were 2.2; 0,125kg; 227 in the high floodplain and 3.1; 0,141kg; 128 in the low floodplain. T-test (α =0,05) indicated significant difference between both environments types regarding the number of fruit/bunch produced by A. murumuru. These results in addition with further abundance and population structure analysis will enable to predict the regional fruit production capacity of these resources and the ecological potential for management of these important species.

2011-12-07 11:26 Sell It to Save It- A community trade campaign working with communities in Kenya and Australia to benefit wildlife and people.

Squires, B*, *Wildlife, Conservation and Science;*

The Beads for Wildlife community trade campaign aims to assist people and save wildlife in Northern Kenya. Zoos Victoria (ZV) is working with the Northern Rangelands Trust (NRT) to help alleviate community-driven threats to the region's wildlife. Working with four NRT community conservancies, the first step in this ambitious project is to provide incentives for people to save wildlife. Zoos Victoria has helped establish and run a community trade project to engage 500 conservancy women with conservation and at the same time providing them with income. By making traditional beadwork that ZV sells in Australia, the women have earned more than AUD.140,000, leading to increased food security, better health and education outcomes, and decreased household conflict. This is directly benefiting wildlife through decreased grazing competition between livestock and wildlife. These outcomes have become powerful channels to communicate with people about sustainable resource management, and protection of wildlife and habitats. In Australia, ZV's call-to-action campaign engages Australian communities with helping people and wildlife in northern Kenya, through linking Plains Zebras in our zoos with Grevy's Zebra in Kenya. The results so far demonstrate the power of working with

communities to tackle biodiversity issues.

2011-12-08 18:30 Rare plant populations on degraded and natural habitat do not respond equally to mitigation of pest and pathogen pressure

Squires, S, *of Environment and Conservation, Government of Newfoundland and Labrador, Corner Brook, NL, Canada;* **Hermanutz, L*,** *Department of Biology, Memorial University, St. John's, NL, Canada A1B 3X9;* **Dixon, P,** *3Agriculture and Agri-Food Canada, St. John's, NL, Canada;*

Populations of the Limestone Barrens endemics, Braya longii (endangered) and B. fernaldii (threatened) have declined since 1998. Stage based transition matrices created from nine years of demographic data and summarized into deterministic projections suggest additional declines over the next 10 years for each Braya species. The viability of populations on natural substrate is vulnerable to increased mortality of large, flowering plants, where as populations on anthropogenically degraded substrate are vulnerable to declines in seedling survival and seed production. Between 2003 and 2006 the impacts of a non-native insect and pathogenic threats on Braya reproduction and survival was determined. Management scenarios were explored by adjusting the baseline viability models to reflect the survival rates of unaffected plants. For populations on natural substrate, the removal of the insect improved population growth rate more than the removal of a pathogen (B. longii- 8.0% vs 1.8%, B. fernaldii- 10.0% vs 0.3%), where as on anthropogenically degraded substrate the removal of a pathogen improved the population growth rate more than the removal of the insect (B. longii- 1.8% vs 1.1%, B. fernaldii- 10.7% vs 7.4%). Intervention, including the prevention of mortality due to pests and the restoration of populations will help improve long-term population viability.

2011-12-07 17:00 Identifying indicators of illegal behaviour: carnivore killing in human-managed landscapes

St. John, F.A.V.*, *Bangor University;* **Keane, A.M.,** *University College London;* **Edwards-Jones, G.,** *Bangor University;* **Jones, L.,** *n/a;* **Yarnell, R.W.,** *Nottingham Trent University;* **Jones, J.P.G.,** *Bangor University;*

Managing natural resources often depends upon influencing people's behaviour. Effectively targeting interventions to discourage environmentally harmful behaviours is challenging because those involved may be unwilling to identify themselves. Non-sensitive indicators of sensitive behaviours are therefore needed. Previous studies have investigated people's attitudes, assuming attitudes reflect behaviour. There has also been interest in using psychological bias resulting from people's tendency to imagine that others are more like themselves than they really are, to identify those involved in sensitive behaviours. However, there has been little attempt to test the value of potential indicators. We use the randomised response technique, designed for investigating sensitive behaviours, to investigate potential indicators of human-wildlife conflict. We estimate the proportion of farmers in north-eastern South Africa killing five carnivore species, and investigate indicators of carnivore killing using a modified logistic regression model. One-fifth of farmers admitted to killing leopards in the last year. Farmers' attitudes towards carnivores and their estimates of their peers' carnivore killing behaviour predict the likelihood of farmers killing carnivores. Attitude and bias in estimates of peer behaviour may be useful indicators of people's involvement in illicit behaviours. Such information can be used to identify groups of people to engage in behaviour-change interventions.

2011-12-07 16:45 Can pocket parks support suburban birds in a compact city?

Stagoll, K*, *Fenner School of Environment and Society, Australian National University;* **Manning, AD,** *Fenner School of Environment and Society, Australian National University;* **Knight, E,** *Fenner School of Environment and Society, Australian National University;* **Fischer, J,** *Faculty of Sustainability, Leuphana University Lueneburg;* **Lindenmayer, DB,** *Fenner School of Environment and Society, Australian National University*

The desire to improve urban sustainability is motivating many city planners to adopt growth strategies that increase residential density, leading to substantial changes in the urban form. In Australia, for example, Canberra is moving from a "garden city" approach of large residential blocks with extensive private open space, to a "compact city" plan of small blocks with high levels of impervious surface cover. What affect this change will have on biodiversity remains unclear, but it is expected that the role of public green space in providing wildlife habitat will become critical. In our study, we explored the role of suburban "pocket" parks as habitat for birds, and how this role changes with different urban forms. We looked at the effects of several scales, including the vegetation structure within the park, the amount of green space within the neighbourhood, and the housing structure of the suburb. We also considered the importance of physical connectivity between the park and other public green space. We conclude that pocket parks, especially those retaining large native trees, (1) provide foraging and nesting resources for a wide diversity of birds, (2) help maintain a continuum of stepping stones throughout suburban areas, and (3) may function as suburban refugia as cities become more compact.

2011-12-07 10:30 Conservation translocations: from reintroduction to assisted colonisation.

Stanley Price, MR, *University of Oxford;* **Seddon, P*,** *University of Otago;* **Moehrenschlager, A,** *Calgary Zoo*

Reintroductions have developed greatly over the last 40 years from, at worst, irresponsible releases to rigorously designed and monitored scientific practice. Quantitatively, reintroductions have increased both absolutely and in in the diversity of taxa reintroduced, thereby constituting a significant element in the conservation tool box. This presentation will briefly review the development of reintroduction science and practice, proposing a new typology for the array of translocations for conservation purposes. But, reintroduction science and practice must now prepare for the challenges and opportunities afforded by climate change and other major threats to species' persistence. This presentation will explore the issues around future reintroductions and the proactive moving of species for conservation purposes – 'assisted colonisation'. We will explore the potentials for reintroduction in the context of forthcoming major change in many contemporary communities and the prospect of novel climates and ecosystems; we will then outline the consequent novel considerations around policy, sociology and ethics, as well as the need to advance urgently our knowledge and capacity in diverse areas such as risk and decision-making, genetics and micro-evolution, priority-setting, reintroduction objectives and measures of success, and the requirement for climate models at appropriate scale for reintroductions.

2011-12-07 18:15 Does research and conservation management reduce lifetime reproductive success in a long-lived seabird?

STEIN, AM*, *Zoology Department, University of Otago, PO Box 56 Dunedin 9054;* **van Heezik, Y,** *Zoology Department, University of Otago, PO Box 56 Dunedin 9054;* **Seddon, PJ,** *Zoology Department, University of Otago, PO Box 56 Dunedin 9054;*

The analysis of long-term life history data can be used to calculate lifetime reproductive success. Individuals can vary greatly in productivity according to life history traits, and a relatively low proportion of individuals may actually contribute genetically to the next generation. It is common for vulnerable or threatened species to be subject to consistent and high levels of disturbance for scientific studies and conservation efforts. These efforts often necessitate the handling of birds, eggs, and their young, or involve more intrusive activities such as blood sampling, stomach sampling and TDR deployment. It is often unknown what impact these activities may have on the species that such research is intending to benefit. The aim of this study is to determine which life history components, including interventions for scientific research and conservation management, influence lifetime reproductive success in yellow-eyed penguins (Megadyptes antipodes) on the Otago Peninsula, New Zealand. This will be achieved by analysing a long-term dataset of life history and breeding data recorded from individual birds.

2011-12-07 18:00 Orang-utan persistence under global change requires a multi-faceted conservation strategy

Stephen D. Gregory*, *The Environment Institute and School of Earth & Environmental Sciences, University of Adelaide, Adelaide, South Australia, Australia;* **Damien A. Fordham,** *The Environment Institute and School of Earth & Environmental Sciences, University of Adelaide, Adelaide, South Australia, Australia;* **Benoit Goossens,** *Biodiversity and Ecological Processes Group, Cardiff School of Biosciences, Cardiff University, United Kingdom & Institute for Tropical Biology and Conservation, Universiti Malaysia Sabah, Sabah, Malaysia;* **Marc Ancrenaz,** *Kinabatangan Orang-utan Conservation Project, Sabah, Malaysia;* **Alfred Raymond,** *Borneo Conservation Trust;* **Laurentius Ambu,** *Sabah Wildlife Department, Kota Kinabalu, Sabah, Malaysia;* **Barry W. Brook,** *The Environment Institute and School of Earth & Environmental Sciences, University of Adelaide, Adelaide, South Australia, Australia;*

Major threats to globally endangered Malaysian orangutans, including habitat degradation and fires, have caused an estimated 50% decline in their population over the last 60 years. Most remaining populations now live outside wildlife sanctuaries, in lowland forests exploited for timber production or remnant patches in a matrix of agricultural land. Forecast climate change is predicted to amplify these threats by increasing fire frequency and intensity. Using aerial nest counts collected over 8 years (2002-2010) together with expert advice and the most up-to-date climate and landscape spatial data, we coupled species distribution models and stage-structured, spatially explicit population models to examine the effect of land use and climate change and different conservation strategies on the persistence of orangutan populations in the Malaysian province of Sabah. We assessed model performance using data from independent aerial nest surveys collected by a different protocol. By comparing scenarios, we show that land use change and changing fire frequency threaten to drive orangutan population declines. Their long-term persistence will require a multi-faceted conservation strategy that expands habitat availability through carefully planned and managed land purchasing initiatives.

2011-12-07 11:15 Winter migration patterns and habitat use by adult northern fur seals: filling in gaps to aid conservation and management of a declining species

Sterling, JT*, *(1) National Marine Mammal Laboratory, 7600 Sand Point Way NE, Seattle, WA, 98115;* **Springer AM,** *(2) Institute of Marine Science, University of Alaska Fairbanks, Box 757220, Fairbanks, AK, 99775 ;* **Iverson SJ,** *(3) Department of Biology, Dalhousie University, Halifax, Nova Scotia, Canada, B3H4J1;* **Johnson SP,** *(4) Johnson Veterinary Service, 8402 Quail Canyon RD, Vacaville, CA 95688;* **Pelland N,** *(5) School of Oceanography, University of Washington, Box 357940, Seattle, WA 98195-7940 ;* **Johnson DS,** *(1) National Marine Mammal Laboratory, 7600 Sand Point Way NE, Seattle, WA, 98115;*

The northern fur seal (NFS, Callorhinus ursinus) population in Alaska is declining and information on winter migration patterns will help aid conservation efforts and management goals. A critical gap in our knowledge is understanding how and why adult males and females utilize different winter migratory habitats during their eight-month hiatus from breeding sites. This study investigated migratory movements, behavior, and habitat characteristics of adult males and females by deploying five satellite-linked conductivity, temperature, and depth data loggers on adult male NFS, and six satellite-dive recorders and four satellite transmitters on adult female NFS on St. Paul I. (Pribilof Is.) during October 2009. Initial dispersal from St. Paul I. occurred between 25 October and 23 November, with most animals departing within a 10-day period. Dispersal patterns, winter foraging habitats and diving behavior differed between sexes. Environmental determinants, such as winter cyclones, upwelling features, mixed-layer depth and lunar cycle explained some of the movement and diving variability. We speculate that as winter winds intensify, fur seal prey fields deepen and become dispersed leading females to migrate farther south and east to more accessible prey fields while males, because of their larger size and physiological capabilities, can remain in regions farther north and exploit prey below the surface mixed layer.

2011-12-07 11:45 Citizen Involvement in Urban Biodiversity Conservation - opportunities and obstacles in New Zealand

Stewart, G*, *Lincoln University;* **Meurk, C,** *Landcare Research;*

There are hundreds of community conservation groups in New Zealand cities. These may involve stream-care, legal trusts that manage million dollar predator-fenced parks, pest control, planting, nature walking and political lobbying. Indigenous peoples, with special relationships to the land are often carrying out projects on their tribal areas. Many groups work in partnership with local government who provide tools, plants and financial grants. This is generally in line with policies to support local action as opposed to regulation and council-led action. In some few cases a body corporate of a subdivision may have to carry out certain environmental management - by local residents or through commercial contractors. Obstacles arise from natural/intrinsic factors, community value conflicts or bureaucratic failures. The main natural barriers result from New Zealand's idiosyncratic biogeography and vulnerability of its ancient and/or depauperate biota to introduced competitors and predators. Secondly, not all members of the community want to see their city dominated by indigenous species and often the supportive silent majority is not as visible or influential as the few angry knockers. Some council's fail to recognise this dynamic and have inadequate consultation processes. Nevertheless, the number of conservation groups continues to grown and there are endless opportunities to enhance nature through pest control, tree planting, weeding and education.

2011-12-06 10:45 Measuring effectiveness of law enforcement in reducing threats to wild tigers and their prey: improving the interpretation of patrol-based data

Stokes, EJ*, *Wildlife Conservation Society;* **Burn, RW,** *University of Reading;* **Underwood, FM,** *University of Reading;*

Wild tigers are in a critical state with numbers at an historical low of 3,200. Poaching of tigers for their commercial value, and of their prey are major limiting factors in the tigers' recovery. Anti-poaching patrols (APP) are one of the principal means of controlling poaching. Given the limited resources available for tiger conservation it is vitally important to monitor the effectiveness of conservation measures. In 2007, standardized data collection protocols for APP were established in key tiger sites to evaluate and improve enforcement: APP rangers collect data on poaching encounters as well as details of the patrol. Whilst these data can be routinely and cheaply collected they present a considerable challenge to traditional statistical methods. We present guidelines for designing patrol-based data collection programs and introduce new analytical tools that will enable the use of patrol data to provide robust measures of the impact and effectiveness of APP. Through case-studies from tiger sites, we illustrate how these tools can address key problems in patrol data, including a lack of randomness, variation in patrol effort and a lack of independence between APP and the process being monitored. Finally, we highlight the potential application of these tools for evaluating current global efforts to recover tigers, and, more broadly, for any conservation situation employing patrol-based interventions.

2011-12-07 11:30 High Conservation Value Forest Assessments in Boreal Canada

Strittholt, JR*, *Conservation Biology Institute;*

The boreal region of Canada has been the focus of numerous High Conservation Value Forest (HCVF) assessments. With much of the biome relatively intact, Canada offers unique opportunities and challenges in assessing and implementing the HCVF concept. Not only is HCVF fundamental to forest certification throughout Canada, it has also become an important component of the historic Canadian Boreal Forest Agreement with the main impetus of this agreement being the protection of woodland caribou throughout Canada. Taking advantage of the web-based Boreal Information Centre and newly launched Forest Stewardship Council Gateway, many of the foundational spatial datasets supporting HCVF assessments and case study results are readily available to users via the Internet. These two online resources with examples of data, case studies, and basic system functionality will be reviewed.

2011-12-08 18:30 Wildfire effect on an endangered island bird: The case of the Gran Canaria blue chaffinch (Fringilla teydea polatzeki)

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Habitat destruction is identified as the main threat to biodiversity. Among all factors causing habitat disturbance, wildfire is recognized as one of the most important ecological forces that influences not only the physical environment but also the structure and composition of floral and faunal communities. These processes are often translated in population bottlenecks, which occur frequently in threatened species and result in loss of genetic diversity and evolutionary potential. In this study, we analyzed the genetic consequences of demographic bottleneck produced by a forest fire that reduced the population of the endangered blue chaffinch which inhabits the island of Gran Canaria (Fringilla teydea polatzeki) to approximately 122 individuals. Analysis of nine microsatellite loci revealed that, while a decline in census was observed during the bottleneck, there was no observed excess of heterozygosity nor evidence in decline in allelic richness, two characteristic bottleneck signatures. On the contrary, we observed that the Gran Canaria blue chaffinch has retained significant levels of genetic diversity and show no evidence for inbreeding depression either before or after the bottleneck. The results from this study have important implications for the conservation of this endangered subspecies and provide insight concerning management strategies to prevent its extinction.

2011-12-08 18:30 Mate Choice and Population Structure of the Water Toad (Bufo stejnegeri) in South Korea

Suk, Chamoon*, *Seoul National University;*

Water toads (Bufo stejnegeri) are an unusual, peculiar species of toad that are found in Korea and northeastern China. As their name suggests, they are highly aquatic, very unlike other species of toads. Although the species has a wide distribution in Asia, its status within Korea is unclear. The toads appear rare, confined to limited ranges in eastern Gyeonggi-do and Gangwon-do. They are found in woodland riparian areas, at elevations from 200 to 700 metres. The toads form breeding pairs in the autumn, and overwinter amplexed in streams covered by ice, apparently ready to oviposit early in the spring. The water toad is typically nocturnal but is also active during the day during summer rains. I am studying their mate choice, population structure, and MHC variation in relation to disease resistance. My research should provide more accurate information about the toad's natural history and susceptibility to disease that should contribute to the development of management strategies that will protect this species.

2011-12-08 10:30 Building an integrated platform for projecting and monitoring persistence of wildlife populations faced with roads and traffic

Sunnucks, P*, *Monash University;* **Taylor, AC,** *Monash University;* **Amos, N,** *Monash University;* **van der Ree, R,** *Australian Research Centre for Urban Ecology, Royal Botanic Gardens Melbourne;*

Molecular ecology as a discipline was born around 20 years ago. It makes contributions to the most effective approaches to tackle some of the most important and difficult issues in ecology such as population connectivity, demography and evolutionary change, and is increasingly efficient and useful. However, it has been surprisingly difficult to achieve substantial uptake in ecology and environmental management, including in road ecology. It seems likely that the molecular population biology community has not managed to make it sufficiently understood what the field has to offer in terms of outputs, costs and benefits. But we can make a new start: recent developments in two major areas are causing a second wave of rapid increase in the utility and cost-effectiveness of molecular population biology approaches: population modelling, and genomics fuelled by new DNA sequencing technologies. We consider the example of the challenges and potential approaches to arguably the most important yet difficult question in ecological management: how to project and monitor population persistence, with particular emphasis on wildlife populations faced with roads and traffic. I conclude that we can and should build an integrated platform that can deliver rapid, cost-effective solutions to applied problems in ecology.

2011-12-08 10:30 Ownership, poverty alleviation and conservation: the dolphin-watching industry in Chilika lagoon, India

Sutaria, D*, *Foundation for Ecological Research, Advocacy and Learning;* **Marsh, H,** *James Cook University;*

Globally, wildlife tourism is emerging as a significant human-animal interaction, often directed towards income generation. Transforming such tourism into a conservation tool is a serious challenge. Chilika lagoon, India harbors a small population of Irrawaddy dolphins (Orcaella brevirostris). People (~200,000) from 142 villages, mainly fishers, depend on the lagoon's resources for multiple needs. In 1986, local fishers initiated a dolphin-watching industry in the Outer channel (30sqkm) of the lagoon. The tourist fleet of 450 boats serves as a source of alternative income. In order to identify opportunities for conservation, we assessed fishers /'tourist-boat operators' perceptions towards dolphins and their socio-economic well-being by conducting 400 semi-structured interviews in 44 villages, analyzed tourist log-book data between 2004 and 2006, and conducted 65 questionnaires. The interviews reveal a direct dependency between local communities and dolphin tourism that mimics the strength of their linkage to fishing. We demonstrate that proximity of village to dolphin hotspots; tourist-boat ownership, and age positively influence individual perceptions towards dolphins. Interestingly, growth of the local tourism has been self-limiting, due to conflicts over ownership and access to fishing areas and dolphin hotspots. Our results underline the importance of understanding local socio-political processes and incorporating them into conservation planning of endangered species.

2011-12-07 11:30 Can we construct a comprehensive marine reserve system just using environmental domains?

Sutcliffe, P.R.*, *University of Queensland;* **Klein, C.J.,** *University of Queensland;* **Possingham, H.P.,** *University of Queensland;*

In many instances around the world, knowledge of marine systems is limited and the cost of data is high. Therefore, for the design of systems of marine reserves, we need to know whether more readily available data is enough for comprehensive and representative reserve system design. Here we used environmental data, collated at a 0.01 degree resolution, to develop environmental domains on the Great Barrier Reef, Australia. Then we developed a reserve system based on these environmental domains, using Marxan. We tested the representation of biological features collected at 1189 sites from the Great Barrier Reef seabed in this reserve system. We found that 411 out of 842 species reached their conservation target using this environmental domain approach, and only 152 species were under half their target. This supports the use of environmental domains to develop reasonable reserve systems where biological data is limited, that could be modified later as more data is assembled.

2011-12-08 18:30 Tourist perception of the 2010 coral bleaching event in Mu Koh Chang, Thailand

Sutthacheep, M*, *Ramkhamhaeng University;* **Pengsakun, S,** *Ramkhamhaeng University;* **Klinthong, W,** *Ramkhamhaeng University;* **Sangmanee, K,** *Ramkhamhaeng University;*

The severe mass coral reef bleaching event in 2010 has led to coral mortality in the Gulf of Thailand. The present study aimed to assess socio-economic impacts and tourist perceptions of the 2010 coral bleaching event in Mu Koh Chang, the eastern Gulf of Thailand, based on questionnaire surveys, secondary data sources and interviews of key informants. The survey revealed that 52% of Thai tourists interviewed were aware of the 2010 coral reef bleaching event. About 69% of tourists in the sample were their first SCUBA diving/snorkeling at Mu Koh Chang and they mentioned that the diving was as good as they expected before coming to the islands. Only 9% of tourists who have visited Mu Koh Chang before said that

SCUBA diving/snorkeling was not as good as they expected because of coral bleaching. Most tourists were happy to pay the extra money to see better coral reef condition in Thailand. About 95% of tourists interviewed said that they would like to visit Mu Koh Chang again. A proper management plan should be implemented with close collaboration of Mu Koh Chang National Park and private tourism companies in order to ensure sustainable tourism in Mu Koh Chang and its vicinity.

2011-12-09 17:45 Drift and selection result in greater loss of adaptive MHC diversity compared to loss of neutral genetic diversity following population bottlenecks.

Sutton, JS*, *University of Otago;* **Nakagawa, S,** *University of Otago;* **Robertson, BC,** *University of Otago;* **Jamieson, IG,** *University of Otago;*

Despite over 15 years of research, empirical studies offer highly contradictory explanations of the relative roles of selection and genetic drift acting on genes of the functionally important major histocompatibility complex (MHC) during bottlenecks. We take a unique meta-analytical approach to examine the effects of bottlenecks on MHC polymorphism. Contrary to the majority of previous studies, we show that the consequences of genetic drift and selection result in overall loss of MHC polymorphism that is approximately 15% greater than loss of neutral genetic diversity. We suggest that post-bottleneck patterns of MHC diversity may be more reflective of other functional gene complexes (on which both selection and drift act) compared to patterns of putatively neutral genetic diversity (which reflect drift, but not selection). Our results are important for conservation managers wishing to maintain adaptive potential of small, threatened populations, particularly in cases where previous research has focused on neutral markers as surrogates for genome-wide diversity. However, rather than viewing inexpensive neutral markers, such as microsatellites, as potentially misleading proxies for assessing loss of adaptive variation in bottlenecked populations, we suggest that they could be considered conservative estimators of the true loss of functional genetic diversity.

2011-12-08 18:30 Experience and Results of Conservation of the White-headed duck (Oxyura leucocephala, EN/IUCN) in Russia

Svetlana Nimirskaya*, *Deputy leader of Environmental Education ;* **Evgeniy Murzakhanov,** *Leader of project ;* **Andrey Bazdyrev,** *Member of project;*

Russia – is one of the 4 key countries of habitation of the white-headed duck (Oxyura leucocephala, EN/IUCN) in the world. Here nests not less than 500 birds and migrates not less than 4000 birds of this species. In 2006-2011 the team of the conservation centre «Strizh» has been realizing the projects on conservation of the white-headed duck in 46 key habitats in Russia. The conducted work is unique, bases on the complex approach and wide involvement of the stakeholders. Methods: scientific investigations, selection of IBA, monitoring of the number, interaction with the authorities and NGO, raising the information awareness level of the local population, establishment and support of the children's clubs of observation of birds. Results of project: the modern number and distribution of the white-headed duck as well as its change during the last 50 years were revealed; the key factors and threats for the white-headed duck population in Russia were determined; more than 35 thousand people were involved into the activity on the conservation of the species; a protected area on the key place of the white-headed duck nesting in Western Siberia is founded; the level of the information awareness of the local communities was raised from 3% to 86%; the National Working Group on the conservation of the white-headed duck in Russia was established; the National Action Plan on the conservation of the white-headed duck was developed.

2011-12-08 18:30 Population and Community Characteristics of Wildlife Rescued During the Expansion of the Panama Canal

Swan, JL*, *Department of Forestry;* **Carver, AD,** *Department of Foresty;* **Correa, NJ,** *Asociación Panamericana para la Conservación ;* **Nielsen, CK,** *Cooperative Wildlife Research Laboratory;*

Since the ceding of the Panama Canal from the United States to the Republic of Panama in 1999, human development has accelerated in Panama, resulting in the loss of tropical rainforest habitat and declines in wildlife populations. Researchers from Southern Illinois University Carbondale and a local Panamanian conservation NGO (Asociación Panamericana para la Conservación, APPC) have partnered to address wildlife conservation challenges in Panama, including wildlife rescue in the Canal Zone due to the Third Locks Expansion Project. Herein, we summarize these wildlife rescue efforts, including human labor required and wildlife species composition. During 2006-2009, 1,343 wild animals were rescued from 8 core areas along the canal; 1,179 animals were successfully relocated to protected areas or secondary forests. Of the rescued wildlife, 425 were protected under Panamanian law, 771 were IUCN Red Listed, and 528 CITES listed. Of the rescues, 40% were reptiles, 37% mammals, 10% birds, 9% amphibians, 4% insects, and 1% fish. We also used these data to assess the relationship between wildlife community characteristics (e.g., biodiversity, relative abundance) and habitat attributes of rescue sites (e.g., % forest cover, distance to roads). Our analyses provide rare insight into wildlife rescue operations and relationships between wildlife community characteristics and habitat in a Neotropical environment.

2011-12-07 17:15 Pathogen spillover from greenhouses and declines of North American bumble bees

Szabo, ND*, *University of Ottawa;* **Kerr, JT,** *University of Ottawa;*

Bumble bee species in the subgenus Bombus sensu stricto have recently undergone dramatic declines in North America. Commercial bumble bees began to be supplied for vegetable pollination in greenhouses shortly before the declines of these species were noted and it has been shown that commercial bumble bees and wild bumble bees near greenhouses have high pathogen loads. This has led to speculation that pathogen spill over from greenhouses is the main cause of the decline of Bombus species. We examined this hypothesis using a database of bumble bee occurrence records compiled from museum, university and government collections, and greenhouse data from Canadian and American Agricultural Censuses. Our results indicate that patterns of range loss for these species are not consistent with the hypothesis that pathogen spill over from greenhouses is a major cause of decline. These results suggest that future research and conservation efforts should be directed towards other potential causes of decline of these important pollinators.

2011-12-08 12:00 From artisanal fishing vessels to space: using all the available tools to know more about the endangered franciscana dolphin (Pontoporia blainvillei)

Szephegyi, MN*, *Cetaceos Uruguay; Facultad de Ciencias;* **Franco Trecu, V,** *Cetaceos Uruguay;* **Passadore, C,** *Cetaceos Uruguay;* **Costa, P,** *Cetaceos Uruguay;* **Dimitriadis, C,** *Cetaceos Uruguay;* **Laporta, P,** *Cetaceos Uruguay;* **Abud, C,** *Cetaceos Uruguay;*

By-catch has become the biggest threat to small cetaceans in the world, and Franciscana dolphin (Pontoporia blainvillei) is not out of this threat. Considered the most endangered dolphin in the South-western Atlantic, it is caught in artisanal fishing nets all along its distribution. However, this interaction is not completely known in Uruguay, neither the habitat use it makes of the coast, both basic requirements to design management strategies if needed. Here we present preliminary results from the joint work with artisanal fishermen from the Uruguayan coast, where they voluntarily registered the dolphin by-catch as well as fishing data. In 3060 fishing events monitored (2006-2008), 162 franciscanas were caught, with maximum in spring (N=73) and minimum in winter (N=17), representing an annual mortality of 289 (95% CI: 266-350). GLM analysis suggests that soaking net time, number of nets and depth are the main variables significantly affecting by-catch. This information is being complemented with remotely sensed information to obtain habitat use models. After this joint work experience, we can affirm fishermen inclusion along the daily research process, strengthened with interactive workshops, provides previously unknown information, but also generates a strong bond allowing the discussion and even joint design of management strategies in the future.

2011-12-07 14:15 From Pattern to Process -- Advancing the science and practice of large scale conservation around the globe.

Tabor, GM*, *Center for Large Landscape Conservation;*

In 1987, the Brundtland Commission report ("Our Common Future" - the United Nations Environmental Perspective to the Year 2000 and Beyond) suggested that 12% of a jurisdiction should be protected for conservation.

While the 12% goal was ambitious at its time, this arbitrary threshold has since been used by the majority of governmental bodies as a justified ceiling for conservation and not as a foundation to build upon. In the past quarter century, conservation science and global ecological monitoring continue to confirm the declining dashboard indicators on the health of the natural world. With wholesale climate change impacts looming, not only does the status of biodiversity appear on the ropes, so does the influence and ambitions of the conservation community. Large landscape conservation approaches have emerged as a conservation necessity to ensure species protection and the integrity of ecological processes. These efforts by well design encourage the sustainability of human livelihoods and prosperity. There is growing discourse within the conservation science community that 50% for nature is ecologically realistic and scientifically sound; however, advancing this agenda faces the challenge of societal opprobrium. This presentation provides an overview of large landscape successes, some of the key science that was marshaled in these efforts, and the strategies to gain public acceptance. On the shoulders of these exemplars, conservation efforts may yet work at the scale nature functions.

2011-12-08 18:30 Population and Density Estimate of Black Rat (Ratts rattus) in Mangrove Forest

Taher Ghadirian*, **Mahmood Karami**(2), **Afshin Danehkar**(2) & **Mahmood Reza Hemami**(3)

(1) Science and Research Branch, Islamic Azad University, Tehran, Iran; (2) Faculty of Natural Resources, University of Tehran, Karaj, Iran; (3) Department of Natural Resources, Isfahan University of Technology, Isfahan, Iran

Population and density estimate of Black Rat in Mangrove forests was conducted by two independent procedure including Seber-Jolly and Catch-Effort Methods. A selected trapping area with 15 hectare area was studied. We used Color earrings and numerical rings for marking the captured individuals. Seber-Jolly method was performed in 7 steps which population for steps 2 to 6 were estimated 68.5, 96.9, 105.8, 61.7 and 73.6 respectively with density of 4.1 to 7 Rat/ha. Catch-Effort method performed in 6 steps and population estimate was 89.3 with density of 5.9 Rat/ha. For comparing the population estimates with the total population captured in the trapping area, the total number of rats were 96 with density of 6.4 Rat/ha. Considering the results, around 4-7 Black Rats survive in every single Hectare of Mangrove forests of study site, which states low differences between the results of Seber-Jolly, Catch-Effort and total count methods. All of these methods appear to be suitable for population-estimate for this species in this habitat, but because of lower Standard Error(SE) of Catch-Effort method, it is the most recommended to study Black Rats in Mangrove forests. Black Rat is an exotic and pest species in this habitat and removal them for scientific reasons would not damage their population or the ecosystem. The other advantages of the Catch-Effort method is its low cost and efficiency which could lead us to a total population estimate of the area.

2011-12-08 10:54 Mussel and dogwhelk distribution along the north-west Atlantic coast: testing predictions from the abundant-centre model

Tam, J.C.*, *Victoria University of Wellington;*

We performed the first test of predictions from the abundant-centre model using north-west Atlantic coastal organisms. We tested the hypotheses that the density of intertidal mussels (Mytilus edulis and M. trossulus) and dogwhelks (Nucella lapillus) would peak at an intermediate location along their distribution range. We also assessed the latitudinal variation in critical aerial exposure time. We measured mussel density and dogwhelk density in 60 wave-exposed rocky intertidal sites spread evenly in six regions from Newfoundland to New York. Critical aerial exposure times were determined using online data. Density data for M. edulis and N. lapillus provided limited support for an abundant-centre pattern and M. trossulus showed a clear ramped-south distribution. Critical aerial exposure times were negatively correlated with overall mussel density. This suggests that the level of physiological stress experienced by mussels during summer and winter low tides might partially explain the observed patterns in mussel abundances. Dogwhelks, which prey on mussels, seem to respond positively to prey density at the regional scale. Our study supports the notion that, while the abundant-centre model is a useful starting point for research and conservation efforts, it often represents an oversimplification of reality.

2011-12-09 15:30 The role of legislation and formal education in the conservation of biocultural diversity

Tang, R*, *Victoria University of Wellington;* **McCarter, J,** *Victoria University of Wellington;* **Gavin, M,** *Victoria University of Wellington;*

The traditional ecological knowledge (TEK) of local people is a key determinant of the success or otherwise of biocultural approaches to conservation. However, little research has thoroughly examined means for the maintenance and revitalization of TEK, despite the fact it is at risk in the context of pervasive environmental and social change. Here we present original case study research based on qualitative methodology from Inner Mongolia and Vanuatu, examining the role of top-down governmental actions in the conservation of TEK. Specifically, we describe the enactment of a novel legislative intervention in China focusing on the revitalization of traditional institutions; and evaluate the potential of formal education systems in Vanuatu to both erode and conserve TEK.

We find that governmental instruments, such as legislation and formal education, can be effective tools for the revitalization of TEK, and have potential to strengthen the ability of local people to sustainably manage resources. However, we find there are critical barriers to the effective conservation of TEK through top-down initiatives such as these, and note the importance of considering complete cultural landscapes for the maintenance of biocultural diversity.

2011-12-06 14:15 Prioritising threat management for global biodiversity conservation

Tara Martin*, *CSIRO Sustainable Ecosystems;* **Josie Carwardine,** *CSIRO Sustainable Ecosystems;* **Trudy O'Conner,** *The Wilderness Society;* **Sarah Legge,** *Australian Wildlife Conservancy;* **Brendan Mackey,** *Australian National University;* **Hugh Possingham,** *University of Queensland;*

Biodiversity is declining at an alarming rate around the globe due to a range of threatening processes. The management of key threats to biodiversity is essential for conserving species within functioning ecosystems, but threat management actions are rarely costed and prioritised for decision-making. We present a widely adaptable and economically-grounded approach for prioritising threat management to maximise the protection of biodiversity in-situ per dollar spent. Our approach draws on empirical data and expert predictions of the likely responses of species to a set of costed management scenarios. An application to the iconic Kimberley region of north-western Australia shows that the loss of 45 mammals, birds and reptiles can be averted by managing fire, grazing and invasive species at a cost of approximately $40 million per year. Our approach is flexible and can be rapidly applied even where formal survey data is limited but expert advice is available. It delivers transparent guidance for protecting species and ecosystems and is relevant to decision-makers the world over.

2011-12-08 18:30 Community-Based Adaptive Marine Co-Management in the South Pacific: A Fiji experience

Tawake, A*, *James Cook University;* **Meo, S,** *Institute of Applied Science, University of the South Pacific, Fiji;* **Bogiva, A,** *Institute of Applied Science, University of the South Pacific, Fiji;* **Fong, S,** *Institute of Applied Science, University of the South Pacific, Fiji;* **Tawake, L,** *University of Sunshine Coast (Aus);* **Vave, R,** *Institute of Applied Science, University of the South Pacific, Fiji;* **Comley, J,** *Institute of Applied Science, University of the South Pacific, Fiji;* **Aalbersberg, B,** *Institute of Applied Science, University of the South Pacific, Fiji*

Marine resources, the mainstay of most Pacific Islands people's livelihoods have been dwindling rapidly over the last several decades. This led to the judicious revival of local management practices since the 1990s utilizing community based adaptive management (CBAM) process. CBAM is based on progressive participatory community-driven approaches informed by marrying scientific and traditional knowledge. Despite the widespread promotion of CBAM, their role and effectiveness remains contested. Hence, this paper focused on the key question: to what extent does CBAM work as a practical and useful approach to marine conservation in the South Pacific? The progress of CBAM initiatives in the Pacific is first reviewed and both empirical and experiential evidences on successes and challenges of CBAM in Fiji presented as a case study. Household incomes have

improved by as much as 30%, fish catches increased, communities' adaptive capacity enhanced, knowledge and attitudes improved and a sense of ocean stewardship, ownership and pride being restored back into communities. CBAM have also transformed decision making for customary marine areas from a more traditional, autocratic style to a more participatory and democratic process of governance. In addition, social learning motivated by the CBAM approach is clearly evident in the adaptive measures implemented by communities and in policies and legislation put in place by provinces and the national government. In conclusion, the Fiji study revealed that CBAM leads to improvement in the livelihoods of the people in all sorts of ways, both anticipated and unanticipated.

2011-12-08 18:30 Measuring reproductive success in a nocturnal and secretive species: A novel approach for little spotted kiwi (Apteryx owenii)

Taylor, HR*, *Allan Wilson Centre for Molecular Ecology and Evolution, School of Biological Sciences, Victoria Univesity of Wellington;*

Species existing in small, isolated populations with a history of bottlenecks are prone to inbreeding depression, which could affect their long term viability. Once widespread throughout New Zealand, the little spotted kiwi is now just such a species, exhibiting perhaps the lowest genetic diversity of any of the five extant species of kiwi. As a result, the investigation of impacts of past bottlenecks on little spotted kiwi has been cited as a priority action by the New Zealand Department of Conservation. For the 2011/2012 breeding season, a total of 30 adult male birds have been fitted with specially designed radio tags loaded with a bespoke "chick timer" program to investigate levels of reproductive success in two populations with different founding histories. Modifications to tag design and software programming, combined with a tag change halfway through the reproductive season, sufficiently extended radio tag battery life for the duration of the season. This is the first time this software has been used in this species and the technique has facilitated the collection of novel data on activity patterns and nest abandonment in little spotted kiwi without the need for direct observation. The information gathered using this method will provide new estimates of population growth rates and inform decisions on future translocations of individuals. It will also provide insight into the effects of inbreeding in wild populations and its impact on species recovery.

2011-12-07 16:34 Using ancestral and contemporary DNA in Peary caribou to examine the relative loss of microsatellite and Mhc variation following population bottlenecks

Taylor, Sabrina S.*, *Louisiana State University;* **Jenkins, Debbie,** *Dept. of the Environment, Baffin Region;* **Arcese, Peter,** *University of British Columbia;*

Scientists generally use neutral sequences of DNA to estimate genetic variation in endangered species. However, neutral sequences may not reliably indicate adaptability because they are unrelated to fitness by definition and may lose variation more rapidly than functional genes. This study uses threatened Peary caribou (Rangifer tarandus pearyi) samples to compare loss of genetic diversity at neutral and functional loci by comparing historical and contemporary DNA. Specifically, it: 1) tests if current levels of genetic variation in Peary caribou have been similarly or differentially reduced at neutral versus fitness loci as a consequence of population bottlenecks; and 2) provides data to recovery planning by identifying accurate methods to assess and manage genetic variation for threatened species generally. We report data comparing genetic variation at 8 microsatellite and one Mhc locus between Ellesmere Island historical samples (n ~ 30 samples) collected c. 1905 prior to population bottlenecks and contemporary samples (n ~ 50 samples) collected c. 2001 from post-bottleneck populations.

2011-12-08 18:30 Natural history and population characteristics of Actinote negra demonica (ORDER: LEPIDOPTERA); specie under commercial harvest in the National Park

Tejeda Wendy*, *Institute of Ecology;*

The sustainable management of butterflies (Lepidoptera: Papilionidae), is a good alternative for communities using of natural resources and promoting the conservation of tropical forests through the production and marketing of the species, decreasing the negative pressure over the forests for activities such as agriculture. The butterflies are sustainable for its abundance, diversity, space-time stability, and taxonomic group more studied. Recognizing these advantages, the project "Sustainable use and marketing of butterflies in the ANMI Cotapata, worked with aspects of the biology of the specie Actinote negra demonica (Family: Acreidae), such as: survival and mortality rates, time of development, growth rate, and behavior, in laboratory condition and field. Very high mortality was observed in both cases, 70 % for early larval stages, because they are very sensitive to laboratory conditions, and 94% in the field. The development time from egg to adult was estimated in 30 and 40 days (laboratory and field respectively). Females deposit up to 160 eggs on the underside of the leaves of the host plant (Munnozia hastifolia) at 1 to 2 m. height. Finally, the technique and recommendations of work were forwarded to the producers of the species to its proper management.

2011-12-07 17:30 Relative roles of urban greenery and landscape variables in promoting bird and butterfly communities in Singapore

Teo, S, *Centre for Sustainable Asian Cities, School of Design and Environment, National University of Singapore;* **Chong, KY*,** *Department of Biological Sciences, National University of Singapore;* **Kurukulasuriya, BR,** *Centre for Remote Imaging, Sensing and Processing, National University of Singapore;* **Chung, YF,** *Centre for Sustainable Asian Cities, School of Design and Environment, National University of Singapore;* **Tan, HTW,** *Department of Biological Sciences, National University of Singapore;*

With ever-growing urbanization, conservation ecologists can no longer focus their attention solely on intact ecosystems. In heavily human-modified sites such as cities, urban greenery plays a major role in mitigating the hostility of the built environment for wildlife. Studies on the effects of urban greenery have seldom investigated the relative roles of cultivated and spontaneous vegetation on promoting urban wildlife. We use bird and butterfly surveys and satellite-image derived urban landscape information to test the effects of cultivated tree, shrub, ground cover, spontaneous vegetation cover, road lane density, impervious cover, and building height on bird and butterfly species richness. Spontaneous vegetation cover trumps other forms of urban greenery in promoting bird and butterfly species richness, while road lane density had strong negative effects. No significant additional effects were found for impervious cover and building height. These preliminary findings suggest that pockets of natural and semi-natural areas are critical for maintenance of high biodiversity in urban areas, while traffic networks need to be carefully designed to reduce their impacts on urban wildlife.

2011-12-07 16:38 Individual Genetic Diversity does not Predict Ejaculate Quality in Captive- or Wild-Born Cheetahs (Acinonyx jubatus)

Terrell, KA*, *Center for Species Survival, Smithsonian Conservation Biology Institute (SCBI), Front Royal, VA;* **Crosier, AE,** *Center for Species Survival, Smithsonian Conservation Biology Institute (SCBI), Front Royal, VA;* **Wildt, DE,** *Center for Species Survival, Smithsonian Conservation Biology Institute (SCBI), Front Royal, VA;* **O'Brien, SJ,** *Laboratory of Genomic Diversity, National Cancer Institute, Frederick, MD;* **David, VA,** *Laboratory of Genomic Diversity, National Cancer Institute, Frederick, MD;* **Anthony, NM,** *Department of Biological Sciences, University of New Orleans, New Orleans, LA ;* **Crumpler, N,** *Science Applications International Corporation, Laboratory of Genomic Diversity, National Cancer Institute, Frederick, MD;* **Marker, LL,** *Cheetah Conservation Fund, Otjiwarongo, Namibia;* **Johnson, WE**; *Laboratory of Genomic Diversity, National Cancer Institute, Frederick, MD*

Numbers of wild cheetahs have declined by ~90% over the last century and remaining populations are fragmented. This species is a frequently-cited example of inbreeding depression, having survived a Pleistocene population bottleneck and now experiencing high juvenile mortality, extreme disease susceptibility and poor ejaculate quality. Evidence in the puma (Puma concolor) suggests that continued inbreeding may exacerbate these problems and result in infertility. Our objective was to identify recent trends in genetic diversity and impacts on ejaculate quality among individual southern African cheetahs. Individual genetic diversity was estimated (n = 13 microsatellites) among males (n = 98) for which reproductive data (testes and semen volume; sperm concentration and morphology) were collected previously (1977 – 2009) by SCBI researchers. Cheetahs were wild-caught in Namibia, or captive-born at institutions in South Africa, North America or Europe. Analysis revealed that genetic diversity declined in wild-caught

cheetahs over the ~30 year period, but was maintained in captive-born individuals. Surprisingly, estimates of genetic diversity were not correlated to any reproductive metric. These data suggest a more complex link between felid ejaculate quality and inbreeding than previously identified. The continued loss of genetic diversity in wild-caught cheetahs is alarming, given that Namibia contains the world's largest remaining population of this charismatic species.

2011-12-09 11:45 Communicating Salamander Science to Rural and Urban Audiences

Terrell, KA*, *Smithsonian Conservation Biology Institute (SCBI);* **Sevin, J,** *Center for Conservation Education and Sustainability, SCBI;* **Murphy, J,** *National Zoological Park, SCBI;* **Bronikowski, E,** *National Zoological Park, SCBI;* **Evans, M,** *National Zoological Park, SCBI;* **Quintero, R,** *National Zoological Park, SCBI;* **Grant, EH,** *United States Geological Survey, Patuxent Wildlife Research Center;* **Dallalio, E,** *United States Geological Survey, Patuxent Wildlife Research Center;* **Gratwicke, B**; *Smithsonian Conservation Biology Institute (SCBI)*

The Appalachian region is the world's most diverse salamander hotspot and is home to 76 species representing more than a dozen genera. However, the vast majority of people living in this region are unaware of their unique biodiversity heritage. Because dozens of Appalachian salamanders are experiencing severe, enigmatic declines, there is an urgent need to increase society's awareness and valuation of these remarkable species. The SCBI is uniquely positioned to be a leader in salamander conservation, with a research center located in the heart of Appalachia (Front Royal, VA) and a zoological park (NZP; Washington, DC) that engages nearly 3 million visitors each year. In addition to its rapidly-growing amphibian research program, SCBI is actively involved in new, creative strategies to engage rural and urban audiences in salamander conservation. These include hands-on, mobile salamander exhibits, the use of wildlife photography and social media, Citizen Science Bio-Blitz surveys, and the ongoing construction of an interactive salamander research laboratory at the NZP's Reptile Discovery Center. Furthermore, our group works closely with federal and state agencies, not only to inform practitioners of scientific findings, but also to allow on-the-ground conservation needs to drive salamander research. The SCBI's multifaceted salamander program provides an excellent model for efforts to engage diverse audiences in conservation science.

2011-12-08 18:30 Genetic diversity and patterns of inbreeding/ outbreeding in an isolated population of bottlenose dolphins (Tursiops truncatus) in Fiordland, New Zealand

Tezanos-Pinto, G.*, *The University of Auckland;* **Steel, D,** *The University of Auckland, Oregon State University;* **Baker, CS,** *The University of Auckland, Oregon State University;*

A small, resident population of bottlenose dolphins in Fiordland, New Zealand, was recently classified as 'critically endangered' by the IUCN. This population is estimated to number less than 205 and thought to be isolated from the other two coastal populations in New Zealand. Here, we investigated differentiation among the three bottlenose dolphins populations in New Zealand, by analyzing mtDNA sequences and 11 nuclear microsatellite loci from skin biopsy samples (n=219). Additionally, we assessed the relative levels of genetic diversity of Fiordland by comparing values of allelic diversity, heterozygosity with other populations and investigated the extent of within-individual genetic diversity. Results confirmed genetic isolation among the three regional populations (microsatellite FST = 0.09; $p<0.001$; mtDNA FST = 0.15, Φ ST = 0.20; $p<0.001$). Haplotype and allelic richness in Fiordland were lower than in the other two New Zealand populations and 16.7% of Fiordland dolphins showed internal relatedness (IR) values greater than expected for offspring of half-siblings (0.25). However, the genetic diversity of the Fiordland samples was not as low as might be expected from the small reported census size and assumed effective size of this population. These results could be explained by previously undetected interchange among local communities in Fiordland, periodic interchange with pelagic populations or a recent colonization event.

2011-12-08 10:30 Measuring biodiversity outcomes in the world's protected areas

Thomas Brooks*, *NatureServe;* **Stuart Butchart,** *BirdLife International;* **Mark Hockings,** *University of Queensland;* **Stephen Woodley,** *Parks Canada;*

The primary threat to the world's threatened species is destruction of the natural habitats in the places where they live. By extension, the primary response should be to protect these sites. This response is impressive: the number and extent of protected areas globally has tripled since 1980. However, the aggregate extinction risk of the world's mammal, bird, and amphibian species, as measured by the IUCN Red List Index, has increased over the same period. Work convened through the IUCN Species Survival Commission and World Commission on Protected Areas joint taskforce on "Biodiversity and Protected Areas" is asking: why? One possibility is that protected areas might not work. However, recent studies have shown that they are effective in reducing habitat loss. Moreover, emerging data show that protected area coverage of important sites for species does reduce their slide towards extinction. Another possibility is that protected areas might not be being established in the right places. Gap analyses over the last decade have shown this to be the case, and the rate at which gaps are being filled is lagging behind protected area expansion overall. Safeguarding these unprotected important sites is an essential contribution towards slowing biodiversity loss.

2011-12-08 18:30 Wok wantaim: engaging remote Papua New Guinea communities in biodiversity conservation.

Thomas, J, *Tenkile Conservation Alliance;* **Banks, C B*,** *Zoos Victoria;*

The Tenkile Conservation Alliance (TCA) is driving biodiversity conservation in Papua New Guinea's Torricelli Mountains in Sandaun Province. Using the Scott's Tree-kangaroo, or Tenkile, and Golden-mantled tree-kangaroo as flagships, the broad-based conservation program integrates social development needs with wildlife conservation goals. Recognising that 97% of land in PNG is under customary ownership, engagement with 42 village communities is critical to achieving program goals. A critically important approach is to provide the initial training for key individuals, to then enable subsequent facilitation and action across the communities. Three particular focuses have been (i) schools-based education through train-the-teacher courses; (ii) project management skills for village representatives to manage the 90,000ha Conservation Area in the core of the mountains; and (iii) training local facilitators for them to work with the village communities to deliver a health & hygiene project that decreased the level of diseases such as scabies and diarrhorea by as much as 70%. The program uses distance sampling to evaluate wildlife conservation outcomes and Most Significant Change Stories to assess community impact. Analysis of field data indicates that the Tenkile population has increased by 65% since the program commenced in 2003, suggesting that this is the most successful wildlife conservation program in PNG to date.

2011-12-06 17:15 Improving conservation education and connecting families to nature through programs targeting the wildlife values of the public

Thomas, Rebecca*, *Colorado State University;* **Teel, Tara,** *Colorado State University & President of the SCB Social Science Working Group;* **Bruyere, Brett,** *Colorado State University;* **Manfredo, Michael,** *Colorado State University;*

Societal changes occurring as a result of modernization are tied to a decrease in direct day-to-day interaction with nature which in turn has implications for human health and future commitment to natural resource stewardship. Recent research on human values toward wildlife in the western United States provides a framework for thinking about ways to improve conservation education initiatives in the face of these changing societal conditions. Findings highlight the need for tailored approaches that readily attend to the diversity of values in contemporary society. Building from this prior work, the purpose of our study was to develop, implement, and evaluate pilot programs for connecting families to nature that account for the wildlife values of the public in six locations throughout the U.S. Program development was informed by qualitative (e.g., focus groups) and quantitative (e.g., surveys) research assessments of value orientations toward wildlife and nature, barriers to program participation, and preferences

for program formats and content. Lessons learned from this study offer guidance for conservation organizations wanting to expand the reach and effectiveness of their educational efforts to reconnect people with the natural environment and garner broad-based support for conservation initiatives in the future.

2011-12-07 17:00 Urbanisation and its effects on the distribution and activity of insectivorous bats and their insect prey in Sydney, Australia

Threlfall, C*, *Evolution and Ecology Research Centre, School of Biological Earth and Environmental Sciences, University of New South Wales, Sydney, NSW 2052, Australia;* **Penman, T ,** *Forest Science Centre, Industry and Investment NSW, Beecroft, NSW, Australia;* **Law, B,** *Forest Science Centre, Industry and Investment NSW, Beecroft, NSW, Australia;* **Banks, P,** *School of Biological Sciences, University of Sydney, NSW 2006, Australia;*

Urbanisation has an uneven impact on wildlife but the mechanisms that determine winners and losers in the modified environment are poorly known. We investigated three hypothesised mechanisms influencing spatial patterns of insectivorous bats in Sydney, Australia; landscape heterogeneity (diversity of land uses), productivity (as indexed by landscape geology and insect biomass) and trait diversity. Bat species richness and activity (bat passes/night) were collected using ultrasonic bat detectors at 29 randomly selected landscapes (urban; suburban; and vegetated, each 25 km2) across 113 sites comprising various land uses and productivities. We found greater bat activity and more species of bat in suburban landscapes on fertile geologies. Productivity and urbanisation interacted with species traits to structure the bat community; open-adapted bats were associated with areas of greater urbanisation, while clutter-adapted bats were associated with greater amounts of bushland. The prey base of bats (nocturnal insect biomass) was also greater within fertile suburban landscapes in both natural and human modified areas. Our data demonstrates processes determining spatial patterns of urban microbats and highlight areas for conservation action. Our results suggest that landscape structure coupled with human activities can favour certain species traits, and may shift trophic relationships in cities as they alter the bottom of the food web in ways that impact upon higher trophic levels.

2011-12-08 18:30 How group size and roost switching behaviour of insectivorous bats influences predation risk in urban environments

Threlfall, C*, *Evolution and Ecology Research Centre, School of Biological Earth and Environmental Sciences, University of New South Wales, Sydney, NSW 2052, Australia;* **Law, B,** *Forest Science Centre, Industry and Investment, Beecroft, NSW 2119, Australia ;* **Banks, P,** *School of Biological Sciences, University of Sydney, NSW 2006, Australia ;*

Roosting is a risky activity, creating focal points of activity and producing olfactory cues that are attractive to predators. For urban wildlife, these predation risks may be heightened due to high abundance of "urban predators" such as rats and cats that use bushland remnants for hunting. We investigated patterns of predator visitation to artificial microbat roosts in Sydney, Australia, experimentally manipulating roosting odour cues to compare the efficacy of two key strategies that bats use to reduce predation risk; roost switching and changing group size. Artificial roosts were baited with 0.1 g or 1 g of faeces collected from local bat species to simulate solitary and group roosts. The odour cue was either replenished every day or applied only once to emulate bats re-using a roost, or switching roosts daily. Nightly predator visitation was monitored with infrared video cameras. We report on predator identity and rate of visitation to roost sites. We found a variety of potential predators visiting the artificial roosts, where both solitary and group roosts were visited, with re-used solitary roosts and those only used once being visited more often than group roosts. Roost predation is likely to be a more important aspect driving roost selection by bats than previously thought and may be important in various systems (e.g. islands) where some bats have suffered severe declines. Our results demonstrate that knowledge of such interactions is vital to conservation managers.

2011-12-08 18:30 Identification of suitable areas for a Brazilian Atlantic Forest endemic bat the may help to finally establish its conservation status

Tiago Souto Martins Teixeira, *State University of Rio de Janeiro (UERJ);* **Mariana M. Vale*,** *Federal University of Rio de Janeiro;*

Lonchophylla bokermanni is a nectar bat endemic to southeastern Brazilian Atlantic rainforest. In Brazil it is considered "Vulnerable" due to its small and isolated populations, small distribution range, and extremely fast habitat loss. We know very little about the species, however, and consequently it is considered "Data Deficient" by the IUCN. This is an undesirable situation for an endemic, locally rare species that is facing massive habitat loss. Here we generated a potential distribution model for L. bokermanni using the jackknife method for modeling rare species within the MaxEnt modeling package. We used 20 occurrence records and 9 bioclimatic variables. The resulting distribution model was refined by extracting all areas that have already been deforested. Finally, a map of caves occurrence probability was combined to the final distribution model, to identify areas with high probability of species occurrence. We were able to identify 8 such areas outside its currently known distribution range, mostly southern to its distribution. They should be prioritized for the search of new populations of L. bokermanni, so that the species' "Extent of Occurrence" can be determined and its conservation status under IUCN finally assigned.

2011-12-07 16:30 How powerful are underwater visual census methods for detecting long-term trends in temperate reef fish abundances?

Timothy Jones*, *Victoria University of Wellington;* **Robert J Davidson,** *Davidson Environmental ltd;* **Jonathan P A Gardner,** *Victoria University of Wellington;* **James J Bell,** *Victoria University of Wellington;*

The need to monitor population trends in marine reserves, particularly for commercially important fish species, is widely recognised. Underwater visual census (UVC) methodologies are used extensively to achieve this goal, but little research has assessed their effectiveness. The lack of information about the power of these methods may lead to erroneous conclusions about the status of fish populations, which could be costly from a conservation perspective. We applied a novel Monte-Carlo simulation approach to assess the statistical power for detecting long-term trends in abundance using fish counts obtained by UVC, based on data collected from three marine reserves in New Zealand. Applying this method to a range of fish species, we found that current monitoring has predominantly low power to detect biologically significant trends, with the average power to detect a trend corresponding to a doubling or halving of abundance over ten years being just 35% (alpha=0.1). However, this outcome is species specific and depends on the magnitude of interannual variability and initial population abundance. Alternative monitoring designs were investigated, and we found that increasing the number of sites increased statistical power more than increasing the number of transects per site. This is the first rigorous power analysis of long-term datasets obtained using UVC methods and highlights the potential of this methodology to maximize the effectiveness of monitoring programmes.

2011-12-07 12:00 Disease Management: Treating causes not symptoms

TOMPKINS, DANIEL*, *Landcare Research;*

Many of the characteristics of endangered and threatened species and their habitats (such as small population size, inbreeding, habitat fragmentation and degradation) make them vulnerable to disease impacts that healthy populations living in healthy habitats would be resilient to. Hence, to solve disease threats in a long-term sustainable fashion you need to treat the causes and not the symptoms. For example, in species with low genetic diversity making them vulnerable to disease, expending resources to treat specific diseases in the wild may be wasted effort since you are not addressing the cause of the issue. A paradigm shift from current wildlife disease management practises, where the traditional approach of diagnosing and treating specific illnesses still generally prevails, is thus needed if longer term goals of securing and restoring native species are to be achieved. Here I argue that conservation managers need to be able to (1) rebuild and maintain native species and habitat resilience to disease impacts, (2) where resilience in the wild can be restored in the short-term, mitigate disease impacts to prevent further loss, and (3) where resilience in the wild cannot be restored in the short-term, secure healthy captive populations for potential future reintroductions. I

finish by highlighting current barriers to such management, and suggest how they may be overcome.

2011-12-07 13:00 Defining boundaries for ecosystem-based management: A multispecies case study of marine connectivity across the Hawaiian Archipelago

Toonen, RJ*, *Hawaii Insititute of Marine Biology;* **Bird, CE,** *Hawaii Insititute of Marine Biology;* **Selkoe, KA,** *Natl Center for Ecological Analyses & Syntheses;* **Andrews, KR,** *Hawaii Insititute of Marine Biology;* **Eble, JA,** *Hawaii Insititute of Marine Biology;* **Gaither, MA,** *Hawaii Insititute of Marine Biology;* **Skillings, DJ,** *Hawaii Insititute of Marine Biology;* **Bowen, BW,** *Hawaii Insititute of Marine Biology*

Determining the geographic scale at which to apply ecosystem-based management (EBM) has proven to be an obstacle for many marine conservation programs. Generalizations based on geographic proximity, taxonomy or life history characteristics provide little predictive power in determining overall patterns of connectivity, and therefore offer little in terms of delineating boundaries for marine spatial management areas. Here, we provide a case study of over 50 taxonomically and ecologically diverse species (including reef fishes, marine mammals, gastropods, echinoderms, cnidarians, crustaceans and a shark) that reveal five concordant barriers to dispersal within the Hawaiian Archipelago which are not detected in any of the single-species exemplar studies. We discuss various approaches to combining multispecies population genetic data and contend that this multispecies approach to determine concordant patterns of connectivity is an objective and logical way in which to define the minimum number of management units. Using this approach, we show that EBM in the Hawaiian Archipelago requires at least six spatially managed regions that do not correspond to current oceanographic models of larval dispersal.

2011-12-08 15:15 How communities of people view island restoration

Towns, D.R.*, *Department of Conservation;* **Boudjelas, S.,** *Pacific Invasives Initiative;* **Nagle, W.,** *Pacific Invasives Initiative;*

Island restoration will often not be possible without participation by local communities. We review the forms of community involvement in seabird island restoration for 25 projects in 8 countries. The projects involved the eradication of predators; were in remote locations; included some habitats sensitive to high levels of public traffic; required considerable technical and institutional support; and, in developing nations, were all initiated by outside NGOs. Overall, projects included those led by agencies with minimal citizen participation beyond public outreach (public engagement), others with devolution of responsibility to local communities (stakeholder participation), and some initiated by citizens themselves (stakeholder instigation). We use case studies from the Pacific islands and New Zealand to illustrate how communities can become involved in island restoration. However, we found that even the most highly motivated and well resourced groups must confront issues with capacity, continuity of funding and enthusiasm, and long (decadal) timeframes. We conclude that most projects with high community involvement are in their infancy, the long term issues these projects face are poorly understood, and there is often little dedicated capacity within government agencies or outside funders to provide long term support.

2011-12-06 15:00 The Wildlife Picture Index: Monitoring Biodiversity in Mongolia

Townsend, SE*, *ZSL/Wildlife Ecology & Consulting;* **Galtbalt, B,** *Steppe Forward Program/ZSL;* **Myagmar, M,** *Steppe Forward Program/ZSL;* **Baillie, JEM,** *Zoological Society of London;*

The Wildlife Picture Index is a composite biodiversity indicator based on the geometric mean of relative occupancy estimates derived from camera trap sampling at the landscape level, which targets medium to large sized terrestrial vertebrates in forested and grassland ecosystems. Using the WPI at an unprecedented level of effort, we are assessing how well Protected Areas are functioning to conserve wildlife (biodiversity) in Mongolia. Mongolia supports a rich ungulate and carnivore fauna, has low human population density, and has established protected areas, presenting ideal conditions to test this new conservation tool for assessing trends in biodiversity. Our three year project resulted in over 3,000 trap nights in one ecoregion in 2009, over 16,000 in three ecoregions in 2010, and an equal level of effort planned for the 2011 summer season. Thus far, we have documented occupancy for heretofore undetected species and increased levels of human disturbance in the most protected areas that correlated with decreased occupancy for certain rare species. We will present the WPI for each study site comparing between management areas and over time. We will show how this approach has proven to be cost effective and easily implemented in assessing biodiversity and the status of individual species.

2011-12-08 15:30 Inbreeding depression, multilocus heterozygosity and fitness in a small, inbred population of South Island robins

Townsend, Sheena M*, *University of Otago, Zoology Department;* **Jamieson, Ian G,** *Unversity of Otago, Zoology Department;*

It is widely accepted that inbreeding depression poses a potential threat to the persistence of small or isolated populations. While molecular estimates of inbreeding may be made using genetic markers such as microsatellites, the interpretation of resulting Heterozygosity Fitness Correlations (HFCs) with respect to inbreeding depression is not always straightforward. In this study, we consider the cost of inbreeding in a small, isolated population of South Island robins (Petroica australis) on Stewart Island, New Zealand. This population has been closely monitored since its initial translocation to Ulva Island in 2000. Our study design represents a rare opportunity to examine HFCs within sibling pairs across the range of known inbreeding levels in a pedigreed island population. We examine the relationship between multilocus heterozygosity at microsatellite loci and fitness within sibling pairs that are subject to similar conditions during nestling and fledgling periods and have similar levels of genome-wide heterozygosity. Despite the variation in inbreeding levels present in the pedigree, we do not find evidence to support local-effects that have been reported elsewhere. These findings further support the current emphasis that HFCs should be interpreted with caution especially within conservation scenarios and where detailed data on inbreeding are unavailable.

2011-12-08 14:24 Top predator decline, mesopredator release and disease transmission: The case of the Tasmanian devil, feral cat and toxoplasmosis

Tracey Hollings*, *University of Tasmania;* **Menna Jones,** *University of Tasmania;* **Nick Mooney,** *Department of Primary Industries, Parks, Water and Environment;* **Hamish McCallum,** *Griffith University;*

Tasmanian devil populations are being devastated by devil facial tumour disease (DFTD), a consistently fatal transmissible cancer. Where the disease has been present for a decade or more, population declines of up to 94% have occurred. Evidence is emerging of feral cat increases in many areas of Tasmania, which may be a consequence of declining devil densities. Feral cats are of immense concern within the Australian environment, not only with the risk they pose to native wildlife through predation, but also as they are the only known definitive host of the coccidian parasite, Toxoplasma gondii. Australia's native wildlife has not evolved in the presence of cats or their parasites We are assessing whether native species are at increased risk of contracting toxoplasmosis in areas where populations of feral cats have increased following devil decline. We tested native species for toxoplasmosis antibodies in areas of varying cat densities. The highest toxoplasmosis seroprevalence in pademelons occurred in areas where cat density was the highest, being almost 5 times higher than in regions with the lowest cat densities. The highest prevalence was observed in eastern quolls which reached 59% in high cat density areas. Mesopredator release of cats may be a significant issue for conservation of native species, not only from increased predation pressure but through transmission of toxoplasmosis whose population level impacts on native wildlife are currently unknown.

2011-12-09 12:00 Fire-sensitive vegetation and fire feedbacks in an Australian savanna

Trauernicht, Clay*, *University of Tasmania;* **Murphy, Brett P.,** *University of Tasmania;* **Portner, Talia E.,** *University of Tasmania;* **Bowman, David M.J.S.,** *University of Tasmani;*

Alternative stable state theory suggests fire feedbacks by trees contribute to the co-occurrence of distinct biomes with contrasting fire regimes. No research has tested whether a similar interaction affects burning heterogeneity and compositional complexity within fire-prone savannas.

We conducted experimental burns with Aboriginal landowners in a tropical savanna in northern Australia to examine whether a native, fire-sensitive conifer, Callitris intratropica, imposes a negative fire feedback, thereby contributing to the persistence of conspecifics and other woody plants. We measured probability of burning, fire intensity, canopy openness, and fuel availability along transects (55-75 m) spanning entire C. intratropica stands and extending into the surrounding savanna matrix and found these variables decreased with increasing proximity to C. intratropica. The numbers of trees and large shrubs, including fire-sensitive, obligate-seeding species, increased nearer to C. intratropica. However, flammability, canopy openness, and composition in fire-damaged C. intratropica stands were similar to open savanna, despite the persistence of C. intratropica adults. We argue that C. intratropica stands impose a negative feedback on fire occurrence and intensity, but once this feedback breaks down, the habitat switches to fire-adapted vegetation. This is the first reported example of alternative stable state dynamics maintaining fire heterogeneity and habitat complexity in savannas.

2011-12-06 12:15 Maintaining Marine Population Connectivity in Multi-Species Conservation

Treml, EA*, *University of Queensland;* **Riginos, C,** *University of Queensland;* **Possingham, H,** *University of Queensland;*

Population connectivity is critical for metapopulation persistence and the ability to cope with climate change. However, identifying the important drivers and the resultant patterns in connectivity poses one of the greatest challenges in marine ecology and conservation. Marine population connectivity describes the likelihood that an individual of a population can disperse some distance from its natal habitat patch to settle in available downstream habitat. We explore the complex interaction between the dynamic seascape and species' life history characteristics to (1) quantify the influence of key biological parameters on potential connectivity, and (2) identify the spatiotemporal patterns emerging from these interactions. We describe an ecological and spatially-explicit biophysical modelling approach that effectively quantifies the population connectivity for a species from demographically relevant to evolutionarily significant scales. We shed new light on the contradictory literature regarding the important life history parameters which drive patterns in connectivity. Finally, we show how network analysis can efficiently identify multi-species dispersal corridors and barriers and discover emergent bioregions suitable for marine conservation planning.

2011-12-06 12:00 How can regulating livestock and wildlife herbivory help conservation?

Treydte, A.C.*, *University of Hohenheim;*

African savanna vegetation has been shaped by livestock and wildlife herbivory over time. Mammalian herbivore species composition, density, and duration affect plant biodiversity, structure and nutrient contents. Selectively excluding herbivores can be a useful tool for restoring vegetation and understanding grazing impact processes over time. This study analyses different management strategies (enclosures vs free grazing) on vegetation and soils over a period of up to 40 years. Further, the combined effect of herbivory and tree cover on understorey vegetation was addressed for rangeland systems at three study sites in Ethiopia, South Africa, and Kenya. Plots and transects were established to assess herbaceous and woody vegetation species composition, structure and nutrient quality under varying herbivore pressure. Grass biomass was higher in enclosures compared to outside, however, did not differ during the wet season. Grass species composition differed inside and outside of enclosures, with slightly higher diversity in enclosures, and was additionally affected by tree presence. Older age of enclosures did not pronounce differences in understorey vegetation, which highlights the importance of rotational grazing practices. Herbivore feeding preferences were strongly related to grass nutrient contents and woody cover. Hence, enclosures represent important management tools to restore herbaceous quantity and quality, in combination with the presence of tall trees.

2011-12-07 14:00 Conservation of a threatened pest: the Regent Parrot (Polytelis anthopeplus) in almond orchards in Victoria, Australia

Triplett, SA*, *Charles Sturt University;* **Luck, GA,** *Charles Sturt University;* **Spooner, PG,** *Charles Sturt University;*

Is it possible to promote the conservation of a threatened native species, perceived as an agricultural pest, if it's valued for the provision of an ecosystem service?? The rapid expansion of the almond industry in south-eastern Australia has created a plentiful food supply for the threatened Regent Parrot (Polytelis anthopeplus). The Regent Parrot is recognized as a pest to the almond industry because it damages crops. We compared independent assessments of Regent Parrot activity and damage in almond orchards with estimates from almond industry representatives. We also examined the contribution of the Regent Parrot and other bird species to the ecosystem service of waste removal, whereby almonds not suitable for human consumption are removed from the ground, possibly reducing invertebrate, disease and bacteria damage. Exploring trade-offs in the costs and benefits of species activity in agricultural landscapes contributes to achieving an effective balance between production and conservation.

2011-12-06 10:30 Determining Native Fauna Occupancy in Unmined Jarrah Forest in South-western Australia

Triska, MT*, *University of Western Australia;* **Craig, MD,** *University of Western Australia and Murdoch University;* **Hobbs, RJ,** *University of Western Australia;* **Pech, R,** *Landcare Research;* **Stokes, V,** *Alcoa;* **Hardy, G,** *Murdoch University;*

The jarrah (Eucalyptus marginata) forest in south-western Australia lies within one of the world's 20 biodiversity hotspots; however there is limited knowledge about the habitat requirements of much of its native fauna. Additionally, the jarrah forest has been drastically changed by agriculture and mining, which both involve removal of the forest. However, mining companies apply restoration techniques intended to return the forest to a fully-functioning ecosystem. Specifically, Alcoa World Alumina Australia mines and restores ~550 ha annually creating a mosaic of seral and mature forest. Many native fauna species have been documented in restored forest, but their continued use of restored areas ultimately depends on their habitat requirements. If restored areas do not meet these requirements, species may traverse, but not permanently occupy, restored forests. Determining important attributes of unmined forest for occupancy by native fauna is needed to predict their occupancy in restored forest. Detection histories from 20 trapping grids in unmined forest around Alcoa's Huntly mine, collected over 4 years, were compiled for 15 reptile and 2 mammal species, along with field-collected and GIS-derived habitat covariates. Occupancy models were then used to determine essential covariates for each species and recommend improvements to restoration design that increase recovery rates of critical habitat attributes and, ultimately, occupancy rates by native fauna in restored areas.

2011-12-06 11:45 Prioritising species for monitoring conservation actions: accounting for benefits, costs and uncertainty of management outcomes

TULLOCH, AYESHA*, *The Ecology Centre, School of Biological Sciences, University of Queensland, St Lucia QLD 4072, Australia;* **Chades, Iadine,** *CSIRO Ecosystem Sciences, EcoSciences Precinct, 41 Boggo Road, Dutton Park, QLD, 4102, Australia;* **Wilson, Kerrie,** *The Ecology Centre, School of Biological Sciences, University of Queensland, St Lucia QLD 4072, Australia;* **Possingham, Hugh,** *The Ecology Centre, School of Biological Sciences, University of Queensland, St Lucia QLD 4072, Australia;*

Defining measureable objectives is crucial for evaluating the success of threatened species management. Quantifying the relative benefits and costs of monitoring and accounting for uncertainties enables managers to select between species and between actions. We develop a method to measure the likelihood of successful monitoring using information on the variability and trends of species responses from 35 time-series datasets. We then develop a quantitative method for determining the 'surrogacy' value of species, which can be used to weight the benefit of monitoring. For a case study of invasive predator management in Western Australia, we incorporate data on the benefits and costs of monitoring to determine the value of monitoring a species or set of species depending on different objectives and available

budget. We find that the species selected under a maximal coverage objective are not the species that are currently targeted for monitoring. If costs, dependencies and uncertainties in response are not incorporated into the planning process, decisions will be more costly or less efficient, and uninformative or suboptimal species might be monitored. By explicitly stating objectives and exploring uncertainty before monitoring takes place, it is easier to adaptively manage and monitor populations, and account for and audit investment decisions. Our framework will enhance the utility and transparency of monitoring programmes in the future.

2011-12-06 12:15 Utilizing Australia's wet tropics rainforests and ecotourism to educate tourists about major threats to rainforests, such as climate change

Turton, SM*, *School of Earth & Environmental Sciences, James Cook University, Cairns, Australia;*

The Wet Tropics of Queensland World Heritage Area (WTQWHA) was proclaimed in 1988 after a prolonged battle between the logging industry and conservationists. Since the proclamation, sustainable ecotourism has become the dominant industry utilizing these internationally recognized tropical rainforests with an estimated net value of AU$1B pa to the regional economy. While the WTQWHA are not threatened by many of the direct and insidious forces being inflicted on tropical forests in other parts of the developing world, they are not immune to threats such as climate change and invasive species. Due to past land use change, the WTQWHA comprises of many small forest remnants on the coastal plain and Atherton Tableland, interspersed with large blocks of contiguous forest on the less accessible mountainous areas. In recent times, there has been a strong effort applied to restore landscape connectivity between remaining forest remnants through use of wildlife corridors and riparian restoration along degraded waterways. My talk will present a framework demonstrating how to combine world class rainforest science from the WTQWHA with ecotourism to provide a platform to educate Australian and international tourists about the major threats to tropical forests around the world.

2011-12-08 13:15 Rethinking barriers and bridges to AM: risk, uncertainty, and indeterminism.

Tyre, A.*, *University of Nebraska;* **Michaels, S.,** *University of Nebraska;*

Adaptive Management doesn't provide what people need in all circumstances. Why? One reason is the failure to acknowledge that there are social origins of indeterminism with different consequences than natural sources of indeterminism. Consequently, we introduce the idea of social indeterminism as a form of not knowing what will happen that arises from the unpredictability of human interactions. We argue that Adaptive Management is most suited for situations where social indeterminism is low. We develop a matrix of natural and social indeterminism for explaining where Adaptive Management is most useful, and where it is most likely to be dissatisfying. We go on to discuss strategies that may be applicable when social indeterminism is high.

2011-12-07 17:45 How does salmon aquaculture affect marine fish biodiversity and ecosystem structure?

Uglem, Ingebrigt*, *Norwegian Institite for Nature Research;* **Dempster, Tim,** *Department of Zoology, University of Melbourne;* **Bjorn, Paal-Arne,** *NOFIMA;* **Sanchez-Jerez, Pablo,** *Department of Marine Sciences and Applied Biology, University of Alicante;* **Fernandez-Jover, Damian,** *Department of Marine Sciences and Applied Biology, University of Alicante;*

Coastal ecosystems are the most productive and exploited of marine ecosystems. Of the various agents of anthropogenic change to coastal ecosystems, sea cage fish farming is among the most pervasive and is known to alter biodiversity and ecological processes in many ways. Our studies show that while salmon farms cover a limited area, they are highly attractive to a range of wild fish species, which aggregate in their immediate vicinity in large numbers. The constant supply of lost feed from cages is the primary mechanism for aggregation of wild fish. Wild fish aggregating at farms modify their diets, condition, fat-content and tissue fatty-acid distributions. Changed diets might affect the reproductive potential of wild fish, as well as palatability, due to use of vegetable oils in the feed. Levels of various pollutants also differ among farm attracted and non-attracted fish and movements of attracted fish may be a potential pathway of pathogen transfer. Finally, farms may affect natural migration patterns of wild fish and also change the susceptibility of some species to fishing. In sum, our results demonstrate that salmon farms may be regarded as "artificial" hotspots of biodiversity, which also could constitute ecological traps for some species. These findings have a range of implications both for the society and for conservation.

2011-12-08 18:30 Taxonomic and systematic revision of species of the genera Gobio and Romanogobio in the light of frequent hybridization

Urbankova, S*, *Institute of Vertebrate Biology, v.v.i., Czech Republic ;* **Mendel, J,** *Institute of Vertebrate Biology, v.v.i., Czech Republic ;* **Vasileva, E,** *Zoological Museum, Russia;* **Nowak, M,** *University of Agriculture in Krakow, Poland;* **Stefanov, T,** *National Museum of Natural History, Bulgaria;* **Sanda, R,** *National Museum, Czech Republic;* **Kosco, J,** *University of Presov, Slovakia;* **Halacka, K,** *Institute of Vertebrate Biology, v.v.i., Czech Republic*

The presented paper deals with the taxonomy, phylogeography, hybridization and current distribution areas of 20 species of gudgeons of the genera Gobio and Romanogobio in the Eurasian context. The level of endangerment resulting from sympatric occurrence, the end area and frequency of hybridization events is evaluated. A comprehensive revision of three newly discovered taxa was finished and their species status identified. The species of gudgeons, not analyzed so far, were added into the pilot phylogenetic study with a view to determination of their systematic relations within both the genera. For the purpose of biodiversity inventory of the Czech Republic the originality and quantity of the taxa with newly proposed species status was evaluated. From the point of view of conservation a new identification method, S7indel diagnostics, was formulated and its contribution in the Eurasian context was evaluated. Against the background of genotypization an attempt was made to develop a morphologic key of some species of the two genera both for the professional and general public. From the point of view of museum conservation, a type series of newly revised species from the territories of the Slovak and Czech Republics including barcodes and detailed vouchers was assembled. The study was carried out within the framework of the research project no. 206/09/P608 supported by the Grant Agency of the Czech Republic.

2011-12-07 15:45 Performance of terrestrial vertebrate taxa as indicator groups for the identification of priority sites for conservation

Urquiza-Haas, T. *, *The National Commission for Knowledge and Use of Biodiversity ;* **Koleff, P. ,** *The National Commission for Knowledge and Use of Biodiversity ;*

Conservation planning is inevitable based on the use of surrogates. We determined whether a system of land areas for conservation designed for one terrestrial ver¬tebrate taxon can be appropriate for the rest of the vertebrate taxa.. Conservation area systems were generated for each taxon of vertebrates (amphibians, rep¬tiles, birds and mammals) with Marxan. The system of conservation areas identified for the group of am¬phibians had a smaller area (477 planning units of 256 km2) than the other groups, while the system identified for birds was three times larger. Systems designed for amphibians and reptiles were able to represent a higher proportion of species from other groups (80% and 86% respectively), while the sys¬tem designed for birds was to the least effective for the species of the other taxa (i.e. it represented the lowest number of species over a larger area). It was estimated that the priority sites for amphibians and birds are, on average, able to represent, within an area equal in size, 80.1% and 60.9% of the species of other groups, respectively. By contrast, bird spe¬cies were represented almost entirely (97.8%) by the systems designed for other taxa. The results indicate that, while no conservation area system designed for a single taxon is entirely appropriate for the other groups, the reptiles and amphibians are the most effective surrogates, since they achieve the representation of a very high proportion of species of the other groups.

2011-12-07 10:54 Conserving leopards in non-protected forest of Karnataka, India

Usham Singh*, *Wildlife SOS;* **Kartick Satyanarayan,** *Wildlife SOS;* **Geeta Seshamani,** *Wildlife SOS;* **Haobijam P. Meetei,** *Wildlife SOS;* **Samad Kottur,** *Wildlife SOS;*

Human-leopard conflict is a serious challenge since conflict centered around the non-protected forest and human-dominated landscape. A survey was conducted during 2008-09 in Karnataka, India, covering vast non-protected landscape in nine administrative districts. Leopards Panthera pardus killed 331 animals, comprising 8 species namely goat (40.7 %), cattle (26.5 %), sheep (15.1 %), dog (14.8 %), horse (1.2 %), buffalo (0.9 %), cat (0.3 % and domestic fowl (0.3 %). District-wise distribution of conflict showed that high conflict occurred in Bellary (30. 6 %), Koppal (26.3 %), Chittadurga (16.6 %), Uttar Kannada (10 %) and Gadak (6.5 %). 88 % locals who loss livestock due to predation by leopards were unaware of the Govt-sponsored compensation scheme. Lack of awareness among the locals motivated WSOS to conduct further study. An extensive education programme is currently being undertaken in the high-conflict areas. A joint-venture programme involving local's representatives and managers is being planned primarily to bridge the relation between locals and managers. Conserving leopards in the non-protected forests require developing public relations.

2011-12-07 17:00 Effects of pond draining on farm pond biodiversity and water quality

USIO, NISIKAWA*, *Niigata University, Japan;* **Miho Imada,** *National Institute for Environmental Studies, Japan;* **Megumi Nakagawa ,** *National Institute for Environmental Studies, Japan;* **Munemitsu Akasaka ,** *National Institute for Environmental Studies, Japan;* **Noriko Takamura,** *National Institute for Environmental Studies, Japan;*

Farm ponds have high conservation values because they contribute significantly to regional biodiversity and ecosystem services. In Japan, pond draining is a traditional management method that is widely believed to improve water quality and to eradicate invasive fish. On the other hand, pond draining may reduce freshwater biodiversity through extirpation of immobile aquatic animals. However, scientific evaluation of the effects of pond draining is lacking. Here, we evaluated through a natural experiment the effects of pond draining on freshwater biodiversity and water quality with regards to differential pond management practices and heterogeneous landscapes. Sixty four farm ponds were surveyed for various aquatic animals and plants. Macroinvertebrates and bloom-forming Cyanobacteria were used as indicators for freshwater biodiversity and water quality, respectively, and these variables were related to pond management practice and land use variables. The key findings are that: 1) contrary to the expectations, pond draining was neither effective in eradicating invasive animals (i.e. bluegill sunfish and red swamp crayfish) nor improving water quality and 2) pond draining can have adverse effects on red list species (mainly snails) in forest-dominated landscapes. Overall, our results indicate that pond draining is not effective at least for the selected variables. There is a pressing need for developing target-specific management methods of farm pond ecosystems.

2011-12-09 11:06 How landholders have organized to lead conservation efforts on Kolombangara Island, Solomon Islands

Vaghi, F*, *Coordinator, Kolombangara Island Biodiversity Conservation Association;* **Cox, AS,** *Technical Officer, Kolombangara Island Biodiversity Conservation Association;*

The biodiversity of the Solomon Islands is globally recognized yet less than 1% of land or sea is under formal protection, partly due to complex systems of customary land tenure. However, on Kolombangara Island, a strong conservation program led by landholders has emerged. This paper presents the story of how community leaders, a sustainable forest plantation company and scientists found a way forward by bringing together a variety of perspectives and opportunities. The approach has been rooted in respecting and reinvigorating customary practices and honoring a vision conceived by island elders rather than relying heavily on traditional science and conservation-based approaches. Creating a neutral body separate from divisive land ownership issues has been fundamental. This empowered, locally-driven conservation institution is now leading real efforts to conserve Kolombangara Island's unique biodiversity, including its renowned endemic birds, under threat from industrial-scale logging and unsustainable land practices. Kolombangara Island Biodiversity Conservation Association, is in the process of formally creating a conservation area for all lands above 400m altitude, won a High Court challenge against logging in 2010 and is improving the quality of life of Kolombangara's Dughore people. The paper explains the reasons underlying KIBCA's success, sets out KIBCA's ongoing challenges and makes general observations applicable to other locations.

2011-12-08 18:30 Relative abundance estimation of the mountain tapir (Tapirus pinchaque) in the high-Andean forests of the Puracé National Park, Colombia.

Valderrama, Stephany*, *No;* **Abud, Melissa,** *No;* **Duque, Sebastian,** *No;* **Calero, Humberto,** *No;*

The mountain tapir (Tapirus pinchaque) is a species in dangerous, it is an ungulate that only inhabits in the Andes of Colombia, Ecuador and Peru. To ensure effective conservation measures it is necessary to collect information regarding the natural history and population status of the species. Our aim was to estimate the relative abundance in the north and south of Puracé national park through camera-trapping. Our study is the first camera-trapping with the tapir in the area. We achieved 1546 camera-nights in the north and 1008 camera-nights in the south of the park. An overall capture of 38 photographic events indicate that in average there are 4 individuals per 100 camera- nights. Furthermore we obtained 32 photographs of other wildlife such as cougars and spectacled bears. We conclude that camera-trapping is effective in the area and allows us to know the minimum sampling effort necessary for a remote camera survey for these species. More camera-trap stations and a larger area coverage could result in a reliable approach to population parameters of the tapir in the park. Additionally we developed an educational strategy with local and government stake-holders to promote the importance of the tapir and its ecosystem.

2011-12-09 15:45 The song of the North Island kokako: From island to island on an island

Valderrama, SV*, *Department of Biological Sciences, The University of Waikato, Hamilton, New Zealand;* **Molles, LE,** *Agriculture and Life Sciences Division, Lincoln University, Christchurch, New Zealand;* **Slabbekoorn, H,** *Institute of Biology, Leiden University, Sylvius Laboratory, Leiden, The Netherlands;* **Waas, J,** *Department of Biological Sciences, The University of Waikato, Hamilton, New Zealand;*

Cultural transmission of vocal traditions in the once widespread North Island Kokako (Callaeas wilsoni) may be currently undergoing disruption and drift in the remaining fragmented and isolated populations. Endangered and endemic, kokako are a flagship species requiring rigorous management of introduced predators, and translocation of individuals to areas with suitable habitat. Song traditions in small surviving and translocated populations could be especially susceptible to founder effects and rapid cultural drift. We first studied song variation in five surviving populations and two translocated populations. Our study suggests that geographic dialects in surviving populations and divergence in translocated populations are forged by fragmentation and isolation. Vocal divergence might lead to discrimination against immigrants due to reduced mutual recognition – a potential issue when multiple translocations among populations may be needed to maintain genetic diversity. Subsequently, a reciprocal playback experiment was performed to examine the impact of song divergence on behavioural responses of translocated and source populations. None of the populations discriminated between local and non-local songs. However, overall differing vocal performance and intensity of response to playback suggest that simulated intruders represent different levels of threat to different populations. Consequently, further vocal divergence over longer-term isolation may create reproductive barriers between populations.

2011-12-06 14:30 Managing habitat for endangered species: Carnaby's black-cockatoo, food resources and time since last fire

Valentine, LE*, *WA State Centre of Excellence for Climate Change, Woodland and Forest Health;* **Wilson, BA,** *Department of Environment and Conservation, Bentley;* **Stock, WD,** *School of Natural Sciences, Edith Cowan University;* **Fleming, PA,** *Veterinary and Biomedical Sciences, Murdoch University;* **Hardy, GEStJ,** *Biological Sciences and Biotechnology, Murdoch University;* **Hobbs, RJ,** *School of Plant*

Biology, University of Western Australia;

Habitat loss is often the primary factor contributing to a decline in the range or abundance of threatened species. Management of threatened or endangered species is often focused on acquisition of remnant habitat, with minimal focus on habitat quality, in terms of resource provisioning. We investigated the influence of time since last fire on food resources in banksia woodlands for the endangered Carnaby's black-cockatoo (Calyptorhynchus latirostris) in southwest Western Australia. We measured tree density and fruit productivity of two dominant banksia species (Banksia attenuata and B. menziesii) in 38 sites with varying fire ages. Using pre-existing information on the calorific content of banksia seeds and the field metabolic rate of Carnaby's black-cockatoo, we estimated the number of birds per hectare of habitat of different fire ages (0-5, 6-10, 11-19, 20-29 and ≥ 30 years since last fire) could support. Time since fire strongly influenced the fruit productivity of both banksia species. Recently burnt habitat (< 6 years since last fire) could support the least number of birds (~ 50 birds/ha) as opposed to habitat that was 20 – 29 years since last fire (~ 300 birds/ha). Fire is a management tool often used in conservation reserves and appropriate fire management will be important for ensuring adequate food resources for the endangered Carnaby's black-cockatoo.

2011-12-07 18:15 Regional and species-specific variation in long-term habitat-occupancy relationships

Van der Hoek, Yntze*, *City University of New York/College of Staten Island;* **Manne, Lisa,** *City Univeristy of New York/College of Staten Island;*

The minimum amount of habitat needed in a landscape for a species to persist has been a widely recognized conservation target. Several studies have identified habitat thresholds below which persistence rapidly declines, but as yet we know little of the extent to which thresholds vary spatially and between species. This information is necessary for establishing whether we can apply the same conservation targets across broad geographical regions. We used repeated state-wide breeding bird atlases of several U.S. states to investigate long-term occupancy dynamics. Our objectives were to determine: (1) whether threshold models were always the best models to describe a species' habitat occupancy relationship, (2) to what extent threshold curves varied regionally within species, and (3) if species characteristics could explain variation in threshold curves across species. We used threshold (segmented regression) and non-threshold (logistic regression) models to describe the relationship between forest cover and occupancy dynamics. Estimates between species and between regions vary significantly, supporting the notion that previous studies on this topic are case-specific and difficult to extrapolate. Threshold estimates vary regionally due to variation in the overall availability of suitable habitat on a landscape-wide scale. We argue that our approach can be repeated for species or regions that are of particular conservation interest, therefore providing a valuable methodology to be included in environmental planning and ecosystem management.

2011-12-09 10:50 The Asian Crocodile Crisis

van der Ploeg, J*, *Leiden University;* **van Weerd, M,** *Leiden University;*

Crocodiles are a conservation success-story. In most parts of the world crocodilian populations have rapidly recovered in response to regulation of harvesting, captive breeding and the creation of protected areas. But not in Asia. Of the seven endangered crocodilians in the world, five occur in the Oriental zoogeographical region: the Philippine crocodile Crocodylus mindorensis, the Indian Gharial Gavialis gangeticus, the Chinese alligator Alligator chinensis, the Siamese crocodile Crocodylus siamensis, and the Malay Gharial Tomistoma schlegelii. Crocodile populations in tropical Asia continue to decline in the wild as a result of hunting, the use of destructive fishing methods and the degradation of freshwater wetland habitat. Asia poses a specific set of challenges that demand innovative solutions. The classic conservation model focused on sustainable use and protected areas, which has been successful in other parts of the world, is clearly failing. An alternative community-based approach to conserve crocodiles in human-dominated landscapes is beginning to take shape in several countries in Southeast Asia, most notably in the Philippines and Cambodia. These grassroots initiatives actively engage rural communities in conservation through education and public awareness campaigns. These small-scale conservation projects counter 'the use it or lose it' narrative that has shaped crocodile conservation policy and practices, and provide hope for the survival of Asia's dragons.

2011-12-08 12:00 Experimenting with roads: Learning how to improve mitigation for wildlife

VAN DER REE, R*, *Australian Research Centre for Urban Ecology;* **Jaeger, J,** *Concordia University, Canada;* **Fahrig, L,** *Carleton University, Canada;* **Madrinan, F,** *Concordia University, Canada;* **Houlahan, J,** *University of New Brunswick at St john;* **Findlay, S,** *4Institute of the Environment, & Ottawa-Carleton Institute of Biology;*

Roads and traffic affect wildlife by increasing rates of mortality, creating barriers to movement and reducing habitat quality. Road agencies around the world routinely include mitigation measures (under and overpasses, fencing) in road projects to minimize their negative effects, often at significant cost. Research to quantify the effectiveness of mitigation is also underway. Now and into the future, road agencies will need to address the following scenario: If this mitigation is not fully effective, what and by how much does it need to be modified? An experimental approach to the mitigation should be adopted now so that the modifications made in 10 or 20 years time are based on rigorous science and offer the best value for money. Numerous changes to the current system is required, including i) support for the role of science in road agencies; ii) ability to spend money across project, state or national borders; iii) a willingness to delay mitigation at some locations; iv) development of an international database of mitigation measures; v) prioritization of parameters to be tested; vi) improved reporting and data sharing; and vi) establishment of an "experimental mitigation area". In this paper we will demonstrate the need for this approach and outline the necessary steps to design and implement the experiments. Importantly, road and conservation agencies must take this next step to ensure the maximum benefit for conservation is obtained from the funds spent.

2011-12-06 14:45 Urban ecology in New Zealand: challenges and opportunities

van Heezik, Y.M.*, *University of Otago;*

Studies of birds in urban New Zealand (NZ) are rare and recent, reflecting environmental management that continues to follow a largely preservationist model involving the protection of endangered species in wilderness areas, with little value being accorded modified habitats. NZ's human population is small compared with that of other developed countries, however, for the >86% of people that live in NZ urban areas, encounters within the city will shape their knowledge, appreciation, and awareness of biodiversity. While NZ urban areas are small and apparently green on a global scale, there is a very high degree of homogenization, with exotic birds comprising >40% of bird species. NZ natives have evolved in the absence of mammalian predators, and urban areas contain dense concentrations of predators such as domestic cats, the control of which is complex and contentious. Community-led restoration projects involving the creation of predator free areas, so called mainland islands, when located close to urban areas (e.g. Zealandia in Wellington and Orokonui in Dunedin) have the potential to act as source populations provided there is adequate connectivity.

2011-12-06 12:15 Gender, Pregnancy and Individual Identification in Giant Panda Populations using Fecal Near Infrared Reflectance Spectroscopy (FNIRS).

Vance, CK*, *Biochemistry, Molecular Biology, Entomology and Plant Pathology, Mississippi State University, MS USA;* **Kouba, AJ,** *Memphis Zoological Society, Memphis, TN USA;* **Holtvoigt, A,** *Memphis Zoological Society, Memphis, TN USA;* **Nei, YG,** *Institute of Zoology, Chinese Academy of Sciences, Beijing, China;* **Wei, FW,** *Institute of Zoology, Chinese Academy of Sciences, Beijing, China;* **Willard, ST,** *Biochemistry, Molecular Biology, Entomology and Plant Pathology, Mississippi State University, MS USA;*

Fecal Near Infrared Reflectance Spectroscopy (FNIRS) is a remote sensing approach we are applying to the study of giant pandas and other wildlife in the field with the aim of developing rapid methods to identify gender, reproductive state, and possibly individual identity for population surveys.

The objectives of the current study were to develop FNIRS discriminant calibrations for prediction of panda identity and physiological status. Fecals were collected from seven giant pandas housed in US Zoos and from six wild pandas from Foping Nature Reserve in China. NIRS spectra were obtained with a portable ASD FieldSpec3 and direct surface probe. For chemometrics analysis of FNIRS spectra, we used GRAMS 9.0 AI software to build our PLS 2-block discriminate algorithms with cross validation analysis, mean centered first derivative processing and normalized pathlength correction. Calibration sets were formed from 75% of the spectra and the remaining 25% were used for validation. Gender assignment correctly predicted at least 86% female and 89% male wet fecals, simulating in situ conditions, and 89% of female and 95% of male fecals that were further processed to remove water signals. For animal identification, initial results correctly predicted a minimum of 87% of fecals belonging to a specific individual. NIRS has the potential to collect, non-invasively and remotely, physiological information about individuals within a species for population survey estimates.

2011-12-07 17:30 A new technology for rapid gender determination and disease prevalence in amphibians using Near Infrared Reflectance Spectroscopy (NIRS)

Vance, CK, *Biochemistry, Molecular Biology, Entomology and Plant Pathology, Mississippi State University, Mississippi State, MS 39762, USA;* **Kouba, AJ*,** *Conservation and Research, Memphis Zoo, 2000 Prentiss Place, Memphis, TN 38112, USA;* **Willard, ST,** *Biochemistry, Molecular Biology, Entomology and Plant Pathology, Mississippi State University, Mississippi State, MS 39762, USA;*

The number of field-based technologies that can provide rapid in-vivo assesment of an animal's physiological status are limited. One potential tool might be the use of Near Infrared Reflectance Spectroscopy (NIRS) for directly analyzing animals in the field. The goals of our study were to test a rapid and noninvasive means for assessing the presence of the amphibian disease chytridiomycosis and to identify gender in monomorphic amphibian species as an initial examination of the technologies capabilities. For both objectives, NIRS spectra were obtained from live animals with a surface contact probe at the abdomen of the individual using an ASD FieldSpec3 NIR Spectrophotometer. Chemometric analysis of spectra utilized a 2-block PLS1 discrimination and PCA analysis. Spectral calibrations for chytrid presence were verified and quantified against qPCR identification. NIRS correctly classified 100% of moderate and strong chytrid infections while 70% of all chytrid infections were correctly identified, including those with low zoospore numbers, as quantified by qPCR analysis. Additionally, NIRS correctly predicted gender in 93% and 95% of individual Bufo boreas and Bufo Fowleri, respectively. It is possible that differences in skin properties due to chytrid infection or discrepancies between genders are providing the framework for the categorical separations. In summary, the portable field-based NIRS system will likely have wide spread application to physiological studies in-situ.

2011-12-07 15:00 Evolution of Oahu elepaio nest height in response to predation by alien rats

VanderWerf, EA*, *Pacific Rim Conservation;*

Nest predation by alien black rats (Rattus rattus) is the most serious threat to the Oahu elepaio (Chasiempis ibidis), an endangered Hawaiian forest bird that evolved in the absence of mammalian predators. As part of a long-term demographic study, I measured height of 305 Oahu elepaio nests from 1996-2011. Average nest height increased from 8.2 meters in 1996 to 11.7 meters in 2011. Lower nests failed more often and became less frequent over time, but height of nests built by individual birds did not increase over time, suggesting elepaio nest height has evolved in response to predation, and not as a result of learning. Nest height did not differ in areas with vs. without rat control, indicating elepaio did not assess predation pressure and adjust nest height accordingly. Rat control is effective at decreasing predation on Oahu elepaio nests, but controlling predators on islands the size of Oahu is currently impractical. Natural responses to threats, such as evolution of nest height and immunity to introduced diseases, will likely play an important role in conservation of many species.

2011-12-09 11:10 Advocacy coalitions in the formation of conservation and environmental legislation in New Zealand

Vaughter, PCD*, *University of Minnesota-Twin Cities;*

Conservation biologists view legislation protecting biodiversity and ecosystems as crucial steps in the conservation process. However, the formation of laws to protect the earth's diversity and resources requires politicians in participatory democracies to create coalitions of different actors from a nation's political, business, and NGO sectors as well as to successfully frame the legislation so it is palatable to the voting public. New Zealand is a participant in many of the UN's environmental treaties as well as the host to a great amount of domestic legislation in regards to ecosystems, biodiversity, and environmental quality. An analysis of the advocacy coalitions involved with each piece of environmental legislation reveals that laws protecting the environment are most generally successful in Parliament when a larger variety of actors participate in advocating for the law, and when politicians are able to frame the law to voters through the press as a net benefit for the nation's public.

2011-12-07 14:30 Solving a monitoring conundrum; an on-the-ground solution for REDD+

VENTER, MICHELLE*, *James Cook Universitiy;* **Bird, MI,** *James Cook University;*

The REDD+ mechanism represents one of the most promising opportunities of securing a future for tropical forests. The success of REDD+ projects is dependent on the provision of alternative livelihoods for those forest using communities forgoing forest exploitation. At the same time, these projects also depend on the timely and accurate monitoring of forest carbon stocks. A unique opportunity exists to address the twin issues of livelihoods and forest monitoring through programs that employ local peoples to participate in biomass inventories. But do participatory methods for measuring forests produce good quality data? To quantitatively assess the quality of data collected by non-experts, five teams from different forest using communities measured a total of 60 plots in primary rainforest in a remote area of Papua New Guinea, and these plots where subsequently entirely re-measured by trained scientists. We evaluated 1) site selection 2) plot area 3) tree measurements 4) plant identification and 5) forest condition. We show that non-expert, local people can collect forest biomass data at a similar quality level to experts at a fraction of the cost. We propose practical training updates that address the major sources of errors in data collection. This study identifies a feasible approach to involve local stakeholders in large scale on-the-ground carbon stock assessments that can benefit REDD+ programs, and biodiversity conservation.

2011-12-09 10:45 Acting optimally for biodiversity in a world obsessed with REDD+

Venter, O*, *James Cook University;* **Wilson, KA,** *University of Queensland;* **Hovani, L,** *The Nature Conservancy;* **Possingham, HP,** *University of Queensland;*

Actors, such as non-governmental organizations, concerned with the conservation of imperiled biodiversity have for several decades served as an integral part of the response to the tropical forest crisis. With REDD+, a carbon finance scheme that aims to Reduce Emissions from Deforestation and forest Degradation, novel options for conserving tropical forest are rapidly emerging. How should biodiversity and REDD actors interact? In this study we critically assess for the first time the expected outcomes of three contrasting scenarios of engagement between a biodiversity actor and a REDD actor working in the same region. We discover that if a biodiversity actor acts in ignorance of REDD, meeting their targets is substantially more expensive than necessary. Meeting biodiversity and carbon targets is always cheaper if actors collaborate. However, if the REDD actor has a relatively large budget, the biodiversity actor could benefit even more by free-riding off the REDD actor, which involves shifting biodiversity investments to areas not sufficiently represented by the REDD actor's conservation network. While good for biodiversity, free-riding leads to a conservation network that costs more overall than one selected collaboratively. These findings are relevant to rapidly evolving policies to conserve imperiled tropical forests.

2011-12-09 11:00 Engaging stakeholders in the selection of flagship species

Veríssimo, D*, *Durrell Institute of Conservation and Ecology;* **Smith, RJ,** *Durrell Institute of Conservation and Ecology;* **Pongiluppi, T,** *SAVE Brasil;* **Santos, C,** *SAVE Brasil;* **Develey, PF,** *SAVE Brasil;* **MacMillan, DC,** *Durrell Institute of Conservation and Ecology;*

Flagship species are instrumental in raising awareness and changing behaviour for biodiversity conservation. However most flagships are selected without consulting the stakeholders they attempt to influence, which can seriously hamper their effectiveness. To tackle this issue we developed a framework based on social marketing and environmental economics which aims at understanding the values key stakeholders hold for different species. This framework was applied to select a bird flagship species for the Atlantic forest in the Serra do Urubu, Northeast Brazil. Through the use of 438 choice experiment questionnaires, we found that selected stakeholders first prioritized aesthetically-pleasing species, followed by species with small populations, high visibility and those which could not be kept as pets. We then used these four criteria to produce a candidate list of four potential flagship species by linking this information with the profiles of the 221 bird species found in the Serra do Urubu. Finally, we conducted a survey where stakeholders chose between the different flagship candidates, which allowed us to identify the most popular flagship species and understand more about the trade-offs that influence conservation decision-making. This study highlights how social marketing and environmental economics contribute towards an active engagement of stakeholders in the design of behaviour change and awareness raising campaigns.

2011-12-08 18:30 Range size and habitat use of a naturally occurring island population of the northern quoll, Dasyurus hallucatus.

Vincent van Uitregt*, *The University of Queensland;* **William Ellis,** *The University of Queensland;* **Sean Fitzgibbon,** *The University of Queensland;* **Robbie Wilson,** *The University of Queensland;*

The northern quoll Dasyurus hallucatus is a predatory marsupial that has undergone massive range reduction in Australia. Previously common across the top end of the mainland, D. hallucatus populations have disappeared soon after the invasion of the toxic cane toad Bufo marinus. Fortunately, many island populations that have had no contact with B. marinus persist in high densities. Groote Eylandt, off the Northern Territory coast, is one such island where the traditional owners maintain customs that closely link them with their country and the animals therein. In a collaborative effort, researchers from The University of Queensland and Rangers from the Anindilyakwa Land Council are investigating the range size and habitat use of D. hallucatus on Groote Eylandt. The primary aim is to provide baseline data on this naturally occurring island population, which is becoming more and more important for the conservation of the species, and to provide data for comparison with mainland populations and recently translocated island populations. This collaboration fosters an exchange of skills that will enable the local indigenous rangers to carry out ecological research to monitor and maintain biodiversity on the island.

2011-12-08 14:30 Impacts of hydro-electric project development on the critical habitats for montane birds, Western Himalaya

Virat Jolli*, *CISMHE, University of Delhi*

The montane forest of Sainj Valley, Western Himalaya is under anthropogenic pressure due to the development of hydro-electric projects (HEP). The ongoing HEP activities around highly biodiverse areas (Endemic Bird Area Zone) have negatively affected the birds of Sainj Valley. To guide conservation initiatives, montane bird communities were studied to determine their response along a disturbance gradient with the aim of identifying key factors influencing their distribution. Habitat types surveyed included primary and secondary montane forests, agricultural, and HEP affected habitats (disturbed). Response variables included total avifaunal and woodland species richness and abundance and were measured using point count surveys. Explanatory variables measured were related to tree and shrub density, disturbance intensity and altitude. Estimated 'true' species richness was higher for pristine and minimally disturbed sites, lower in agricultural sites and lowest in HEP affected sites. This study revealed that tree and shrub density and disturbance influenced species distribution; woodland birds responded acutely with HEP activities. Generalist species tended to increase around human modified landscape while specialist avoided it. The avian foraging guilds across a disturbance gradient suggested that frugivores and carnivores were the most affected one while omnivore abundance increased in human modified landscape, while insectivore abundance remained unchanged. I recommend increasing vegetation cover in disturbed habitats along with proper landscaping and any development proposed in and around protected Himalayan forest needs to be well evaluated and later monitored closely to minimise habitat loss for avian habitats.

2011-12-09 14:15 The effectiveness of contrasting protected areas in Madre de Dios, Peru

Vuohelainen, A*, *University of Oxford;* **Coad, L.,** *University of Oxford;* **Marthews, T.,** *University of Oxford;* **Malhi, Y.,** *University of Oxford;* **Killeen, T.,** *Conservation International;*

Accurate monitoring of the effectiveness of protected areas in reducing deforestation is increasingly important, given the vital role of forest protection in climate change mitigation. Previous studies on protected area effectiveness have often employed remote sensing to measure deforestation, comparing deforestation rates within protected areas to 'buffer' areas outside them. However, buffer analysis may overestimate protected area effectiveness and provides little information on the factors contributing to effectiveness. We used a regression model, controlling for landscape effects, to estimate the effectiveness of ten protected areas in Madre de Dios, Peru. Factors influencing protected area effectiveness were investigated using in-situ key-informant interviews. While our analyses suggested that all of the areas had prevented deforestation to some extent, the most effective areas were ecotourism and conservation concessions, with surveillance and good relations with surrounding landowners. Native community areas were found to be less effective, with deforestation mainly driven by internal resource use and population growth. Weak local governance and immigration were identified as underlying factors reducing the effectiveness of protection. The results highlight the need to combine remote sensing with information on protected area management, as identification of drivers and deterrents of deforestation is vital for improving the effectiveness of protection

2011-12-09 16:45 Captive Facilities as a Safe Harbour - Saving New Zealand Native Frogs from Extinction

Waldman, Bruce*, *Seoul National University;*

New Zealand endemic frogs (genus Leiopelma) are 'living fossils', the most archaic lineage of living anurans. Their conservation presents special challenges. The species exist in small, isolated or highly fragmented populations, with limited gene flow and highly structured populations. Of most concern is Archey's frog, Leiopelma archeyi. Populations surveyed in optimal habitat declined by over 80% since 1996. But in many areas where frogs were common in the early 1990s, none remain. After the discovery of amphibian chytrid fungus, Batrachochytrium dendrobatidis (Bd), infecting Canterbury hylid frogs in 1989, reducing risk of exposure of Leiopelma frogs to Bd became a primary management objective. While a low proportion of Archey's frogs have been found infected by Bd in the field, infections have not been observed to cause morbidity or mortality. Sick frogs have been frequently found in the field, however, showing clinical signs, including blisters and skin ulcerations, associated with other diseases. A captive breeding programme was established in 2002 to safeguard the species from disease. Infected individuals, rescued from the field, showed full, spontaneous recovery within 6 months under optimised ex situ conditions. Further, frogs successfully bred under simulated natural conditions. Genetic approaches, including selective breeding for MHC alleles known to confer disease resistance, should be incorporated into management strategies to ensure successful reintroductions.

2011-12-09 12:15 Land reform, grassland conversion, and species habitat loss in New Zealand's remaining indigenous grasslands

Walker, S*, *Landcare Research, Private Bag 1930, Dunedin 9054, New Zealand;*

A process of land reform (called 'tenure review') is coinciding with a period rapid pastoral intensification in New Zealand's remaining indigenous grasslands. In 1992, the Crown owned about 2.4 million ha of land (9.3% of New Zealand) in about 350 large properties that it leased for grazing in the interior of the South Island. Although a limited form of biodiversity

protection, the Crown leases have retained significantly more indigenous vegetation (mainly grasslands), and hence more residual indigenous species habitat, than private land in the same environments. Over this period purchases of pastoral grazing rights by the Crown has created more grassland conservation areas in the high country. However, tenure review has also privatised the majority of indigenous grasslands in the locations most vulnerable to conversion for intensive agricultural use. This has increased risk to low elevation grassland biodiversity, and is resulting in direct extirpation of species through loss of critical habitat and long-term extinction debt as indigenous grassland remnants become increasingly isolated in an exotic matrix. The highly modified inland Mackenzie Basin is an example of where ongoing leasehold land privatisation through tenure review is plainly combining with increasing development pressure, and weak constraints on vegetation clearance in District Plans, to accelerate removal of vulnerable residual habitats of threatened indigenous species.

2011-12-06 15:00 Analysing spatial behaviour to understand the costs of protected areas to artisanal fishers at Lake Alaotra, Madagascar

Wallace, APC*, *Centre for Environmental Policy & Division of Biology, Imperial College London, UK;* **Jones, JPG,** *Bangor University, Wales;* **Milner-Gulland, EJ,** *Centre for Environmental Policy & Division of Biology, Imperial College London, UK;* **Young, RP,** *Durrell Wildlife Conservation Trust, Jersey, Channel Islands;* **Nicholson, E,** *Centre for Environmental Policy & Division of Biology, Imperial College London, UK;*

Fisheries are a key source of food and income for many subsistence communities. However, excessive or unmanaged fishing activity can compromise biodiversity and lead to declining returns for fishing effort as well as livelihood insecurity. Management interventions such as protected areas and no-take zones may reduce environmental degradation and improve fishery sustainability, but carry short-term costs to fishers. Applying marine spatial planning concepts to a freshwater fishery, we conducted systematic catch monitoring, follows, and interviews with more than 700 artisanal fishers at Lake Alaotra, Madagascar. Spatially-explicit analyses at individual fisher and group level confirm that a series of proposed protected area interventions would generate direct costs in terms of increased effort and reduced catch sizes. Using generalized linear mixed effects models we clarify relationships between catches, effort, and spatial restrictions to identify the drivers of fisher behaviour and quantify how no-take zones affect livelihoods. This information can be used in conjunction with fisher feedback to propose alternative designs for protected areas, allowing conservation planning to minimise the adverse impacts of interventions and increase fisher support and compliance. We demonstrate that it is critical to engage fishers and understand their spatial behaviour in order to manage fisheries sustainably and promote effective long-term conservation of freshwater ecosystems.

2011-12-09 10:46 Quantifying the parameters of primate crop-raiding behaviour to mitigate farmer-wildlife conflict in Uganda

Wallace, GE*, *Anthropology Centre for Conservation, Environment and Development, Oxford Brookes University, Oxford, UK;* **Hill, CM,** *Anthropology Centre for Conservation, Environment and Development, Oxford Brookes University, Oxford, UK;*

Understanding and addressing conflict between subsistence farmers and wildlife due to crop-raiding is an increasingly crucial conservation issue. Farmers often use lethal methods when attempting to protect their crops; losses compromise local food security, reduce tolerance of wildlife, and undermine conservation efforts. On-farm wildlife behaviour must be understood to develop effective deterrents to raiding, yet there are few quantitative accounts of this behaviour, and therefore a lack of appropriate mitigation methods. We worked in partnership with farmers adjacent to Budongo Forest Reserve, Uganda, to quantify key parameters of primate raiding behaviour and farmer-primate interactions using systematic observational techniques. Data for crop-raiding dynamics during the baseline growing season identified factors that determine the patterns and amount of crop loss. These data were then used in conjunction with interviews and focus groups with farmers to develop, implement, and evaluate a series of locally-appropriate deterrents over the next season. Techniques trialled were alarms to improve early detection, barriers, border crops, natural repellents, systematic guarding, and alternative crop locations. Benefits, costs, and limitations were specified for each deterrent; in almost all cases raid frequency and damage were reduced. The research provides methods to quantify wildlife crop-raiding behaviour and inform intervention strategies to mitigate human-wildlife conflict.

2011-12-07 17:45 Investigating the feasibility of managing an alien marine species through the combined efforts of central government and local communities.

Walls, K*, *Ministry of Agriculture and Forestry, Biosecurity New Zealand (MAFBNZ);*

Pyura praeputialis ("Pyura") is an Australian ascidian that was first recorded in the Far North of New Zealand in 2007. In Chile, where Pyura was probably introduced by ship hull fouling or ballast water over 80 years ago, it displays invasive characteristics in rocky intertidal habitats. In New Zealand, Pyura could displace native species and also impact on economic, environmental and social and cultural values. A survey showed that Pyura is widespread in the Far North and that eradication from New Zealand is not possible. However, local elimination of relatively small, isolated populations from sites with high values to local communities may be feasible. A pilot programme is underway to investigate the feasibility of local elimination of Pyura. Central government and local communities are working together to clear Pyura from two sites in the Far North. A key part of the programme is the provision of field skills training. Initial results suggest that it is feasible to manage populations of Pyura at specific sites by clearing them at regular intervals. The role of communities is critical to the successful management of this species in protecting high value sites over the long term.

2011-12-08 11:00 Understanding evolving resource governance in Gabon: lessons for community-based conservation

Walters, G., *University College London;* **Coad, L.*,** *University of Oxford;* **Schleicher, J.,** *University of Cambridge;* **Hymas, O.,** *Zoological Society of London;* **Kialo, P.,** *Institut de Pharmacopee et Medicines Traditionelles, Gabon;*

Improving natural resource governance has become an important focus of many conservation projects. Recent work indicates that integrating local perspectives into conservation project frameworks and incorporating understandings of community complexity, local beliefs and land history is fundamental to project success. Between 2005 – 2010 we used semi-structured interviews, community mapping and historical archives to examine the history of land-use governance among the Pouvi and Bateke ethnic groups in Gabon, Central Africa, investigating how and why village governance laws and structures have changed in the last 100 years. In both communities, village governance has undergone significant changes, moving from a closed-access, tribe or family-based division and use of forest resources with strict penalties for trespass, to a more open-access system. Changes have occurred in part due to a system of merging villages, or 'regroupement', initiated by the colonial government, and a shift from village to government 'ownership' of the forest. Despite similarities between the communities, important differences warn against generalisation. Current governance structures are based on a mixture of state, colonial and traditional influences and results suggest that community-based projects aiming to work alongside or strengthen 'traditional' village governance structures must first gain an understanding of the history of the communities they wish to engage with.

2011-12-06 11:15 Estimating resistance to gene flow for multiple habitat types

Wang, Ian*, *Harvard University;*

Understanding how environments affect population size and functional connectivity among populations is a major goal of modern conservation biology. In this study, I describe a method for inferring the resistance to dispersal of different habitat classes and for identifying the environmental factors influencing effective population size. This approach utilizes high resolution GIS layers, molecular data, and a landscape genetics framework to link patterns of genetic and environmental variation. I performed the analysis on three distinct breeding pond networks of the federally endangered (USA) California tiger salamander (Ambystoma californiense), sampling a total of 1600 individuals from 39 populations across multiple years and the entire species range, and using between 10 and 15 microsatellite loci to assess genetic variation. To test the accuracy and repeatability of the inferences, I compared results between study sites, across years from the same study

site, and between molecular and field-based estimates of dispersal from the same study site. The results reveal that the inferences made from these landscape genetic methods are highly consistent and accurate across space and time, providing strong confidence for the efficacy of these methods for population management, the detection of dispersal corridors, and identifying the importance of preserving specific landscape features.

2011-12-08 15:30 Environmental ethics: meeting the ethical challenges from opponents of lethal control of invasive animals

Warburton, B*, *Landcare Research;* **Norton, B,** *Georgia Institute of Technology;*

Since early humans started to migrate, natural barriers to plant and animal dispersal have been broken down and species have been translocated ("introduced") deliberately or accidentally to new ecosystems. When released from their native predators, competitors, and diseases, some species become well established and abundant, and have a significant impact on natural environments, agriculture, and human health and infrastructure. Often these invasive species have to be managed (often killed), but in dealing with a sentient species, conflict can arise between those (one part of the community) wanting to protect the indigenous species and ecosystems threatened, and those (individuals in the wider community) wanting to protect individuals of the pest species. Such conflicts often lead to opponents of control believing they have the ethical high ground and those involved in the killing often at a loss on how to deal with the philosophical arguments posed by the opposition. When the target species are sentient, there is never universal agreement on whether control is necessary or, when it is, how it should be implemented. The extent to which an introduced species is characterized as good or bad is a value judgment, and such judgments often lead to conflicts. Some philosophers have suggested that an invasive species policy based on aesthetic, ethical, or spiritual values might be legitimate, but when based on nebulous concepts of biodiversity, harm, and impact, such policy can be challenged. There are two major philosophical positions: one focusing on individuals (animal rights and animal liberation) and the other on communities and ecosystems (holistic eco- or biocentric ethics). We will expand the arguments for these two positions and then suggest an adaptive management approach as a possible pragmatic solution as a way of addressing the ethical concerns posed by the wider community.

2011-12-08 11:15 Climate change impacts on the terrestrial biodiversity and carbon stocks of Oceania

Wardell-Johnson, GW*, *Curtin Institute for Biodiversity and Climate;* **Keppel, G,** *Curtin Institute for Biodiversity and Climate;* **Sander, J,** *Curtin Institute for Biodiversity and Climate;*

We review the threats from anthropogenic climate change to the terrestrial biodiversity of Oceania, and quantify decline in carbon stocks. Oceania's rich terrestrial biodiversity is facing unprecedented threats through the interaction of pervasive environmental threats (deforestation and degradation; introduced and invasive species; fragmentation) and the effects of anthropogenic climate change (sea level rise; altered rainfall patterns and increased fire frequency; temperature rises and increased storm severity, extreme weather events and abrupt system changes). All nine of Oceania's terrestrial biomes harbour ecosystems and habitat types that are highly vulnerable under climate change, posing an immense conservation challenge. Current policies and management practices are inadequate and the need for new legislation and economic mechanisms is clear, despite powerful interests committed to limiting progress. Mitigation can be achieved by increasing the effectiveness of the protected area network, by maintaining and effectively managing existing carbon stocks and biodiversity, and by reforestation to sequester atmospheric carbon. A price on carbon emissions may encourage less carbon-intensive energy use while simultaneously encouraging reforestation on long-cleared land, and reducing degradation of native forests. However, realising these changes will require societal change, and depend on input and collaboration from multiple stakeholders to devise and engage in shared, responsible management.

2011-12-06 10:30 Mongoose management and recoveries of endemic vertebrates on Amami-oshima Island, Japan

Watari, Y*, *Japan Forest Technology Association;* **Nagumo, S,** *The International University of Kagoshima;* **Kubo, S,** *The International University of Kagoshima;* **Yamada, F,** *Forestry and Forest Product Research Institute;* **Abe, S,** *Ministry of the Environment;* **Fukasawa, M,** *The University of Tokyo;*

Assessing conservation outcomes is crucial for validating/improving management strategy, testing scientific hypothesis, and consensus development in the society. This is especially important for the invasive mammal managements, which are usually conducted under high cost, complex species interactions, and issue of ethics. However, there are not so many programs that incorporate the assessment program.Amami-oshima Island (712km2) is located on the Nansei Islands, southern Japan, which harbors numbers of endemic species. In 1979, the mongoose (Herpestes auropunctatus) was introduced to this island, causing destructions of native species populations. Japanese governments begun to control mongoose population since early 00's, and recently density of the mongoose has dramatically reduced. We have conducted monitoring program for native vertebrates since 2003, when the density of the mongoose was highest. The results suggest that four species, including Amami Rabbit and three frog species increased in their abundance, three of which also expanded their distribution. In contrast, native ground-dwelling bird did not show recovery. Differences for each species in potential habitat distribution, effects of other invasives, and dispersal abilities might cause these different responses to the mongoose reduction. This study is the first example to show the recoveries of native species after mongoose management on massive island.

2011-12-08 11:00 What is needed to increase the capacity of Australia's protected area system to represent thfreatened species?

Watson, J*, *Wildlife Conservation Society;* **Evans, M.,** *University of Queensland;* **Carwardine, J.,** *CSIRO;* **Fuller, R.,** *University of Queensland;* **Joseph, L.,** *Widlife Conservation Society;* **Segan, D.,** *University of Queensland;* **Taylor, M.,** *WWF-Australia;* **Possingham, H.,** *University of Queensland*

Protected areas are an important tool in threatened species conservation, buffering populations from many types of threatening processes. Here, we assess how effectively Australia's protected areas (89 million ha, 11.6% of the continent) overlap with the geographic distributions of terrestrial threatened species and compare this against both a random solution and a spatially 'efficient' solution created with the spatial prioritization tool Marxan. We define minimum area targets for each species based on range size and level of vulnerability. While the current configuration of protected areas performs better than a random solution, 166 (12.6%) threatened species occur entirely outside protected areas and only 259 (19.6%) species achieve target levels of protection. Critically Endangered species were among those most under-represented, with 12 (21.1%) species occurring entirely outside protected areas. Reptiles and plants were the most poorly represented taxonomic groups, and amphibians the best represented. Spatial prioritization analysis revealed that an efficient protected area system of the same size (11.6% of Australia) could meet representation targets for 1272 (93.3%) of threatened species. Moreover, we show that by protecting 17.8% of Australia, all threatened species could achieve target levels of representation, assuming all current protected areas are retained. While this is theoretically achievable, existing land uses and the finite resources available for conservation mean that land acquisition may not always be possible or even effective for the recovery of threatened species.

2011-12-08 14:00 What does connectivity conservation actually mean for terrestrial conservation planning in a time of climate change?

Watson, J.EM*, *Wildlife Conservation Society;* **Mackey, B.,** *Australian National University;*

The reality of human-forced rapid climate change presents an unprecedented challenge to the conservation of biodiversity. However, that the current approach to conservation planning based on accumulating small amounts of protected lands across Earth, using a set of arbitrary conservation 'targets', will not be effective in mitigating the impacts of human-forced climate change on biodiversity. We argue that regional and continental wide 'connectivity conservation' strategies are needed that incorporates a larger adaptation agenda- one that recognizes the importance of protecting and

restoring those natural processes and responses that have enabled species to persist through past environmental change. The following key elements are a crucial component of an effective conservation plan: identifying and protecting important climate refugia (both ecological and evolutionary); conserving the large-scale migration and connectivity corridors that operate at continent scales (including regional networks of habitat patches and habitat 'stepping stones'); maintaining viable populations of all extant species to maximize intra-species genetic diversity and thus options for local adaptation; reducing all current threatening processes at the landscape scale across the continent; and protecting and restoring key large scale ecological processes (especially hydro-ecology and ecological fire regimes). Finally, underpinning climatic adaptation responses must be a thorough understanding of the special role extensive intact landscapes will play in the future protection of native biodiversity.

2011-12-09 10:42 Aloha Aina: Successfully Integrating Traditional Ecological Knowledge into Conservation Efforts

Watson, TK*, *Honua Consulting;*

Traditional ecological knowledge continues to be a vital asset to biodiversity, environmental conservation, and restoration globally. Drawing from multiple examples in Hawai`i where the use of traditional knowledge has enabled collaborations with Native Hawaiians and local communities, this presentation will highlight conservation success stories from endangered species recovery, climate change, community education and outreach, and co-management of protected areas. This presentation will provide summaries and "lessons learned" from past experiences for communities around the world that continue to seek out pathways for successful partnerships between western conservation science and indigenous communities. The goal of this presentation is to emphasize the common conservation goals shared by western science communities and indigenous communities, encouraging all peoples committed to a healthy earth and ecology to come together to achieve their shared environmental goals.

2011-12-09 15:30 Genetic translocations of fragmented populations to cope with climate change

Weeks AR*, *The University of Melbourne;* **Sgro CM,** *Monash University;* **Hoffmann AA,** *The University of Melbourne;*

Translocations are being increasingly proposed as a way of conserving biodiversity, particularly in the management of threatened and keystone species, with the aims of maintaining biodiversity and ecosystem function under the combined pressures of habitat fragmentation and climate change. Evolutionary genetic considerations should be an important part of translocation strategies but there is often confusion about concepts and goals and therefore they are rarely considered by managers. Yet the imperative for conservation managers should now be conservation and restoration practices that maintain and increase genetic diversity within species, thereby promoting in situ adaptive processes. The long term implications of ignoring adaptability when planning translocations will extend well beyond the persistence of species, with potential impacts on biodiversity and ecosystem function and resilience in response to climate extremes. Here we discuss how adaptive evolution can be considered when undertaking translocations. We develop case studies to illustrate how managers can undertake translocations to increase gene flow, genetic variation and adaptability of populations to help counter stressful conditions arising from climate change.

2011-12-09 10:45 Conservation Prioritisation in a changing landscape - New Zealand's indigenous grasslands a case study

Weeks, ES*, *University of Waikato;* **Walker, S,** *Landcare Research;* **Overton, J,** *Landcare Research;* **Clarkson, B,** *University of Waikato;*

To be effective, conservation planning needs to better anticipate the rates and patterns of dynamic threats to biodiversity, such as rapidly changing land use trends. This is a pressing need in temperate grasslands internationally, and New Zealand's indigenous grasslands are a good example. Although the area of formally protected temperate grasslands in New Zealand has increased in recent decades, low to mid-altitude systems continue to be poorly protected and land use intensification has accelerated in recent years. The area of remaining indigenous grassland was reduced by 7% (from 43 to 40%) between 1990 and 2008. Poor understanding and prediction of the drivers and patterns of change has made it difficult to assess the relative vulnerability of areas of remaining indigenous grassland habitat, and identify those in most immediate need of protection. Here we use quantitative spatial models to assess and predict the vulnerability of New Zealand's remaining indigenous grassland habitat to land use intensification in for the first time. Our models are based on our new mapping and measurement of past and current land use in relation to patterns of climate, topography, soils, and proximity to infrastructure (i.e. roads) or existing development. Overall, areas most vulnerable to land-use intensification are located at moderate to high elevations with low slopes that have previously been classified as more suitable for low productivity extensive grazing, but we also found important regional variations. We show that the significance of the remaining biodiversity of the most vulnerable grasslands is recognized by other New Zealand conservation planning tools, but they have not been targeted for conservation in recent land reforms. We demonstrate how rapidly conservation priorities may change over time, and the importance of regularly-updated spatial land use information, by comparing models based on land use data from earlier time periods and other recent New Zealand conservation prioritization tools.

2011-12-08 12:30 Improving the Effectiveness of Community-Managed Marine Protected Areas for Biodiversity Conservation, Fisheries Management and Climate Change Adaptation

Weeks, R*, *Wildlife Conservation Society - Fiji;* **Pressey, RL,** *ARC Centre of Excellence for Coral Reef Studies, James Cook University;* **Jupiter, SD,** *Wildlife Conservation Society - Fiji;* **Comley, J,** *Institute of Applied Science, University of the South Pacific;*

Community-managed marine protected areas (MPAs) are a primary tool for marine and coastal conservation and management throughout Oceania and the Coral Triangle. In most cases, community objectives are focused primarily on fisheries benefits for fishes and commercially important invertebrates. Marine protected areas often emerge as a synthesis of local tradition and scientific knowledge and comprise a multitude of different management strategies, including permanent closures, temporary closures, size limits, seasonal or species bans, and gear restrictions. This focus group will review theoretical and empirical evidence for the effectiveness of different community-based MPA management strategies for biodiversity conservation, fisheries management, and climate change adaptation objectives, and will work towards developing practical ecological criteria (rules of thumb) for size and spacing of MPAs that are applicable to community-based management, recognising upper size limits and that permanent no-take closures are not always feasible. Anticipated outputs include a review paper for journal publication and a standardised framework for quantifying the contribution that community-managed MPAs make towards conservation targets.

2011-12-08 14:30 Building Social and Ecological Connectivity for Climate Resilience

Weeks, R*, *Wildlife Conservation Society Fiji;* **Jupiter, SD,** *Wildlife Conservation Society Fiji;* **Eisma-Osorio, R-L,** *Coastal Conservation and Education Foundation;*

Protected areas are increasingly recognised for their role in strategies to conserve biodiversity, support livelihoods and maintain ecosystem services in the face of future climate change. Mindful of the fact that protected areas are embedded within both a physical landscape and a complex human landscape of governance, policy and management, conservation planners and policy makers are beginning to look beyond individual protected areas when developing climate change strategies. We provide two examples of how improving ecological and social connectivity can increase the benefits of protected areas for climate change mitigation. In Fiji's Vatu-i-Ra Seascape, conservation partners are focusing on managing for the predicted but uncertain impacts of flooding and coral bleaching through implementation of protected area networks designed to maximise ecological resilience, located within a broader ecosystem-based management framework. Concurrently, social capacity to adapt to climate fluctuations is being increased through efforts to strengthen community-based management structures, improve communications networks, and build collaboration amongst a range of sectors and partners. In the Philippines, building social connectivity amongst community-based coastal resource managers has proven an effective approach to develop ecologically connected and resilient marine protected area (MPA) networks. Inter-municipal collaborations have led to rapid improvements in management effectiveness and enforcement capacity, followed by efforts to redesign MPA networks following scientific

recommendations to increase the size of existing MPAs and establish new MPAs to maximise ecological representation and connectivity.

2011-12-08 11:14 Invasive alien plant species: is it a threat to the existence of threatened spot-billed pelicans in Sri Lanka?

Weerakoon, K*, *Eco friendly Volunteers;* **Athukorala,** *Eco friendly Volunteers;*

Lack of information on the distribution of near threatened Spot-billed Pelican (Pelecanus philippensis) and threats to its habitats within Sri Lanka handicap conservation of this charismatic species. A survey was conducted to find out its distribution and threats to its habitats. We surveyed over 1550 tanks across five provinces for last five years in Sri Lanka. It is observed invasive alien plants are clogging man-made tanks which reduce feeding habitats for Pelicans and other waders. Over 30% of the surveyed tanks were completely covered with vegetation mostly with invasive alien plant species. The most common identified invasive alien plant was Water Hyacinth (Eichornia crassipes). Local people said pelicans and other birds have stopped coming to some tanks when those started getting covered with vegetation. Lack of awareness among people and ignorance was the main reason for fast spreading of invasive species. Increasing awareness on invasive alien species among local communities and conducting manual cleaning campaigns helped to save tanks from spreading of alien invasive species and it gave more space for threatened pelicans and other water birds for feeding. This proved that well maintained water bodies reduce the rate of spreading of invasive species and increased the habitat for pelicans and other waders.

2011-12-07 16:30 Conserving allelic diversity in small populations

Weiser, EL*, *Department of Zoology, University of Otago;* **Grueber, CE,** *Department of Zoology, University of Otago;* **Jamieson, IG,** *Department of Zoology, University of Otago;*

Securing a species from extinction may involve establishing and maintaining small protected populations. The genetic viability of each population will depend partly on parameters that can be managed, such as the number of founders and amount of migration. We modelled genetic drift in a population of threatened brown kiwi (Apteryx mantelli) currently being reintroduced to a 230 ha fenced reserve in Taranaki, New Zealand. This population will be used as a source of individuals to supplement declining populations, so its genetic diversity should be maintained for long-term viability. We used a computer model to test management options to achieve 90% retention of rare alleles (initial frequency = 0.05) for 200 years (10 generations). Given the estimated carrying capacity of 50 breeding pairs, we estimated that 2-13 effective migrants per kiwi generation would be needed depending on the number of individuals initially released (10-100). Changes in population growth rate, age of individuals released, period of population establishment (over 5 years versus 1 year), or adding migrants gradually over one generation rather than in pulses did not significantly change the probability of retaining a rare allele. The model we adapted can also be easily applied to other species with a variety of life histories, enabling managers to directly estimate required migration rates given parameters relative to their populations.

2011-12-06 17:15 Brains versus Brawn: the role of knowledge exchange and policy influence on the resilience of a marine species co-management network

Weiss, Kristen C.*, *James Cook University;* **Hamann, Dr. Mark ,** *James Cook University;* **Marsh, Dr. Helene,** *James Cook University;*

Power sharing and knowledge exchange are essential components of adaptive co-management. Understanding the structural characteristics and patterns of actor relations within co-management networks provides a clearer picture of knowledge and power dynamics, and is important in determining how to achieve more resilient conservation outcomes. This study used Social Network Analysis to examine patterns of knowledge transfer and policy influence among actors within a co-management network for marine species in Northern Australia. The network structure of this co-management system supports extensive decentralized information flow, but a disproportionate amount of top-down policy influence compared to knowledge accumulation. Such an arrangement hinders well-informed decision making, especially at higher management levels. Having knowledge is not a direct indication of power within this network. Nor do powerful actors necessarily have the most information for decision-making. Addressing communication gaps between knowledge producers and policy makers should improve the resilience of this co-management network, providing better protection for species while meeting the needs of diverse stakeholders. Using a network approach to study natural resource co-management systems holds much promise for characterizing the relationship between network structure and power dynamics, and their impact on the resilience of both the management system and the resources or species in question.

2011-12-08 18:30 Global freshwater fish review: causes of endangerment and extinction

Weiss, S, *University of Graz;* **Mack, J,** *University of Graz;* **Geyer, E*,** *University of Graz;*

The number of freshwater fish species facing extinction or increasing levels of endangerment is increasing throughout the world. A wide range of primarily human activities is responsible for their imperiled status. Although this general fact is well known, there is limited understanding concerning the global distribution of specific causes of freshwater fish endangerment. Effective conservation plans and global strategies for freshwater fishes must be based on assessment of the primary causes of extinction and endangerment. We present the major threats for freshwater fish throughout the world and assess their relative importance at various geographic and taxonomic scales. Approximately ten main categories of impacts are assessed, whereby some require further sub-categorization. For example, dam construction is further categorized by projects with or without hydropower production. Climate change, a popular current theme, is further categorized as an effect acting alone, or in combination with other major threats, such as water abstraction. Our analysis aims to portray the relative importance of various threats at a global as well as continental scale and to provide a tool for critiquing large-scale socio-economic planning, dealing with such fields as transportation, agriculture and energy development.

2011-12-08 18:30 Gene flow and differentiation in the alpine archipelago of the New Zealand rock wren (Xenicus gilviventris)

Weston, K.A*, *University of Otago;* **Robertson, B.C,** *University of Otago;* **Jamieson, I,** *University of Otago;*

Many species occur in naturally subdivided populations due to spatial heterogeneity of the landscape. Such a pattern is especially evident in alpine species, where naturally fragmented habitat forms an 'alpine archipelago'. High altitude habitat patches and the species they harbour can serve as models for predicting responses to the synergistic effects of anthropogenic habitat fragmentation and climate change. The rock wren (Xenicus gilviventris) is a threatened alpine passerine belonging to the endemic New Zealand wren family (Acanthisittidae). This largely flightless family was once represented by at least seven species, however due to the impacts of introduced mammalian predators, only two species remain. Conservation management of rock wren has only recently commenced via translocation of individuals to offshore islands, but genetic considerations are not currently a part of management practices. Here we investigate genetic population structure by sampling rock wren (n=70) from throughout their range. Using 15 rock wren-specific microsatellite markers and mitochondrial control region DNA sequence, we have identified populations important for translocations and reintroductions in conservation management of the species. A thorough knowledge of genetic population structure will allow managers to prioritise other management efforts, such as predator control in areas harbouring important rock wren populations.

2011-12-06 14:30 Factors influencing the cost, effectiveness and efficiency of conservation

White PCL*, *University of York;* **Laycock HF,** *University of York;* **Smart JCR,** *Aarhus University;* **Raffaelli DG,** *University of York;* **Moran D,** *Scottish Agricultural College;*

The importance of monitoring the effectiveness of conservation programmes is becoming increasingly recognized. The effectiveness of conservation can be increased by a clearer understanding of the factors which contribute to successful programmes. Here, we use statistical

models to investigate the factors that may influence the cost, effectiveness and efficiency of conservation programmes, using the UK Biodiversity Action Plan (BAP) as a case study. The UK BAP was launched in 1994 in response to dramatic biodiversity loss in the UK during the 20th century. We evaluate the effectiveness and efficiency of individual Species Action Plans using Cost-Effectiveness Analysis, Cost-Utility Analysis and Threat Reduction Assessment. Then we use statistical models to investigate the factors, including both species characteristics and plan characteristics, that may influence the cost, effectiveness and efficiency of the Species Action Plans. We found that characteristics of the species had more influence on plan success than characteristics of the plan itself. Invertebrate plans tended to be less effective, whereas vertebrate plans were less efficient. Plans for widely distributed species with longer generation times also tended to be less efficient. Older and less concise plans were less efficient, whilst the involvement of multiple organisations in plan delivery appeared to reduce effectiveness. These results can be used to inform decisions on which species we should be investing in if we want to maximise the rate of return on our investment, and also how we can improve the species recovery plan process. However, conservation resource allocation decisions cannot be based exclusively on economic reasoning, since moral, social and cultural considerations are also inevitably involved.

2011-12-06 14:16 Habitat-Related Breeding Success and Abundance in Burrow-Nesting Seabirds: A Predictive Modelling Approach

Whitehead, Amy*, *Landcare Research, PO Box 40, Lincoln, New Zealand;* **Lyver, Phil,** *Landcare Research, PO Box 40, Lincoln, New Zealand;* **Jones, Chris,** *Landcare Research, PO Box 40, Lincoln, New Zealand;* **MacLeod, Catriona,** *Landcare Research, Private Bag 1930, Dunedin, New Zealand;* **Pairman, D,** *Landcare Research, PO Box 40, Lincoln, New Zealand;* **Ruamaahua Islands Trust,** *.;* **Te Tapatoru a Toi,** *.;*

Colonial burrow-nesting seabirds have significant cultural, economic and biological value in many countries. However, many seabird populations and ecosystems are at risk. High adult survivorship and low reproductive rates of seabirds makes them vulnerable to predation by introduced mammals, alterations in food-webs, fisheries by-catch, land development around breeding colonies and climate perturbations. Access to reliable information about burrow-nesting seabird population dynamics is crucial for restoration and management of such colonies and their associated ecosystems. However, such data are often poor or unavailable. We use predictive habitat models to estimate breeding success and abundance of grey-faced petrels (Pterodroma macroptera gouldi) on three islands off northern NZ. Estimates of annual variation in egg and near-fledging chick burrow occupancies and burrow entrance densities are combined with habitat data in island-specific habitat predictive models to estimate breeding population size. Breeding success and burrow density is significantly influenced by habitat, with implications for ecosystem restoration projects focussing on burrow-nesting seabirds.

2011-12-08 18:30 Experimental habitat rehabilitation for the Philippine Cockatoo Cacatua haematuropygia in Palawan, Philippines

Widmann, IDL*, *Katala Foundation;* **Widmann, P,** *Katala Foundation;*

Extreme lowland forests are the core habitat of the critically endangered Philippine Cockatoo which has its last stronghold on the island of Palawan. Most of these forests have already been cleared for agriculture and settlements, and the remaining few patches are usually degraded. Experimental rehabilitation of two coastal forest patches was attempted employing assisted natural regeneration in heavily degraded areas and enrichment planting in residual stands. Tree species selection for trials was based on vegetation analyses, previous experience from reforestation projects and information on food-providing and nest trees of the cockatoo. Conservation education campaigns on forest rehabilitation and species conservation were conducted in settlements adjacent to the sites. In degraded grassland a closed canopy could be achieved within two years after planting. After four years some tree species started fruiting, and foraging cockatoos were observed in one site. At least four more globally threatened vertebrate species were recorded in the two plots and are likely benefiting from the rehabilitation project as well. Results of the experiment justify replication on a larger scale, particularly within and adjacent to existing cockatoo reserves and other key sites in Palawan.

2011-12-07 18:00 Invasive plants in conservation linkages: what have we been overlooking?

Wilkerson, ML*, *University of California, Davis;*

Conservationists continue to debate the potential downsides of enhancing landscape connectivity through the use of large-scale linkages. One often-discussed though virtually unstudied concern is that linkages will also aid non-native plant movement. As part of a broad study to address the potential problem of linkages facilitating invasive plants, I have focused on large-scale conservation linkages in Southern California. I am examining the patterns and potential mechanisms of plant invasion associated with these specific landscape features, emphasizing the role of edge effects and the impact of matrix types. I collected data from eight linkages dominated by chaparral and coastal sage scrub in two Southern California counties. Surveys confirm that plant invasion has a spatially explicit structure, with linkage interiors being more invaded than their edges. These spatially-explicit patterns varied among invasive species with different dispersal syndromes (wind vs. animal vs. bird). In turn, these patterns depend upon the types of matrix that surround the linkage. Therefore, what constitutes a landscape for a wind-dispersed invasive species is not the same as that of an animal-dispersed invasive species or a bird-dispersed species. These conclusions will help land managers/owners effectively prioritize invasive plant management within linkages and also will advance our conceptual understanding of invasive plant movement and connectivity at the landscape level.

2011-12-06 12:00 Incorporating Connectivity in Endangered Species Reintroduction Site Selection

Wilson, JW*, *North Carolina State University;* **Fay, JP,** *Duke University;* **Haddad, NM,** *North Carolina State University;*

Despite being critical for ecosystem functioning and conservation management, habitat connectivity has been neglected in reintroduction biology. We propose a framework that incorporates connectivity in selecting reintroduction sites. Using a graph-theoretical approach in a GIS framework, we analyze regional patch dynamics of the St. Francis' Satyr (SFS) (Neonympha mitchellii francisci), a federally endangered species globally restricted to early-successional wetlands on United States military grounds at Ft. Bragg, NC. Our top priority reintroduction site is the unoccupied habitat patch connected to the greatest number of other unoccupied habitat patches. Our model that considers only the spatial configuration of suitable patches suggests that SFS persists as one metapopulation, with the top priority reintroduction site directly connected to eight other habitat patches through 15% of the network's dispersal routes. Models that also incorporate dispersal limitations suggest that SFS persists as five metapopulations, with the top priority reintroduction site directly connected to five other patches through 18% of that metapopulation's dispersal routes. Reintroductions at highly connected sites reduce dispersal limitations, enabling reintroduced populations to better disperse to nearby unoccupied habitat as population sizes increase. Over the long term, highly connected populations should be better equipped to adapt their ranges to changing environments.

2011-12-09 14:45 Climate change conflicts and biodiversity conservation

Wilson, KA*, *The University of Queensland;*

The UN Secretary General, Ban Ki-moon, has predicted that an increased scarcity of resources due to climate change will potentially lead to "a breakdown of established codes of conduct, and even outright conflict". We evaluate the potential impact of climate change on the frequency and spatial distribution of conflicts in the future, focusing in particular on biodiversity hotspots. We find that only five biodiversity hotspots (of 34) comprise countries that are unstable and also at risk of climate change, due to impacts such as sea level rise, decreased crop viability, and/or water shortage. We assess the possible impact climate change related conflicts will have on biodiversity conservation, particularly given the potential impact that such conflicts might have on the allocation of conservation funding. We explore the following scenarios (1) a business as usual scenario (2) a risk averse scenario where areas of high conflict do not receive any investment (3) a scenario that explicitly accounts for the risk of conflict in evaluating the benefits of investment.

2011-12-08 18:30 The impact of alien fish species on feeding behavior and shelter use in Alpine newt

Winandy, L*, *University of Liège;* **Denoël, M,** *University of Liège;*

The introduction of alien fish species in the natural environment is a major and current conservation concern whose main consequence is biodiversity lost. Amphibians are particularly affected by these introductions and are declining worldwide. While previous studies have mainly highlighted population extirpation in presence of fish, the involved mechanisms are little known particularly at the behavioral level. For this purpose, we compared behavioral patterns (shelter use and feeding) of 100 adult Alpine newts (Mesotriton alpestris) in a replicated laboratory design (20 aquariums). Half of individuals were in indirect (visual and olfactory) contact with goldfish (Carassius auratus). In the presence of fish, significantly more newts were hidden under shelters and less were feeding in comparison with controls. However, food detection latency (i.e., the time from food delivery to the first feeding act) did not differ in the two treatments. These results show that the mere presence of fish, i.e. without direct contact, can alter newt behavior. By reducing their activity level outside shelters, newts have lower access to food in presence of fish. Looking at such behavioral patterns help in understanding of mechanisms of exclusion and coexistence patterns between fish and amphibians. This shows that non-predatory species, such as goldfish, have detrimental effects on newts.

2011-12-08 12:30 From prediction to action - the science of saving species under climate change.

Wintle, B.A., *University of Melbourne;* **Possingham, H.P.*,** *University of Queensland;*

Substantial investment in climate change research has led to dire predictions of the impacts and risks to biodiversity; the IPCC Fourth Assessment Report1 cites 28,586 studies demonstrating significant biological changes in terrestrial systems. Yet there is little advice or precedent in the literature to guide climate adaptation investment for conserving biodiversity. Given that there is an impending extinction crisis, we need to move urgently from predictive science to decision science in order to support difficult choices between climate adaptation options under severe uncertainty. Here we present the first systematic ecological and economic analysis of a climate adaptation problem in one of the world's most species rich and threatened ecosystems; the South African Fynbos. We discover a counter-intuitive optimal investment strategy that switches twice between options as the available adaptation budgets increases. We demonstrate that optimal investment is non-linearly dependent on available resources, making the choice of how much to invest as important as determining what to invest in and where. Our study emphasises the importance of a sound analytical framework for adaptation investment that integrates information and tools from ecology, economics, social science and decision science. Our method for prioritising investment can be applied at any scale to minimise the loss of species under climate change. We anticipate that the approach illustrated here will form the basis of future climate adaptation investments.

2011-12-08 15:45 Inter-population variation and sociality of the North Island rifleman (Acanthisitta chloris granti): Implications for conservation management

Withers, Sarah Jane*, *The University of Auckland;* **Parsons, Stuart,** *The University of Auckland;* **Hauber, Mark,** *Hunter College, City University of New York;* **Lavery, Shane,** *The University of Auckland;*

Species management strategies are often formulated and carried out after a species has become endangered or threatened. This inevitably leads to strategies which are limited in their scope to collect explorative information related to the ecology and variation present within the species' distribution. Unfortunately this often results in a lack of fundamental knowledge related to that species, particularly in relation to aspects of their biology which may influence the success or failure of particular management strategies. Translocation is a management strategy that is being increasingly utilized as a tool for expanding the range of a declining or fragmented species. However individuals from threatened species are often translocated between populations or into new areas with little knowledge of the variation inherent between meta-populations. Using DNA analysis, bio-acoustic techniques and morphological comparisons, my research focuses on collecting both ecological and genetic data to identify variation between separated populations of the New Zealand North Island rifleman (Acanthisitta chloris granti), a sub-species which is not yet endangered, but is declining and becoming increasingly fragmented. The results of this research have important implications for the definition of appropriate management strategies for the sub-species, particularly with regard to the use of translocation as a tool for future management.

2011-12-06 17:00 Conservation on private lands: the need for a science-based framework

Wittmer, HU*, *School of Biological Sciences, Victoria University of Wellington, PO Box 600, Wellington 6140, New Zealand;* **Marshall, AJ,** *Department of Anthropology, University of California, Davis, CA 95616, USA;*

Private lands are playing an increasing role in the conservation of endangered species. Recently, conservation efforts on private lands have expanded in scope and scale, including ambitious initiatives such as the creation of entire National Parks. Private conservation efforts at large spatial scales, however, are more likely to be accompanied by drastic changes in management. Despite the best intentions of managers, such changes can be risky and, at least in the short term, lead to unanticipated negative outcomes. Here we report on the unintended consequences of removing >30,000 domestic sheep for the viability of endangered huemul (Hippocamelus bisulcus) deer during the establishment of the future Patagonia National Park, Chile, on a privately owned Estancia. Following the removal of sheep, predation of huemul fawns and adults from native predators increased dramatically, threatening the viability of one of the endangered species that the Park was intended to protect. Based on these results, we highlight the need for a science-based framework for conservation efforts on private lands to ensure that such initiatives will meaningfully contribute to conservation efforts. Key components of a science-based framework are transparency, accountability, independent assessment, incorporation of sound management practices, and consideration of all relevant ecological processes and interactions.

2011-12-06 12:15 Taxonomy, population genetics and conservation of the Critically Endangered Southern Bent-wing Bat (Miniopterus schreibersii bassanii)

Wood, RE*, *Genetics Department, The University of Melbourne, Victoria, Australia;* **Appleton, BA,** *Genetics Department, The University of Melbourne, Victoria, Australia;*

It is integral to the effective long-term management and conservation of populations that taxonomic relationships are understood and resolved. This research aims to clarify the taxonomy and population structure of the Australian complex of the Large Bent-wing Bat (Miniopterus schreibersii) with a particular focus on the Critically Endangered Southern Bent-wing Bat (M. s. bassanii). Using mitochondrial, microsatellite and nuclear genetic markers, investigation into historical and contemporary population structure has provided insight into the interactions and evolutionary relationships within and between populations of the two southern forms, M. s. bassanii and M. s. oceanensis. Despite the overlapping ranges of these two taxa, the genetic, morphological and ecological differences observed indicate that they may in fact be reproductively isolated, thereby warranting recognition as distinct species. A major concern for M. s. bassanii is not only their declining populations but also the low genetic variation observed. As this is likely to have a long-lasting impact on their viability in the long-term, efforts should focus on promoting habitat quality and demographic stability, at least in the short-term. The importance of this research in establishing the taxonomic status and population structure of M. s. bassanii is emphasized by the continued decline of populations and the imminent need for their effective management and conservation.

2011-12-09 17:15 Science Narratives: Inspiring participation in large landscape conservation

Wyborn, C*, *Fenner School of Environment and Society, ANU;*

Large landscape 'connectivity conservation' initiatives are rapidly gaining prominence across the world. They are motivated by a desire to halt biodiversity decline and preserve ecosystem processes in the face of climate change and habitat fragmentation. At the heart of these initiatives is the motivation and ability of individuals, agencies and institutions to collaborate across multiple scales, land tenures and land uses. Drawing on the concept of ecological connectivity, proponents claim to be 'connecting

people' while 'connecting landscapes': a framing intended to engage and inspire a commitment to conservation through creating a positive narrative that places small-scale interventions in a larger landscape context. This framing demonstrates the power of a science-based concept that can bridge normative and scientific domains to create a space for meaningful action at the local scale. Using qualitative social research examining two large landscape conservation initiatives in Australia and North America, this paper will explore how charismatic species, captivating visions and a crisis are being mobilised to create a shared imperative for collaboration. Charismatic narratives may embellish the purity of scientific concepts however they also play an important role in engaging diverse groups of people in the context of landscape scale science and action.

2011-12-09 12:30 Indigenous management and the ecological role of Andean peatlands (bofedales) in the context of global environmental change.

Yager, KA*, *Biospheric Sciences, NASA Goddard Space Flight Center;* **Tupayachi, A,** *Vargas Herbarium, UNSAAC ;* **Meneses, RI,** *National Herbarium of Bolivia and National Natural History Museum of Bolivia, , UMSA ;* **García, C,** *ECOBIOSIS, Universidad de Concepción;* **Beck, S,** *National Herbarium of Bolivia, UMSA;*

In the Andes of South America, bofedales (or high Andean peatlands) are fundamental to the traditional livelihoods of Andean pastoralists, in addition to providing numerous ecosystem services. In this presentation, we discuss the biology and ecological role of bofedales on a regional basis, including the intersection of water and soils that permit the formation of these unique vegetation communities, which support biodiversity, help to regulate hydrological resources, provide highly palatable and nutritious forage, and act as a carbon sink. We compare peatland characteristics (including species diversity, primary vegetation communities according to gradients of elevation and humidity, and total distribution) and local indigenous management (including irrigation, animal preference, and pasture sectoring) of bofedales in Southern Peru (Cordillera Vilcanota and Urubamba) and Bolivia (Cordillera Occidental and Oriental). Recent threats to the sustainability of bofedales are discussed, including the impacts of rapid climate change. As indigenous communities re-negotiate local management practices in the face of global change, the continued management of these integral mountain systems is increasingly challenged. In addition to securing enough pastures for future generations, the strategic conservation of bofedal systems will contribute to maintaining mountain biodiversity and water availability over the long-term as the Andes region is adversely and increasingly impacted by global environmental change.

2011-12-08 18:30 Effects of clam dredging on population density of the surf clam Paphia undulata in the eastern Gulf of Thailand

Yeemin, T*, *Ramkhamhaeng University;* **Saenghaisuk, C,** *Ramkhamhaeng University;* **Yuchareon, M,** *Ramkhamhaeng University;* **Donsomjit, W,** *Ramkhamhaeng University;* **Sutthacheep, M,** *Ramkhamhaeng University;*

The surf clam Paphia undulata is a commercially important species in Thai waters and has supported an offshore fishery in Thailand for several decades. The deleterious impact of clam dredging on the benthic environment has been documented at many fishing grounds. This study aimed to assess the effects of clam dredging on a soft sediment community, especially changes of population density of the surf clam P. undulata, in Trat Province, the eastern Gulf of Thailand. The survey in August 2010 revealed that the surf clam P. undulata was the most abundant species. The average population density was 10 individuals/m2 with an average size of 2.6 cm. Following the report of illegal clam fishing at the study sites, the intensive study on population density of macrobenthic animals was conducted. There were no P. undulata from the samplings. A few polychaetes and brittle stars were observed on the soft sediment community. At the moment surf clam stocks are overfished therefore it is vitally important that strict preservation of surf clams in the protected areas be taken into account in the fisheries management plan. This may be achieved by increasing efforts to enforce the laws and enhancing community empowerment.

2011-12-08 18:30 Community-let nest protection and Pagoda based head-starting of Cantor's Soft-shell Turtle in Cambodia

Yoeung, SUN*, *Conservation International;*

Since 2007, a conservation team of endangered Asian Giant Soft-shell turtle Pelochelys cantorii from Conservation International, Cambodia have been working with local villagers living along Mekong River to conserve this rare species and its nest after the turtle was rediscovered in 2007. This species will be listed as Critically Endangered one soon because it is rare in the world. The turtle nests protection is focus on Cambodia Mekong River which from Sambor district in Kratie province to up stream. From 2007 to 2010, thirty turtle nests were protected by villagers with in total number of 616 hatchlings released back to their habitat successfully. In 2010-2011, the project is doing protection the nest as previous activities by giving some incentive to people to find and guard the turtle nests. So far 8 of 20 nests hatched with 238 hatchlings but 88 hatchlings were released back to their habitat and 150 hatchlings have being kept in CI office. Moreover, Conservation International and history 100 pillar pagoda has agreed to construct a turtle head-starting facility included re-build an old pond and a turtle facility in the pagoda ground to be used for feeding turtles for the purpose of eco-tourism for improvement of riparian people benefit and conservation dissemination of Cambodian turtle species especially P. cantorii. Also, we will train people about how to take care the turtle hatchlings in the facility.

2011-12-08 15:00 Cost-benefit analysis for international plant introductions under uncertainty

Yokomizo, H*, *National Institute for Environmental Studies;* **Possingham, HP,** *The University of Queensland;* **Hulme, PE,** *Lincoln University;* **Grice, AC,** *CSIRO Ecosystem Sciences;* **Buckley, YM,** *The University of Queensland;*

Worldwide, we rely on introduced plants for the essentials of human life; however, intentional plant introductions for commercial benefit have resulted in invaders with negative environmental, economic or social impacts. We argue that plant species of low expected economic value should be less acceptable for introduction than species of high economic value if their other traits are similar; however key traits such as likelihood of escape and costs of escape are often highly uncertain. We developed a cost-benefit analysis for determining plant introduction that incorporates probability of escape, expected economic costs after escape, expected commercial benefits, and the efficiency and cost of containment. We used a model to obtain optimal decisions for the introduction and containment of commercial plants while maximizing net benefit or avoiding losses. Optimal decisions for introduction and containment of commercial plants depended, not only on the probability of escape and subsequent costs incurred, but also on the anticipated commercial benefit, and the cost and efficiency of containment. When our objective is to maximize net benefit, increasing uncertainty in parameter values increased the likelihood of introduction; in contrast, if our objective is to avoid losses, more uncertainty decreased the likelihood of introduction.

2011-12-08 18:30 Habitat modification by an invasive alien grass reduces native food availability of a grasshopper species endemic to Japan

Yoshioka, A*, *Graduate School of Agricultural and Life-Sciences, The University of Tokyo;* **Kadoya, T,** *Environmental Biology Division, National Institute for Environmental Studies;* **Suda, S,** *Graduate School of Agricultural and Life-Sciences, The University of Tokyo;* **Washitani, I,** *Graduate School of Agricultural and Life-Sciences, The University of Tokyo;*

To examine the relative importance and interactions of trophic and non-trophic effects of plant invasions on herbivores, we investigated how the invasion of weeping lovegrass Eragrostis curvula impacted a threatened species, Eusphingonotus japonicus, a food generalist grasshopper endemic to gravelly floodplains with sparse vegetation in Japan. Field observations and laboratory experiments showed that the grasshopper fed mainly on herbs endemic to the gravelly floodplains, which were negatively impacted by the alien grass. The alien grass was not consumed as food. Field censuses also showed that the density of the grasshopper was positively correlated with the coverage of endemic herbs in a plot where weeping lovegrass was

not dominant. Dominance of the grass (i.e., habitat modification for E. japonicus) not only negatively affected the density of the habitat specialist grasshopper, but also weakened the positive relationship between the coverage of the endemic herbs and the density of the grasshopper. These results suggest that understanding of the interaction between non-trophic and trophic effects is essential to predict the impacts of plant invasions on herbivores.

2011-12-09 14:15 The Benefits of Augmented Gene Flow – Genetic rescue in the self-incompatible herb Rutidosis leptorrhynchoides

Young, A.*, *CANBR, CSIRO Plant Industry;* **Pickup, M.,** *Deaprtment of Ecology and Evolutionary Biology, University of Toronto;* **Dudash, M.,** *Department of Biology, University of Maryland;*

Loss of genetic variation and increased inbreeding are features of small, fragmented plant and animal populations and evidence for associated negative effects on individual fitness and population demography is accumulating. Despite this, examples of successful "rescue" of wild populations through addition of novel genetic material are still few. Self-incompatible plants are excellent targets for such genetic management approaches because of the direct link between genetic diversity at the self-incompatibility locus and population reproductive performance. Here we report results of a long-term study of the self-incompatible grassland plant Rutidosis leptorrhynchoides and explore the potential for genetic rescue in this species. Controlled-crossing experiments, marker-based analysis of mating and field-based demographic monitoring show that populations are mildly bi-parentally inbred and that those smaller than 200 flowering plants exhibit reproductive failure due to low S allele numbers. Population simulation modelling indicates that this translates into reduced population viability. In glasshouse experiments, inter-population pollinations have a higher probability of successful fertilisation than within-population crosses in small populations, but not in large ones, and there is some evidence that they result in increased progeny fitness. In contrast, field-based pollen augmentation experiments show that increases in the reproductive performance of small populations, and the fitness of resulting progeny, are modest and variable. While not an ecological panacea, genetic rescue to restore reproductive function can form an effective part of population recovery strategies for self-incompatible plants.

2011-12-07 14:08 Science and elephant management decisions in South Africa

Young, K.D.*, *Conservation Ecology Research Unit, Department of Zoology and Entomology, University of Pretoria;* **van Aarde, R.J.,** *Conservation Ecology Research Unit, Department of Zoology and Entomology, University of Pretoria;*

Conservation resources are often limited. Conservation management decisions should therefore be evidence-based and rely on scientific information. However, most conservation managers rely on experienced-based information for management decisions. In South Africa, government policy directs elephant managers to base their decisions on the best available scientific information. This is because elephant management considerations there are complex. While elephants are an iconic conservation species, increasing elephant numbers may have negative impacts on biodiversity. We interviewed 30 managers from small to large protected areas in South Africa to evaluate whether science underpinned strategic and applied elephant management decisions. Further we evaluated manager's perspectives regarding limitations and opportunities for greater reliance on science. We found that although managers valued science, most managers based decisions on experience-based information. Only 28%, 30% and 8% of managers respectively developed objectives, identified issues and selected management methods on science-based information. Furthermore, only 30% selected a desired number of elephants, and 5% selected a population control method, according to science-based information. Limitations included a lack of relevance and application of science findings to respective management areas, and scientists' attitudes and credibility. Opportunities included more site specific studies, better communication and easier access to scientific material. Implementing these opportunities could close the implementation gap between science and elephant management by enabling scientists to contribute more effectively to elephant management decisions. Furthermore, they may improve the reliance on science among the wider community of conservation practitioners in Africa.

2011-12-09 18:15 The persecuted alpine parrot, kea (Nestor notabilis), is an essential seed disperser for alpine plants

Young, L.M*, *University of Canterbury;* **Kelly, D,** *University of Canterbury;* **Nelson, X.J,** *University of Canterbury;*

Globally, bird species and numbers of individual birds continue to decline, with potentially serious flow-on effects on ecosystem processes, such as seed dispersal. Numbers of the world's only mountain parrot, the New Zealand kea (Nestor notabilis), have declined drastically over the last 120 years due to a period of intense official persecution, where an estimated 150,000 individuals were legally culled so that now <5000 remain. We investigated the importance of kea as a seed disperser in New Zealand's alpine ecosystems, where the flora displays a preponderance of fleshy-fruitedness, yet lacks an apparent disperser fauna. Field -based foraging observations were coupled with faecal analyses, showing kea are by far the most important alpine frugivorous bird, selecting more fruiting species and consuming far more fruit, than all other bird species combined. Levels of seed predation by kea were extremely low, and evident in only 4 of 16 species eaten. Since kea are consuming c 90% of all consumed alpine fruits, excrete seeds intact, and are the only bird that makes frequent long-distance flights within and between mountain ranges, the alpine flora may depend on kea for effective regeneration. Conservation of kea is vital both for ensuring the survival of the bird and for their role in seed-dispersal mutualisms for which there are no extant substitutes.

2011-12-08 18:30 Restoring coastal ecosystems: removing predators from Hawai`i's first predator-proof fence at Kaena Point Natural Area Reserve

Young, Lindsay C, *Pacific Rim Conservation;* **VanderWerf, Eric A*,** *Pacific Rim Conservation;* **Miller, Christopher J,** *Hawaii Department of Land and Natural Resources;* **Lohr, Michael T,** *Pacific Rim Conservation;* **Smith, David G,** *Hawaii Department of Land and Natural Resources;*

Kaena Point Natural Area Reserve, Oahu contains 20 ha of some of the best native coastal strand ecosystem in Hawaii, and supports 11 species of endangered plants and one of the largest seabird colonies in the main Hawaiian Islands. Alien mammalian predators have been controlled for 15 years to protect these resources, but construction of a predator-proof fence was proposed in 2006 to reduce long-term predator control costs and improve protection. Removal of all predators commenced upon fence completion in March 2011. Feral cats were removed with cage traps and padded leg-hold traps. Diphacinone in bait boxes spaced 25m apart was used to remove small Indian mongooses (Herpestes javanicus), black rats (Rattus rattus), and house mice (Mus musculus). Multiple catch mouse traps spaced 12.5 apart were used to complement bait stations and increase the chance of removing all mice. Tracking tunnels were run every 2-4 weeks and spatial maps of rodent activity were generated to determine areas where additional removal effort was needed. Snap traps were deployed in areas of high activity. Predator removal is anticipated to increase populations of seabirds already present, encourage colonization by additional seabird species, and enhance regeneration and recruitment of native plants and invertebrates.

2011-12-08 18:30 Semi-stabilized sand-dune habitat effects on biological soil-crust microbial functional diversity

Yu, J*, *The Mina & Everard Goodman Faculty of Life Sciences, Bar-Ilan University;* **Kidron, GJ,** *Institute of Earth Sciences, The Hebrew University;* **Pen-Mouratov, S ,** *The Mina & Everard Goodman Faculty of Life Sciences, Bar-Ilan University;* **Wasserstrom, H,** *The Mina & Everard Goodman Faculty of Life Sciences, Bar-Ilan University;* **Barness, G,** *The Mina & Everard Goodman Faculty of Life Sciences, Bar-Ilan University;* **Steinberger, Y,** *The Mina & Everard Goodman Faculty of Life Sciences, Bar-Ilan University;*

The present study was initiated in order to determine the relation between crust type and microbial functional diversity in the western Negev Desert, Israel. Five types of crusts (n=5) were collected from their habitats along the sand dune at the study site in March, 2010. A microrespiration system (MicroRespTM plates) was used to determine each crust type. The soil moisture and organic matter of all the crust types were found to range

from 0.86 to 1.02% and from 0.75 to 2.43%, respectively. Microbial CO2 evolution values for crusts B-E fluctuated between 0.79 and 1.32 μg CO2-C g-1 dry soil h-1, which was two-fold lower in comparison to crust A. However, there were no significant differences in microbial biomass between different crust types. The values of community-level physiological profiles were found to increase from 108.6 for crust A to 196.7 μg CO2-C g-1 dry soil h-1for crust E, and the values for crusts C and E were significantly ($P<0.05$) higher than crusts A and B. The similarity in substrate utilization rates exhibited that crusts A and B greatly differed from crusts C and E. The findings of the present study indicate that crustal microbial functional diversity was significantly affected by sand-dune habitats.

2011-12-08 12:15 The use of innovative learning approaches and tools to catalyse community-based conservation and monitoring

Yuliani, E.L.*, *CIFOR;* **Syahputra, H.A.,** *Consultant;* **Indriatmoko, Y.,** *CIFOR;*

Community-based conservation or collaborative management of protected areas has emerged as a new approach. Aiming to involve local people in conservation, this approach assumes that conservation programs would reach better outcomes if they are managed by local communities for their own benefit. However the terms "community-based" or "collaborative" are often misinterpreted and misused, and implementers of such programs often lack of the necessary knowledge and skills to effectively implement community-based activities. Our field observation and experiences show that the use of inappropriate methods has led to results that are the exact opposite of those that were originally intended. Such situations are made even worse when project implementers lack knowledge about local values and ethics. This paper describes the use of innovative learning approaches and tools used to build a self-reliant community-based conservation project in Jambi and West Kalimantan, Indonesia, and factors required for successful community-based conservation. This paper also outlines the specific knowledge and skills needed by project personnel to catalyze community-based conservation or collaborative protected area management.

2011-12-08 18:30 Interannual changes in satellite-estimated vegetation around water points in Great Gobi A Strictly Protected Area, Mongolia

Yunxiang Cheng*, *Arid Land Research Center, Tottori University;* **Takehiko Y. Ito,** *Arid Land Research Center, Tottori University;* **Maki Asano,** *National Institute for Agro-Environmental Sciences, Tsukuba, Japan;* **Undarmaa Jamsran,** *Center for Ecosystem Study, Mongolian State University of Agriculture;* **Masato Shinoda,** *Arid Land Research Center, Tottori University;*

Great Gobi A Strictly Protected Area in Mongolia is one of the most important habitats for globally rare and endangered animal species, such as wild Bactrian camel, Gobi bear and Asiatic wild ass. This area comprises wide desert with scattering water points. Hence, water points with surrounding vegetation must be important for the endangered animals. To examine the interannual vegetation changes around water points, we analyzed normalized difference vegetation index (NDVI) derived from satellite imagery of ALOS/AVNIR-2 around three water points, and conducted vegetation survey for 2 years. Two water points (WP-A and WP-B) were classified as Phragmites australi community, and another one (WP-C) was identified as Puccinellia tenuiflora community. Areas of NDVI values above 0 during the growing season decreased by 95.1% and 60.3% in WP-A and WP-B, while it increased by 15400.0% in WP-C from 2007 to 2008. These results suggest that interannual variations of vegetation conditions are pronounced even in a protected area and they depend on the vegetation type and/or climate conditions.

2011-12-07 12:00 Effects of climate change on the quality of caribou and reindeer summer fodder in low arctic tundra

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Caribou and reindeer (Rangifer tarandus) are central to the culture, subsistence, and livelihoods of peoples throughout the circum-arctic, however currently over half of the world's herds are known to be in decline. Summer range quality may be an important control on population sizes of R. tarandus (herein called caribou), and yet throughout the past few decades the abundance of food on summer ranges has been increasing with observed warming. Nonetheless, of equal importance as quantity is the quality of fodder, especially in terms of protein content. Using experimental greenhouses in the Canadian low arctic, we investigated the effects of climate change on the quality of caribou summer fodder and the mechanisms driving these patterns. In one the most abundant tundra shrubs, Betula glandulosa, we found warming substantially decreased leaf nutritional value by decreasing protein content and increasing the concentration of digestion-inhibiting phenolics, due to temperature-enhanced photosynthesis that was not able to be met by increased plant nutrient uptake. We conclude that since the decline in summer fodder quality with climate change may not be preventable, a priority should be the maintenance of sufficient summer range area.

2011-12-08 18:30 The economic value of environmental services on Indigenous held lands in Australia

Zander, K.K.*, *Charles Darwin University;* **Garnett, S.T.,** *Charles Darwin University;*

The potential for Aboriginal people in northern Australia to be paid to deliver environmental services on their traditional lands has raised great hopes for a new conservation economy in the north. Investment by government in Aboriginal land management is justified on the basis that it benefits both natural heritage values and reduces Aboriginal disadvantage. This paper tests the willingness of the Australian people to pay for this investment. Overall 70% of respondents were willing to contribute to a conservation fund that directly pays Aboriginal people to carry out conservation activities, particularly pest control. The highest values were found for benefits that are likely to improve biodiversity outcomes, reduce carbon emissions and enhance recreational values. Overall Australians would be willing to pay from $878m to $2b per year for Indigenous people to provide environmental services. This is up to 50 times the amount currently invested.

2011-12-08 18:30 Multi-scale habitat selection by reintroduced Eld's deer in a human-dominated landscape

Zeng, ZG*, *Institute of Zoology, Chinese Academy of Sciences;* **Yan, WB,** *Institute of Zoology, Chinese Academy of Sciences;* **Song, YL,** *Institute of Zoology, Chinese Academy of Sciences;* **Pan, D,** *Institute of Zoology, Chinese Academy of Sciences;* **Wang, TJ,** *Faculty of Geo-Information Science and Earth Observation, University of Twente;* **Xu, MQ,** *Institute of Zoology, Chinese Academy of Sciences;*

Knowledge of the habitat requirements of reintroduced species is crucial to a successful reestablishment of viable populations and an essential criterion for making decisions in reintroduction biology. Using radio telemetry and geographic information systems, we investigated habitat selection by reintroduced Eld's deer (Cervus eldi) from 2005 to 2007 in Chihao region, a human-dominated region located in western Hainan Island, China. We built resource selection function models to test habitat selection of the study population at three different scales (i.e. landscape, home range, and movement patch scale) in two seasons (i.e. dry and wet season). At the landscape scale, Eld's deer showed preference for habitats with scrubland, high elevation, gentle slope, close to water source and road, but far from village. At the home range and movement patch scales, Eld's deer showed preference for habitats with dense forest, scrubland, grassland, steep slope, but far from road. Our study also found that Eld's deer did not change their selectivity toward vegetation types in human-disturbed environment, but they utilized habitats with relatively high elevation and steep slope. However, the vegetation selection by Eld's deer varied with seasons. The Eld's deer increased sparse forest utilization and decreased grassland utilization in dry season in contrast with wet season at all three spatial scales. It indicated that reintroduced Eld's deer had certain adaptive ability and tolerance to the disturbed environment. The findings of this study have a number of important implications for future reintroduction of Eld's deer especially when human-caused disturbance has become a concern.

2011-12-09 14:15 What have we learned from 20 years of conservation projects in Papua New Guinea?

Zeriga-Alone, T*, *Wildlife Conservation Society, Papua New Guinea Programme;* **Sinclair, JR,** *Wildlife Conservation Society, Papua New Guinea Programme;*

The constitutional dictate to protect biodiversity in Papua New Guinea is implemented through legislative and project initiatives that most commentators believe are inadequate. A new impetus for conservation has emerged through funding for climate change adaptation and mitigation. We reviewed 20 years of conservation projects in PNG and suggest ways to improve on them. In the past there have been differing world views and motivations for conservation between project proponents and locals, and a profound lack of insight into the local cultural context. The development aspirations of locals have not been met by projects that could not compete with extractive industries. And when they tried, economic motivations took attention away from conservation and this disappeared completely when goods and services were not delivered. Projects alienated local people by not sharing knowledge and information with them during design and implementation. Project proponents need to work with locals in defining conservation in the local context and understanding its practical implications for things like food security, cultural survival and adaptation to climate change. Projects must operate at appropriate social scales and support not supplant local knowledge and social systems. Strategic partnerships are required to avoid conservationists filling the role of other groups. Careful attention to past mistakes and ways of avoiding them should result in more conservation successes in PNG.

2011-12-07 18:00 Meaningful nature experiences: reconnecting society with a conservation ethic

ZYLSTRA, MJ*, *Dept. Conservation Ecology & Entomology, Stellenbosch University;* **Knight, AT,** *Dept. Conservation Ecology & Entomology,Stellenbosch University;* **Esler, KJ,** *Dept. Conservation Ecology & Entomology,Stellenbosch University;* **Le Grange, L,** *Faculty of Education (Curriculum Studies), Stellenbosch University;*

Eco-literacy decline, technology immersion, information saturation and the 'extinction of experience' are all recognised as contributors to the disconnect separating an increasingly urbanized society and the rest of nature. Bridging this divide is a transdisciplinary and cross-sectoral endeavour which must simultaneously focus on policy change and personal change. Conservation science's efforts have largely focused on policy change with rational information-rich 'need to act' messages. Such messages are often ineffective in engaging the public at the personal level. Environmental psychology perspectives reveal that we must rather emotionally inspire the individual with 'love to act' messages. Meaningful nature experiences (MNEs) provide an avenue for realising multiple aspirations linked to societal engagement and the fostering of a sustainability ethic. Mixed methods research involving persons who have had profound encounters with wildlife provides new evidence for being more connected to nature and impassioned for conservation. Results suggest that MNEs influence an individual's behaviour toward the environment (the outer) and also support human development (the inner). Education influences how MNEs are perceived, particularly with reference to the impact of invasive alien species. This all carries implications when designing educational and/or social marketing interventions. We conclude that MNEs should become more central to the conservation-society dialogue.

2011-12-08 18:30 The science, action and art of reconnecting with nature through meaningful experience

ZYLSTRA, MJ*, *Dept. Conservation Ecology & Entomology, Stellenbosch University;*

eyes4earth.org is an action research initiative encouraging shared learning about the benefits of reconnecting with nature through meaningful experience. eyes4earth.org is a transdisciplinary endeavour exploring: 1. If/how meaningful experiences and profound encounters with wildlife reconnect humans with nature; 2. How ecological change (focusing on impacts from alien invasive species) affects the intensity and frequency of meaningful nature experiences; and 3. How insights from such experiences may practically inform action-oriented education for sustainability (in building social-ecological resilience). eyes4earth.org aims to stimulate public awareness and reflection on the profound ways we benefit, interact and participate with nature. It is doing this through: 1. Science: Strengthening capacity to further research on the links between meaningful experience and connectedness to nature to better inform education for sustainability; 2. Art: Utilising a range of social media tools to engage and interact with the public. Sharing personal stories collated on meaningful nature experiences through creative audio and visual material; 3. Action: Supporting on-ground education & outreach efforts, e.g. Baviaanskloof Nature Awareness Group - a grassroots initiative driven by local youth as a result of their combined efforts to reconnect themselves, school children and broader community with nature. This poster will present research and education outputs from each of the above areas.

Index to Authors

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