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Poster Abstracts

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Refugia as a conservation tool for hayfield insects and their vertebrate predators

Hay harvesting involves the near-total removal of aboveground vegetation for both vertebrate and invertebrate inhabitants of semi-natural grasslands. Recent studies have shown dramatic crashes of orthopteran populations following hay mowing in Europe and some benefits of leaving unmowed areas, at least for this taxon. We experimentally tested the utility of unmowed patches and the implications of patch shape for orthopterans and other phytophagous insects in central New Jersey (USA) hay fields. We left five 0.25 ha uncut patches of varying shapes within a 20 ha field in central New Jersey. Sweep net samples (once before and three times after mowing) were used to assess invertebrate communities inside and outside of refugia and within two neighboring fields lacking refugia. Preliminary analysis is suggestive of considerably lower densities in mowed areas post-harvest and a possible crowding effect (i. e., increased densities) in unmowed refugia. This work has implications for the conservation of both hayfield invertebrates and their vertebrate predators. A population of state-threatened neotropical migrant birds breeds in the study grassland and depends on late-season invertebrate food resources to fatten up for southbound migration.

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Urban sprawl or compact cities? Importance of landscape matrix morphology configuration to urban bird conservation

There is a growing interest to understand the effects that urbanization has on bird species as well as to identifying opportunities for their conservation in cities. A significant part of the research has focused on testing the importance of size and vegetation of urban green areas has over the maintaining of richness and abundance of bird species. Conversely there is a limited knowledge about the influence that have the matrix design that surrounds this spaces. Mainly in relation to patterns of building height and density. Aspects strongly related to the debate if the cities should be sprawl or compact as they grow and their impact on biodiversity. This study evaluated the link that the morphological landscape configuration of the urban matrix (MLCUM) has directly with the diversity and distribution of birds occupying urban green areas. We characterized and compared bird assemblages in 60 small green areas and 20 larger urban and natural green areas located in Santiago de Chile. These areas corresponded to a stratified sample of contrasting MLCUM based on height and density of the surrounding buildings. 12 bird repeated counts were developed between November 2013 and June 2015. Richness and species-specific abundance patterns were obtained and GLM models were used to quantify and contrast the effect size of multiple variables at different spatial scales. We concluded that the height and density of the urban matrix are modulating the composition and structure of urban bird communities and influence the probability of some species to occupy urban green areas.

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Comparison of camera trap and aerial forward looking infrared (FLIR) surveys for white-tailed deer

Conservation biologist require accurate and precise population estimates in order to inform the management of overabundant white-tailed deer (*Odocoileus virginianus*) herds. In this study, we conducted the first comparison of two commonly used techniques: aerial forward-looking infrared (FLIR) census and ground-based, camera trapping. Using thermographic bird-eye images, aerial FLIR surveys generate a complete count of the population under the assumption of 100% detection. Trail camera data are analyzed using traditional and spatial mark-resight (MR) analyses relying on the unique branched-antlers of male deer as distinct marks. Twelve ground based camera traps were deployed on 19 December 2014 and were collected on 20 January 2015 in the Greenbelt Nature Preserve in Staten Island, NY. A FLIR survey of all of Staten Island was conducted on three days in February of 2015. Total deer density using traditional and spatial MR analyses were 19.1 km^{-2} (95% CI = 11.7 – 28.2) and 14.0 km^{-2} (95% CI = 7.9 – 21.2), respectively. Deer density was estimated at 23.4 km^{-2} using FLIR. Confidence intervals for both traditional and spatial estimates overlapped one another; however, only the traditional MR estimate overlapped the FLIR point estimate. A similar comparison is currently underway using camera and FLIR data from suburban Westchester County, NY.

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The effects of frequency specificity of environmental noise on ecological synchrony

Ecological synchrony is an important topic for ecology and conservation biology. Many ecological communities exist as geographically fragmented populations which are connected by low rates of dispersal, referred to as metapopulations. If extinction occurs in one of the populations that comprise a metapopulation, dispersal from a neighboring population can recolonize the area of extinction and allow for population recovery. However, if all the populations in a metapopulation become extinct simultaneously, the metapopulation (or possibly the entire species) is lost. The probability of metapopulation extinction is enhanced if the fluctuations in the populations' densities are correlated through time (i.e. synchronous). In previous studies, measurements of ecological synchrony have relied on variations of the correlation coefficient. However, these methods do not take into account how synchrony may vary over different time scales. Our approach considers the correlation of population densities over different time scales by using cospectra to examine metapopulation synchrony in the frequency domain. We conducted simulations of metapopulation models to investigate how different environmental cospectra, dispersal rates, and population dynamics interact to determine ecological synchrony and probabilities of metapopulation extinction. Our results indicated that environmental fluctuations which are positively correlated over long time scales (red-shifted) enhance the probability of metapopulation extinction. This is true even when the total correlation among the environmental factors is zero (low-frequency positive covariance is canceled by high-frequency negative covariance). Understanding the factors that determine ecological synchrony is an important research goal, given that human activities often result in habitat fragmentation and barriers to dispersal.

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Curating botanical collections: professional development series for public gardens

Conservation occurs in botanic gardens with practices including the cultivation of threatened examples of native flora, management of genetic collections of endangered species, support for in situ conservation, environmental education, management of wild plant populations, and restoration work (Galbraith & Jackson, 2004). Target 8 of the Global Strategy for Plant Conservation is to secure "at least 75% of all threatened plant species in ex situ collections, preferably in the country of origin, and at least 20% available for recovery and restoration programs" by 2020. There are nearly 800 botanic gardens in the United States that could potentially contribute to this effort, but their value in this role is contingent on good curatorial practices. A need has been expressed by the plant collections community for a guide to the basic aspects of effective curation. To help meet this need, a committee of students within the Plant Collections Professional Section of the American Public Garden Association designed and executed a series of three webinars between February and April 2015 entitled "Collections Clarity." The series featured nine prominent professionals in the public garden field presenting and answering questions on what makes a collection, the importance of documentation, and solutions for records management and collection policies. While the subject matter was particularly useful for emerging gardens, organizations of all sizes, ages, and experience participated in this dialogue. This poster will provide information about the series and speakers, results of audience surveys, and resources for gardens interested in taking their curation to the next level.

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Avian nesting success is influenced by vegetation structure on Mt. Cameroon

Nesting predation is a potent force affecting communities of birds, and the viability of isolated bird populations. Its impact is exacerbated on species of conservation concern, making nest predation to move from being an ecological necessity to a conservation priority. Altitudinal gradients are valuable study systems to investigate variations in nest predation between bird populations. In this study, a hypothesis postulating an increase in avian nest survival with elevation as a result of

decreasing predation pressure, was experimentally tested along an altitudinal gradient (300-2250 m) in West-Central Africa. Three types of artificial nests (cup-shrub, cup-ground and bare-ground) were used. Elevation had no effect on daily survival rate (DSR) of artificial nests. However, there was a significant elevation-nest type interaction. Daily survival rate for cup-shrub nests decreased significantly with elevation, but for ground nests, elevation had no significant effect. We tested effects of vegetation structural parameters (tree density, herb and shrub layer coverage, and canopy openness) on DSR. Daily survival rate for bare-ground nests significantly increased with increasing canopy openness, and was positively influenced by coverage of herb layer and tree density. For cup-shrub nests, DSR increased significantly with increasing shrub layer coverage. For cup-ground nests, we found a positive effect of shrub layer and canopy openness on DSR. We found predation risk patterns of our experimental nests at different positions are linked to elevational changes in forest structure. A proper understanding of the causes of avian juvenile mortality along elevations might provide an insight into different life history differences.

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Quantifying variability in loggerhead sea turtle diet in New York waters

The loggerhead sea turtle (*Caretta caretta*) is one of four sea turtle species that occur in the temperate waters of New York State during summer months. Estuaries of Long Island provide critical foraging habitat for juvenile loggerheads from June to November. Effective management of this threatened species requires knowledge of diet and foraging habitat, but little is known about the current diet composition of this species in New York. In addition, diets of loggerhead sea turtles can be indicative of ecological change, and diet shifts in loggerheads has been linked with long-term changes in prey abundance. This project is part of a study evaluating loggerhead sea turtle diet in New York between 1995-2014 that will allow us to quantify long-term variability in loggerhead diet in relation to ecological change. In order to quantify loggerhead diet, we examined individual, seasonal, and inter-annual variation in the digestive tract contents of 103 individuals that stranded on Long Island from 1995-2014. Prey items were identified to the lowest taxonomic level, and the minimum number of prey items was assessed for each sample. We examined loggerhead diet and compared variability in diet between individual, seasons, or years. Prey composition was dominated by Acadian Hermit Crab, Flat-Clawed Hermit Crab, Jonah Crab, Rock Crab, and Moonsnail. The results indicated that diet composition did not differ significantly between individuals, but varied significantly between seasons and years. We discuss the results in relation to observations of the abundance and distribution of marine invertebrates in Long Island estuaries.

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A tool for grower assessment of wild bee abundance in the wild blueberry landscape

Wild bees are a critically important resource, and one of the central problems in promoting bee conservation is that their populations are difficult for stakeholders to see and assess. This research presents a participatory process for developing a novel web-based tool for stakeholders to visualize estimated bee abundance in the landscape around focal crops. Our aim is for this tool to be easily implemented, understandable, and accessible to all wild blueberry growers. Therefore, our research partners with growers. Their industry is heavily dependent on commercial honey bees, however honey bee numbers are declining and dependence on honey bees is increasing in risk. Wild bees are an important source of pollination, and growers that contribute to wild bee conservation near their fields will benefit from increased crop pollination. Development of our web-based tool includes an iterative, participatory process that will incorporate grower feedback about the tool's content and design. We are obtaining feedback at multiple forums: the annual Wild Blueberry Commission Advisory Board meeting, in-depth one-on-one sessions with six key informant growers chosen for their knowledge of different growers groups, a demonstration booth at the Spring wild blueberry growers meeting, and workshops at Blueberry Field Schools. The final version of the tool will help growers visualize the contribution of the landscape surrounding their fields as wild bee habitat and inform their decisions about land management to enhance crop pollination as well as wild bee conservation.

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SOS for Egypt's dugongs: current status and conservation initiative for Red Sea mermaid

The dugong (*Dugong dugon*) population in Egypt's Red Sea is small and isolated from other populations in the world. That make the recovery of the population following decline is unlikely or could even result in local extinction. The study has two directions of assessment one for distribution and relative abundance, and another for feeding habit of dugongs. The study area ranged from Suez to Shalatin, with total distance of 1050 km and approximate total coastal waters area of 735 km². Results from interviews survey with stakeholders at the studied area and the fieldwork during four seasons revealed that, maximum numbers of dugongs were 20 during 2011, concentrated in 18 sites (mainly bays and harbors), which represents less than 1% of the total coastal area. According to these low numbers of mature individuals (<50) and the area of occupancy (<10 km²), the category of Egypt's dugongs should be changed from Vulnerable to Extinction (VU) To Critically Endangered (CR) according to IUCN Red List Criteria B2 and D1. The most common threats detected were boats strikes, mesh nets, outboards noise, and unmanaged ecotourim. Four ecotourism sites, Shiekh Malek, Abu Dabbab, Marsa Egla, and Ras Baghdadi where divers and snorkelers watching dugongs during foraging. Dugongs favored areas of low biomass, dominated by *Halophila ovalis* and *Halodule uninervis* among depths ranged between 4-5 m The highest feeding activity was recorded on the above ground portion of *Halphila stipulacea* (12.43 g dry wt/m²) and below ground of *H. ovalis* (1.27 g dry wt/m²) in summer.

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Planning for a biodiverse future: prioritizing conservation lands in Florida

A major challenge that conservation planners are facing in the coming decades, as the threat of climate change increases, is that potential conservation lands are likely to become developed, unavailable, or otherwise disappear. Understanding how to best value land today, for the purposes of conserving biodiversity into the future, is key to its preservation. Using a newly defined subset of ecosystem services—biodiversity adaptation ecosystem services (BAES)—we developed a methodology for valuing these types of functions, which aid in the survival of species, ecosystems, and landscapes in the face of climate change. With Florida as a case study, we focus on creating an Environmental Benefits Index (EBI) to rank potential land for purchase on its ability to assist biodiversity in the year 2060. Integrating future climate projections, our EBI includes parameters such as habitat patch connectivity, the threat of development, and potential sea level rise as well as a variety of BAES including how the patch functioned as a corridor, migration stopover and its ability to harbor threatened and endangered species. As we see the effects of climate change alter ecosystems and habitats, the incorporation of future projections into methodologies such as our EBI will become increasingly valuable in assisting conservation planners in deciding where and how their money is best spent today in order to ensure a biodiverse future.

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Diversity and origin of *Boraria stricta*, an exotic millipede, in New York

Arthropods represent about 80% of the 1.5 million presently identified species, yet remain among the least understood. One such species, *Boraria stricta*, is a millipede normally restricted to the southern Appalachians but was recently identified hundreds of miles north of its native range in the Mianus River Gorge Preserve (MRGP) in Bedford, NY. With a gap in the literature surrounding *B. stricta*, our research goals were threefold: to describe the diversity of the introduced B. stricta population, to identify the possible sources of introduction, and to identify an approximate time of introduction. Determining the time of *B. stricta* introduction can help elucidate its ecological impact, and describing how the species traveled north can shed light on other instances of introduction. DNA barcoding techniques were used to analyze *B. stricta* populations, using samples from the MRGP and the North Carolina State Museum. The 12S/16S, CO1, and EF1α gene regions were sequenced and analyzed. Sequencing results showed that the diversity in the MGRP population is very low, suggesting that the MRGP population was introduced in a single event. The lack of diversity within the MRGP, however, made it impossible to approximate a time of introduction. Future studies will use contemporary samples from the native range of *B. stricta* as genetic references, which could identify possible source populations for the MRGP introduction. Furthermore, studying populations between the MRGP 1 and their native Appalachian region could provide a better understanding of *B. stricta* range expansion.

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The effect of urbanization on genetic variation within a stream salamander population

Urbanization is an ongoing phenomenon that has negative impacts on many species by creating environmental disturbances in their native habitat. This impact may cause extreme complications for small animals such as salamanders, which depend on specific macro- and microhabitats for dispersal and survival. Many salamander species rely on small stream habitats but will also disperse over land to reach other streams; this behavior maintains genetic diversity throughout large populations inhabiting stream networks. Dispersal can be greatly hindered by urban fragmentation, and may result in loss of genetic variation and differentiation within stream networks. The Northern two-lined salamander (*Eurycea bislineata*) is a common species in northeastern watersheds, but has declined in urban habitats in and around New York City. We compared genetic variation, genetic structure, and demography of *E. bislineata* across sub-populations within an urban watershed, (Staten Island Greenbelt, NYC) and a suburban watershed (Mianus River Gorge, Bedford, NY) to gain better understanding of how a common species is able to adapt to an urbanizing environment. We predict genetic structure within the population will be maintained to a greater degree in the suburban watershed and the urban watershed subpopulations will be more isolated due to fragmentation. In this study we collected DNA samples from multiple individuals and are producing genomic-wide SNP libraries generated with double-digest RAD sequencing to explore genetic structure across populations to compare urban versus suburban population structure. Overall, we strive to understand whether this species is able to maintain connectivity within watersheds affected by increasing levels of urbanization.

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Determining the importance of plant animal interactions in the Anthropocene

Increased unsustainable logging and hunting in Gabon, Central Africa is adversely affecting faunal composition and in the extreme cases leading to defaunation—the emptying of forests of large mammals. Defaunation, in turn, can potentially alter forest recruitment dynamics by interrupting ecological processes such as seed dispersal, seed predation, and herbivory. The recruitment dynamics of *Gambeya lacourtiana*, a tropical tree species in Gabon, has not been studied before, though its fruits are an important non-timber forest product (NTFP) for the tribal people in the area. Furthermore, many animals such as elephants, apes, monkeys, wild hogs, and duikers consume the fruits of this tree. Working with local Gabonese technicians, I will quantify the effects of reduced mammal abundances on the recruitment of this tree. Using a combination of observational and experimental methods, I will identify the terrestrial and arboreal dispersers and quantify disperser effectiveness. I will follow this by measuring to what degree unsustainable hunting alters the post dispersal processes of *G. lacourtiana*. I predict that the loss of large mammals will result in low levels of seed dispersal, exposing the seeds to greater incidences of predation by rodents and other small mammals, but increased sapling survival. With these results, I will be able to assess the link between animal communities and the availability of an important NTFP. Lastly, by providing information about the relative importance of different animal species for recruitment, the results will assist in development of regulations for logging concessions surrounding protected areas in Gabon.

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Does hybridization occur in a captive population of the Scarlet Macaw complex?

Focused conservation of endangered species is necessary to counter the loss of biodiversity due to increasing human impacts on nature. In recent years, advances of molecular tools enable managers to draw conclusions about animal behavior and evolutionary processes, proving highly valuable in devising conservation efforts. The Scarlet Macaw (*Ara macao*) is an iconic and endangered parrot, which has the most widespread geographic range of any of the macaws, ranging from Mexico to Brazil. Recent genetic analyses have shown the Scarlet Macaw complex consists of two different phylogenetic species, currently classified under subspecific designations: *Ara macao macao* in both Central and South America and *Ara macao cyanoptera* in Central America. Hybridization, interbreeding of individuals from genetically distinct populations, regardless of taxonomic status of the populations, has been a concern of conservation biologist as the development of hybrids in the wild threatens the genetic purity and conservation efforts of the parent taxa. Determining whether or not hybridization occurs between Scarlet Macaw taxa can help with assisting conservation management and identifying areas of concern that may be threaten by interspecific interactions in the wild and in captive breeding programs. Through the examination of mitochondrial haplotypes and microsatellite genotyping of nineteen birds from a captive breeding program and using

thirteen individuals from a wild population, as a proxy for pure-bred *A. m. cyanoptera* individuals, I found that the data supported the presence of late-generation hybrids.

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National jaguar conservation strategy: towards environmental policies in Mexico

Jaguar conservation in Mexico dates back to the '90s, however the first solid initiative that brought together experts from various disciplines to advise the government was in 2000, with the creation of the Advisory Jaguar Subcommittee. Since then, actions were carried out in several regions of Mexico and divided into sectors. Despite being a species classified as endangered, those conservation efforts have lacked a proper socio-political framework that can influence the national policy to ensure a far-reaching jaguar conservation in Mexico. In 2005 about 50 experts from universities, federal government and non-government and private organizations gathered together to talk about the need to set solid scientific bases for addressing the risk of jaguar extinction, and its potential consequences. As a result, in 2012 our teamwork started the design of a National Conservation Strategy, a unique document that unlike others existing before, allowed us not only to analyze the biological and ecological conditions of the jaguar and its habitat, but also consider the social and political realities of Mexico. By using socio-ecological research tools and working jointly with local communities, institutions and federal government; agreements, commitments and realistic short-term actions were proposed so that they could contribute to the creation of public policies for better decision-making, consequently expanding and improving scenarios for jaguar conservation. The National Jaguar Conservation Strategy was completed in 2015 and focuses on six key components: Conservation Priority Areas, Infrastructure, Protocol for Liberation of Jaguars, Human-Jaguar Conflict, Communication, Outreach and Education and Monitoring of jaguars and Preys.

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Modeling of tiger and its prey populations in Balkhash Lake Region, Kazakhstan

Southern shore of Lake Balkhash in Kazakhstan, around and to the east of the Ili River delta, was identified by World Wide Fund for Nature (WWF) as a potential site for tiger restoration program. This area has more than 7,000 km² of tugay woodlands and reed thickets that were populated by Caspian tigers (*Panthera tigris virgata*) up to the middle of 20th century. We modeled dynamics of potential tiger habitat, as well as tiger and its prey species populations on the southern shore of Balkhash Lake and Ili River delta in the nearest 50 years given three scenarios of possible habitat change and management options for tiger reintroduction program. Landsat 5 TM imageries as well as MODIS data were used as a basis for tiger habitat mapping; density-dependent population growth models with added environmental stochasticity were applied for modeling of possible tiger and prey populations. Our analysis has shown that the entire tiger population in the area can potentially reach 121-145 individuals given water volume in Ili River and Lake Balkhash remains constant at the level of 2010-2013 in the nearest 50 years. In conditions of progressing water scarcity Ili River Delta is likely to be much more sustainable than other tiger introduction sites and may sustain up to 43 tigers after 50 years from now. Therefore, we recommend to start introduction program with Ili River Delta area.

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Identification of priority species under IDWH using a cumulative assessment method

India—one of the 17 megadiverse countries of the world—contributes to about 8% of the known global biodiversity, has witnessed unprecedented loss of species due to anthropogenic pressure. Several species, such as the Great Indian Bustard, wild buffalo, vultures, and Asiatic lion are facing extinction risk due to lack of response to detrimental factors in appropriate time. One fundamental challenge is to preserve endangered wildlife outside of conventional PAs. Therefore, the Indian government has initiated a comprehensive scheme titled 'Integrated Development of Wildlife Habitats' (IDWH) which aims to provide a broad-spectrum of effective conservation interventions in situ. The IDWH scheme suggested a list of sixteen species with rapidly declining population to make urgent Recovery Plans for arresting their population. Impact of various

threats (e.g. ecological, anthological, unavailability of detailed scientific information, lack of awareness among common citizens) often significantly varies across species. Hence, to assess the actual magnitude of different types of threats for each species, a comprehensive literature survey on species ecology, their conservation status, and impact of anthropogenic pressure was done for listed IDWH species. Each species received a unique score based on occurrence and magnitude of aforementioned threats. Finally, a cumulative threat score was calculated for each species to get a holistic idea about the impact of threat on species survivability. Detailed methodology, results and conservation implication of the study will be discussed. The study aims to help policy makers prioritize species conservation, which needs immediate attention, and implementation of viable conservation plans.

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Impacts of satellite sommunities on protected areas: Kyabobo National Park, Ghana

The demand for the use of forest and wildlife resources keeps escalating and has resulted in the illegal entry by people into protected areas which are reserved for biodiversity conservation purposes. This study highlights the impacts surrounding communities have on the Kyabobo National Park, based on which appropriate management recommendations have been made. Questionnaire administration and focused group discussions were conducted in the communities surrounding the park to extract information on how inhabitants depended on the park for their livelihoods. The data were analysed and the results displayed in the form of tables and charts using Microsoft Excel software. National parks only allow limited human activities. However, this study reveals certain human activities that are carried out in the park, namely hunting, fuel-wood and medicinal plants collection, visitation to special sites of cultural and religious importance, and the use of wildlife products for cultural activities. The results of my work indicate that communities surrounding protected areas have an intrinsic relationship with such areas prior to designation. Conservation managers therefore need to constantly engage such communities through education and livelihood support activities to minimise impacts on the Protected Areas while simultaneously maintaining a cordial but firm relationship with the people.

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Noisy neighbors: slow loris response to anthropogenic noise in West Java, Indonesia

'Anthropogenic disturbance' is commonly associated with dramatic visual effects such as deforestation or pollution but seldom are its auditory effects, such as noise pollution, considered. Indonesia's rapid population growth and increased urbanization have brought more animals in direct contact with humans and in even greater contact with the noises we make. To understand how noise disturbance may be used as a means of quantifying anthropogenic influence, our research explores the effects anthropogenic noise disturbances have on Javan slow loris (*Nycticebus javanicus*) behavior. From September to October 2014, noise instances (e.g. dogs, motorcycles, native birds), their duration and general intensity (scale of 0-3) and corresponding loris behavior were recorded during nightly follows of *N. javanicus* living in an agroforest mosaic in West Java for a total of 100.5 hours. Anthropogenic noise accounted for 86.9% of all noise instances while 9.2 noise instances occurred per hour of observation on average. Lorises were found to respond significantly to anthropogenic noise over non-anthropogenic noise disturbances (Fisher's Exact, $p = 0.047$), yet this relationship was not significant when noise instances originating from the researcher were removed ($p = 0.56$). This research suggests both the importance of considering researcher influence on animal behavior and the extent to which anthropogenic noise data may be readily collected alongside animal behavior observations to quantify the degree of human influence in the area. Further research in anthropogenic noise disturbance and any associated methodologies is needed to strengthen its usefulness as a conservation tool.

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Landscape effects on fine-scale genetic connectivity in a Neotropical mesocarnivore

Habitat degradation and fragmentation are known to affect movement and gene flow in wild felids. We applied an individual-based landscape genetics approach to examine fine-scale genetic connectivity in Neotropical ocelots (*Leopardus pardalis*) across heterogeneous landscape of Belize, Central America by evaluating relationships between different landscape features and genetic distances. First, we applied noninvasive genetic sampling, fecal DNA and 14 microsatellite loci to

genotype 30 individual ocelots collected across several study sites within Belize, and examined countrywide patterns of genetic divergence. Second, least-cost paths and Circuitscape resistance analysis was conducted, which revealed that gene flow patterns in Belizean ocelots were negatively affected by both natural (pine forest) and anthropogenic (agriculture) landscape features. Alternative hypotheses involving effects of urban areas, roads, wetland, savannah, and water bodies were not supported. Our results suggested that central, most northern and southern areas within Belize were more difficult for ocelots to disperse through, indicating that more open agricultural areas (e.g., cattle pastures) and/or exposure to large apex predators such as jaguars in open pine habitats may be the main drivers limiting gene flow in ocelots. We conclude that examining the role that landscapes play in gene flow is crucial information to ultimately improve conservation and management efforts for elusive mesocarnivores such as ocelots.

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Investigating long-term patterns of human-tiger conflict and intervention actions

The Sundarbans, the world's largest mangrove forest spread across the India/Bangladesh border, holds one of the densest populations for Bengal Tiger (*Panthera tigris*). In Bangladesh, the livelihoods of people living in surrounding communities rely on the collection of various natural resources within the Sundarbans which has led to high levels of Human-Tiger Conflict (HTC). HTC incidents, including human fatalities, livestock depredation, and the killing of tigers, are a major concern to local people and conservation groups. Many interventions have been undertaken to reduce HTC in the region and data is regularly collected to monitor the situation, yet managers lack practical methods for analyzing the information to support decision-making to enable HTC improvement. Statistically-based 'system behavior charts' show promise as a novel visual analysis method for determining patterns of variation in HTC data, using samples of days, locations, time of day, and incident type. Qualitative data collected by conservation practitioners and resource managers has been used to create timelines covering known HTC management actions and external drivers such as weather events and price of commonly collected resources (NTFPs). Through analysis of system behavior charts and timelines the relationship between conflict reduction actions and changes to the pattern of human tiger conflict are better understood. These methods have potential as a practical management tool for the reduction of conflict, improvement of human safety, and effective tiger conservation. The approach has relevance in other Human Wildlife Conflict situations and could also be applied in different natural resource management and biodiversity conservation contexts.

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Exploring the land-loss fish production paradox in coastal Louisiana

Louisiana's coastal ecosystem has a long record of productive fisheries. Even in light of the multiple perturbations experienced in this region, fisheries landings have remained stable or increasing. These disturbances have resulted in many unforeseen ecological consequences; one such consequence is the loss of marsh vegetation in southern Louisiana (LA). Marsh habitats are thought to function as nursery habitats for post-larval and juvenile fishes, providing both refuge from predation and increased foraging opportunities. As the loss of marsh appeared to have a null effect on species biomasses, there evolved a hypothesis that described a positive effect on nekton production; increasing marsh edge distance during marsh degradation provides a potential short-term increase in marsh access for organisms. Here we used Geographic Information Systems (GIS) to determine the relationship between marsh edge distance and marsh degradation and to create marsh edge maps for further analysis in an ecosystem model. We then applied Ecopath with Ecosim and Ecospace (EwE) to determine if a suitable response mechanism between estuarine organisms and marsh edge distance could be developed. Finally, the theoretical marsh edge functional response was tested in a future restoration scenario in Barataria Bay, LA, USA. Results of this study indicate that estuarine nekton respond readily to changes in marsh edge distance, and model fits were more suitable when the edge response was similar to a Type II functional response. The results of the future restoration simulation indicated an increase in relative biomass of commercially and recreationally important species after a 91-year simulation.

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In Costa Rica, patches of primary forest sustain specialized interactions

Due to anthropogenic activities, tropical rain forests face many challenges in sustaining biodiversity and maintaining global climates. This project examines how forest successional status affects community composition of saproxylic cerambycids, which, as early colonists of moribund trees, have an important role in nutrient cycling. In the lowland rain forest of Costa Rica, thirty-nine trees in five plant families (Fabaceae, Lecythidaceae, Malvaceae, Moraceae, and Sapotaceae) were sampled in a mosaic of primary and secondary forest. They yielded 3545 cerambycids in 49 species. Species richness was almost identical in primary and secondary forest, but abundance was higher in primary. This was largely because several cerambycid species, that appear to be both host and forest specialists, reached high densities within primary forest patches but seldom colonized apparently suitable trees within secondary forest. Overall, community structure was most strongly influenced by host plant species; within most plant families it was also impacted by forest structure. Moraceae was the exception, presumably because the focal tree species was abundant in both primary and secondary forest. This study suggests that even small areas of primary forest can act as refuges for specialized forest species, but that secondary forest may act as a barrier to their dispersal. The vulnerability of specialized saproxylic insects to global change will be linked to the ability of their preferred host trees to disperse to and persist in disturbed habitats.

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Detection rates and spacial use patterns of coyotes in NYC parks

Since 2012, camera traps have been deployed in 10 parks in New York City to study the occupancy dynamics of coyotes (*Canis latrans*) in an urban center. Previous work has examined coyote site occupancy at the scale of an entire park. The purpose of this study was to investigate detection rates on the scale of individual cameras within multiple occupied parks during the pup-rearing (April through September) and non-denning/pup-rearing (i.e. non-breeding; October through March) seasons. Daily detection rates per camera were 0.05 ± 0.10 (mean ± SD) in the non-breeding season and 0.04 ± 0.07 in the breeding season, indicating that a single camera had approximately a 4–5% chance each day to detect a coyote in an occupied park. The high variability in detection rates within parks indicates that certain cameras were more successful at detecting coyotes and thus coyotes use specific areas of the park more than others. Ongoing analysis will examine what factors may determine these use patterns. Information on the within-park variability in detection among cameras can also help researchers plan future deployments and maximize the change of detecting coyotes with the minimum number of cameras.

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Plant conservation in Brazil: are we actually Red Listing biodiversity?

Brazil is one of the most biodiverse countries in the world, with ca. 46,000 plant species. The challenges to conserve and research such a rich country are many; therefore scientific based policies and capacity building for more conservationists are urgent. At the governmental level in Brazil, conservation is being carried out by the creation of protected areas and through the red listing of species. Throughout history, Brazil has officially published four red lists (1968, 1992, 2008, 2014). The first two haven't got any species of bryophyte. The list from 2008 had 17 bryophyte species listed, among 2,080 plants officially listed. The recently published Red List (2014) has 20 bryophyte species among ca. 4,600 plant species assessed, corroborating the lack of efforts to research and indicate conservation needs for this group of plants. The aim of this work is to present a case study with the results of the extinction risk assessment of 13 *Sphagnum* species and a table of identified threats for two protected areas in the hotspots: Cerrado and Mata Atlantica. The research indicated that five species are threatened, one is Data Deficient, one is Near Threatened and seven were categorized as Least Concern, according to IUCN system. The table of threats includes threats identified, evaluated and ranked, such as mining, poaching and others. The search for basic information and Red Listing of species can direct action planning and be used to discuss and generate public awareness for the importance of bryophyte conservation and red listing worldwide.

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Sea turtle by-catch handling/release practice for fishers in Muni-Pomadze Ramsar site

Poor by-catch handling and release methods by local fishermen is further escalating the problem of population decline of the critically endangered leather-back and other threatened IUCN sea turtles in the Muni-Pomadze Ramsar Site (MPRS). Competence and awareness of by-catch handling and release protocols by local fishers is lacking in this region, hindering efforts to enforce the wildlife laws, aimed at saving and conserving captured turtles. In 2012, A Rocha Ghana, through Rufford Grant, launched a ground-based fisheries by-catch handling and release project that targeted 50 fishers that play critical roles in the conservation of the species. The program adopted a pebble distribution method through group dynamics to ascertain the key threats to the species and their habitat. Also, capacities of fishers were built in proper handling and release methods of the species and subsequently provided with nets, needles, bolt cutters, bite blocks and torchlights to enhance the handling and release process. Sea turtles in the MPRS face many threats in beach and coastal habitats. The most critical threat is fisheries interaction and the least threat is nest predation by dogs and other animals. The most threat to species habitat is over-exploitation of mangrove, followed by unsustainable agricultural practices (Chemical use etc). One year after the program, there are high recorded cases of successful release and more reported cases of capture incidence by the MPRS Office. The program has created a base of understanding, helped to build relationships, and laid the groundwork for future turtle conservation initiatives.

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Health assessments of wild and captive Radiated Tortoises (*Astrochelys radiata*) in Madagascar

Radiated Tortoises (*Astrochelys radiata*), found in southern Madagascar, are considered critically endangered by the International Union for the Conservation of Nature. The illegal harvesting for bush meat and the pet trade are the primary causes for Radiated Tortoise population declines. When Malagasy authorities confiscate tortoises from pet trade smugglers, the tortoises are often housed in zoological or wildlife park facilities and the rerelease of these tortoises remains controversial. Wildlife disease transmission from a captive population to a free-ranging wild population is one of the paramount concerns for wildlife managers and rerelease programs. In 1998 and 2010, the Wildlife Conservation Society (WCS) performed health assessments on a total of 179 Radiated Tortoises from both wild and captive populations in Madagascar. These health assessments included data on parasites, bacteria, biochemistries, hematology, and the tortoises' morphology. Based on the data collected by WCS, we investigated the differences in the health measures of these populations and considered differences by site, by status (captive or wild) and by sex/age (males, females, juveniles). We found statistical differences between nine biochemistry results in wild and captive populations. These differences could be attributed to variations in diet (affecting nutrition and sexual maturity), water availability, and/or the animals' response to humans (stress hormones). Our study will provide veterinarian researchers with baseline health data for Radiated Tortoises in Madagascar in both captive and wild populations and may be useful for studying the disease concerns of captive-release programs.

Harshil Patel, Arshi Kazi, S. K. Tank
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A survey of herpetofauna of Vansda National Park, Gujarat, India

Vansda National Park (VNP) (20051'16"-21021'22"N & 73020'30"- 73031'20"E) is located at the northern most limits of Western Ghats, a global biodiversity hotspot. Recent studies in herpetofauna in southern Western Ghats have revealed many important discoveries. However, fine scale information on the distribution and status of herpetofauna of northern areas of Western Ghats is still lacking. We conducted a detailed survey of herpetofauna of VNP, Gujarat, India, in an attempt to fill the gaps in information. A total of 62 species of herps, including 17 species of amphibians belonging to 7 families and 45 species of reptiles belonging to 12 families were recorded. 4 species of amphibians and 5 species of reptiles were recorded for the first time from VNP. During this study, threats to the herpetofauna, like road kill and habitat alteration, were also recorded. Looking forward, we would like to explore threat level to each species. The present study will also help government agencies to build better conservation policies for conservation of this unique ecosystem.

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Outcomes of migration on sustainable livelihoods: case of Mali village of Nepal

The basic livelihood strategy that is a combination of agriculture and livestock in remote mountains are in multiple stresses through changing climate state. There are studies done in the context of migration and environmental change, however the relationship between migration and livelihood capitals has been little explored in conservation areas. Using the livelihood approach as an organizing framework to examine the effects of migration in the livelihood capitals of Mali village within Gaurishankar Conservation Area, this research collected the evidence through household survey along with key informant and in-depth interviews. The major push factors are in mixed forms, from low agricultural productivity to lack of income gaining opportunities at the village level and increasing debt that has forced village youths to out migrate towards urban areas for wage based jobs. The phenomenon has resulted in inadequate active youth labor in the village along with increasing remittance inflow supporting purchasing capacity of the households. Those households with family members temporarily migrating for jobs have led to less agricultural land cultivation. In addition, women participation in the local institutions like community forestry committee has been limited due to multiple burdens after male out-migration. Hence, institutional reforms in property rights ownership, community forestry participation mechanism along with ways to re-integrate the skills of returned migrant and better use of remittance flow in the village in productive sector is recommended. This paper is a master thesis submitted to TERI University conducted under global transnational collaborative research on Living with Climate Change, mapping the adaptation experiences.

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Assesing the value of the hairy armadillo in Oruro, Bolivia

The high Andes hairy armadillo (*Chaetophractus nationi*) has been traditionally used in Bolivia to manufacture various products, especially a music box named "matraca" used during Carnaval processions. The species is vulnerable to extinction according to IUCN and over-harvesting seems to be one of the main threats. Although the trade of the hairy armadillo is illegal according to national laws and local bylaws in some Bolivian towns, and on the fact that the species is listed in CITES Appendix II, the trade of the animal is open across the country, with additional evidence that dead individuals are also taken inside and outside the country without export permits. In the first stage of the research, we interviewed dancers and artisans, as well as visited local markets to assess the use of the species during Carnaval celebration, particularly in Oruro, where the biggest procession is held. At least 160 animals are harvested every year only for the festivity, despite the availability of alternative material products with a lower price in the market, the reasons for the dancers to keep using the real animal goes beyond the economic and has a deep socio-cultural root. Therefore, to have deeper knowledge about the value of the species in Oruro, further information was gathered using a mixed method approach, and was then processed using qualitative and quantitative analysis. The results of this research will help not only to generate knowledge about people's perceptions, but also to evaluate the potentiality of transforming cultural values in conservation forces

Hari Prakash Ramesh, Vidisha Kulkarni, Sayan Dutta Choudhury, Rajeev Bacchu, Arun Visweswaran, Padma Ashok, Ashok Hallur, Deepak Jois, Sandeep Kumar Jayasankar, Yateesh Kumar, Angad Achappa, Adarsh Raju, Navendu Page, Gururaja K. V., Kaberi Kar Gupta
Urban Slender Loris Project, Bangalore, Karnataka, India

Impact of urban sprawl on destruction of Slender Loris habitat in Greater Bangalore

In India, urban sprawl is taking its toll on the natural resources at an alarming pace. Bangalore's urban sprawl has contributed to great increase in built-up area and high degree of dispersion; its developed area has increased by 74% between 1973 and 2010. Bangalore lies at the junction of the biological hot-spots of Western Ghats and Nilgiri Biosphere Reserve. Urbanization generates significant stress on land cover, native habitats, biodiversity, ecological commons and the ecosystem services that underpin human well-being. Along with the growth of the city, there is also growing concern about loss of forest cover and wildlife within Bangalore's urban landscapes. Species such as Slender Loris were once abundant in the city but their population status remains unknown due to urban growth and fragmentation, and disappearance of habitats. This study aims to document and map the current and past distribution of the loris and its habitats in Greater Bangalore. Through online questionnaire surveys, ethnographic interviews of residents and local people, and nocturnal loris census, the existence of Slender Loris in urban ecology is established. The study also investigates the pressures and threats

on the loris population in the city through habitat loss, hunting, or illegal pet trade. The "Urban Slender Loris project" is first of its kind in India to study the nocturnal urban ecology with the aid of citizen scientists. By focusing on the conservation of the Loris, project aims to create awareness about the deteriorating ecosystem of Bangalore.

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Effects of environmental pollution on the reproductive health of a bioindicator

One of the direct causes of biodiversity loss is the environmental pollution resulting from the use of chemicals. Different kinds of chemicals, like persistent organic pollutants and some heavy metals, are endocrine disruptors which act at low doses for a long period of time, having a negative effect on the reproductive and thyroid system in vertebrates worldwide. Due to their widespread use and their negative effect, measures have been developed to protect human and ecosystem health including the use of bioindicatores to assess the environmental pollution. But the research on the effects of endocrine disruptors and the use of bioindicatores in neotropical ecosystems where the pressure on biodiversity are scarce. This is the case of Chile, where these kinds of chemicals were detected at different concentrations in the environment of some ecosystems, but only few studies have been done on the biological effects that these compounds may have in some organisms. This study proposed *Xenopus laevis* (African claw frog), an introduced species, for its possible use as a bioindicator of endocrine disruptors in aquatic systems in the mediterranean hotspot in central Chile. For this, systemic alterations, gonadosomatic and hepatic index, histology of gonads and presence of limb malformations in animals from areas with different degrees of contamination were determined. We observed alterations that could be linked to endocrine disruptors present in the environment. This study points out the effects that endocrine disruptors may have for the wildlife conservation and the need to assess and monitor such effects throughout time.

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Estimating puma (*Puma concolor*) population densities using mark-resight models

Although the puma (*Puma concolor*) is listed as "Least Concern" by the IUCN because of its wide geographic distribution, the species is in decline, having been extirpated from large areas of its historic range, and it is listed as "Vulnerable" or "Near Threatened" in other parts of its present range. In the past few decades, camera trapping surveys have been used to estimate abundance for large felid species that are otherwise difficult to study because they are often cryptic and occur at naturally low densities. However, pumas lack the distinctive pelage patterns that would allow for individual identification of all photographs and subsequent analysis with traditional mark-recapture methods. Recently, mark-resight models have been developed that allow for abundance estimation when only a portion of the individuals can be identified, but these methods were not applicable to camera trapping surveys until the advent of the Poisson-log normal mark-resight model (zPNE). In this study, photographs of pumas captured in a camera trapping survey in Belize, Central America were identified to individual, where possible, and these data were analyzed using a spatially-explicit zPNE mark-resight model across seven study sites of variable habitat type. Additionally, we compare our estimates to those of jaguars to explore the potential for predator competition as evidence of mesopredator release. We show that it is possible to estimate puma densities from camera trapping surveys, providing a way to examine the demography of multiple predators simultaneously, thus extending the usefulness of camera surveys for carnivore conservation.

Hae Yeong Ryu
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Effects of spatial structure on species viability in a population dynamics model

In nature, spatial configurations of landscape structures form discontinuous patches in which organisms can survive. These habitat patches provide food and shelter for growth and reproduction and therefore, are critical in sustaining populations of a species. Traditionally, in a spatially-explicit population dynamics model, populations have been simply defined by distinct patches in the landscape that represent suitable areas for the species. Habitat patches that are in close geographic distance were commonly considered as a single population, and existing metapopulation models have used simple measures (like the neighborhood distance to define boundaries of populations) by assigning user-specified values of distance around the suitable patches in the landscape. In this project, I plan to investigate the effect of spatial structure of habitat patches on the prediction of a species' population dynamics. Various methods that have been used to quantify dispersal and measure connectivity (i.e. dispersal kernel, connectivity models, individual-based models, and genetic analysis) will be used

to determine the spatial structure of the metapopulation for a scuirid species. Estimates of demographic and dispersal parameters will be modified based on different patch structures and incorporated into a model for population viability analysis. I expect this project to show how a misrepresentation of a metapopulation structure in a simulation model can result in different outcomes of a species' viability and mislead the decision about its conservation status.

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Estimating leopard cat population abundance and density in Sumatra, Indonesia

The leopard cat (*Prionailurus bengalensis sumatranus*) has one of the most extensive geographic distributions across Asia among the felid species. Several spatial and temporal studies have been conducted for leopard cats; however, abundance and density estimates are lacking. Within Sumatra, Indonesia leopard cat studies are virtually non-existent. Leopard cats are listed as "least concern" on the IUCN red list of endangered species, however, determining population status within Sumatra is still important for several reasons: leopard cat young are commonly captured and sold into the pet trade, habitat degradation is severe throughout its range, and there has been significant clearing of forest for crops and palm oil plantations. Population size and/or density is a strong indicator of overall health of a species within its range. In this study, we used camera-trapping methodology within both a traditional mark-recapture framework, and in a more modern, spatially explicit framework, to estimate abundance and density for leopard cats across five field sites in Sumatra. Density estimates for one of the five sites, Tesso Nilo National Park in 2007, ranged between 11 and 19 individuals per 100 km^2, based on 59 capture events. This study produced some of the first population density estimates for the leopard cat in Sumatra, Indonesia, and highlights the use of ancillary data from cameras traps to estimate population parameters for non-target species. This study also provides important data for management policies designed to enhance biodiversity within these protected areas.

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Genetic approaches for biodiversity: identifying Palmyra Atoll's marine invertebrates

Characterizing biodiversity is the first step in any ecological assessment. In the face of alarming global biodiversity loss, genetic approaches for describing biodiversity are contributing greatly to ecological assessments and conservation. One of these genetic methods is DNA barcoding, which improves upon previous species identification efforts by reducing labor and time constraints, and providing a standardized method for identifying organisms. Further, next-generation sequencing technologies have expanded biodiversity assessments to high-throughput volumes. Environmental DNA (eDNA) analysis is one such innovative technique that utilizes genetic material collected directly from the environment (e.g. water, soil, or air), to discover, identify, and monitor organisms. The remote Palmyra Atoll, located about halfway between Hawaii and American Samoa, is a unique environment currently removed from pervasive human influence. Despite its uniqueness, there is insufficient knowledge concerning the Atoll's marine invertebrate communities. To address this issue, the National Ocean and Atmospheric Administration collected marine invertebrates and water samples throughout the Atoll. This research explores the use of DNA barcoding and eDNA analysis coupled with traditional morphological analyses, in assessing these collections. To date, approximately one third of our invertebrate specimens (including polychaetes, gastropods, zooplankton, and more) have new DNA barcodes, suggesting the potential for this study to fill gaps in our knowledge of Central Pacific marine invertebrate diversity. In addition to furthering our understanding and discovery of the region's biodiversity, comparing these genetic techniques will allow us to investigate the usefulness, benefits, and drawbacks of employing these methods in global marine biodiversity assessments, with conservation applications.

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A range-wide molecular analysis of the forest hinge-back tortoise, *Kinixys erosa*

RESEARCH IN PROGRESS: We examined the phylogeographic differentiation of forest hinge-back tortoises, *Kinixys erosa* (*Testudines: Testudinidae*), using sequence fragments from three regions of mitochondrial DNA: 12S rRNA, ND4, and cyt-b (1228 bp) from archived specimens representing much of the known geographic distribution of the species. Maximum parsimony, maximum likelihood, and haplotype network analysis methods congruently defined three distinct mitochondrial lineages corresponding to major geographic regions of African rainforest. They are: (1) A Central African group with

prominent substructuring and the shortest mean p-distance from the most recent common ancestor. Populations from Cameroon and Congo-Brazaville account for this clade. (2) A strongly-supported West African group represented only by individuals from Ghana or unknown origins. (3) A highly-divergent Congo Basin group defined in this study by one sample from the Ituri region. Given the moderately- to well-supported distinctiveness of nearly every local population, this study has clearly undersampled the distribution of *K. erosa*. There is considerable potential for uncovering additional cryptic lineages in other biogeographic. To rule out competing explanations for the complex phylogeography and evolutionary history of *K. erosa*, additional sampling should be directed towards data gaps as well as intermediate distances between the major groups defined in this study. We are optimistic that the conservation of these unique tortoises will be advanced by this and future work as manageable units come into focus.

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Challenge of invasive species in the herbaceous layer for urban forest restoration

Schuylkill Center for Environmental Education (SCEE), a non-profit organization in Philadelphia, PA, USA, has actively restored 142 ha of urban forest over the last 20 years using a strategy of deer management and native species replanting. We have compared the ten years prior to the implementation to the ten years after for deer, bird, plant, earthworm, and fungal populations. Deer populations decreased dramatically (150-178 deer / mi^2 before to 59 deer / mi^2 after). The goal is 12 deer / mi^2. Native plant species increased overall, except for in the herbaceous layer. In this layer, invasive plant species increased significantly from two to nine as did invasive earthworm populations (density of 89 ind. / m^2 compared to urban sites of 25 ind. / m^2 and rural of 2.5 ind. / m^2). Fungal bacterial ratios declined to 0.19 compared to 10 which is healthy. Bird species had three distinct patterns: recovering, stable, and declining. In conclusion, as deer populations decreased, plant habitat quality in the herbaceous layer did not respond as invasive plant and earthworm species increased, and the fungal bacterial ratio declined markedly.

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The role of introduced rats as seed dispersers in La Olimpia Forest, Puerto Rico

Invasive species are known to cause significant threats to biodiversity, especially on island ecosystems. In La Olimpia Forest in Adjuntas, Puerto Rico, a secondary subtropical wet forest, the role of introduced black rats (*Rattus rattus*) in the dispersal of Sierra palm (*Prestoea montana*) seeds was studied. The Sierra palm, a native to the Greater and Lesser Antilles of the Caribbean islands, is important for maintaining soil stability on steep mountain slopes and its fruit, a valuable food resource for the endangered Puerto Rican parrot (*Amazona vittata*). Fruits of 18 Sierra palm individuals were collected, tagged and placed under their respective parent trees in depots of 25 seeds each. Approximately 75% of the seeds were removed from these seed depots. Automated camera traps photographed only black rats interacting with the fruits in the depots. The majority of the removed fruits had their pulp predated and seeds gnawed and damaged. However, several fruits were found intact or partially damaged. These results suggest that dispersal and predation are occurring as an interaction between black rats and the seeds of native Sierra palm in this forest. Through these interactions, rats are probably influencing the distribution of this native palm and the forest communities in Puerto Rico. By understanding such interactions we can focus on strategic management efforts for native plant species and the maintenance of ecological processes.

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Tracking the fire thief: a first look at the movement of an endangered waterbird

The Hawaiian gallinule (*Gallinula galeata sandvicensis*, HAGA) is an endangered waterbird endemic to the Hawaiian Islands. Despite being notoriously reluctant dispersers, these birds persist in small populations in relict coastal freshwater habitats throughout the heavily developed island of O`ahu. The effect of landscape development on the dispersal rates of HAGA and the resulting landscape-wide population dynamics are unknown. We are using a citizen-science based mark-resight study and population genetics in concert with remotely-sensed landcover data to test two hypotheses: 1) road density decreases inter-wetland dispersal rates of HAGA, and 2) small populations of HAGA on O`ahu persist due to source-sink dynamics

driven by large wetland refuges. Our results will include mark-resight data from 14 months of observing >150 banded individuals and assignment-based effective dispersal rates derived from 11 microsatellite loci.

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Growth management policy impact upon housing growth in the wildland-urban interface

The Wildland-Urban Interface (WUI), where housing meets or intermingles with wildland vegetation, continues to expand across the United States, resulting in significant implications for conservation such as habitat loss and fragmentation, the introduction of exotic species, human-wildlife conflict, wildfire-related incidents, and the degradation of ecosystem services. Though development patterns in the WUI result from a variety of growth management (GM) policies at the local level, the link between these management tools and the growth of housing in the WUI is unknown. Our team of University of Maryland graduate students, in partnership with the USDA Forest Service, is currently compiling and recording presence/absence of GM policies within county comprehensive plans and land use ordinances. Our research scope includes counties within the Denver, CO, Albuquerque, NM, Columbia, SC, and Durham, NC metropolitan statistical areas. At the completion of our policy content analysis (May 2015) we will summarize the county-level policies used to address housing development in the WUI. Additionally, to determine policy effectiveness, we will statistically measure if there is a significant relationship between presence/absence of GM policies for each county and the percent growth of WUI housing from 2000-2010. We expect to find a negative correlation between presence of GM policies and percent growth of WUI housing.

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Can we call it a comeback? Nassau grouper spawning aggregation in the Cayman Islands

Nassau grouper (*Epinephelus striatus*) have been listed as endangered by the IUCN since 1996 and many fisheries are closed. Intense fishing pressure on spawning aggregations is the primary cause of the striking population declines observed around the Caribbean. The Cayman Islands historically hosted five known Nassau grouper spawning aggregation sites. Four of these sites were fished out by about the year 2000, but in 2001 local fishermen ''rediscovered'' an aggregation that anecdotally had not been fished since the 1960s. At the time of its rediscovery the aggregation was estimated at 7,000–8,000 fish. In 2003, after 2 years of intense fishing, the aggregation declined to approximately 2,000–2,500 fish and the Cayman Islands Marine Conservation Board banned fishing on the aggregation site. REEF Environmental Education Foundation, working alongside the Cayman Islands Department of the Environment, began monitoring the site annually in 2003. Together this collaboration led to the implementation of 8-year rolling protections on the Nassau grouper beginning in 2003 and renewed once in 2011. We estimate that their population has more than doubled over the last decade. Additional work focuses on evaluating the fertilization rate at the spawning aggregation, collecting length frequency data, and performing a stock assessment. The current laws expire in 2019 and this work will inform management strategies at that time.

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Intraspecific functional diversity of common species enhances community stability

Ecological stability is a goal of conservation planning, and functional diversity promotes this stability. Common species, by virtue of their abundance, are fundamental to the structure of their communities; if they contribute additional functional diversity they may enhance community stability, thereby ameliorating the effects of ecological change. We used measures of body morphology and stable isotope signatures to evaluate the intraspecific functional diversity (IFD) of two common species, the Deer Mouse (*Peromyscus maniculatus*) and the Southern Red-backed Vole (*Myodes gapperi*), trapped in western Maine, USA, during summer 2014. We modeled the effects of environmental factors on IFD within forest types (fine scale) and across the sampled landscape (coarse scale). Deer Mice responded at the population-level to both coarse- and fine-scale environmental variation, suggesting that they contribute to community stability at a landscape scale. In contrast, Red-backed Vole IFD was driven by individual heterogeneity, suggesting they contribute to community stability at fine spatial

scales in Maine's montane landscape. Our study demonstrates that common species contribute to community stability, and that this contribution may differ among species and unfold at different spatial scales. This capacity to buffer a community against major ecological change is an important attribute for process-level conservation.

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Data are scarce but action is necessary: using agent-based models for conservation

Habitat loss, fragmentation, and degradation has led to an estimated 80% range-wide decline of gopher tortoise (*Gopherus polyphemus*) populations across the Coastal Plain of the southeastern United States. Recently, the gopher tortoise has been listed as a candidate for federal listing under the Endangered Species Act for its eastern populations. As land owner incentive programs are implemented and the state makes land acquisition decisions to manage gopher tortoise habitat in an already fragmented landscape, an understanding of dispersal ability and landscape connectivity is both important and timely to sustain gopher tortoise populations in perpetuity. However, threatened/endangered species are often understudied, and it is often not possible to do large-scale manipulative studies to better understand the ecology of these species to inform management decisions and conservation actions. Individual-based modeling is an approach to simulate the actions and interactions of autonomous agents and their environment. This allows system dynamics to emerge from the collective behavior of individuals obeying simple rules, which are based on a combination of quantitative data, qualitative data, and expert opinion. This research demonstrates an implementation of an individual-based model to understand the genetic connectivity of simulated gopher tortoise populations under varying levels of habitat fragmentation. This project is part of a larger research effort aiming to develop an adaptive landscape planning and decision framework to be implemented by the Georgia Department of Natural Resources to make more-informed state-wide land management decisions for the conservation of gopher tortoise populations.