

ESP-GSA Travel Grant Winners

FALL 2016

Lisa LaCivita

Conference: 2016 ACES (A Community on Ecosystem Services Linking Science, Practice and Decision Making)

Title: County-Wide Amphibian Monitoring for Watershed Condition & Public Engagement

Abstract:

This research examines factors influencing the presence or absence of two common amphibian species, in one Virginia County. The amphibian species serve as a biotic indicator, or proxy, for water quality and watershed condition. Amphibians are vulnerable to pollutants and poor water quality since they spend part of their life cycle submerged in water. The two target species are generalist amphibians whose breeding sites require aquatic habitat and riparian vegetation. The presence of the target species serves as an indicator of water quality, functioning riparian buffers and corridors to forested areas. Landscapes that sustain amphibian populations have the potential to reveal land use, design, planning, or regulations that support water quality and ecosystem services. This detailed study of amphibian occurrence can reveal trends and thresholds of the factors that allow or limit amphibian presence, contributing to our understanding of anthropogenic impacts on biotic communities. The purpose in reporting on watershed condition is to engage citizens in dialogue about their water resources and what can be done to promote and protect watershed integrity and ecosystem services. County-wide amphibian monitoring can become a citizen science effort capable of raising awareness of water resource issues and engaging citizens in water policy. The study area, Frederick County, Virginia, was divided into sub-watersheds and reconnoitered via publicly accessible county roads for routes crossing streams and providing county-wide monitoring coverage. Land use and stream condition (where visible) were noted. Auditory surveys were conducted from these routes using protocols adopted or modified from FrogWatch USA (www.frogwatch.org) between March 15 and July 29, 2016. Time, location, calling intensity and a distance metric were captured using a voice recorder. Data was transcribed into documents and then into spreadsheets. Weather conditions were compiled from National Weather Service observations at the Winchester Regional Airport. Road segments were identified and collected using GIS software. A ½ mile buffer area around each road segment will be created and the amount of forest, water features, riparian vegetation and impervious surfaces will be calculated for each buffer polygon; percentages of each land type will be quantified for analysis. This study of the landscape patterns, watershed integrity and amphibian presence may contribute to our understanding of how aquatic habitats and ecosystem services are maintained in areas subject to land cover change. The baseline data can be used to raise awareness of water quality issues as well as amphibian conservation. Coupling amphibian presence/absence with water quality data brings a tangible element to a somewhat abstract and complex categorizing of watershed integrity. In a democracy, public policy actions need to have citizen support. Enlisting local families to monitor amphibian populations has the potential to build awareness and momentum towards incentivizing riparian buffers and including watershed integrity and “ecosystem services” in comprehensive planning.

SPRING 2016

Kate Malpelli

Conference: Association of American Geographers

Title: A spatial and temporal analysis of human-black bear conflict in Virginia

Abstract:

Black bears are generalist carnivores that have rapidly adapted to the altered landscapes created by human development. Many black bear populations have continued to grow in the face of increasing human populations, resulting in an increase in human-black bear conflict across the U.S. In Virginia, bear populations have increased significantly since 1974, and bear-related complaints throughout the state have also increased. In developed areas, common complaints include damage to bird feeders, scavenging on garbage cans and foraging at dumps, and vehicle collisions. In rural areas, bears are known to damage agricultural commodities, such as beehives, corn crops, orchards, and livestock. Mitigating human-bear problems is one of six goals outlined in the Virginia Department of Game and Inland Fisheries (VDGIF)'s Black Bear Management Plan. Using VDGIF's black bear complaint data, this study examines the spatial and temporal trends in human-black bear conflict in Virginia from 2008-2014. Spatial autocorrelation and hot spot analysis techniques are used to identify patterns in the locations of conflict events for each year and to assess how these patterns have changed over time. Trends in conflicts as a whole and by specific conflict type are assessed. The goal of this analysis is to identify zones with a high degree or increasing rate of conflict, in order to assist managers in identifying priority areas for targeted conflict prevention measures.

FALL 2015

Elly Roland

Conference: Society for Marine Mammalogy

Title: Why not whaling data: Using energetics models to address population consequences of behavioral disturbance

Abstract: Energetics models can fill the gap between behavioral disturbance and impacts to individual or population vital rates. However, there can be problems with this approach. This presentation summarizes several findings derived from the process of creating a proof-of-concept energetics model to answer problems of population consequences of disturbance (PCoD) in cetaceans. Energetic models of the highest quality models need to include calibration, ie., fitting model results to real data. Without this, the model may be little more than mathematical guesswork. Strictly energetics models which use lipid levels or whale weight as measures of whale fitness prevent calibration. This is because there is no reasonable way to repeatedly measure weight or lipid content in free ranging cetaceans. Therefore, a proxy measurement for whale fitness must be found if high quality PCoD models are to become available to managers. This data for this proxy measurement should be attainable with minimal disturbance to the animal. Allometric measurements from photographs and acoustic measurements are possible proxies, and both approaches have pros and cons. Using a proxy for whale fitness also releases the model from needing highly detailed information about the digestion and basal metabolic rates of the species. This allows researchers to avoid the major conundrum of requiring lethal studies to determine if non-lethal impacts are hurting a cetacean population.

Michelle Ryan

Conference: Water Resources Conference of the Virginias

Title: Geospatial analysis of the mystery snail *Bellamya spp.* (Gastropoda; Caenogastropoda: Viviparidae) in the Potomac River Watershed

Abstract:

Bellamya spp. (synonym *Cipangopaludina chinensis*) (Gastropoda; Caenogastropoda; Viviparidae) are non-native mystery snail species found within the Potomac River watershed. Despite the widespread distribution in North America of these non-native snails, the impacts of *Bellamya spp.* on native freshwater ecosystems are poorly understood. The purpose of this study was twofold: the first was to determine if water quality data (pH, electrical conductivity (EC), oxygen reduction potential (ORP), water temperature) and the location of live *Bellamya spp.* within the Potomac River watershed varied from previously published water quality data. Second, the project aimed to determine spatial relationships with water quality data and *Bellamya spp.* length, width, and operculum width by utilizing the Global Moran I model. Findings indicate the Potomac River *Bellamya spp.* survive with greater adaptability in freshwater aquatic environments than previously documented in scholarly literature. Additionally, project results revealed there were little to no statistical significance between water quality metrics and snail location, snail shell length, width, or operculum width.

SPRING 2015

Manuela Dal Forno

Conference: Botany 2015 – Science and Plants for People

Title (1 of 2): Photobiont versus mycobiont diversity: A case study of the lichen symbiosis in the Dictyonema clade

Authors: Manuela Dal Forno, James D. Lawrey and Robert Lücking

Abstract:

Based on recent phylogenetic studies of the basidiolichen clade Dictyonema s.l., 63 species are now accepted in five genera, with still hundreds of species remaining to be described. The identified photobionts of all of these species are members of a remarkable clade of cyanobacteria called Rhizonema, which may be entirely lichenized. To test this hypothesis, we obtained 16S rDNA sequences from 560 specimens representing all major clades within Dictyonema s.l., and an additional 21 ascolichens suspected to contain Rhizonema, collected from Bolivia, Brazil, Canary Islands (Tenerife), Chile, Colombia, Costa Rica, Ecuador (continental), Fiji, Galapagos Islands, Guatemala, Mascarene Islands (La Reunión), Mexico, New Zealand, Panama, Peru, Philippines, Puerto Rico, Thailand, and Venezuela. All of the samples were found to harbor the Rhizonema photobiont. Most samples presented more than one haplotype of Rhizonema, each usually represented by hundreds of reads. For the Dictyonema samples, only 4 out of the 560 did not present a secondary haplotype, and 38 had an equal number of reads for each of the haplotypes observed. Initial alignments of the sequences suggested two main clusters of Rhizonema across all specimens, and Maximum Likelihood and TCS network analyses confirmed this result. We are interpreting these as two separate lineages of Rhizonema, and each is represented by a relatively large number of haplotypes. There is no indication of photobiont-mycobiont co-evolution at the species level in any of the clades of Dictyonema s.l. However, one of the two lineages of Rhizonema (Lineage 2) appears to partner primarily with one of the Cora clades collected from northern Andean locations. The other Rhizonema lineage (1) is represented by a much larger number of haplotypes and these appear to partner with mycobionts from many Dictyonema clades, likely representing the ancestral Rhizonema clade within these lichens. Overall, our results show that the diversity of photobionts is far lower than that of the mycobionts, a view that lends support to a previously published hypothesis concerning photobiont sharing in the clade.

Title (2 of 2): High levels of endemism in Galapagos Islands basidiolichens of the Dictyonema clade: An updated assessment including molecular data and taxonomic novelties

Authors: Manuela Dal Forno, Robert Lücking, Frank Bungartz and James D. Lawrey

Abstract:

The present work is an assessment of the present state of knowledge concerning the diversity of basidiolichens in the Galapagos Islands. Based on collections from the Islands made in the past and by us recently, all basidiolichens in the Galapagos belong to the Dictyonema clade. After a previously published taxonomic account, here we include for the first time a molecular phylogenetic study of 90 specimens in the genera Acantholichen, Cora, Cyphellostereum, and Dictyonema, making use of two nuclear ribosomal DNA markers (ITS and LSU). A detailed morphological and anatomical revision is also incorporated. Ten basidiolichen species are now known from the Islands, among them three that have been published elsewhere: Acantholichen galapagoensis Dal-Forno, Bungartz & Lücking, Dictyonema pectinatum Dal Forno, Yáñez & Lücking, and Dictyonema galapagoense Yáñez, Dal Forno & Bungartz, here recombined as Cyphellostereum galapagoense (Yáñez, Dal Forno & Bungartz) Dal-Forno, Bungartz & Lücking. An additional seven species are here proposed as new to science: Cora galapagoensis Dal-Forno, Bungartz & Lücking, Cora santacruzensis Dal-Forno, Bungartz & Lücking, Cyphellostereum

floreanum Dal-Forno, Bungartz & Lücking, Dictyonema barbatum Dal-Forno, Bungartz & Lücking, Dictyonema bungartziana Dal-Forno, Yáñez & Lücking, Dictyonema ramificans Dal-Forno, Yáñez & Lücking and Dictyonema subobscuratum Dal-Forno, Bungartz & Lücking. Based on our phylogenetic analysis including a large number of samples from the South American continent, it appears that of these ten species, only two (*D. pectinatum* and *D. subobscuratum*) are found outside of the Galapagos Islands, indicating a potentially high level of endemism of 80% in these lichens for the archipelago.

Rachel Golden

Conference: 27th International Congress for Conservation Biology

Title: Protected area downgrading, downsizing, and degazettement (PADDD) in the United States, 1900 - 2014

Authors: Rachel E. Golden, Roopa Krithivasan, Michael B. Mascia

Abstract:

Traditionally, protected areas have been considered permanent means to conserve biodiversity and safeguard natural and cultural resources. However, widespread evidence of protected area downgrading, downsizing, and degazettement (PADDD) demonstrates that legal changes affect protected areas worldwide. Legal changes to reduce the status or size of protected areas have been linked to higher levels of deforestation, carbon emissions, and habitat fragmentation. Drawing on the legal, peer-reviewed, and grey literature, we identified patterns, trends, and causes of PADDD in the United States' protected area system that occurred from 1900 to 2014. During this period, the United States enacted 265 PADDD events (242 downgrades and 23 downsizes) affecting an area of 747,456 km² across 145 protected areas. In addition, we identified 1,841 PADDD proposed events, 1,166 of which are currently active. These 1,166 downgrades and 6 downsizes may affect an area of 990,358 km² across 1,118 protected areas. A large proportion of the documented PADDD events were systemic, wherein one legal change affected multiple protected areas simultaneously. The most common proximate causes of these legal changes were infrastructure construction, subsistence-level extraction, and other industrial-scale resource extraction. Events occurred in every decade and across all federal agencies that manage public lands. Evidence of PADDD in the United States demonstrates that protected areas in developed countries are not immune to legal changes. Further, the magnitude of PADDD across space and time suggests that protected areas should not be regarded as permanent conservation interventions, but instead recognized as dynamic systems. Strategic planning for protected areas should consider systematic accounting for PADDD in the future.

Dana McCoskey

Conference: 27th International Congress for Conservation Biology

Title: Molecular identification of the wood thrush diet and validation of a protocol for studies of avian diets

Abstract:

DNA barcoding markers and next-generation sequencing (NGS) show great promise in applications to food web studies. By extracting mixed community DNA from an animal's scat or stomach contents and then using polymerase chain reaction (PCR) and NGS with public reference databases, this method can identify prey species DNA while overcoming limitations of traditional foraging studies. For example, field observations are both time and labor intensive and biased by the detectability of focal species. Likewise, scat and stomach content analyses are labor intensive, require expert knowledge of prey morphology, and can be biased by differences in digestibility of prey. We tested the efficacy of these methods to quantify diet diversity and breadth for a declining neotropical migratory bird, the wood thrush (*Hylocichla mustelina*). We compare species detected in partially digested remains to those found with an NGS molecular method. We then compare molecular results from scat samples and stomach

contents from the same individuals, to determine how much information is lost during digestion. The success of this approach strongly depends on data generated by universal molecular markers, the processing of samples, and if information is lost during digestion. Our data help to validate a low impact molecular method that will improve our understanding the wood thrush's niche and which can be applied to studies of other bird species.

Amanda Sills

Conference: American Fisheries Society Annual Meeting 2015

Title: Trends in Ichthyoplankton Assemblage Structures in a Recovering Freshwater Tidal Embayment

Abstract:

Gunston Cove, VA, an embayment of the Potomac River, is a tidal freshwater system utilized by anadromous, estuarine and freshwater fish species for spawning and larval development. Historically polluted by point source pollution from a wastewater treatment facility, water quality has improved since nutrient loading from the effluent was significantly reduced in the 1980s. This improvement allowed for a transition from a phytoplankton dominated ecosystem to a system whose primary production is driven by submerged aquatic vegetation (SAV) in the last decade. This study aims to determine effects of observed trends in environmental quality on ichthyoplankton assemblage structures and abundances. Using data from bimonthly pelagic ichthyoplankton tows conducted since 1993, we employed multivariate statistical approaches to explore relationships between assemblages and environmental variables associated with nutrient loading. We found a significant difference between assemblage structures sampled within the cove during phytoplankton and SAV dominated time periods. Increases in abundance of fish species that utilize SAV habitats for spawning were found to be significant and correlated with decreases in total nitrogen, total phosphorus and total suspended solids. Outcomes from this analysis help broaden the understanding of the effects of point source nutrient reduction in ecosystems undergoing recovery.

Fall 2014

Tunde Adebola

Conference: Ecopath 30 years

Title: Reducing Anthropogenic Impacts on Nigerian Coastal Fisheries

Abstract:

Historically, Nigeria has produced from 25,000 MT to 323,200 MT of fish annually (1950-2006). This amount of fish production meets only a fraction of the animal protein needs of a growing population of 175 million. Although imports have bridged the shortfalls in supply of fisheries resources, high demand for these resources have implications for overexploitation of marine and coastal resources. In addition to heavy exploitation of marine resources, other anthropogenic stressors in the coastal ecosystems include petroleum hydrocarbon pollution, and habitat degradation due to the close proximity of megacities such as Lagos and Africa's largest hydrocarbon extraction industry in the Niger Delta. More recently, effects of overfishing in the industrial fishing subsector may have been ameliorated due to a release of fishing pressure caused by accessibility issues. The most important ecological issues are: (1) habitat degradation arising from nutrient enrichment and land reclamation from the sea in coastal cities. (2) Severe environmental pollution in the Niger Delta (an important nursery area for a variety of marine and brackish water species) caused by direct discharge of petroleum hydrocarbons into estuarine habitats and oceanic waters, (3) Large scale artisanal fisheries with approximately 100,000 small fishing units employing low to medium technologies to exploit fish resources in 850 km stretch of coastal waters, and (4) Intensification of industrial shrimp trawling from the mid 1980s - 2000s when landing far outstripped prediction from shrimp resource potential in the Gulf of Guinea coastal surveys of the 1960s. A more recent development for the industrial fishing subsector is restriction of access to important fishing grounds due to safety concerns caused by unrest in the Niger Delta. An ecosystem approach is proposed using the Ecopath with Ecosim software to answer the following questions: How is recruitment impacted by loss of habitat through sea reclamation and oil pollution? How has waste generated from coastal cities impacted the quality of coastal waters and their ability to support important fisheries? How do high densities of fishing canoes impact coastal fisheries? How are these multiple factors interacting to drive observed patterns and processes in Nigeria's coastal ecosystems? What strategies are required to safeguard coastal resources so they can continue providing the important ecological and economic services they have traditionally provided? To address these questions, we (1) build a food web model for Nigerian coastal waters and account for fisheries, (2) model impacts of habitat loss, (3) traces contaminants through the marine food web, and (4) explore management alternatives for the fisheries and hydrocarbon extraction industries.

Peter Jacobs

Conference: AGU Fall Meeting

Title (1 of 2): It Ain't (Just) the Heat, It's the Humanity: Increasing Public Understanding of Scientific Consensus and Its Role in Climate Literacy

Authors: Peter Jacobs, John Cook and Dana Nuccitelli

Abstract:

An overwhelming scientific consensus exists on the issue of anthropogenic climate change. Unfortunately, public perception of expert agreement remains low- only around 1 in 10 Americans correctly estimates the actual level of consensus on the topic. Moreover, several recent studies have demonstrated the pivotal role that perceived consensus plays in the public's acceptance of key scientific facts about environmental problems, as well as their willingness to support policy to address them. This

"consensus gap", between the high level of scientific agreement vs. the public's perception of it, has led to calls for increased consensus messaging. However this call has been challenged by a number of different groups: climate "skeptics" in denial about the existence and validity of the consensus; some social science researchers and journalists who believe that such messages will be ineffective or counterproductive; and even some scientists and science advocates who downplay the value of consensus in science generally. All of these concerns can be addressed by effectively communicating the role of consensus within science to the public, as well as the conditions under which consensus is likely to be correct. Here, we demonstrate that the scientific consensus on anthropogenic climate change satisfies these conditions, and discuss past examples of purported consensus that failed or succeeded to satisfy them as well. We conclude by discussing the way in which scientific consensus is interpreted by the public, and how consensus messaging can improve climate literacy.

Title (2 of 2): Putting the Past to Work: Driving Ecosystem Models with Mid-Pliocene Patterns of Warming

Authors: Peter Jacobs and Kim de Mutsert

Abstract:

The Pliocene epoch, and the mid-Pliocene Warm Period (mPWP) in particular, are widely-cited as analogs for near-future anthropogenic warming, due to elevated GHG levels but similar boundary conditions in other respects. This has led to a great deal of interest in the mechanisms and spatiotemporal patterns of Pliocene warmth and sea level rise, as well as interest in how the Pliocene can constrain climate sensitivity. The Pliocene has also been used to identify potential biases or missing processes in climate models (through model-proxy reconstruction comparisons). To date, however, there has been little focus on exploiting the model-reconstruction disagreements in order to better inform policymaking, by providing alternative scenarios beyond those produced by models alone. We drive a marine ecosystem model of the North Atlantic Ocean with state of the art climate model output from the CMIP5 archive, as well as conditions derived from the PRISM multiproxy reconstruction of mid-Pliocene SSTs, in order to assess the impact future warming spatially-resembling the Pliocene will have on fisheries relative to warming anticipated by climate models.

Jenell Walsh-Thomas

Conference: AGU Fall Meeting

Title: Assessing the Use of Metaphors to Facilitate and Improve the Effectiveness of Climate Change Communication

Abstract:

Metaphors are sometimes used in science communication to explain unfamiliar scientific concepts and processes in more familiar terms. Empirical research has shown that metaphors can help audiences better understand complicated scientific concepts. A growing number of metaphors are used to explain various climate science concepts, but the only empirical evaluation of climate metaphors to date (van der Linden et al, 2014, Climatic Change) found that medical and bridge safety metaphors did not enhance the effectiveness of a simple corrective statement about the scientific consensus on human-caused climate change. Drawing on a recent meta-analysis by Sopory and Dillard (2002, Hum Commun. Res.), we will briefly review what is known about appropriate metaphor usage in communicating scientific concepts. We will also present preliminary findings from an experiment currently underway to further explain the conditions in which metaphors are likely to help in communicating climate science concepts. We hypothesize that metaphors will be more effective in communicating high complexity climate science concepts that are less easily understood by the public than more easily understood low complexity concepts (such as scientific consensus on climate change). We also hypothesize that the more familiar people are with the referent (performance enhancing drugs in baseball is a metaphor

about “the climate system on steroids”), the more effective the metaphor will be. To test these hypotheses, we are randomly assigning ~1000 adults – approximately representative of the US adult population – to read one brief passage in which one of four relatively simple or complex climate concepts is presented and explained with or without a metaphor. The outcome measures will include climate change belief, concern, knowledge, and involvement. This study is intended to add to the knowledge base about use of metaphors in science communication, and provide practical advice to climate communicators.

SPRING 2014

Amy Johnson

Conference: North America Congress for Conservation Biology

Title: Grassland and shrubland bird associations with native grasses in Virginia

Authors: Amy Johnson, Norm Bourg (Smithsonian Conservation Biology Institute), David Luther, Scott Sillett (Smithsonian Conservation Biology Institute), William McShea (Smithsonian Conservation Biology Institute)

Abstract:

Grassland bird conservation is difficult to assess as more than 80% of North America's grasslands are on private lands. We investigated the relationship between native grasses and the associated diversity of grassland and shrubland birds on mostly private lands in Virginia. Bird diversity for each 10 ha site (n=29) was calculated from point count data (4 per site in spring 2013) using Shannon-Weiner diversity. Twenty-one target species were identified for analysis due to their dependence on grasslands and shrublands. Vegetation was sampled in twenty-one 1m² quadrats for each site during peak growth. Grass species were identified and % cover measured to determine the ratio of native to exotic grasses. Target bird diversity was significantly correlated (p<0.05) with the ratio of native to exotic grasses but not overall grass abundance. Our data suggest that native grasses benefit grassland bird conservation through increased bird diversity and should be integrated into land management.

Samantha Oester

Conference: International Marine Conservation Congress

Title (1 of 3): Using Social Media to Make Your Marine Science Matter

Abstract:

If used effectively, social media can be rewarding and informative for scientists and conservation professionals. Social media is a significant means of communication for the general public, organizations and agencies. In fact, recent polls have shown that internet-savvy adults (and children) get a substantial portion of their news via social media and the web. Social media campaigns can take advantage of built-in audiences and the ease with which those people can share and promote your message, increasing the reach of your outreach. Social media and internet resources can also be used effectively for data collection and citizen science campaigns. I will discuss the importance of conservation communication and having an online and social media presence. I will also give how-tos and tips on successfully using various online tools and social media outlets, as well as how to collect data and assess the effectiveness of social media strategies.

Title (2 of 3): Talking the Talk: Giving Effective and Engaging Presentations

Abstract:

This workshop, aimed at students and those who need public speaking experience, will give participants tips and advice on giving presentations in various outlets, including science conferences. I will go over tricks on calming nerves, effective presentation organization, how to edit down slides, what aspects to focus on and tailoring presentations for different audiences. I will also go over helpful suggestions on public speaking and having a confident "stage" presence. Participants who are presenting at IMCC3 will get the chance to practice giving their presentations during the workshop, and will get feedback on visuals and the oral presentation.

Title (3 of 3): The Science of Conservation Communication: Effective Outreach through the Media and Collaborating with Communication Professionals

Abstract:

The importance of science communication has been known for decades, but communication needs to be effective to be successful. Communication-savvy scientists and communication professionals will speak on the importance of conservation communication, effective science communication, tips on working with the media and collaborating with filmmakers and authors for wider media coverage. In this workshop, scientists, journalists, editors, writers and filmmakers will give the inside scoop on effectual and powerful communication through various media outlets. The panel will also discuss how to connect with and build relationships with communications professionals. The workshop will end with a panel discussion on common science communication pitfalls and tips for effective messaging.

FALL 2013

Katheryn Patterson

Conference: 20th Biennial Conference on the Biology of Marine Mammals

Title: Orca survivorship in captivity: Where are we now?

Authors: Katheryn Patterson, Naomi Rose, and E.C.M. Parsons

Abstract:

In 1995, Small and DeMaster published an analysis of annual survivorship rates (ASR) for killer whales (*Orcinus orca*) held in captivity through 1992, calculating an ASR for non-calves, males and females, of 0.938, which was significantly lower ($p < 0.001$) than the non-calf ASR (0.976) for a well-studied population of wild killer whales in the eastern North Pacific. Small and DeMaster hypothesized that ASRs for captive killer whales would increase as husbandry improved and more animals were born in captivity. In late 2009 and early 2010, two trainers were killed by two different captive killer whales, leading to increased scrutiny of the public display of this species. For example, a U.S. Congressional oversight hearing in April 2010 examined the public costs and benefits of displaying this large, wide-ranging predator and more recently the documentary *Blackfish* focused on the 2010 trainer death. Given the growing controversy, it seemed timely to test Small and DeMaster's hypotheses, using data through 2010 on all known captive killer whales. Methodology and statistical analyses similar to those from the 1995 study were used, in order to be able to compare results. The ASR for the 188 individuals included in this analysis (calves and non-calves) was 0.916, a decrease from 1995 (0.937). For all whales held only since 1993 ($n=31$), and therefore experiencing only the "improved husbandry" hypothesized by the 1995 study, the ASR was 0.934. For all killer whales born in captivity ($n=58$), the ASR was 0.937, exactly the same as the ASR for all killer whales from the 1995 study. Both hypotheses were therefore disproved. ASRs for captive killer whales have not improved in the past 20 years and may have worsened. Killer whales appear inherently unable to adjust physiologically to captivity, even when captive-born.

Loren Petruny

Conference: North Atlantic Right Whale Consortium 2013 Annual Meeting

Title: Getting it right for the right whale: a last opportunity for effective marine spatial planning along the US Atlantic coastline

Authors: Loren M. Petruny, Andrew J. Wright, Courtney E. Smith

Abstract:

Marine spatial planning (MSP) is a promising tool for ocean and coastal management. However, it has been under-applied in the US, languishing in the realm of ad-hoc information sharing and thus not meeting National Ocean Council recommendations for an integrated planning process. The imminent installation of offshore wind (OSW) devices along the mid-Atlantic coastline combined with commercial shipping traffic and associated routes presents an opportunity to holistically manage human impacts on the critically endangered North Atlantic right whale (NARW), with shipping noise and ship strikes being the largest contributing factors. Following a framework applied in the Stellwagen Bank National Marine Sanctuary, we propose instigation of a multi-stakeholder process of MSP that includes appropriate positioning and timed construction of OSW devices. The optimal end-state is development of OSW energy and a safe shipping infrastructure, where there is minimal exposure to shipping noise and collisions for migrating NARWs. As we increasingly turn to marine resources for energy solutions, people should consider collateral conservation measures like that proposed here. We think this opportunity for whale conservation can be turned into a successful model that can be applied where there are other problematic intersections between marine life and the expansion of commercial activities.

Chelsie Romulo

Conference: 2013 Conference of the Raptor Research Foundation/ I World Wide Raptor Research Conference

Abstract:

Global Introduction: Global diversity assessments contribute to the understanding of large taxonomic groups, and conservation efforts depend on knowledge of taxonomic status, distribution and abundance of species. These assessments and databases provide a basis for studying patterns and changes in species distribution and diversity, especially in light of global issues such as climate change. As apex predators, owls can play a significant role in providing for broader ecosystem-level conservation and analysis. Because they are excellent indicators of biodiversity and ecosystem health, owls can be used to identify conservation targets and at-risk areas. By studying and conserving owl species, larger biodiversity conservation goals can be achieved. This project developed a geodatabase of 211 owl species range maps and analyzed the characteristics of the global distribution of owls for the Global Owl Project (GLOW).

Aim: The purpose is two-fold; (1) to inform conservationists and researchers of the Global Owl Project geodatabase for research and contributions, and (2) to assess global owl distribution and identify owl conservation priorities.

Methods: Species maps were obtained from Bird Life International, by digitizing König and Weick's Owls of the World maps (2008), and from species specific data. Species-specific grid maps were created and combined to visualize the distribution of species richness, near-threatened species, threatened species, and restricted-range species. For the rarity-weighted species analysis, species were included that either have a threatened status and/or have a restricted range. Values were assigned to each cell based on the inverse of the number of cells in which a species occurs. Standard deviation was used to highlight areas with the highest relative value, and therefore highest concern in terms of conservation need.

Results: The largest grouping of owl species in the same geographic area is 20, though 5 to 10 is more common. The threatened species (32) are concentrated along the west African coast and on islands, especially in the South Pacific. About one third of all owl species (75) fall into the restricted-range category, mostly in the Western Hemisphere and Africa. We identified 3 major hotspots - South America, Africa, and Indonesia - that have a relatively high number of irreplaceable cells due to the number of species within them are threatened and/or have a restricted range.

Significance: These diversity hotspot maps identify three major conservation target areas from a weighted analysis of threatened and endemic species that represent ideal locations for concentrating conservation efforts for owls. The correlation between the owl species hotspots and other studies on species diversity supports the claim that owls can be used as bioindicator species for biodiversity analyses Owl Distribution, Diversity Analysis, and Conservation Hotspots

Karin Schwartz

Conference: Conservation Breeding Specialist Group 2013

Title: Integrated Data Management for Reintroductions and Conservation Translocations: Linking In Situ and Ex Situ Data Management for Conservation

Abstract (Workshop Convenor):

With anthropogenic factors accelerating the extinction rate of species 100 to 1000 times the natural rate, biodiversity conservation has become mandatory for sustainability of our natural world. It is imperative that species conservation strategies involve both in situ (in the wild) and ex situ (in captivity) communities for holistic, integrative conservation action planning, as outlined in the One Plan Approach (OPA), developed by IUCN/Species Survival Commission Conservation Breeding Specialist Group. The overall goal of the OPA is to look at the entire metapopulation of a species to involve both in situ and ex situ communities in holistic conservation action planning.

Zoos and aquariums have become centers committed to biodiversity conservation, contributing through participation in captive breeding for reintroduction, head-starting animals to increase juvenile survival after release, rescue/rehabilitation/release of injured wildlife or supplementation programs to increase wild populations. For all of the scenarios, there is integration of ex situ and in situ components for overall species conservation.

Sophisticated records-keeping and population management tools have been developed for use in zoological conservation management programs. Globally, over 800 zoological institutions use the International Species Information System – a central global database for animal records collection, compilation and analysis, all integral for scientific population management. ISIS has deployed a new system, the Zoological Information Management System (ZIMS) that will include leading-edge web-based technologies, data warehousing and veterinary care tracking functionality, enabling real-time access to animal records and veterinary history from anywhere in the world. Currently, very few conservation translocation programs utilize these data management tools for holistic animal management and there is no direct link between the animal records in ISIS and databases used in monitoring and managing those animals released to the wild or for intensively managed wild populations. There is a need for information exchange and standardization between ex situ and in situ data management practices when these factions intersect in species recovery programs.

The overall objective of this work is to develop scientific-based recommendations for establishing a global database system that will provide a direct link between information collected on animals under human care and on the wild population in order to enhance in situ conservation of these species. For the in situ component, input is needed from those specialists that are working in the field and their input is critical to make sure that a holistic information system can handle the required information to manage and assess these recovery programs.

This working group will explore current practices for data management of in situ species conservation programs and identify how critical components can be integrated with ex situ processes for holistic species conservation. Platforms to be discussed include ISIS Zoological Information Management System as well as data management tools used for monitoring animals in the wild, with the possibility of linking systems.

SPRING 2013

Lauren Augustine

Conference: 26th International Congress for Conservation Biology

Title: Nutritional comparison of larval *Cryptobranchus alleganiensis* (hellbender) diets in captivity and in the wild

Authors: Lauren Augustine, Kimberly A. Terrell, Christina Petzinger, and Michael Maslanka

Abstract:

Hellbender (*Cryptobranchus alleganiensis*) populations are declining in the wild, an increasing number of institutions are maintaining this species in captivity for conservation purposes including propagation and reintroduction. Yet providing captive animals with a nutritionally complete diet can be a challenge, particularly for a relatively under-studied species. Commercially-sourced diets can contribute to nutritional deficiencies in captive amphibians (e.g., metabolic bone disease), and wild-sourced food items carry the additional risk of disease introduction. We investigated the nutritional content of a commercially-sourced diet (i.e., worms, shrimp, krill, and crayfish) for captive juvenile hellbenders compared to invertebrate prey available to wild counterparts. Invertebrates were collected from seven streams known to contain hellbenders in the eastern United States (across VA, PA and NY). Commercially-sourced and wild-caught invertebrates were assayed for dry matter, fiber, fat, protein, chitin, ash and gross energy. Nutritional content of commercial versus wild crayfish was similar, except for dry matter, which was greater ($P < 0.05$) in wild-caught individuals. Macroinvertebrate species available to wild hellbenders contained more ($P < 0.05$) dry matter, ash, fiber, and chitin, but less ($P < 0.05$) energy and protein compared to the captive diet. All non-crayfish captive fed diet options contained higher gross energy than their wild caught counterparts. These findings suggest the importance of continued nutrient evaluation of commercially available prey sources for hellbenders, and it appears to be current best practice to provide as much diversity in prey items as reasonable and practical, rather than focusing on any single commercially available item

Adrian Dahood

Workshop: Programming with EWE

Attended as a participant to learn skill needed to conduct dissertation research

Mirian Tsuchiya

Conference: 93rd Meeting of the American Society of Mammalogists

Title: Phylogeography, demographic history and molecular diversity of two Neotropical species of family Procyonidae (Mammalia, Carnivora): *Nasua nasua* and *Procyon cancrivorus*.

Authors: Mirian T.N. Tsuchiya, Klaus-Peter Koepfli, and Eduardo Eizirik

Authors:

Comparative phylogeographic analyses are useful to shed light on common historical processes affecting regional faunas, as well as to identify species-specific life history features that may influence their genetic legacy. Here we performed phylogeographic analysis of two medium-sized Neotropical carnivores, the brown-nosed coati (*Nasua nasua*) and the crab-eating raccoon (*Procyon cancrivorus*), using mitochondrial DNA and microsatellite markers, in order to characterize and compare their patterns of genetic diversity and underlying evolutionary history. Mitochondrial DNA analyses showed levels of diversity that were up to ten-fold higher for *N. nasua* relative to *P. cancrivorus*. Six reciprocally monophyletic mtDNA phylogroups were recognized for *N. nasua*, which were also supported as distinct populations by the microsatellite analyses. In contrast, the mtDNA data set for *P. cancrivorus* indicated the existence of three recognizable population units, but the magnitude of their differentiation was

much less pronounced than that observed in *N. nasua*. Moreover, the microsatellite data did not support any genetic subdivision in this species. These results demonstrate that these species have very distinct evolutionary histories, which may at least in part be a consequence of differences in social structure and dispersal patterns. These results highlight the evolutionary complexity of the Neotropical biota, and underscore the need for multi-species analyses employing comparable data sets so that common and contrasting patterns can be adequately investigated.

FALL 2012

Jessica Kordell

Conference: Red Panda SSP and Husbandry Course

Title: Red Panda Research Past, Present and Future