

Oral Presentation Abstracts

Listed alphabetically by presenting author. Presenting author names appear in bold. Code following abstract refers to session presentation was given in (Day [Mon = Monday, Tue = Tuesday, Wed = Wednesday] - Time slot [AM1 = early morning session, AM2 = late morning session, PM1 = early afternoon session, PM2 = late afternoon session] - Room number - Presentation sequence. For example, Mon-PM1-2-3 indicates: Monday early afternoon session in room 2, and presentation was the third in sequence of presentations for that session. Using that information and the overview of sessions chart below, one can see that it was part of the “Conservation and Ecology of Bats” session. Presenters’ contact information is provided in a separate list at the end of this document.

Overview of Oral Presentation Sessions

MON	MONDAY APRIL 16, 2012		
9:00–10:30	Concurrent Sessions - Early Morning		
	Room A	Room B	Room C
	Invasive Species I	Wetland Restoration and Conservation I	
11:00–12:30	Concurrent Sessions - Late Morning		
	Room A	Room B	Room C
	Small Mammal Ecology	Herp Ecology and Conservation	Fish Ecology I
1:30–3:20	Concurrent Sessions - Early Afternoon		
	Room A	Room B	Room C
	Ethnobotany and Traditional Knowledge	Developing Approaches to Conservation Research	
3:45–5:30	Concurrent Sessions - Late Afternoon		
	Room A	Room B	Room C
	Turtle Conservation and Ecology	Naturalists and Natural History: Linking the Past and Present I	Plant Ecology I

TUE	TUESDAY APRIL 17, 2012		
9:00–10:30	Concurrent Sessions - Early Morning		
	Room A Invasive Species II	Room B Coyotes and Wolves in the Northeast I	Room C
11:00–12:30	Concurrent Sessions - Late Morning		
	Room A Naturalists and Natural History: Linking the Past and Present II	Room B Coyotes and Wolves in the Northeast II	Room C Wetlands and "Waters"
1:30–3:20	Concurrent Sessions - Early Afternoon		
	Room A Avian Ecology I: Migration, Breeding, and Wintering	Room B Earthworm Ecology and Evolution	Room C Fish Ecology II
3:45–5:30	Concurrent Sessions - Late Afternoon		
	Room A Naturalists and Natural History: Linking the Past and Present III	Room B Large Mammal Ecology	Room C Plant Ecology II
WED	WEDNESDAY APRIL 18, 2012		
9:00–10:30	Concurrent Sessions - Early Morning		
	Room A Invasive Species III	Room B Pollution Impacts on Forest Biodiversity	Room C
11:00–12:30	Concurrent Sessions - Late Morning		
	Room A Avian Ecology II: Habitat and Foraging	Room B Ecosystem Services and Habitat Functions Provided by Nonnative Plants	Room C Wetland Restoration and Conservation II
1:30–3:20	Concurrent Sessions - Early Afternoon		
	Room A Ecology and Conservation of Insects	Room B Fish Ecology III	Room C Plant Ecology III
3:45–5:30	Concurrent Sessions - Late Afternoon		
	Room A Ecological, Biogeographic, and Evolutionary Responses of Mammals to Climate Change	Room B Urban Ecology	Room C Environmental Toxins and Biota

A Learning Process Approach to Leopold: Intense Consciousness of Land

Walter M. Aikman (Cayuga Community College, Auburn, NY; aikman@cayuga-cc.edu)

Aldo Leopold's life, career, and writings advances an ecological understanding of land that requires we reflect on our ethical responsibilities to ecosystems and act on our moral obligations to change our conduct when we know land-use practices are wrong. Leopold's scientific and ethical framework, "his moral compass", provides the grounding for a 200-level biology course taught at Cayuga Community College in the Finger Lakes of New York State. In the section of the "Conservation of Natural Resources" described here, students read, discuss, and integrate selections from Aldo Leopold's writings into their assignments to unravel and examine their connections to the Finger Lakes landscape. Through conversations with land owners, resource managers, and developers, and through visits to legacy ecosystems, wildlife refuges, CAFOs, water pollution control plants, and solid waste management facilities, students get first hand, practical experience in observing, discussing, and exploring regional issues relating to watershed management, land trusts, cooperative resource management, and ecosystem management. In an era when many of us "old salts" wonder if another generation will come forward to embrace Leopold's land ethic, enrollment in this course is almost always over-booked, and students thrive on the readings, assignments, field work, experiential learning and community service opportunities available in this course. Leopold is alive and well in this course, and his enduring wisdom is helping Cayuga students foster a more intense relationship with New York's Finger Lakes landscape.

Mon-PM2-B-1

Raiding Patterns of Slavemaking Ants and Impacts on Exploited Host Colonies

Jennifer L. Apple (SUNY Geneseo, Geneseo, NY; applej@geneseo.edu), Sarah Dzara (SUNY Geneseo, Geneseo, NY; sad7@geneseo.edu), Daniel Kane (SUNY Geneseo, Geneseo, NY; ddk3@geneseo.edu), Jeffrey Levine (SUNY Geneseo, Geneseo, NY; jll15@geneseo.edu), and Sara Lewandowski (SUNY Geneseo, Geneseo, NY; sara.lewandowski@umassmed.edu)

Slavemaking ants raid colonies of other ant species to obtain larvae and pupae which will become the labor force in their own nests. The enslaved host workers help care for the slavemaker brood and forage for food, while the slavemaker workers generally remain at the nest except during raids. The 8-ha Roemer Arboretum on the SUNY Geneseo campus hosts two species of slavemaking ants, *Formica subintegra* and *F. pergandei*, which both parasitize the locally abundant mound-nesting ant species, *F. glacialis*. For three years, we have been mapping colonies and collecting field observations to describe the spatial and temporal dynamics of the interactions between these slavemakers and their hosts. Over 600 *F. glacialis* nests have been mapped at the site, although not all mapped nests are active. These *F. glacialis* colonies face exploitation by ten colonies of *F. subintegra* and four colonies of *F. pergandei*. To describe intraspecific variation in raiding behavior, raiding patterns of individual slavemaker colonies were examined over the three-year period in the context of the local spatial distribution of hosts and slavemaker colony relocations. In addition, we assessed the fate of raided colonies and compared year-to-year persistence of raided vs. unraided nests. Field observations are complemented by molecular data revealing polymorphic colony structure of hosts (monogynous vs. polygynous nests) and patterns of genetic differentiation among colonies. These data contribute to our understanding of the dynamics of this host-parasite interaction and its impacts on the most abundant ant species in this local community.

Wed-PM1-A-1

Restoring Seasonally Inundated Freshwater Wetlands and their Biota: Challenges and Opportunities

James Arrigoni (State University of New York College of Environmental Science and Forestry, Syracuse, NY; jearrigo@syr.edu), **James P. Gibbs** (State University of New York College of Environmental Science and Forestry, Syracuse, NY), **James Curatolo** (Upper Susquehanna Coalition), **Kimberly L. Schulz** (State University of New York College of Environmental Science and Forestry, Syracuse, NY), and **Tess E. Youker** (State University of New York College of Environmental Science and Forestry, Syracuse, NY)

Seasonally inundated freshwater wetlands of northeastern North America, commonly called vernal pools, are increasingly recognized as unique habitats that support several poorly known and imperiled species. Construction of vernal pools has been proposed to compensate for historic and contemporary losses, but the extent to which constructed pools can reliably achieve the habitat values of naturally occurring pools remains inconclusive and controversial. Using an array of 71 pools constructed in 2010 by the Upper Susquehanna Coalition at the SUNY-ESF Heiberg Research Forest in central New York, we are comparing amphibian production and aquatic macroinvertebrate taxa richness with that of nearby existing vernal pools. We are assessing specific construction methods at the pool-level (e.g., basin dimensions, organic matter amendments) and the landscape-level (e.g., pool cluster density, distance from nearest wetland). Preliminary results are encouraging: flagship pool-breeding amphibian species including *Lithobates sylvaticus* (Wood Frog) and *Ambystoma maculatum* (Spotted Salamander) colonized 62% and 48%, respectively, of new pools in the year following construction. However, *Lithobates clamitans* (Green Frog), which has the potential to suppress Wood Frog recruitment by predation on embryos, colonized 30% of pools, and Wood Frog tadpole die-offs associated with the pathogen *Ranavirus* were observed in 4% of pools. Results from 2011 and the upcoming field season will be applied to the development of pool- and landscape-level design recommendations for restoration practitioners. Constructed vernal pools would reverse the extensive historic losses if it can be shown that they replicate natural habitat values. In addition, conservationists seeking to reverse declines to species that depend on or benefit from vernal pools will have an additional means by which to actively improve critical habitats.

Wed-AM2-C-4

Restoration of Abandoned Agriculture Fields into Native Meadows in Southern Ontario

Jennifer Balsdon (University of Waterloo, Waterloo, ON, Canada; jh4lau@uwaterloo.ca) and **Stephen Murphy** (University of Waterloo, Waterloo, ON, Canada; sd2murph@uwaterloo.ca)

Restoration ecology has largely remained a compilation of techniques and bodies of knowledge derived out of case-by-case studies. Resilience, the ability of a system to absorb disturbance yet retain the same function, structure, identity, and feedbacks, as a conceptual framework for restoration ecology offers guidance for building a structured approach to ecosystem recovery and providing transferable knowledge between research projects. Biodiversity of native plant species can be one foundation of resilience. Land management decisions have caused overall declines in diversity of native plant species, especially meadows that have been eliminated by farming and urbanization. Where restoration has occurred, forests and wetlands tend to be the focus. The lack of meadows and their species and functions may reduce resilience even where some other habitat restoration occurred. Locally, we hypothesized that increasing the diversity of plant species would increase the diversity of responses to stressors and functional diversity. Long-term, this will help address whether meadow restoration does have a positive effect on resilience. In 2010, seeds and plant plugs were planted for five plant species: *Danthonia spicata* (Poverty Oatgrass), *Elymus trachycaulus* ssp. *trachycaulus* (Slender Wheatgrass), *Monarda fistulosa* (Wild Bergamot), *Penstemon hirsutus* (Hairy Beardtongue), and *Sporobolus cryptandrus* (Sand Dropseed). After 2 years of experiments, the plant plugs of all five species survived at all sites, except the plant plugs of *D. spicata*, *E. trachycaulus* ssp. *trachycaulus* and *M. fistulosa* survived significantly less in the wet agriculture field. Planted seeds survived at all three sites for both flower species, except *M. fistulosa* did not do well in the wet agriculture field. Planted seeds did not survive for *E. trachycaulus* ssp. *trachycaulus* or *Sporobolus cryptandrus* at all sites, but survived for *D. spicata* at the dry agriculture field. Corresponding growth responses followed similar trends to survival.

Wed-PM1-C-4

Lessons of History: Historic Collections of the Bristol County Agricultural High School

Brian Bastarache (Bristol County Agricultural School, Dighton, MA; bbastarache@bcahs.com) and Aaron Caswell (Bristol County Agricultural School, Dighton, MA)

The Bristol County Agricultural High School was created one hundred years ago. In 1992, it developed the Natural Resource Management (NRM) Division to provide new vocation course of study. In 1995, the NRM Division created the Bristol County Natural History Museum using the historic collection of renowned ornithologist Arthur Cleveland Bent. Since its inception, students have been involved in all aspects of museum operations including the management and care of its collections. In 2000, the museum accepted the donation of the Walter B. Savary egg collection. This collection of approximately 1000 specimens was found and acquired through the independent efforts of NRM students.

Tue-AM2-A-3

Combining Natural History and TEK to Enhance Knowledge of Muskrat Root, a Culturally Important Plant

Michelle Baumflek (Cornell University, Ithaca NY; mbaumflek@gmail.com) and Rocky Bear (Tobique First Nation, Tobique New Brunswick; rockybear@hotmail.com)

Acorus species (Muskrat Root, Sweetflag) are obligate wetland emergents that are widely distributed across North America. They are also medicinal plants whose rhizomes are highly prized by Native American and First Nations gatherers throughout their range. Indigenous Maliseet and Mi'kmaq communities in northern Maine and New Brunswick have recently become aware that their landscape contains two distinct species of Muskrat Root (*Acorus americanus* and *Acorus calamus*). Although they appear almost identical, one species (*A. calamus*) contains a pro-carcinogenic compound, while the other does not (*A. americanus*). By combining indigenous traditional ecological knowledge (TEK) and natural history, our research aims to identify locations where *A. americanus* can be safely harvested. Data collected from 2009-2012 includes: interviews with Maliseet and Mi'kmaq plant gatherers that detail TEK about *Acorus* habitat associations, harvesting techniques, and ecological cycles; vegetation transects and soil and water sampling; and analysis of over 300 *Acorus* herbarium specimens. Our research has developed a better understanding of the factors that affect the two species' distribution, identifying distinct habitat preferences between the two species. This information is immediately useful to plant gatherers as they make decisions about where to best harvest Muskrat Root. We conclude that in the case of culturally important plant species, TEK and natural history are not only useful complements, but can also be one and the same.

Mon-PM1-A-5

Population Structure, Morphology, and Landscape Associations in the Wolf-Coyote Hybrid Zone around Algonquin Park

John F. Benson (Trent University, Peterborough, ON, Canada; benson.johnf@gmail.com) and Brent R. Patterson (Ontario Ministry of Natural Resources, Peterborough, ON, Canada; brent.patterson@ontario.ca)

Hybridization between *Canis lycaon* (Eastern Wolves) and both *C. latrans* (Coyotes) and *C. lupus* (Gray Wolves) has been extensive in Ontario, and a genetically distinct population of Eastern Wolves was recently identified in Algonquin Provincial Park (APP). Previous work indicates Algonquin-type Eastern Wolves differ genetically from *Canis* spp. populations across Ontario, as animals in other regions of the province are mainly Gray Wolves, Coyotes, or admixed individuals. Given that Eastern Wolves are listed as a "species of special concern" in Canada and Ontario and that hybridization has been extensive in most populations outside of APP, it is important to determine the extent of the APP population and whether breeding Algonquin-type Eastern Wolves exist in areas outside the Park. However, detailed genetic information is lacking for canids in areas adjacent to Algonquin. Therefore, we studied Wolves, Coyotes, and hybrids in and around APP to: 1) characterize population structure of resident pack animals, 2) compare morphology of individuals of different genetic types, 3) identify clines or other genetic patterns surrounding APP, and 4) investigate associations between environmental conditions (fragmentation and prey base) and genotypes of resident canids. Our data support the hypothesis of 3 distinct genetic groups in the Algonquin area: northeastern Ontario wolves (NEON, Gray-Eastern Wolf hybrids), Algonquin-type Eastern wolves, and Coyotes. Morphological data support our genetic inferences as weight and length differed significantly among the genetic clusters in a predictable pattern, with Algonquin-type Eastern Wolves being intermediate in size between Coyotes and NEON Wolves. We identified a steep genetic cline extending west from APP as genotypes of resident animals graded sharply from predominantly Wolves in the Park to predominantly Coyotes and hybrids to the west. Importantly, we also found that clines were considerably more gradual south and northwest of APP where breeding Algonquin-type Eastern wolves exist among a diversity of Coyotes, Wolves, and admixed individuals. Finally, we found that Coyote ancestry was positively associated with road density and negatively associated with *Alces alces* (Moose) density across the study area. Our results clarify understanding of the hybrid zone around APP and should improve Eastern Wolf conservation efforts in Ontario.

Tue-AM1-B-3

The Influence of Multiflora Rose (*Rosa multiflora*) and Bush Honeysuckle (*Lonicera maackii*) on the Breeding Success of Shrub-nesting Birds

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It is tempting to assume that what is not native to a particular natural area will also be detrimental. For example, it has often been suggested that bird nests established in or near exotic shrubs are exposed to a significant and negative exotic shrub effect. However, studies to date have failed to find a clear link between decreased daily survival rates (DSRs) and characteristics intrinsic to exotic invasive shrubs. To determine if exotic invasive shrubs are the cause of decreased DSRs, it is necessary to 1) define the factors that are known to affect DSR and that are a product of nesting substrate, 2) describe the growth form and distribution patterns of exotic shrubs that may differ from those of native nesting substrates, and 3) differentiate factors affecting patterns of DSR that are intrinsic and extrinsic to the exotic shrubs. Three factors particularly affected by choice of nesting substrate that are also known to affect rates of nest predation for forest-nesting birds are nest height, nest concealment, and distance of the nest from the forest edge. To test the hypothesis that nests in exotic substrates experience lower DSRs than nests in native substrates, I first determined how height, concealment, and distance from edge differed between nests located in exotic and native substrates. Using an information theoretic approach, I then contrasted nest height, nest concealment, and nest distance from edge against parameters intrinsic to exotic shrubs in order to determine if any patterns in daily survival were exclusively attributable to exotic shrubs. I failed to detect a negative influence on DSR attributable to use of *L. maackii* or *R. multiflora*. Further, I found that the amount of exotic shrub cover surrounding a nest site and the use of an exotic shrub as nesting substrate were both associated with improved DSRs. These results suggest that some patterns in DSR that have previously been identified as signs of negative effects of exotic shrubs may in fact have been more related to fundamental factors associated with all nesting substrates (height, concealment, edge distance) and not to exotic shrub effects.

Wed-AM2-B-3

Phenotypic Variation and Local Site Adaptation in Native and Introduced Ranges: Responses of Two Woody Ornamentals

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Phenotypic plasticity may be an important contributor to the success of many invasive plant species. Shifts in genotype induced by the recipient environment can lead to a range of phenotypic expression not seen in the native range. Selection for these novel genotypes can lead to local adaptation in the introduced environment. To investigate plasticity and local adaptation in an invaded region, we established three reciprocal transplant gardens using clonal replicates from two common invasive species in New England, *Berberis thunbergii* (Japanese Barberry) and *Celastrus orbiculatus* (Oriental Bittersweet). The four source regions for woody cuttings included Japan (native range), Connecticut (near initial introduction point), Vermont (northern invasion front), and North Carolina (southern invasion front). For *B. thunbergii*, we included horticultural varieties as another “population”. The three garden locations, northern Vermont, Connecticut, and central Japan, are proxies for a variety of climatic variables that contrast in precipitation and winter and summer temperatures. *Celastrus orbiculatus* genotypes overall responded similarly to the different environments, suggesting a lack of local adaptation. However, the North Carolina genotypes were able to outperform all other genotypes in all gardens regardless of environment, reflecting broad genotypic adaptation. *Berberis thunbergii* genotypes displayed evidence of general-purpose genotypes in northeastern North America, with all wild genotypes responding with relative similarity to the different environments. However, the horticultural varieties outperformed other genotypes in colder climates with less summer rainfall (climatic factors previously determined to be beneficial to *B. thunbergii* establishment). This finding may reflect the selective breeding for locally robust and general purpose cultivars. One of the consequences of developing many broadly adapted Barberry cultivars is that wild lineages may show limited local adaptation, in contrast to Bittersweet genotypes. Evidence suggests that invasive spread of *B. thunbergii* has been facilitated by phenotypic plasticity rather than adaptation to the local environments. Despite similar native ranges and invasion histories, *B. thunbergii* and *C. orbiculatus* respond uniquely to their novel, invasive environments suggesting that different factors have influenced genotype selection and expression. Evidence of plasticity has important implications for continued introduction and spread, in addition to potential responses to climate change.

Mon-AM1-A-3

Importance of Soil Calcium in the Distribution and Diet of Eastern Redbacked Salamanders: Contrasting Results from Across the Northern Forest Region

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Many amphibian species are sensitive to changes in pH, and their distribution may be limited by acidification and loss of calcium (Ca) from upper soil horizons. Low soil pH has been shown to disrupt sodium balance, reduce growth rates, and limit the availability of suitable microhabitats of *Plethodon cinereus* (Eastern Redbacked Salamander). As a keystone species in northern hardwood forests, *P. cinereus* strongly shape forest floor food webs and metabolism of key nutrients including Ca. Recent research in the upland hardwood forests of the Adirondack Mountains, NY found a strong positive relationship between *P. cinereus* abundance and soil Ca. Diet analysis of salamanders at those sites found that *P. cinereus* consumed significantly more Ca-rich prey than other salamander species. To evaluate whether these relationships existed across the broader Northern Forest region, in 2011 we replicated the Adirondack study at upland forest sites across Vermont and New Hampshire. Salamanders, their stomach contents, and forest-floor invertebrates were sampled at 17 sites representing a gradient in soil Ca. We found that *P. cinereus* were by far the most abundant salamanders, but their abundance was unrelated to soil Ca, unlike in the Adirondacks. Interspecific competition with *Desmognathus fuscus* (Northern Dusky Salamander) that was observed at the Adirondack sites, but was absent from the Vermont and New Hampshire sites, may explain these different results. Diet samples of 157 *P. cinereus* along this Ca gradient in VT and NH are being analyzed to determine relationships with soil chemistry. In light of recent studies indicating that *P. cinereus* may be able to acclimate to low-pH forest soils, we will conduct more in-depth sampling of microhabitat and population characteristics at our sites in 2012. This study is part of a broader investigation of the roles of Ca and acidic deposition in shaping community structure and biodiversity in northern hardwood forest ecosystems.

Wed-AM1-B-3

Herpetofauna of New York: 11,000 B.P. to 1842 A.D.

Alvin R. Breisch (Altamont, NY; arbreich@yahoo.com)

The amphibian and reptile species found in the New York State today are the result of a series of invasions that followed the retreat of the Laurentide Ice Sheet beginning about 11,000 years ago. By 5800 B.P., the modern assemblage of herpetofauna had essentially become established. Although Native Americans utilized some of these species in a variety of ways, little of this use is documented in early literature or archaeological digs. The earliest written reports of amphibians and reptiles in what is now New York came from the Dutch settlers shortly after Henry Hudson sailed up the river bearing his name. The Dutch interest in the species they found in the New World centered on whether they provided a source of food or whether they could cause harm. In 1829, James Macauley published "The Natural, Statistical, and Civil History of the State of New York". Volume 1 included a section on the flora and fauna of the state and contained the first list of the plants and animals found in New York. Macauley's list contained 14 species of "Reptilia", which include turtles, lizards, salamanders, and frogs, and "Serpentes", which included 13 species of snakes. It is impossible to determine exactly which species he was referring to in all cases. Often the names he used in the text were different from the names presented on the lists. In 1842, James DeKay, as head of the Zoology Section of the New York Geological and Natural History Survey, produced the 3 volume "Zoology of New-York". These volumes were the first scientific treatment of the state's vertebrate life and set the standard for that time by which other state faunas were measured. DeKay reported 28 species of amphibians and 30 species of reptiles as occurring in New York. These 58 species can be matched to 23 species of amphibians and 29 species of reptiles we recognize today. DeKay also accurately predicted several other species that he thought would be found in New York since they were known at that time from surrounding states.

The Blaschka Marine Invertebrates: History and Recent Restoration

Elizabeth R. Brill (Blaschka Marine Invertebrate Preservation Specialist, Corning, NY; elizabeth.brill@mac.com)

Leopold Blaschka, born in 1822 in northern Bohemia, was the son and grandson of glassworkers. At the age of 31, he set forth on a voyage that led to the creation of thousands of the most intriguing glass objects the world might ever see. The world of the twenty-first century, however, sees few of them, as many have been forgotten and neglected. Hidden in basements and storage closets around the world, many of these objects have been collecting dust for decades. For twenty-five years, Leopold and his son, Rudolph, made models of marine invertebrates which were marketed around the world. The three collections of these models at Cornell University, The Museum of Comparative Zoology at Harvard University, and the Boston Museum of Science comprise approximately 1300 specimens. Because the models have come to be admired not only for their zoological accuracy, but also as works of art, the Blaschkas' original audience of students and scientists has expanded to include artists and the public at large. The models are studied by scientists for comparison with living animals, by artists for inspiration in creative expression, and by museum-goers from all walks of life for an introduction to a world of marine life they might otherwise never encounter. Having been in temporary storage for many years, all of the models are in need of cleaning, some are in need of repair. Since a careful examination of each object and documentation of its condition is required, opportunities arise to study the flameworking techniques employed by the Blaschkas, and to analyze the materials they used. Preparation of the models for exhibition and storage, permanent and temporary, involves adopting the same rigorous practices and standards in place at art museums worldwide. These include delicate cleaning techniques, carefully monitored climate and light control, appropriate case design, cautious preparation for travel, etc. The author describes her involvement with these projects from the curatorial point of view, from that of marine biology, and from her experience as a flameworker.

Tue-AM2-A-1

Diversity of Waterfowl and Water Dependent Birds on Onondaga Lake: An Analysis of National Audubon Society Christmas Count Data 1991–2010

Bernard P. Carr (Terrestrial Environmental Specialists, Inc. Phoenix, NY; berncarr@tesenvironmental.com)

The National Audubon Society (NAS) Christmas Count has become a method for researchers to detect trends in wintering bird populations. Onondaga Lake was designated as an Important Bird Area (IBA) by NAS primarily due to wintering waterfowl and gull numbers. Trends in avian diversity correspond to local weather conditions and ice conditions on water bodies to the north such as Oneida Lake. Improvements in lake water quality and proposed aquatic bed enhancements could increase waterfowl use. This talk will include personal observations from over 20 years of participation in this Christmas count.

Tue-PM1-A-5

The Botanical Exploration of New Brunswick by James Fowler (1829–1923)

Stephen R. Clayden (New Brunswick Museum, Saint John, NB, Canada; stephen.clayden@nbm-mnb.ca)

James Fowler was a native of New Brunswick (Canada), a Presbyterian minister, and a self-taught naturalist who became the leading 19th-century authority on the flora of the province. In 1879, he published the first catalogue of New Brunswick's vascular plants, bryophytes, and selected lichens. A year later, on the recommendation of Asa Gray, he was appointed lecturer in natural sciences at Queen's University in Kingston, ON. He became Queen's first professor of botany in 1894, retiring in 1907 at age 78. Fowler was a tireless collector. Through exchanges and donations, his material made its way to several northeastern North American and other herbaria, in addition to those at Queen's and at the New Brunswick Museum. With the increasing availability of collections databases, it is now possible to reconstruct his field itinerary in some detail. New Brunswick was the first and main focus of his botanical work. He collected in the province every year from 1860 to 1879, and on return visits in 1890, 1892, 1894, 1897, and 1900. Most of his early collections are from the coastal lowland region of eastern New Brunswick. He later explored parts of the Saint John River valley, coastal areas along the Baie des Chaleurs, and near Saint John and St. Andrews. His careful work provided a foundation for all subsequent floristic studies in the province, and for modern efforts to conserve the flora.

Mon-PM2-B-1

Effects of Dam Removal on Anadromous Fishes, Resident Fishes, and Physical Habitat in a Coastal Maine Stream

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Sedgeunkedunk Stream, a tributary of the lower Penobscot River, typifies coastal streams impacted by small dams. Runs of anadromous fishes declined or disappeared after the building of multiple dams within the watershed. These declines mirror those in the entire Penobscot watershed, which contains over 100 dams. As part of a collaborative project, fish passage has been restored in Sedgeunkedunk Stream at the location of two dam sites 0.7 km and 6 km upstream of the Penobscot confluence. The lowermost dam (Mill Dam) was removed in 2009, and the next upstream dam (Meadow Dam) was bypassed in 2008 by a rock-ramp fishway. We have been monitoring the distribution and abundance of resident and anadromous fishes along a longitudinal gradient in the watershed since 2007. The presence and eventual removal of Mill Dam caused striking changes in fish assemblages not seen in a neighboring reference system or in an isolated headwaters site. Prior to dam removal, diversity and abundance of resident fishes were greatest immediately downstream of Mill Dam and lowest immediately upstream. A small spawning population of anadromous *Petromyzon marinus* (Sea Lamprey) and occasional individuals of *Salmo salar* (Atlantic Salmon) and *Alosa pseudoharengus* (Alewife) occurred downstream of the dam. Within two years after dam removal, diversity and abundance of resident fishes increased markedly several km upstream of the former dam. Adult Sea Lamprey expanded their range upstream by 5 km and quadrupled in abundance, and both Atlantic Salmon and Alewife spawned successfully in the upper stream reaches. Spawning activity of Sea Lamprey altered the stream-bed topography by creating complex depth and velocity profiles, increasing substrate heterogeneity, removing fine sediment, decreasing particle embeddedness, and increasing interstitial spaces, all of which presumably improve spawning and nursery habitat for Atlantic Salmon. Sedgeunkedunk Stream serves as a model of what might be observed at a much larger scale when large dams are removed next year on the mainstem Penobscot. We view the Penobscot River structurally and functionally as a network of hundreds of Sedgeunkedunk-sized tributaries, and as mainstem dam removal proceeds, effects on fish assemblages and connectivity should be detectable in these small watersheds first.

Mon-AM2-B-4

Effects of Large Woody Debris Addition on Brook Trout and In-Stream Habitat in Western Maine

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We tested effects of large woody debris (LWD) addition on habitat and wild *Salvelinus fontinalis* (Brook Trout) populations in twelve 1st–2nd order streams in the Mahoosuc Range of western Maine. In 2007 and 2008, we treated ≈ 2 km stretches of six streams at a rate of 40 LWD pieces per 200 m; six streams served as reference sites. Brook Trout sampling occurred twice yearly, and habitat surveys occurred yearly. We sampled all streams 1–3 times prior to, and 5–8 times subsequent to, LWD addition. Natural abundance of LWD was low (mean \pm 2 S.E.: 1.1 ± 0.6 pieces per 200m). Two years after LWD addition, treatment sites contained twice the abundance of LWD as reference sites (19 ± 3.6 pieces vs. 8.5 ± 2.8), but abundance of pools did not differ (12 ± 1.5 vs. 13 ± 1.7 pools per 200 m). Brook Trout density (range: 0.02 ± 0.001 to 0.47 ± 0.15 fish m^{-2}) and biomass (range: 0.3 ± 0.15 to 6.1 ± 2.9 g m^{-2}) was highly variable over time and among sites, and effects of LWD were not clear. In 5 of 6 treated sites, Brook Trout abundance and density declined sharply after treatment but recovered above pre-treatment levels 3 years subsequent, but metrics in most reference streams also increased. By the 4th year post-treatment, there were few differences between treated and reference sites. Other studies suggest that in small, high-gradient streams, LWD is not a major pool-forming agent, and thus addition of LWD might not improve habitat for Brook Trout. A longer time series is necessary to evaluate the efficacy of LWD addition, but these results suggest little impact on Brook Trout in headwaters streams in Western Maine.

Tue-PM1-C-2

Impacts of Spawning Sea Lamprey on Foraging Behaviors and Growth Potential of Stream Fishes

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Historically, many Maine streams supported spawning runs of sea-run fishes that contributed marine-derived nutrients and energy to otherwise oligotrophic systems, but declined or disappeared after dam-building. Sedgeunkedunk Stream, a tributary to the Penobscot River, experienced a dam removal in 2009, and in 2010 *Petromyzon marinus* (Sea Lamprey) had recolonized formerly inaccessible habitat for the first time in 200 years. Sea Lamprey construct nests by rearranging cobbles into pit-and-mound structures similar to salmon redds. In the process, they dislodge invertebrates from the substrate, and these invertebrates and newly-spawned eggs entrained in the drift may provide an important food source for stream fishes. I combined videography, drift sampling, and diet analysis to quantify the foraging behavior of minnows (Cyprinidae) during the Sea Lamprey spawning run in Sedgeunkedunk Stream. Minnows occupied primarily high-velocity microhabitats (mean \pm 2 SE: 28 ± 1.2 cm/s) within an active nest, with local densities as high as 25 individuals per 0.001 m^2 . Minnows responded quickly to the sediment plume produced by spawning Sea Lamprey, by moving upstream and shifting from benthic to drift foraging within 0.5 seconds. Minnow guts contained large quantities of sediment and very few prey (3.5 ± 0.5 items), most of which were caddisfly larvae; few Sea Lamprey eggs were consumed. Drift samples collected downstream of active nests contained up to 10x the invertebrate density of reference samples, and high densities of Sea Lamprey eggs ($>14/ \text{m}^3$) occurred, but infrequently. High velocities and turbidity from the sediment plume probably result in low prey capture success, but that may be offset by sheer quantity of available prey. By coupling empirical estimates of fish consumption and food availability with bioenergetics models that predict growth as a function of net energy gains associated with specific habitat—in this case, active Sea Lamprey nests—I can quantify the energetic subsidies that Sea Lamprey provide directly to minnows via bioturbation. These results are forthcoming, and should clarify the interactive ecology of anadromous and resident fishes and also help predict the effects of Sea Lamprey recovery on these fishes in newly accessible habitat gained by dam removal.

Wed-PM1-B-5

Quantifying the Structure of Fish Assemblages in the Penobscot River in Anticipation of Dam Removal

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The Penobscot River once provided thousands of kilometers of lotic habitat and tens of thousands of hectares of lentic habitat accessible to sea-run fishes. The construction of dams blocked migrations of these migratory fish and fragmented resident fish populations, changing the structure of fish assemblages throughout the river. The Penobscot River Restoration Project is an ambitious effort to restore connectivity among fragmented habitats and fish populations through the removal of the two lowermost mainstem dams and the improvement of fish passage at other dams, beginning in summer 2012. In 2010–2011, we conducted boat electrofishing surveys seasonally in the lower ≈ 70 kilometers to quantify baseline conditions prior to dam removal. We employed two different sampling designs: fixed sampling conducted along 11 pre-established transects (1000 m in length), and stratified-random sampling conducted along multiple randomly selected transects (500 m) per stratum, within each of nine strata. Sampling effort for each design was sufficient to adequately assess fish assemblages, and both designs provided similar results, except that the stratified-random approach required less effort to encounter $>80\%$ of the asymptotic diversity. Fish assemblage structure differed by strata, especially with increasing distance upstream, and a faunal break was associated with the lowermost mainstem dam (Veazie Dam). Many diadromous fishes were restricted to tidal waters below Veazie Dam, although *Salmo salar* (Atlantic Salmon), *Petromyzon marinus* (Sea Lamprey), and *Anguilla rostrata* (American Eel) were captured or observed upstream. Species richness was relatively high below Veazie Dam, was consistently low in the stratum above the dam, and increased but did not recover fully upstream. *Micropertus dolomieu* (Smallmouth Bass), *Esox niger* (Chain Pickerel), and *Catostomus commersoni* (White Sucker) were well-distributed throughout the river, and the native minnows *Semotilus corporalis* (Fallfish), *Luxilus cornutus* (Common Shiner), and *Notemigonus crysoleucas* (Golden Shiner) were most abundant in the uppermost strata. Fish abundance ranged from 200–1500 individuals/km, and in most strata, exotic Smallmouth Bass dominated the catch. Multivariate ordination showed a distinct gradient in assemblage structure from upstream to downstream. We expect that our sampling scheme will be sufficient to detect changes in fish assemblage structure following dam removal.

Wed-PM1-B-3

Optimal Stream Survey Design for Detection of Fish Population Trends: Insights Gained from Long-term Monitoring

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Use of surveys to detect trends in population abundance over time can be very difficult due to high natural variability. Trout populations are no exception, with reported coefficients of variation (CV) ranging from 15–108%. Given the finite amount of resources available to managers, knowledge of how survey design affects the ability of monitoring to detect population trends would be highly beneficial. To assess these effects, we applied varying spatial and temporal survey designs to a *Salvelinus fontinalis* (Brook Trout) population dataset that contained 19 years of fine-scale survey data, and had a positive linear trend over that interval. Spatial designs revealed that annual sampling of four 50-m sections (10% of available habitat) that were initially randomly selected but remained fixed over the monitoring period resulted in CV (51.4%) and statistical power (0.88) values comparable to those obtained from sampling the entire stream (46.7%, 0.99). Temporally, sampling the entire stream at a fixed annual frequency ranging from 2 to 5 years resulted in significant trend detection in only 29% (4/14) of all monitoring possibilities. The low detection rate was caused by high abundance variability, evidenced by the fact that annual monitoring required a minimum of 17 years before reaching adequate power (0.81).

Tue-PM1-C-4

Brook Trout Reproductive Strategies: Implications for Population Persistence in the Context of Habitat Fragmentation and Climate Change

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The outcome of individual decisions on when and with whom to reproduce determines reproductive variance, and age-class contribution to population growth rate. Both of these attributes determine a population's effective size (N_e), which is directly correlated with its fitness and probability of persistence under environmental change. By developing and applying conservation genetics techniques, we assessed reproductive strategies and the resultant effects on N_e for two wild *Salvelinus fontinalis* (Brook Trout) populations. Using microsatellite DNA analysis and pedigree reconstruction, we found that mating pairs were significantly size-assortative, with individual length accounting for 37% of the variation. This pattern resulted in a reproductive strategy closer to monogamy than polygamy. Of all reproducing adults ($n = 157$), 80% ($n = 126$) produced only one full-sibling family, and only 6% ($n = 9$) contributed to more than two full-sibling families. Age-at-maturity ranged from 0 to 2 years, with the proportion of age-0 and age-1 individuals maturing in a given year dependent upon growth opportunities determined primarily by environmental conditions. The above patterns resulted in an overall effective population size to census population size ratio (N_e/N_c) of 0.49, a value almost four times greater than the average reported across 165 different species. These findings are discussed in the context of population persistence given the trend of increasing habitat fragmentation and looming climate change.

Wed-PM1-B-2

“Jay on Jay”: The Conchological Contributions of John C. Jay

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John Clarkson Jay was born in 1808 and grew up in Rye, NY, one of a long line of influential family members throughout US history including New York assemblyman Peter Augustus Jay and Supreme Court Chief Justice John Jay. Although a prominent banker and physician, Dr. Jay would make his impact on natural history in conchology. He was founder of the NY Lyceum of Natural History, Trustee of the American Museum of Natural History (AMNH), and member of the Boston Society of Natural History and Academy of Natural Sciences of Philadelphia (ANSP). Jay was an avid shell collector, accumulating over 50,000 specimens comprising 14,000 species (≈ 7000 by today's standards)—the second largest in the US—and a 1000-volume mollusk library—one of the largest worldwide and costing him over \$35,000. Through trade with eminent conchologists (Adams, Anthony, Baker, Cailliaud, Cuming, Gundlach, Lea, Linsley, Mighels, Prime, Sowerby, Wheatley), Jay acquired several type specimens (57 described species) and described 46 Recent mollusks from around the world, most relocated and documented. Jay self-published four editions and one supplement of his collection catalogue from 1835–1852. He was asked to publish a listing of specimens collected by Commodore Matthew C. Perry's US Naval Expedition to Japan in 1852–1854, which opened Japan to the West. The shell collection and library were purchased by Catherine L. Wolfe in 1873–1874 for \$10,000 and donated to the AMNH as a memorial to her father, John D. Wolfe, the museum's first president. The shell collection was catalogued by Sanderson Smith, a Staten Island collector, and exhibited in its entirety from 1874–1911. John C. Jay's legacy, and that of his family, is maintained by the Jay Heritage Center at Jay's boyhood home in Rye, NY; set on 23 acres of the original 400-acre Jay Family Estate, it is the oldest National Historic Landmark structure in New York.

Mon-PM2-B-1

“You Are What You Eat ... Plus a Few Permil” Diet-tissue Fractionation in the Double-crested Cormorant (*Phalacrocorax auritus*)

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Stable isotope analysis is a valuable and widely used method in the study of foraging ecology of colonial waterbirds. Stable isotope signatures in the tissues of fish-eating birds correspond to the signatures of the fish they consume. However, this is not a simple one-to-one relationship. Isotopically, “you are what you eat, plus a few permil.” The biochemical and physiological processes that occur when a bird consumes a fish, and then uses those nutrients to grow new body tissue, have the potential to alter isotope signatures. This difference between the isotope signature of a consumer and its diet is referred to as diet-tissue fractionation. There is no universal diet-tissue fractionation rate for all species, or even for all tissue types within a single species. Therefore, before we can use stable isotope analysis to determine diet, we must first know the diet-tissue fractionation factor for both the species and tissue of interest. This study is the first to identify diet-tissue fractionation factors in *Phalacrocorax auritus* (the Double-crested Cormorant), a species whose foraging ecology and diet are of great interest to a wide range of biologists and wildlife managers. After feeding wild-captured cormorants a diet of farm-raised catfish (*Ictalurus punctatus*) for six to eight weeks, we determined diet-tissue fractionation factors of carbon, nitrogen, and sulfur isotopes for six tissue types: feathers, red blood cells, plasma, liver, muscle, and fat. The results show that fractionation factors in this species vary among tissue types, and also differ from those observed in other closely related species like *Phalacrocorax carbo* (Great Cormorant). This result confirms the necessity of using only the correct species- and tissue-specific fractionation factors when conducting diet studies using stable isotope analysis. With this information, Double-crested Cormorant researchers can now use stable isotope signatures of these tissues to identify the diet and explore the foraging ecology of this highly charismatic and controversial species.

Wed-AM2-A-4

Restoration and Recovery of Plant Communities Following Invasive Plant Removal in the Adirondacks

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Three invasive plant species, Japanese Knotweed (*Fallopia japonica*), Common Reed Grass (*Phragmites australis*), and Pale Yellow Iris (*Iris pseudacorus*), pose significant challenges to plant community management in the Adirondacks even though most populations are small so far. Control efforts will be inadequate unless recolonization by invasive species can be minimized and native vegetation is restored. To evaluate management efficacy, we developed a strategy involving sampling 31 reference sites and 31 impacted sites along a progressive time series since initiation of control that reflect different site characteristics, management strategies, and time since treatment. Variables include the three target species, habitat (uninvaded, forested wetland, non-forested wetland, upland), management technique (herbicide, manual, or integrated), and duration. Species composition and percent cover are evaluated periodically using 0.25-m² quadrats, in stratified random arrays (3 to 10 per site) with managed and adjacent uninvaded compared using pairwise statistical tests. Sampling has been continuous since 2007, and permanent plots were added in 2011 as a second method (a rapid assessment technique) for comparison. By investigating both ecological effectiveness and efficiency, the study informs restoration and conservation planning to accompany invasive plant management in natural landscapes. Overall, management was effective in reducing cover of the target species. However, herbicide control was superior to manual treatments, which were relatively ineffective in comparison. Furthermore, post-treatment species composition in managed sites shows gradual convergence with nearby reference communities. While a full comparison will require more research, rapid sampling using permanent plots holds promise as a useful measure of treatment efficacy.

Tue-AM1-A-3

Methodology to Identify the Ordinary High Water Mark and Delineate Stream Channels

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The ordinary high water mark (OHWM) defines the lateral extent of non-wetland waters and assists in regulating “Waters of the United States” (WoUS) under Section 404 of the Clean Water Act (33 U.S.C. 1344). The OHWM is defined as “that line on the shore established by fluctuations of water and indicated by physical characteristics such as a clear, natural line impressed on the bank, shelving, changes in the character of the soil, destruction of terrestrial vegetation, or the presence of litter and debris” (33CFR Part 328.3). Over the past decade, we have done extensive field research, flow modeling, and GIS analyses to provide a scientifically defensible interpretation of this definition and develop a repeatable and reliable signature for the OHWM to delineate stream channels. To date, we have established methodology for identifying the OHWM in ephemeral and intermittent streams throughout the western United States. We have developed classification systems to identify the variety of channels in the western United States such as the braided, flashy washes in the arid regions and steep, snowmelt-driven channels in the mountain regions. We have examined how flow indicators can be used to assist in identifying the hydrogeomorphic floodplain units associated with the OHWM in these channel types and have analyzed and provided guidance on how gage data should be utilized in OHWM determinations. Currently, we are expanding the methodology and guidance for how to identify the OHWM and delineate stream channels into the Eastern Mountains. Through these efforts, we determined the OHWM in ephemeral and intermittent streams is best identified as the upper-most limit of active sediment transport processes. Common features associated with this boundary often include a break in slope, change in vegetation species and percent cover, and change in sediment size.

Tue-AM2-C-3

Earthworm Effects on Forest Understory Vegetation: Are Generalizations Possible?

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Introduced earthworms are now widespread across forests in North America and produce multiple ecosystem effects, including significant negative impacts on forest understory communities. Much of the evidence for earthworm effects comes from investigations either comparing invaded and uninvaded forests or following invasion fronts. While important, such work is rarely able to capture the full or isolated effect of earthworms on other biota since most forest systems in North America face multiple stressors including expanding ungulate herbivores (deer, pigs), other introduced plants and animals, nutrient enrichment, and changes in land-use histories. Using a mesocosm experiment we investigated the effect of the anecic introduced earthworm, *Lumbricus terrestris* on a suite of 14 native plant species in different functional groups. Earthworm presence did not affect plant survival, fertility, or biomass of any of the plant species tested. However, *L. terrestris* presence significantly decreased the number of culms of the sedges *Carex retroflexa* and *Carex radiata*. Our results contrast with reports indicating extensive and significant negative effects of introduced earthworms on many native forbs, and positive effects on sedges. We suggest that earthworm impacts are context-specific and that generalizations about their impacts are potentially misleading without considering and manipulating other associated factors.

Tue-PM1-B-2

Where Spiketail Dragonfly Nymphs Dwell: A Microhabitat Study (Odonata: Cordulegastridae)

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Cordulegaster (spiketail) dragonfly nymphs are shallow burrowers of lotic waters; thus, factors such as sediment size, organic matter, water depth, and current influence their presence and abundance. Previous work in Nelson Swamp (Cazenovia, Madison County, NY) demonstrated that *Cordulegaster diastatops* (Delta-spotted Spiketail) and *Cordulegaster maculata* (Twin-spotted Spiketail) use seeps and springs where the substrate was qualitatively determined to be “muck”, cobble (>4 cm diameter), or mixed; more nymphs of larger size occurred in the muck, while fewer, smaller individuals occurred in the cobble. Studies on other species, however, showed positive correlations between sediment particle size and the size of spiketails. In this study, we measured substrate and water variables of 46 sites within 20 seeps and springs in both the presence and absence of spiketails. Using 1000-cm³ quadrats, we measured the percent aquatic vegetation, pH, water depth, and sediment depth, as well as the number and sizes of spiketails. From each site, we collected 6 drams of sediment to analyze for percent organic matter, median particle size, percent silt, and percent cobble. Nymphs occurred more commonly in shallow water where sediment depth exceeded 133 mm and the sediment contained >21.5% percent silt (particles < 0.05 mm). We found no relationship between median particle size and the sizes of the spiketail nymphs; however, the substrate for the majority of the sites where nymphs were found was composed of silt and very fine sand (particles < 0.1 mm). Other studies finding a positive relationship between nymph size and sediment particle size may be due to the greater range of particles in those sites relative to the ones in Nelson Swamp. Nevertheless, larger nymphs tended to occur in sites with a larger percentage of organic matter and shallower sediment depths.

Wed-PM1-A-2

Value of Native and Invasive Fruit-Bearing Shrubs for Migrating Songbirds

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Invasive species can out-compete native plants and disrupt the natural ecosystem of an area. It is important to understand how an invasive plant affects an ecosystem, especially when considering implementing a management strategy for the species. Songbirds are organisms that may rely on these invasive species for food and shelter, particularly during autumn migrations when many species of songbirds consume large quantities of seasonal fruits during critical refueling periods. The objective of this study was to determine whether migrating songbirds prefer and/or benefit from the use of native or invasive fruit-bearing shrubs. We conducted nutritional analyses on the fruits of four native shrub species (*Cornus racemosa* [Gray Dogwood], *Cornus amomum* [Silky Dogwood], *Cornus sericea* [Red Osier Dogwood], and *Viburnum trilobum* [Highbush Cranberry]) and three invasive shrub species (*Rhamnus cathartica* [Common Buckthorn], *Rosa multiflora* [Multiflora Rose], and *Lonicera* spp. [bush honeysuckles]) collected at two bird-banding stations in Rochester, NY. We also conducted a fruit consumption experiment to compare fruit removal rates among four focal native and invasive fruiting shrub species throughout fall migration and monitored the density of flying insects supported by these same species during the spring migration period. The fruits of native dogwoods had higher fat and energy content than fruits of invasive species. Native dogwood fruits were consumed by migrating birds at higher rates than invasive species over the fall migration period. However, there was no clear pattern of insect density between native and invasive shrub species during the spring migration period. Our results suggest that fruits of native shrubs are of higher nutritional value to migrating songbirds than the fruits of invasive shrubs during fall migration which is supported by the preferential selection and use of the native fruits by birds.

Wed-AM1-A-1

Burrow Characteristics, Nest Success, and Productivity of Black Guillemots on Two Islands in Maine

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Knowledge of the *Cepphus grylle* (Black Guillemot) population, nesting habitat preference, nest success, and chick growth in North America is limited as the majority of studies on this species have been conducted in other northern countries such as Ireland and Greenland. Petit Manan Island and Eastern Brothers Island (Gulf of Maine, ME) differ in their Black Guillemot nesting habitat. Petit Manan offers predominately debris-like habitat (driftwood, buoys, etc.), while Eastern Brothers offers traditional rock-cliff habitat. We investigated the influence of burrow characteristics on nest success (number of eggs hatched) and chick growth (body mass/wing chord) on both islands. Burrow measurements were particle size of nest substrate, nest depth, nest cup diameter, light penetration, and neighbor distance. Average particle sizes for debris and rock burrows were 30.75 mm and 37.43 mm, respectively. Depth averaged 35.58 cm for debris and 39.02 cm for rock burrows. Debris burrows had greater light penetration than rock burrows, measuring 42.71 foot-candles and 28.93 foot-candles, respectively. Neighbors averaged 14 m from debris burrows and 6.31 m from rock burrows. Nest cup diameters were significantly larger in debris (13.25 cm) than in rock burrows (8.45 cm), which were typically tight crevices (Stepwise regression, $P = 0.0043$). No other characteristics were statistically significant different between debris or rock burrows. Nest success and chick growth was not affected by type of burrow on either islands ($P = 0.4314$, $P = 0.1293$, respectively). When compared to a study in the Gulf of St. Lawrence, it is noted that burrow characteristics did play a significant role in nest success and chick growth on those islands of study. It is interesting that the Black Guillemot nesting populations of Petit Manan and Eastern Brothers Island did not see similar affects.

Tue-PM1-A-4

Sparrow Nest Site Selection in a Gull Colony

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Great Duck Island, on the coast of Maine, has three species of sparrows, Savannah Sparrow (*Passerculus sandwichensis*), Song Sparrow (*Melospiza melodia*), and Nelson's Sharp Tailed Sparrow (*Ammodramus nelsoni*). They live in relatively high densities and in close proximity to a colony of nesting gulls. Presumably, gulls are predators of sparrows and thus would effect nesting patterns of the three species, causing them to nest farther away from the gull colony. I tested the ability of gulls to find sparrow nests and found the gulls were almost unable to find ground nests. By comparing the density of gull nests to the density of sparrow territories, I found that gulls did not influence nesting as much as had been thought. Rather, habitat and food availability may play a much greater role.

Tue-PM1-A-3

Local Distribution Factors and Optimum Sampling Design for the Frosted Elfin Butterfly, *Incisalia irus* (Godart)

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Incisalia irus Godart (Frosted Elfin) is a Lycaenid butterfly found in eastern North America and listed as endangered, threatened, or of special concern in most northeastern states. Like the related and endangered *Lycaeides melissa samuelis* Nobokov (Karner Blue Butterfly), *I. irus* larva are oligophagus Wild Blue Lupine (*Lupinus perennis*) feeders throughout most of their inland range, though coastal *I. irus* populations will also feed on *Baptisia* spp. (Wild Indigo). Loss of open sandy habitat has resulted in the decline of this plant species in the Northeast and limited the New York distribution of *I. irus* to pine barrens habitats of Long Island and the Hudson Valley. Observations of *I. irus* suggest the species persists wherever its host plant can be found, regardless of site size or isolation. However, unlike *L. melissa samuelis*, *I. irus* occupancy doesn't seem to depend on the density of its host plant. Instead, the best model suggests occupancy probability is most affected by shrub cover and patch size, signifying that these will be important factors to explore when considering habitat restoration and recovery plans for the species. Detection of *I. irus* depends primarily on observer and survey date. Results of this study suggest that the minimum sampling effort for pine barrens habitats should consist of observation of 20 sites over 6 surveys or 10 sites over 8 surveys.

Wed-PM1-A-3

Lake Sturgeon in the Oswego Basin, NY

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As part of an ongoing program to restore Lake Sturgeon (*Acipenser fulvescens*) in New York, hatchery-produced fingerling juveniles have been stocked into Oneida (8127) and Cayuga (3752) lakes, 1995–2004. Release of juveniles as a sturgeon restoration strategy assumes movement into available suitable habitat, thus into the lake-linked New York canal system. This part of the New York canal system consists largely of altered original rivers and in some areas a highly altered barge canal, with a portion of the habitat consisting of relatively homogenous depths and substrates maintained by regular dredging. We are modeling the physical parameters of the available sturgeon habitat. Migration of the released fish into the Seneca and Oswego Rivers (Cayuga/Seneca Canal, Erie Canal, Oswego River) is documented. Measurable local groups of Lake Sturgeon appear to be developing in the system. They are seasonally abundant upstream and downstream of barriers (lock/dam complexes) and in Cross Lake. The June 2010 average size in the Seneca River was 1.34 m and 15.03 kg ($n = 12$), and June 2011 average size was 1.33 m and 15.13 kg ($n = 12$). In Cross Lake, the October 2010 average size was 1.25 m and 9.23 kg ($n = 14$), and October 2011 average size was 1.22 m and 9.25 kg ($n = 12$). These fish are using the available habitat, and the sizes indicate good growth rates. The canal system offers a suite of human-impacted habitat conditions, including degraded water quality, that are unfortunately not so rare within the Lake Sturgeon's native range across the Great Lakes Basin.

Wed-PM1-B-4

Wetland Characteristics of Glacially Derived Boulder Fields in the Northeastern United States

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Boulder fields are unique landscapes that occur within the Northcentral and Northeast (NC-NE), Western Mountains, Valleys and Coast, and Alaska regions and can develop from glacial activity or periglacial processes. Recent research into boulder fields of the Northeast has provided interesting insights regarding the hydrology in these unique geologic features. These boulder fields were developed from glacial processes and are characterized by topographically concave surfaces, a thick folist layer covering the top of the boulders, FACU to UPL vegetation, mixed upland and hydric soils, and groundwater present through most of the growing season. These distinctive field conditions result in significant discussion regarding whether or not boulder fields are a unique type of wetland. We evaluated the potential for these boulder fields to be considered wetlands under section 404 of the Clean Water Act by monitoring the hydrology and soils in two boulder fields in Maine during the 2011 growing season. We recorded hydrology data from 19 water-table monitoring wells in a variety of micro-topographic positions. The following wetland indicators were tested: primary and secondary hydrology indicators from NC-NE Regional Supplement (RS), presence of ferrous iron using alpha, alaphadipyridyl (AAD) paper strips and AAD liquid, hydric soil indicators as described in the NC-NE RS, iris tube reduction, a separation between the folist layer and the soil surface, and the presence of hydrophytic vegetation determined using the dominance ratio and the prevalence index. We tested the proportions of vegetation, soil, and hydrology indicators in plots that met and failed to meet the groundwater hydrology criteria of water within the top 12 inches of the soil surface for 14 or more consecutive days. The data suggest that hydrology and soil indicators described in the NC-NE RS do not always co-occur in northeastern boulder fields. The well data showed that 12 of the 19 plots met the groundwater criteria and 7 plots failed to meet it. 85.7% of the upland plots had at least one hydrology or soil indicator present. Results suggest that boulder fields are wetlands that can be regulated under section 404 of the Clean Water Act. They should be delineated as FACU dominated wetland/nonwetland mosaics.

Tue-AM2-C-4

Lichenicolous Fungi of Atlantic Canada: A Survey-in-progress

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Fungi that occur in obligate associations with lichens are a diverse and ecologically interesting, yet under-collected and little-studied group in Atlantic Canada. About 35 species have been reported from the region. Through recent field work by ourselves and colleagues, screening of selected potential hosts among herbarium collections, and compilation of other unpublished records, the known diversity has grown to about 115 species—a more than threefold increase. The host lichens occur in a wide spectrum of habitats, from old forests to intertidal rocky shores. Some common lichen genera, including *Cladonia*, *Lecanora*, and *Parmelia*, are well-represented among the regional hosts. Lichens with mycobionts belonging to the subclass Ostropomycetidae (e.g., *Baeomyces*, *Loxospora*, *Pertusaria*, *Thelotrema*) are, likewise, relatively frequent hosts. Saxicolous lichens have been less thoroughly screened for lichenicolous species than those occurring on bark, wood, or soil. Most of the approximately 50 genera of lichenicolous fungi now known in the region are represented by a single or a few species. Notable exceptions include *Dactylospora* and *Skyttea*, with 11 and nine species, respectively. Only two species had been reported previously for each of these genera, and the reports of *Dactylospora* were based only on 19th-century collections. Much work (and opportunity) remains to thoroughly survey the diversity, host ranges, and distributions of lichenicolous fungi in this region.

Mon-PM2-C-2

Using Foraging Site Surveys as an Indicator of Local Movement of Great Egrets in the NY/ NJ Harbor

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The reappearance of nesting colonies of long-legged wading birds, including herons, egrets, and ibises (waders) on islands in the NY/NJ Harbor has been hailed as a sign of improved environmental quality and biodiversity in the Harbor Bight region. We investigated use of wetlands as foraging habitat by long-legged wading birds within the urban/suburban matrix of this metropolitan region to (1) identify preferred foraging sites within the NY/NJ area, (2) track seasonal species abundance, and (3) examine post-breeding movements. Field work was conducted by NJ and NYC Audubon citizen scientists, appropriately trained in survey methodology. More than 7000 observations of waders were made from 2009 through 2011; *Ardea alba* (Great Egret) and *Egretta thula* (Snowy Egret) were the most commonly observed wader species. In New Jersey, the Meadowlands region had the highest average number of egrets. South Brother Island is the nearest known breeding colony to those sites, located 10 km to the east. In New York, highest numbers of both species were recorded in Jamaica Bay, which is also where the Canarsie Pol colony is located. Numbers of egrets peaked at preferred sites during the second half of August, and then decreased by the end of September. This pattern is most likely the result of the influx of the juvenile birds and movement of the adults away from the island colonies. The numbers of egrets recorded at all foraging sites approximated the number of adults and projected number of hatching-year birds at the NY/NJ colonies and suggest that dispersing birds from the NY/NJ Harbor islands use hyper-local wetlands post-breeding.

Wed-AM2-A-2

The Role of Apical Dominance in Influencing Drying, Viability, and Vigor in Eurasian Watermilfoil (*Myriophyllum spicatum*) Fragments

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Myriophyllum spicatum (Eurasian Watermilfoil [EWM]) the most common aquatic invasive species currently in Adirondack Park, is known to be spread by transport via boats and the trailers on which they travel. Research into desiccation tolerance of EWM and its ability to grow after different degrees of drying is important to inform eventual models of lake invasibility and the continued spread of the plant. One potentially important component in vitality and vigor of fragments is the presence or absence of the apical tip. An intact apex on a fragment may reduce the release of lateral buds and roots on internodes. Alternatively, an apical tip may slow desiccation rates during transport (due to dense leaf whorls), thus increasing the chance of a strand remaining viable after transport. Also, if an apex is present and viable, the strand may have greater overall vigor once in a new lake. To address the above mentioned hypotheses, we conducted a 6-week laboratory experiment with EWM that included up to seven drying times and fragments with intact apices and with apices removed. We found that the presence of an apical meristem on fragments did indeed significantly reduce the number of nodes that developed both new lateral leaf growth and new rootlets after they were rehydrated. Strands with an apical meristem did dry more slowly, such that fragments with apices dried for 3 hours in the lab had equivalent desiccation values to those without apices dried for only 2 hours. At least partially as a result of the differences in desiccation rates, more fragments with apices were alive at the end of 6 weeks in the control, 3-, and 12-hour drying treatments. There was no difference in the length of lateral growth measured between fragments with apices and those without, suggesting that while removing the apex did release lateral buds, it may have decreased the rate at which those buds grew. An intact apical meristem may, if the fragment remains viable, allow transported fragments to grow at a faster rate than fragments without a meristem, albeit reducing the number nodes that form new growth.

Tue-AM1-A-2

Earthworm Effects on Soil Carbon: Patterns and Mechanisms

Tim Fahey (Cornell University, Ithaca, NY; tjf5@cornell.edu)

Through their feeding activities, earthworms can greatly alter the quantity and forms of carbon stored in forest soils. We used an isotopic tracer approach to examine the mechanisms and magnitude of these effects in a northern hardwood forest. Earthworms mix surface organic matter into mineral soil resulting in the stabilization of some of this organic matter in soil aggregates. The mixing process also appears to prime microbial utilization of existing organic matter pools. The net effect is a major reduction in soil carbon storage in earthworm-invaded soils.

Tue-PM1-B-1

History of Entomology at the Yale Peabody Museum

Lawrence Gall (Peabody Museum of Natural History, Yale University; (lawrence.gall@yale.edu)

This talk will offer an abridged history of entomology and the activities of entomologists affiliated with the Peabody Museum of Natural History (Yale University), from around the time of the museum's inception (1866) to the present day. Topics covered will include patterns of growth in the collections, available facilities, curatorial and research focus, and current digitization initiatives that seek to capture the rich history of the collection materials.

Tue-PM2-A-1

Chemical and Partial Biocontrol Control of *Ailanthus altissima* or How I Defoliated a Forest Last Summer

Richard Gardner (Independent Researcher, Bernville, PA; rtgardner3@yahoo.com)

The control of *Ailanthus altissima* (Tree-of-Heaven) in public and private spaces is a major concern. Research over the last several years supports the use of concentrated glyphosate with the encouragement of local biocontrols to control differing age groups of this weed tree. This past summer saw the apparent successful use of concentrated glyphosate in a safe and efficient manner to defoliate a forest of mature *A. altissima* in central Pennsylvania. At the same time at another local site, there was the obvious death of a stand of *A. altissima* happening through natural means: herbivory and disease in a complex web of interactions. These events reinforce past observations that by using native and indigenous biocontrols complimented with limited chemical usage there is hope that in defined areas *A. altissima* can be eradicated. The larger application is that this can serve as a model for similar eradications of exotic invasive plants in small landscapes.

Wed-AM1-A-2

Developing a National Standard for Challenges to the National Wetland Plant List

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The National Wetland Plant List (NWPL) contains five wetland indicator rating categories that are used during wetland delineations in the USA to determine if vegetation is hydrophytic. Each species' rating represents the frequency with which it is thought to occur in wetlands, based on botanical literature and the field experiences of wetland scientists and botanists. Until recently, no landscape-scale frequency data were available to confirm or refute these ratings. The most recent update of the NWPL allows individuals and/or institutions to challenge a plant species' wetland indicator rating using landscape-scale frequency data. We tested a data collection and analysis method that was developed in cooperation with the National Panel of the NWPL and the National Technical Committee for Wetland Vegetation. Five plant species were randomly sampled throughout a 12-digit HUC in south-central New Hampshire. Frequency data were collected along sixty 100.0-m transects: 30 in wetlands and 30 in uplands. We compared results produced when wetland frequency was calculated using a traditional frequency formula, a weighted frequency formula, and a Bayesian model that predicts wetland frequency from the data we collected and prior occurrence data. The three methods agreed when large, equivalent numbers of transects were used to calculate wetland frequency. The methods disagreed when data were non-normally distributed and/or there were large discrepancies in the number of wetland and upland transects used in the calculations. For challenges to the NWPL, the preferred data collection method is 30 upland and 30 wetland transects. Sampling wetlands and uplands in proportion to their occurrence in the landscape is not recommended. The weighted frequency formula may be used, provided that a minimum of 10 transects of one type are collected and the data are normally distributed. These general methods should ensure that proposed additions or changes to the NWPL are evaluated using data collected at an appropriate scale and are analyzed using scientific methods. Sampling methods may be adjusted for species whose occurrence in wetlands is seasonal or varies with disturbance or watershed type.

Tue-AM2-C-2

Evaluating Genetic Connectivity and Re-colonization Dynamics of Moose in the Northeast

Michale Glennon (Wildlife Conservation Society, Saranac Lake, NY; mglennon@wcs.org) and **Heidi Kretser** (Wildlife Conservation Society, Saranac Lake, NY; hkretser@wcs.org)

The goal of this project was to inform future management and conservation efforts for Moose in the Northeast by establishing the genetic connectivity of Moose in the northeastern states and provinces and understanding re-colonization dynamics of the Adirondack Moose population. Despite Moose's historic recovery of in one of the most populous regions of the world, little is known about how Moose use the northeastern landscape and how important connectivity might be for a population potentially founded by a few individuals with little genetic variation. We tested 293 tissue and hair tissues and 140 scat samples to look at genetic markers of Moose from the Northeast to specify the relationship among regional sub-populations; we amplified DNA from 140 samples of Moose scat collected using detection dogs in May 2008 to determine whether the method would be viable for calculating population estimates. We are now disseminating the results to inform future Moose management and conservation efforts in the Northeast, especially in light of climate change. We found distinct genetic differences among Moose from north of the St. Lawrence Seaway and south of the St. Lawrence seaway. We could also see distinctions in the Cape Breton and Nova Scotia mainland populations. Of the 140 scats from New York State, we amplified DNA from 38 samples and found 25 individuals. For NYS, scat-sniffing dogs may be a viable method for assessing population if collection and DNA extraction can take place within one month. Overall, if landscape connectivity in the northeast is affecting genetic flow, it could also hinder adaption to climate change. Future research should explore the northward movements of Moose in the Northeast.

Tue-PM2-B-2

Evaluating the Ecological Road Effect Zone in the Adirondack Park, NY

Michale Glennon (Wildlife Conservation Society, Saranac Lake, NY; mglennon@wcs.org) and **Heidi Kretser** (Wildlife Conservation Society, Saranac Lake, NY; hkretser@wcs.org)

We conducted a study to measure the ecological impact zone of rural roads in Adirondack Park, using birds as indicator taxa and comparing our work with a prior study examining the impact zone associated with single residential exurban homes. We used a standard count method to sample bird communities at the road edge, and at 200 m and 400 m into surrounding forest and sampled along roads placed into 3 levels of hypothesized impact based on width, average speed, and average traffic levels. For a majority of species, the type of road more strongly shaped the response of birds than did the distance from it. When grouped into families, however, birds responded more strongly to the distance from the edge of the road than to road type, suggesting that responses to roads are highly species-specific. These responses were of 3 basic types. A number of species were attracted to road edges and in lower numbers farther away from roads. Expectedly, a number of species also responded negatively to road edges. Most interestingly, a third group of birds had high occupancy at road edges and in interior forest (400 m), and low occupancy at 200 m. It appears that the size of the ecological effect zone may extend as far as 200 m for both roads and houses, but the relative impacts of the two are varied. Roads may provide foraging and feeding opportunities for a number of species, but less in terms of nesting or primary habitat versus areas near houses. Our results run counter to other studies which suggest that road traffic can have a strong negative impact on breeding-bird densities near roads; this is likely because the roads studied here were all smaller and of lower traffic densities than those examined by other researchers. Relatively narrow, low-traffic roads in this region may not have a strong negative impact on songbird occurrence. Information on reproductive success and survivorship of birds breeding near roads in the rural northeast would help to determine whether or not the attraction effect that roads appear to cause for birds is ultimately an ecological trap.

Tue-PM1-A-2

Effects of Artificial Brush Piles on Small Mammal Abundance and Survival in Central Pennsylvania

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Brush piles have long been promoted as a means to enhance wildlife habitat, yet few studies have experimentally tested the perceived benefits of these structures for wildlife or evaluated the efficacy of different arrangements of these piles within landscapes. Over two summers, we used live-trapping and program MARK to compare small-mammal abundance and survival in forested habitats with brush piles versus similar habitats without, both at sites located adjacent to agricultural edges and within the interior of forests in central Pennsylvania. Only *Peromyscus* mice, Eastern Chipmunks (*Tamias striatus*), and Northern Short-tailed Shrews (*Blarina brevicauda*) were caught frequently enough for comparisons. *Peromyscus* were more abundant at edge than interior sites, but showed no effect of brush pile treatment on abundance. *Peromyscus* survival was greater during the trapping season than over-winter; however, during winter, survival was greater at brush pile sites than at controls. Chipmunk abundance varied greatly across the trapping seasons and showed no consistent effect of brush pile treatment or landscape location. Chipmunk survival was generally high, but was greater during the trapping season than over-winter. Shrew abundance varied by trapping season, but did not differ by brush pile treatment or landscape location. Overall, the position of trapping sites within the landscape had a greater effect on small-mammal community composition than the presence or absence of brush piles. Brush piles, however, were used as cover by all three focal taxa, and may have particularly benefitted mice by providing high quality winter nesting sites.

Mon-AM2-A-4

Los Wakon Meci Miw Naka Dega: Weaving Traditional Ecological and Scientific Knowledge to Assess Basket Trees in Maine

Suzanne Greenlaw (SUNY ESF, Syracuse NY; suzanne_greenlaw@hotmail.com)

Fraxinus nigra (Brown Ash) is the main and essential component of Native American ash basketry. Wabanaki people of Maine and Maritime Province hold spiritual, economical, and cultural connections with Brown Ash. Known to the Wabanaki as the basket tree, Brown Ash can be pounded and split along its growth rings to produce exceptionally strong and pliable strips to weave. Brown Ash harvesters report increasing difficulty obtaining basket-quality wood and express concerns for the future health of Brown Ash trees with the encroaching invasive beetle *Agrilus planipennis* (Emerald Ash Borer). We report here on a study that seeks to address this concern by documenting the Wabanaki traditional ecological knowledge (TEK) of harvesting basket grade Brown Ash. Through ethnographic research and scientific field measurements, we will attempt to model tree and site characteristics associated with basket-grade wood and estimate the current supply and spatial distribution of basket-grade trees throughout the State of Maine. Ongoing consultation with tribes and Native American harvesters is a central component of the study design. Results will contribute to the identification of strategies for management and/or restoration.

Mon-PM1-A-3

Diet of Double-crested Cormorants in New York Harbor

Colin Grubel (CUNY Graduate Center and Queens College, NY, NY; atlasbear1@yahoo.com) and **John Waldman** (Queens College, NY, NY)

Double-crested Cormorants (*Phalacrocorax auritus*) have been breeding in and around New York Harbor since 1986. Cormorants are opportunistic hunters and their diet may change by region and season. Concerns are often raised regarding the effect their predation may have on fish species valued economically and recreationally. The purpose of this study was to assess, for the first time, the diet of Double-crested Cormorants in the New York Harbor area. Bolus samples were collected from three islands in the upper and lower NY Harbor area during the breeding and chick-rearing seasons of 2006–2011. The results indicate a varied diet encompassing 46 species of fish, and 4 species of crustaceans, and including species associated with marine, estuarine, and freshwater environments. Dietary overlap as measured by the Schoener Index, varied over the years with an average of 0.4227, indicating a moderate amount of overlap. Frequent species included Scup (*Stenotomus chrysops*; 13.4% of samples), Menhaden, (*Brevoortia tyrannus*; 7.2%), and Black Seabass (*Centropristis striata*; 6.9%). Species of interest to local fishermen such as Striped Bass (*Morone saxatilis*) and Winter Flounder (*Pseudopleuronectes americanus*) were identified in the samples but not in high numbers. In addition, four birds were tracked with 30-g PTT satellite transmitters from Sirtrack. Tracked birds showed a preference for specific foraging areas, indicating that while as a population the diet is highly variable, diets of individual birds may be less so. Our results are consistent with what is known of the diet preferences elsewhere, but the prey species and numbers found indicate that future management of the local cormorant population must consider the particular details of the population's place in the ecosystem with regards to their diet.

Wed-AM2-A-3

Modeling Conservation Corridors for the Bog Turtle (*Glyptemys muhlenbergii*) in Northeastern Dutchess County, New York

Ingrid Haeckel (Hudsonia Ltd., Annandale NY; ihaeckel@bard.edu), **Gretchen Stevens** (Hudsonia Ltd.), and **Erik Kiviat** (Hudsonia Ltd.)

The federally listed *Glyptemys muhlenbergii* (Bog Turtle) is threatened throughout its northern range primarily because of the loss, fragmentation, and degradation of its fragile core habitat—calcareous fens and sedge meadows—and migration corridors, as well as by collection for the wildlife trade. Climate change and its predicted effects on habitat composition and location compound the threats to isolated Bog Turtle populations. There has been a substantial effort to locate and monitor extant populations of Bog Turtles, but little is known about the location of connecting corridors that allow turtle migrations from deteriorating core wetlands, mate-seeking, migration to hibernacula, and genetic exchange. Identifying a network of corridors between core Bog Turtle habitat and suitable matrix habitats facilitating turtle movement will help regional conservation efforts for the species. We employ least-cost path modeling to identify a network of potential conservation corridors for the Bog Turtle in northeastern Dutchess County, NY, where several known Bog Turtle populations exist. Hudsonia Ltd. has completed detailed town-wide habitat maps for this area depicting ecologically significant habitats, including potential core Bog Turtle habitat and matrix habitats. The habitat maps along with data on Bog Turtle movement patterns from the scientific literature were used to generate a cost surface representing the resistance of the landscape matrix to the species' mobility. Least-cost paths were then used to identify probable connections between core Bog Turtle habitat patches. Conservation corridors were defined around the least-cost paths according to the width of suitable habitat present following consistent criteria as far as possible. Our results illustrate the value of detailed habitat maps for modeling ecological connectivity at the regional and local level to assist in prioritizing habitat conservation in land-use planning and to plan for species' movements among habitat patches under a rapidly changing climate. A similar approach could be applied to modeling conservation corridors for other species of conservation concern such as *Sylvilagus transitionalis* (New England Cottontail) and *Emydoidea blandingii* (Blanding's Turtle).

Mon-PM2-A-2

Assessment of Coyote Predation on White-tailed Deer Fawns Using GPS technology

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Although *Canis latrans* (Eastern Coyotes) have inhabited the northeastern United States for several decades, their predation impacts on *Odocoileus virginianus* (White-tailed Deer) fawns remain unclear. Several advances in GPS-collar technology, including smaller size and prolonged battery life, have only recently allowed their use on Coyotes to quantify predation. In 2008 and 2009, we placed GPS collars on 16 adult Coyotes in 2 rural New York study areas and backtracked to GPS clusters (2 or more 20-min GPS fixes within 50 m) during the fawning period to search for carcasses. Due to time and property access constraints, every GPS cluster could not be searched to empirically measure kill rates. Therefore, GPS cluster patterns from known kill sites were used to predict likely locations of additional kill sites using a space-time permutation scan statistic. We then used binary logistic regression to determine the probability that predicted clusters were kill or non-kill sites, and multinomial logistic regression to distinguish between fawn kills and other prey species. Top logistic regression models predicted the probability that unsearched clusters were fawn kill sites, allowing quantification of the number of fawns killed per Coyote per time period. GPS collars have proven useful for locating small-bodied animals killed by Coyotes throughout their entire home range, resulting in accurate assessments of fawn predation.

Tue-AM2-B-1

Vascular Flora of Cortland and Onondaga Counties, New York

Michael Hough (SUNY Cortland, Cortland, NY; michael.hough@cortland.edu)

A review of herbarium specimens, recent field work, and vouchered literature has identified about 1900 vascular plant taxa in two central New York counties. While the flora of Onondaga County has been studied extensively since the late 1800s, prior accounts of the Cortland County flora have been limited in scope and geographic extent. An initial dataset was created from uncatalogued specimens in the Herbarium of the State University of New York at Cortland (CORT) and an additional 400 specimens have been added since 2009. Published accounts of about 150 additional taxa housed in other herbaria were included. A total of 1086 vascular plant taxa have been identified from Cortland County, of which 795 are considered native and 291 introduced. This includes 52 taxa currently listed as rare by the NY Natural Heritage Program (i.e., S3 or lower), one of which (*Carex capillaris*) is presumably extirpated. An estimated 10–30% of the flora may not yet be documented based on land area and accounts of other floras in the region. Several checklists for Onondaga County have been compiled based on collections housed in the Herbarium of the State University of New York College of Environmental Science and Forestry (SYRF). Additional taxa have been collected since the last published flora in 1969, mostly by the late Mildred Faust, and some additional taxa have been identified among existing specimens at CORT and SYRF. A total of 1826 taxa have been documented for Onondaga County, of which 1257 are native and 569 introduced. This includes 148 taxa listed as rare in the state, eight of which are likely extirpated due to habitat destruction. This work will be presented in an annotated flora of Cortland and Onondaga counties that will include collecting locations, notes on habitat and phenology, and a modern taxonomic treatment with keys to the taxa.

Mon-PM2-C-3

Guerrilla Taxonomy, the Ecological Species Concept, and the Spruce Problem

Jerry Jenkins (Wildlife Conservation Society Adirondack Program, Saranac Lake, NY; jcjenkins@hughes.net)

The species descriptions in botanical manuals are in fact hypotheses. They imply that certain morphological characters associate reliably and can be used to distinguish populations that are ecologically meaningful. Like all hypotheses, descriptions can be true or false. You will not know which they are until you test them. When you test them, you will often be surprised by the results. Over the last 30 years, I have developed a process of making local tests of taxonomic hypotheses that I call guerrilla taxonomy. It starts by examining local populations to see if they have the morphological stability and ecological consistency I require in a species. If they do, their variations patterns are compared to the characters described in the manuals. Glenn Motzkin and I devoted a chapter to this method in the Harvard Forest Flora; I give an example here. *Picea mariana* (Black Spruce) and *P. rubens* (Red Spruce) are common in lowland boreal habitats of the Northeast. They have strong ecological identities but overlap morphologically. At least 14 characters for separating them have been proposed at various times. One question is which of these characters work. Another is whether the trees of intermediate habitats are intergrades. A guerrilla-taxonomic study in Vermont and the Adirondacks had surprising results. First, all our spruces are highly variable: 11 of the 14 characters supposed to separate them associated freely in ecologically homogeneous populations and were useless for separating species. And second, ecologically intermediate populations resembled bog populations, and seemed to be all or mostly Black Spruce. Similar investigations of other species pairs suggest a general conclusion: botanical manuals greatly underestimate local within-population variability, and thus over-estimate the distinguishability of species. For some pairs of close species, like the spruces, there are core characters that are stable and useful. For a surprising number of others, there are not.

Tue-PM2-C-1

Reinventing the Field Guide: The Northern Forest Atlas Project

Jerry Jenkins (Wildlife Conservation Society Adirondack Program, Saranac Lake, NY; jcjenkins@hughes.net)

The biological field guide as a category of reference aids is a little over a hundred years old. In this time, it has produced a distinguished literature. The works of Schuyler Mathews, Elsie Klots, John Comstock, Roger Peterson, Boughton Cobb, and John Farrar are, by any reasonable standard, intellectual milestones. So, I believe, will prove some of the works of our own generation: David Sibley of course, but also a number of others. Field guides, as currently conceived, have limitations. Paper books have limited numbers of pages and can have these pages ordered in only one way. Their authors are, to a large extent, locked into a tradition of serial description. They are great at describing characters but poor on making comparisons. Ecology and associations get short shrift. Illustrations of whole creatures are common; illustrations of significant details rarer, and illustrations of communities and landscapes almost unknown. All this is changing. The current generation of naturalists has new techniques available for imaging and presenting nature. It also has, I am convinced, a deeper and more systematic knowledge of ecology and landscape than its predecessors. These techniques and understanding will remake the field guide. What might the new field guides look like? In my concept they will be open format, linked to libraries of online images and illustrations; comparative, using mosaic illustrations to compare similar species; ecologically focused, showing who associates with whom and where; multi-track and multi-scale, using imagery and drawings in parallel, at scales ranging from millimeters to miles; and multi platform, produced in paper, e-book, and interactive forms. This talk reports on one such attempt. I am producing a series of field guides to the natural history of the northern forest region. The first products from this project will appear online soon, and I can give you a detailed preview here.

Mon-PM1-B-2

Relationship of Habitat and Nestedness to Wetland Floristic Quality Assessment

Suneeti Jog (The Nature Conservancy, Albany, NY; sjog@tnc.org) and **Jason Bried** (Oklahoma State University, Stillwater, OK; bried@okstate.edu)

The floristic quality index is a widely used method for ecological condition assessments in the United States. However, habitat variability may confound the index estimates and should be evaluated in a manner to determine if floristic quality compared among different habitats is valid. Additionally, floristic quality assessment has not been studied in the context of nested subset structure, and the two phenomena may be interrelated since they are driven by similar factors (e.g., species distributions, human disturbance). Using a vascular plant survey of sand plain seasonal wetlands from three protected areas in upstate New York, we tested if floristic quality (measured as mean species conservatism) provides a clear signal of human stress (measured using a rapid-assessment land-use metric) or varies according to gradients of geomorphic setting, primary community type, wetland area, and water level. The vegetation community showed significant nested subset structure, and aggregate (mean) conservatism had stronger influence on the pattern than species conservatism, disturbance condition, wetland area, and water level. Overall, the vegetation of sites with poorer condition and lower floristic quality tended to be a subset of the vegetation in sites with better condition and floristic quality. Based on standard least-squares analysis of the regression slopes, aggregate conservatism was able to capture the disturbance gradient independent of each habitat gradient. This finding suggests the floristic quality method can be robust, but since our result may not be universally true, we urge analysts to evaluate the common slopes assumption before making inferences about relative floristic quality among different habitats.

Wed-PM1-C-2

Potential of Habitat Manipulations as a Conservation Strategy for Eastern Massasauga Rattlesnakes

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Sistrurus catenatus catenatus (Eastern Massasauga Rattlesnake, EMR), a subspecies of *S. catenatus* listed as endangered in New York State, is adapted to wetland habitats with low vegetative cover. Habitats for this subspecies are rapidly being lost in the northeastern US through woody plant succession. In spring 2011, the New York State Department of Environmental Conservation created 32 basking plots, a 10-acre clear-cut, and two 5-acre forest thinnings at a wetland site to increase suitable basking habitat for the EMR. Associated monitoring of snake response involves assessing changes in habitat use and preference by EMRs in response to manipulations and estimation of rates of growth, survival, and reproduction to better understand the current status of the population. Visual surveys are being conducted three times per week during 2011 and 2012 seasons to determine sighting frequency of snakes among habitat types. In 2012, the influence of habitat type on environmental temperatures and ability of the EMR to avoid predators will be evaluated. Preliminary results from the 2011 season indicate strong selection by EMRs for newly created openings. To develop estimates of demographic parameters, data will be combined from field studies conducted from 2006–2010. We are also determining rates of succession within critical habitat areas through inspection of a time series of aerial photographs in order to develop a plan for long-term maintenance of high quality basking sites. Lessons learned from this study will ultimately contribute to the conservation of a snake species threatened throughout most of its range and will help conserve many other snake species in the northeastern US threatened by forest succession.

Mon-AM2-C-2

Differences in Culturally Significant Species Found in Primary and Post-agricultural Forests in Central New York

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The northeastern United States has experienced a history of intense human disturbance through agriculture land-use. The composition and diversity of understory communities in post-agricultural forests continues to reflect historic agricultural use, even long after field abandonment. Many understory plant species that are associated with primary forests are often absent or uncommon in secondary forests, and while this trend is important ecologically, it is also significant because of the cultural value of many of these plants to local indigenous people. The overarching goal of this study was to understand the relationship between primary and secondary forest stands and understory herbaceous species, especially those of ethnobotanic importance. Herbaceous species stem counts and woody basal area were recorded in primary and post-agricultural secondary forest stands in central New York. This information was coupled with interviews conducted with Haudenosaunee plant gatherers to better understand the ethnobotanic uses of the plant species surveyed in the study, along with possible native tending techniques used to promote the growth of specific plant species. Understory species composition differed between primary and secondary forests; however, overstory composition and diversity did not. We expect to see differences in the availability of culturally significant species between primary and secondary forests. The relationship between native tending techniques and culturally significant species can be a unique way to look at the possibility of facilitating forest herb restoration, especially into post-agricultural forests.

Mon-PM1-A-2

Salt Marsh Restoration and Vegetation Reestablishment in the Medouie Creek Wetland Complex, Nantucket, MA

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The Medouie Creek wetland complex, historically a tidally influenced saltwater marsh, experienced ditching and diking prior to the 1930s, reducing tidal saltwater influence to a restricted portion of the marsh. Hydrologic alteration decreased soil pore water salinity, impounded freshwater, and decreased tidal action disturbance to the marsh, allowing for the establishment of the non-native, invasive species *Phragmites australis* (Common Reed). To restore hydrology, reduce populations of invasive species, and reestablish salt marsh habitat, a culvert was installed in December 2008 to hydrologically reconnect the marsh. Rigorous monitoring protocols established before restoration allow for examination of changes to vegetation communities, pore-water salinity, and water-level variation in response to this restoration. Three growing seasons post-restoration show a dramatic decrease in *Phragmites australis* and a steady conversion to salt marsh habitat characteristics in the previously restricted marsh. Soil pore-water salinity has increased from an average of 4 ppt to 20 ppt in the previously restricted marsh. Vegetation monitoring pre-restoration revealed a dominant plant composition of *Typha* (cattail) -*Phragmites* in the restricted marsh. Post-restoration monitoring reveals significant dieback of freshwater vegetation, including *Phragmites australis* and *Typha* ssp. with an increase in salt marsh vegetation and developing areas of mudflats. Water-level loggers recorded tidal influence only in the front marsh pre-restoration, but tidal influence has been demonstrated since restoration throughout the previously restricted marsh, particularly in conjunction with high-tide events. Continued monitoring of water levels and pore-water salinity will document any seasonality of hydrologic/salinity fluxes in the marsh and corresponding responses from the vegetation communities. Few saltwater restoration projects have such an extensive monitoring protocol, making Medouie Creek a unique case study for future restoration efforts.

Wed-AM2-C-1

Seasonal Movements of Brown Trout in Onondaga Lake, New York

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Onondaga Lake has been subject to nearly a century of anthropogenically induced habitat degradation. In recent years, however, there has been a marked increase in water quality and a corresponding return of several cold-water species. Research on the return of these species will provide a better understanding of the recovery of this system, which will in turn give managers information necessary for reintroducing native cold-water species. This study examined the ways in which *Salmo trutta* (Brown Trout) utilize the lake and its surrounding tributaries in relation to environmental factors such as temperature and dissolved oxygen. Six large (>400 mm) Brown Trout were tracked biweekly using sonic telemetry and passive sonic receivers from May to September, 2011. These data were used in conjunction with gill-net catch per unit effort to ascertain the movement and migration patterns of Brown Trout throughout the summer. Preliminary results indicate a correlation between hypolimnetic oxygen, epilimnetic temperature, and the presence of Brown Trout in Onondaga Lake. In late June, as maximum temperatures for the trout were reached in the epilimnion, and dissolved oxygen became depleted in the hypolimnion, trout were forced to seek refugia outside of the lake. One implication of this is that space and food availability are most likely limited in the tributaries relative to the lake. Therefore, the productivity and spatial constraints of the tributaries may be directly limiting the lake's potential to support a large cold-water fishery. This work will provide a more complete picture of Onondaga Lake's recovery through its use by a cold-water species.

Tue-PM1-C-3

Effects of Climate Change on Martens (*Martes americana*) and Fishers (*Martes pennanti*) in the Adirondack Mountains

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Climate and competition are two key driving forces influencing animal movements and, thus, can strongly impact distributions of animals throughout a landscape. Across the forested landscape of New York's Adirondack Mountains, two members of the weasel family, *Martes americana* (American Martens) and *Martes pennanti* (Fishers), often compete for common resources such as prey and forested habitat. As climate change will likely alter the snow-cover regimes across the Adirondacks, it is important to evaluate the effects of snow cover on the movements, distributions, and interactions of Martens and Fishers; yet few studies have examined this. Accordingly, my research evaluates the hypothesis that the distributions of Martens and Fishers are strongly influenced by interspecific competition and differences in their abilities to move through snow-covered habitats, with Fishers being theoretically more hindered by deep snow than Martens. I am currently conducting snow-tracking surveys throughout Huntington Wildlife Forest in the Adirondacks to test the validity of this hypothesis. Ultimately, this research aims to provide valuable information on the winter ecology of Martens and Fishers, thus enabling more reliable predictions of the potential influence of climate change on these species of high priority for conservation biologists and wildlife scientists in the region.

Wed-PM2-A-2

Ecosystem Services and Habitat Functions of Nonnative Plants

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Shifts in plant community dominance to nonnative species are generally considered to adversely affect ecosystem services. Yet in many cases, valuable ecosystem services are provided by nonnative species. I present examples organized according to the classification in the Millennium Ecosystem Assessment (MEA). Provisioning services constitute products such as food, pharmaceuticals, energy feedstocks, and fiber. Examples from wild plants include food, energy, and paper from several species, and nectar for Honeybees from *Fallopia japonica* (Japanese Knotweed) and *Lythrum salicaria* (Purple Loosestrife). Regulating services include soil formation, carbon sequestration, climate modulation, waste treatment, and pollination. Robust marsh plants such as *Phragmites australis* (Common Reed) and Purple Loosestrife sequester carbon and nutrients, build soils, and due to high transpiration cool their surroundings. Hollow twigs of *Ailanthus altissima* (Tree-of-heaven) and culms of Common Reed offer nest sites to bees that pollinate crops and wild flora. Supporting services are primary production and nutrient processing. Many rapidly growing nonnative plants provide these services at high levels. Dense beds of *Trapa natans* (Water-chestnut) promote denitrification, thereby removing nitrogen from waters. Cultural services include spiritual and aesthetic inspiration, and subjects for education and research. Plants like Common Reed develop self-maintaining vegetation cover in urban areas and on derelict lands. I consider biodiversity support (habitat functions) separately from the MEA classification. Nonnative plants provide food, shelter, nest material, and other resources for native animals, and these relationships increase with plant abundance and time since establishment. The benefits or detriments of nonnative plants are context-sensitive and complex. I propose that non-habitat services provided by nonnative plants are generally proportional to biomass and production of the plant. Habitat services, however, may be greater at moderate to low levels of biomass of a nonnative plant. Because nonnative plants may provide significant biodiversity support, and because their control is expensive and difficult, we need to view management of nonnatives as optimization of their positive and negative impacts on a site-specific basis.

Wed-AM2-B-4

Case Studies In Urban Ecology From New York Parks and the Bioscience Education Network

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The New York City park system is one of the largest and most diverse in the world. Including the National Parks, within the city there are many excellent opportunities to conduct student oriented research studies and to develop teaching case studies from such projects. We will present here several examples of new discoveries made within New York and discuss their applicability to case-study development. Perhaps the most famous such example is the discovery by a team from the American Museum of Natural History of the centipede *Nannarrup hoffmani* that is endemic to Central Park. It is an excellent case study for issues of species dispersal, evolution, reproductive isolation, leaf-litter ecology and many other subjects. Perhaps less stunning, is our own team's discovery of food-caching behavior in the Tufted Titmouse (*Baeolophus bicolor*) in Central Park. This behavior was previously unreported in this species and we have observed it repeatedly. The easy access to wildlife provided by urban parks make such observations of novel behaviors more likely. There are numerous such opportunities in the urban environment and it is relatively easy to provide student research opportunities because of the accessibility of the study sites. The Bioscience Education Network (BEN) is a forum for sharing the results of such studies with other instructors around the country. This network is sponsored by the American Association for the Advancement of Science and a number of partner institutions. It comprises a collection of over 17,000 peer-reviewed teaching resources for the biological sciences and is constantly accepting new submissions. For those wishing to publish their work as teaching and learning resources, BEN is an excellent opportunity, and all BEN resources become part of the National Science Digital Library. Developing studies of urban ecology with student researchers provides many opportunities.

Wed-PM2-B-3

The Use of Targeted Grazing for the Suppression of the Pastoral Invasive, *Rosa multiflora* (Muliflora Rose)

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Rosa multiflora is an invasive shrub, native to Asia that has infested American pastures and grasslands east of the Rocky Mountains and in the far west. A study of the efficacy of targeted grazing, the use of livestock to accomplish specific vegetation management objectives, for the suppression of *R. multiflora* was conducted in an abandoned pasture in the City of Albany, NY during the 2011 growing season. A mixed flock of 12 adult ewes and wethers (ages 1–8) was moved through a system of nine 0.1-ha paddocks (stocking density = 5 tons/ha) on an approximately 27-d cycle, the rotational frequency being 3 days per paddock. Leaf cover of all *R. multiflora* plants (which ranged from <1 m to >4 m in height) in each paddock was visually estimated prior to grazing, at the approximate midpoint of the grazing season, and in September, following the removal of the livestock. An approximation of the photosynthetic surface area (PSA) of each plant was computed by relating plant dimensions to a hemi-scalene ellipsoid. Coincident estimates of PSA were generated for plants in “reference” paddocks that were not grazed by livestock. During the course of the study, *R. multiflora* in ungrazed paddocks increased by 17 to 102 percent while in the grazed paddocks, the change in PSA was between -1 and -99 percent, with smaller plants being nearly completely defoliated. Visual observations suggest that the plants may have been stressed by grazing even in areas beyond the reach of the sheep.

Wed-AM1-A-3

Synchronous Reproduction of Black Bears in Northern New York State

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Due to the inherent difficulties in censusing secretive, solitary game species such as *Ursus americanus* (American Black Bear) directly, many state wildlife agencies rely on the analysis of harvest data for population assessment. Proper interpretation of harvest data may require an examination of exogenous factors, such as food availability, that could drive patterns in reproductive parameters. *Fagus grandifolia* (American Beech) mast is the primary fall food for Black Bears in the Adirondack region of New York during abundant mast years. Our objectives were to: (1) assess the pattern of Black Bear reproduction in a 40-year period of harvest data; and (2) characterize the relationship between hard mast abundance and timing of cub production. We hypothesized that female bears were reproductively synchronous with the Beech mast cycle. We modeled the relationship between hard mast abundance and cub production using reconstructed age-class estimates for ages 0.75–3.75 as reproductive indices and quantitative data from seed traps to estimate annual Beech mast density (nuts/ha). We selected models using an information-theoretic approach with Akaike information criterion adjusted for small sample sizes (AICc). A pattern of high cub production in odd-numbered years occurred from 1975–2010. Beech mast production was cyclical and followed an alternate-year pattern (1-yr. lagged ACF = -0.526, $P < 0.05$) with small mast crops or complete failures occurring in odd-numbered years and successful crops occurring in even-numbered years. Models that included variables for beech mast density in the autumn before birth best explained annual variation in size for age classes 0.75, 1.75, and 2.75. Our results indicate that the two-year reproductive pattern of female bears in the study area corresponds to the two-year masting cycle of Beech. Monitoring masting patterns may aid in interpreting harvest age structures as well as anticipating increases in human-Black Bear conflict levels due to temporal dispersal patterns of offspring.

Tue-PM2-B-3

Historical Plant Communities of Onondaga Lake: An Ecocultural Approach

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The overall goal of this project is to elucidate the historical ecology of Onondaga Lake, Syracuse, NY (one of the most severely degraded lakes in the country) and adjacent lands in order to improve decision-making on restoring these significant regional resources. The project has three components: to characterize plant communities around Onondaga Lake before major industrialization (1825), to examine cultural practices that shaped those communities during this period of time, and, finally, to draw on this ecocultural history to inform and guide current restoration actions. We researched old maps, texts, newspapers, florae, theses, ethnographic literature, and other written documents to compile species lists and notes on human-plant relationships. I will present results to date for this research, including draft lists of plant species and plant communities that occurred around the lake, evidence for native land management practices, and finally, bringing the project up to date, draft plant community templates based on the historical material as well as current site data. The latter lists represent an application for use in restoration of this major superfund site. This project represents a work in progress with methodologies still to be implemented.

Mon-PM1-A-1

Vegetation Patterns in Logged and Unlogged Hemlock Dominated Forests in Maine

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Adelges tsugae (Hemlock Woolly Adelgid; HWA) has well established populations in much of the Northeastern United States but has only recently been detected in Maine. Currently the Maine HWA infestation is limited to southern portions of the state, providing a unique opportunity to collect baseline ecological data in and design proactive management strategies for the uninfested forests. At 3 uninfested stands, we compared overstory, sapling, and understory structure and composition of logged and unlogged stands of *Tsuga canadensis* (Eastern Hemlock). Logged stands were harvested 1–2 years prior to data collection and had significantly lower overstory basal area (RCB: $F_{3,46} = 15.01$, $P < 0.0001$) and stem density (RCB: $F_{3,46} = 5.11$, $P < 0.001$). Sapling density was more than three times higher in the unlogged plots than the logged plots and *Abies balsamea* (Balsam Fir) comprised 43% of the saplings in the unlogged plots. Other common species in the sapling layer of the unlogged plots included *Fagus grandifolia* (American Beech; 22%), *T. canadensis* at 20%, and *Acer rubrum* (Red Maple; 13%). Similar species were present in the logged plots, but their relative abundance differed, with *T. canadensis* comprising the majority of the saplings (67%) followed by *A. balsamea* (24%), *F. grandifolia* (4%), and *A. rubrum* (2%). The understories of both logged and unlogged stands were dominated by herbaceous species, 25,096 stems/ha and 43,431 stems/ha respectively, with fewer woody than herbaceous species being recorded, 5089 stems/ha versus 5794 stems/ha. Of the woody understory species, *T. canadensis* remained a dominant component in both stand types. The three most abundant species of woody seedlings in the logged stands were *A. balsamea*, *Acer saccharum* (Sugar Maple), and *T. canadensis*. The unlogged stands were characterized, in order of abundance, by *Pinus strobus* (White Pine), *A. saccharum*, and *T. canadensis*. *Acer rubrum* was a minor component of seedling composition in both stand types. Overall, *T. canadensis* regeneration appears sufficient to maintain its dominance or co-dominance in these forests in the absence of HWA. Advance regeneration of *A. balsamea* in the logged stands suggests the potential for this species to replace *T. canadensis* in HWA-infested stands.

Wed-PM1-C-5

Estimating the Embryonic Survival of *Salmo trutta* (Brown Trout) in the Salmon River, New York

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The Salmon River receives spawning runs of *Salmo trutta* (Brown Trout) and three species of *Oncorhynchus* spp. (Pacific salmon) from Lake Ontario. All three species of Pacific salmon are documented to have high reproductive success. However, recent studies indicate that Brown Trout may not be reproducing successfully. The goal of this study is to determine the survival rate of Brown Trout embryos from fertilization until emergence. The survival rate will be determined by excavating a 0.25-m² section of a set of redds to determine the proportion of viable embryos. We also placed *Oncorhynchus tshawytscha* (Chinook Salmon) and Brown Trout embryos from hatchery stock inside perforated plastic tubes and inserted them into natural redds of both species. If the embryos have high survival rates within Chinook Salmon redds and low survival rates within Brown Trout redds, it will suggest that Brown Trout are building redds that are not conducive to survival. River discharge, temperature, and dissolved oxygen levels will be monitored to correlate embryonic survival to physical conditions. Preliminary results indicate that Brown Trout embryos have high survival rates in the early stages of development in this system. Additionally, Chinook Salmon embryos have high survival rates when placed in natural redds of both species. This finding suggests that both species are building redds that are conducive to embryonic survival in the Salmon River system.

Tue-PM1-C-1

The Dynamics of the National Wetland Plant List

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The National Wetland Plant List (NWPL) is an interagency product administered by the US Army Corps of Engineers. The other Federal agencies involved in the updating and assisting in the design of the NWPL include the US Environmental Protection Agency (EPA), the US Fish and Wildlife Service (FWS), and the Natural Resources Conservation Service (NRCS). Since 2006, the NWPL has been undergoing extensive updating and review. Prior updates to the list by the FWS in 1988 and 1996 were extensive but limited due to the lack of computer technology. The external, scientific peer-reviewed update of the NWPL presents two new approach concepts not previously used for the NWPL. First, all aspects of updating of the NWPL are done through regional panels, external professional botanists, and the public by use of an interactive web site. Recently the web site was used to coordinate the involvement of over 400 people actively participating in the update. All parties involved made their input online and their actions can be viewed by wetland regions or at the species level. This approach allows any user to see how each species received its wetland rating based on the type of data or input and by whom. Secondly, the NWPL is designed in the current update to increase the quality of the wetland ratings by using a broadened and dynamic system. This result is accomplished in several ways: 1) at any time, the entire professional public and academic community can make comments and input that will be evaluated annually, 2) challenges to species wetland ratings are now possible through a process that guides the challenger and works with them to obtain acceptable and usable landscape-level frequency data, 3) statistical challenge studies will be peer reviewed by the National Technical Committee for Wetland Vegetation for species tested at the 12 digit HUC, 4) large existing regional and national datasets will be analyzed and computer algorithms will be used to assess wetland ratings at various spatial scales, and 5) updating will be an annual event. The annual updating will include nomenclature and taxonomy, newly proposed species, changes as needed based on results from challenge studies or dataset analysis, re-evaluations of wetland ratings based on GIS and floristic provinces analysis, considerations of any new subregions, and several continuous quality-control steps. If changes to wetland ratings are warranted, changes will be made on an annual basis during the yearly update process.

Tue-AM2-C-1

What Can Otolith Chemistry Tell Us About Fish Habitat in the Northeast?

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The use of fish otoliths (ear-stones) for age and growth studies is now well established, and a great deal of exploration of their chemical properties is now under way. In this paper, I will review common applications of otolith chemistry, some mis-conceptions, and suggest new avenues of research and application.

Tue-PM1-C-5

Introduction and Overview to Symposium: Ecological, Biogeographic and Evolutionary Responses of Mammals to Climate Change

Mark Vincent Lomolino (SUNY ESF, Syracuse, NY; island@esf.edu), **Katherina Bendz Searing** (SUNY ESF, Syracuse, NY; kbsearing@esf.edu), and **Natasha Karniski** (SUNY ESF, Syracuse, NY; nlkarnis@syr.edu)

Climate change includes a variety of altered trends in environmental temperatures and precipitation, along with the timing, duration and intensity of associated events such as storms, drought, and periods of snow and ice cover. Responses of animals to modified climatic regimes can be quite varied and complex, but will fall into one of three categories of impact and adaptation: 1) species can shift their distributions to track spatial shifts in their optimal climatic regimes (providing dispersal barriers and dispersal capacities of the species permit); 2) other species may adapt in situ—exhibiting an impressive range in their climate/niche space either as individuals (adapting by modifying their behavior, physiology, or morphology over seasons to years), or as descendant populations (evolving adaptations over generations); or 3) species may exhibit declines in their abundance, and eventual extinction of their local populations. Here we present an overview of how each of these types of responses to altered climatic regimes are evidenced in historic and prehistoric (Pleistocene to Holocene) records, and then identify some areas of promising research for understanding and possibly mitigating the ongoing and anticipated changes in global and regional climates.

Wed-PM2-A-1

White-Tailed Deer (*Odocoileus virginianus*) Habitat Preference and Home Range in Western New York State

Joshua M. Matijas (Paul Smith's College, Paul Smiths, NY; jmatijas@s.paulsmiths.edu) and **Jorie M. Favreau** (Paul Smith's College, Paul Smiths, NY; jfavreau@paulsmiths.edu)

Two male *Odocoileus virginianus* (White-tailed Deer) were radio tracked from late February to early November of 2003, and two deer were radio tracked from late February to early November of 2007 in southwestern New York State. They preferred deciduous forest the most during the study, occupying deciduous forest 90% of the time in 2003 and between 76% and 85% in 2007. They also exhibited a high preference for evergreen forest during the spring, moderate preference for evergreen in summer, and shrub scrub during the fall (P values of <0.0001 for all individual and seasonal preferences). White-tailed Deer collared in 2003 averaged 266.6 ha (50% kernel) and 95% use of 1167.0 ha (95% kernel). Those collared in 2007 averaged 425.5 ha (50% kernel) and 1626.3 ha (95% kernel). Individuals collared in the same year were observed to use the landscape equally for each season with nearly equal home-range sizes. Spring home ranges were 35% smaller than summer and fall, due to food preference and snow melt on a west-facing slope. Summer ranges were driven by water resources, and fall ranges by the onset of breeding-season activities. Seasonal shifts in mean centers for geographic distribution for spring to summer ranges were 580 m, while summer to fall shifts were half of that distance (283 m). A study of suburban White-tailed Deer conducted in Maryland showed seasonal shifts ranging from 233–574 m. Small shifts in ranges are most likely due to the relative abundance and close proximity of food, cover, and water in the area. White-tailed Deer in this study did not have to travel great distances to fulfill their resource needs, much like suburban individuals. With this understanding of the resources utilized by White-tailed Deer, managers can best manage their populations in this region.

Tue-PM2-B-1

Ever the Humblest Plodder: The Contributions of Philip Cox (1847–1939) to Eastern Canadian Herpetology

Donald F. McAlpine (New Brunswick Museum, Saint John, NB Canada; donald.mcalpine@nbm-mnb.ca)

Born in the central Saint John River valley, NB, in 1847, Philip Cox was best known for his studies in ichthyology. However, from 1898–1907, Cox published 6 papers dealing with the amphibians and reptiles of New Brunswick and the Gaspé, QC. Some 50 years later, J. Sherman Bleakney acknowledged these papers as foundational to his own scientific work, leading to the first Ph.D. thesis awarded in herpetology in Canada and published as the now classic, "A Zoogeographic study of the Amphibians and Reptiles of Eastern Canada". Following a career as a teacher and administrator, Cox was appointed Professor of Natural Science at the University of New Brunswick (1907–1930). Cox appears to have developed his interest in the natural sciences relatively late in life, since his published writings make no reference to his own scientific activities prior to 1888, when he was 41. Possibly Cox was influenced by fellow educator and self-taught naturalist John Brittain (1849–1913). In the summer of 1888, in the company of Brittain, Cox made one of his earliest collecting trips, to the Restigouche River north of Newcastle. Cox's interest in the natural sciences may also have been stimulated by field excursions after 1890 on the Miramichi River with the American naturalist and animal story writer, Rev William J. Long, best known as the central figure in the famous "nature fakers debate" that involved writer William Burroughs and then US. President Theodore Roosevelt. Cox played a leading role in the formation of the Miramichi Natural History Association, perhaps modeling the organization on the New Brunswick Natural History Society, with which he was involved during his brief time working in Saint John. Here I review the context for the emergence of Cox's work on the salamanders, frogs, and snakes of the region; the location and extent of his field studies in Atlantic Canada; his connections with various natural history organizations and naturalists; and the means by which he sought, unsuccessfully, to develop a herpetological specimen collection representative of the Dominion of Canada

Tue-PM2-A-3

19th- to early 20th-century Geology Lectures at the Natural History Society of New Brunswick

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The Natural History Society of New Brunswick (1862–1932) was a leading scientific organization in eastern Canada that produced significant geological discoveries. Like many contemporary organizations, the Society presented lectures by and for its members, and public lectures for the benefit of the community. Public lectures were an important form of scientific communication during the 19th century. In the eastern United States, communities of all sizes established lecture societies. Lecturers included local citizens, itinerant lecturers, and professionals like Benjamin Silliman (1779–1864) from Yale University who drew audiences of 2000 at the Lowell institute in Boston. Geology public lectures in Saint John began with the Saint John Mechanics' Institute. In 1840, the Institute opened a building with eight classrooms and a hall capable of seating 800 people. Early on, geology became a staple of scientific instruction and lectures, due in large part to Abraham Gesner (1797–1864), the first Provincial Geologist in New Brunswick and an active member of the Institute. Geology lecturers at the Institute included other leading regional scientists like Robert Foulis (1796–1866) and James Robb (1815–1861). Visitors like biologist Asa Gray (1810–1888) from Boston and the English agricultural scientist James Finlay Weir Johnston (1796–1855) also lectured before the Institute. When the Natural History Society was founded in 1862, it shared the Mechanics' Institute building. Between 1862 and 1917, Society records indicate more than 800 lectures were read before the Society and public audiences. Papers by J.W. Dawson (1820–1899) and L. Agassiz (1807–1873) were read before the Society, but lecturers were mostly local citizens and members. Even so, lectures were often at the leading edge of scientific discovery. Research and public education output of the Society was prolific. George Matthew (1837–1925) alone published more than 200 scientific papers concerning geology, including his 1890 report of the first authentic Precambrian fossil and the subject of one of his lectures that year.

Tue-AM2-A-4

Factors Affecting Earthworm Assemblages in Central New York State

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We sampled earthworm assemblages at 50 sites across four habitats (residential, old field, conifer plantation, maple forest) in southern Madison County, NY. We identified and tallied worms and measured a variety of habitat quality (soil pH and organic fraction, elevation, slope, aspect, wetness, potential solar radiation) and dispersal-limiting (distance to roads, streams, agricultural clearings) factors. Earthworm density and species richness decreased with increasing distance from roads. Species richness was lower in soils with less organic matter and higher on slopes facing northeast. We were unable to detect worms at 14 (28%) of our sites, suggesting the presence of worm-free habitats in central New York. This preliminary work suggests that further expansion of earthworms in the region may be jointly affected by land use, soil quality, and factors promoting dispersal, particularly roads.

Tue-PM1-B-5

An Examination of Parasite Load in Coyotes (*Canis latrans*) of Western New York

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Within the last 10–80 years, eastern *Canis latrans* (Coyote) populations have colonized different areas of New York State. Indeed, the ecological and pathogenic relationships between these carnivores and other animal populations are not well understood. Coyotes are opportunistic hunters, and could be bioaccumulators of parasites present in their prey, thus serving as sentinel species for monitoring parasites in other animal populations. Additionally, Coyote populations may act as a reservoir for parasites and diseases that could infect other, more fragile, domestic populations. A survey of parasites present in Coyotes in western New York was conducted using established fecal flotation and light microscopy techniques. Fecal samples were collected and identified based on size and content. Fecal flotation in a Sheather sugar solution and microscopy were performed. Parasite eggs and adults were identified, classified, and quantified using digital light microscopy. From 15 specimens, 14 were positive for parasite infection, and 12 different species of parasites were identified. The number of species per fecal sample ranged from 0–6. Six species of nematode were identified: *Trichuris vulpis*, *Eucoleus aerophilus*, *Eucoleus boehmi*, *Toxacara canis*, *Uncinaria stenocephala*, and *Anclystoma* sp. Two species of cestode were identified: *Dypilidium caninum* and *Taenia* sp, and two species of protozoans were identified: *Isospora* sp, and *Eimeria* sp. Additionally, the trematode, *Alaria* sp., and the arthropod, *Mycoptes musculus*, were identified. As eastern Coyote populations are steadily increasing and becoming more urbanized, potential for interactions with human populations and related zoonotic infections is increasing as well. Clinical knowledge of the parasites present in Coyotes is crucial in understanding their potential impacts in more urbanized areas.

Tue-AM2-B-2

Widespread Coyote-Wolf Admixture in Ohio and the Northeast

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With the extirpation of *Canis lupus* (Gray Wolf) in the late 1800s and the colonization by *Canis latrans* (Coyote) over the last 70 years, the Coyote is the new top predator in the Northeast. Northeastern Coyotes are morphologically, behaviorally, and genetically different from their western counterparts. Admixture with eastern Wolves may present an explanation for these observed differences. In fact, the movement of Coyotes into the Northeast did not occur until they hybridized. A more diverse genome, with genes from both species, likely allowed them to survive in new habitats, both forested and human-dominated. Using 63 nuclear, ancestry-informative single nucleotide polymorphisms (SNPs), we took a landscape genomics approach to assess the prevalence and spatial distribution of admixture in Ohio and the Northeast and to estimate Coyote vs. Wolf ancestry of individuals. Our results show that the magnitude and spatial extent of Coyote-Wolf admixture is greater than previously thought, revealing a region-wide hybrid swarm. Surprisingly, even Coyotes from Ohio showed a strong signature of admixture. Given that no Wolf mtDNA has been observed in Ohio, these results provide evidence of sex-biased hybridization between male Wolves and female Coyotes. Although all genotyped individuals were admixed to some degree, those with a western Wolf mtDNA haplotype were more Wolf-like overall than those with an eastern Wolf or Coyote mtDNA haplotype. These findings are relevant to regional Coyote management and Wolf restoration efforts by state and federal wildlife agencies.

Tue-AM1-B-1

Diet of larval American Shad in the Hudson River Estuary

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The American Shad population in the Hudson River has declined since World War II and particularly since the mid-1980s; currently the stock is at an all-time low, resulting in the fishery closing in 2010. Population declines have been attributed to several factors including dredging and channelizing of the river, water pollution, overfishing, and the introduction of invasive species. Zebra Mussels (*Dreissena polymorpha*) have been the cause of many changes in the food web of the Hudson River, making it important to describe the interactions between fishes and the different life stages of Zebra Mussels. In a 2009 and 2010, survey of larval shad habitat use in the Hudson River estuary, we noted the presence of Zebra Mussel veligers in the larvae's intestinal tracts. We thus undertook a quantitative analysis to determine if veligers are an important component to the overall diet and if the contribution changes during different larval developmental stages. Zebra Mussels were found to be an important component of the overall diet of larval American Shad, with some fish having over 300 veligers present in their intestine. All larval stages were found to consume veligers. Veligers were found to be a more important component of the diet in earlier developmental stages.

Mon-AM2-B-1

Herbivory and Soil Features: A Case Study of Coastal Maine Island Plant Communities

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The ubiquity of large mammal herbivory is now taken for granted in most natural areas of New England as the result of increased hunting and trapping regulations and reduced populations of large predators. Although multiple studies, both in New England and the United Kingdom, have documented the influence of herbivory on vegetation, a consensus on the effect of this top-down influence has not yet been reached. A literature review shows that much of this controversy may result simply due to the inherent species-specific nature of how plant communities are influenced by herbivores. Furthermore, a common discussion centers on whether bottom-up (edaphic features) or top-down (herbivory) are more important processes affecting plant communities. This dichotomous generalization, whatever direction argued, is also inappropriate in light of the species-specific plant-herbivore interactions, where case-by-case examinations would be most accurate. In this study, we compare the plant communities and edaphic features of two Maine coast islands, each with a significantly different history of herbivory. This case study examines the common hypotheses presented around plant-herbivore interactions and how they apply to these islands. Several conservation implications are discussed, as well as recommendations about how to make the study of plant-herbivore interactions useful beyond a case-by-case basis.

Wed-PM1-C-3

Water Chestnut Control in Central New York: Success and Challenges

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A multifaceted control program has been implemented to address the approximately 300 acres of Water Chestnut (*Trapa natans*) impacting the Three Rivers System of Central New York. Combinations of treatment from among granulated and topically applied herbicides, high-speed cutting, mechanical harvesting, group hand-pulling, and public education are being used to fulfill the program's primary objective of preventing Water Chestnut from expanding its contiguous distribution eastward in Oneida Lake and westward in Cross Lake. In pre-treated areas of approximately 3 acres or less, plant coverage has been reduced after 3 to 4 years of successive control efforts to where only maintenance-level hand-pulling is needed. In larger expanses (5–10 acres or more), plant reductions have been highly variable and less successful. Historical seed-source abundance along with low seed mortality/removal from annual control efforts are likely factors that will be discussed.

Mon-AM1-A-2

A Comparison of Estuarine Species Diversity in the East and Hudson Rivers, and the Great South Bay in New York

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Seining or “netting” is an efficient way to sample near-shore aquatic fauna. St. Francis College (SFC) has partnered with the Brooklyn Bridge Park Conservancy and the Beczak Environmental Education Center in order to collect biodiversity data through seining. Seining has also been conducted by individuals on the Great South Bay off of Fire Island, NY. The null hypothesis is that there will be no difference in biodiversity among the estuarine fauna of the East River in New York City versus that of the Hudson River in Yonkers, or that of the Great South Bay off Fire Island. A 9.1-m (30-ft) net was used by two people at a time in waders to collect living estuarine fauna. Species lists were compiled as well as species richness, evenness, and diversity. The latter, species diversity, was determined by using the Shannon-Weiner diversity index. It was found that there was a variation in species diversity, with the highest diversity being found in Yonkers, NY (2.13). It was 1.38 in the Brooklyn Bridge Park and 1.9 in Great South Bay, although the Yonkers site was sampled more frequently. Thus, we rejected our hypothesis that there was no difference in species diversity across locations. The Shannon-Weiner diversity index takes into consideration the number of species as well as the proportion that each species makes up of the whole. If the diversity index is low, this indicates that only a few species make up the majority of the catch. Various reasons can contribute to a lower diversity, including a lower water quality. However, continued sampling tends to increase the diversity to a certain extent as more specimens are located. In the future, we would like to increase our effort to make it more uniform across the three locations and also plan to take water quality measurements to see if there is a correlation of diversity with water quality.

Mon-AM2-B-2

Restoring Loon-years-lost from the North Cape Oil Spill

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On 19 January 1996, the North Cape oil tanker caught fire and grounded on the coast of Rhode Island resulting in the spill of approximately 828,000 gallons of home heating oil. The spill resulted in the death of thousands of birds, millions of lobsters, surf clams, and fish, and billions of invertebrates. The vast majority of the estimated 2272 birds killed were marine birds (2082), including gulls, loons, eiders, grebes, mergansers, and goldeneyes. United States law requires restoration of natural resources damaged by oil pollution and this process in marine waters is overseen by the National Oceanic and Atmospheric Administration's (NOAA) Natural Resource Damage Assessment (NRDA). NRDA is a three-step process; the first phase involves a preliminary assessment to determine whether an injury to public resources has occurred and the extent and severity of the damages. During the second phase, trustees will quantify injury and develop a restoration plan to facilitate recovery of the resource. The final phase is to implement restoration and monitor the effectiveness of the project. In the case of the estimated 402 Common Loons killed in the North Cape Oil Spill (NCOS), it was determined that the most reliable restoration method was to bolster fledging production in wild populations through protection of quality breeding habitat that might otherwise be lost to residential development. The on-site replacement of this injury was deemed logistically impractical; therefore, the mitigation of this injury focused on the purchase of breeding habitat in New England. Monies paid by the responsible party were used to permanently protect, through conservation easements and fee acquisitions, nearly 1.5 million acres of Maine forests and lakes that provided nesting habitat for a 125 loon pairs. Biodiversity Research Institute of Gorham, ME monitored reproductive success in this region between 2000 and 2009 to determine overall productivity, which was used to model population growth and evaluate long-term viability. The degree of compensation that was achieved through the restoration plan to mitigate injuries to the Common Loon population incurred from the spill and critical aspects to consider during development of such plans will be discussed during this presentation.

Wed-PM2-C-3

Using Molecular Techniques to Determine Genetic Diversity within the Earthworm Species, *Octolasion tyrtaeum*

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Invasive earthworms are reported to have significant, negative effects on the ecology of northern forests and soils, with impacts dependent on which species or groups of species invade the system. Thus, the ability to accurately identify species within earthworm communities is a crucial step in maintaining forest ecosystems impacted by these organisms. Accurate identification of earthworm species can be challenging using traditional taxonomic methods which are largely limited to adult worms and intact specimens, and may require considerable knowledge of earthworm anatomy. Morphological identifications are further complicated by the fact that many phenotypic features of earthworms are plastic, with variations leading to morphological overlap between species. Using DNA sequences, we were able to confirm earthworm identifications and examine genetic variability within the abundant species, *Octolasion tyrtaeum*. Variations within the mitochondrial 12s, 16s, and COII genes were each used to assess relationships among individuals and may suggest the presence of distinct lineages within a single species.

Tue-PM1-B-3

Legacy Biological Control as the Driver of Giant Silk Moth (Saturniidae) Decline in the Northeast?

Dylan Parry (SUNY-ESF, Syracuse, NY; dparry@esf.edu)

By the middle of the 20th century, conspicuous declines were noted for many of North America's most spectacular native Lepidoptera, the giant silkmoths (Saturniidae). Nowhere has this been more pronounced than in New England, where some formerly common iconic species such as Cecropia (*Hyalophora cecropia*), one of North America's largest moths, have all but disappeared. Several explanatory hypotheses have been proposed including extensive urbanization, mercury halide street lighting, and a variety of other anthropogenic forces. However, none of these are unique to northeastern North America, and outside of New England, many of these declining saturniid species appear to be doing reasonably well. Boettner et al. (2001) proposed a novel hypothesis; that the regional decline in silkmoths was related to a century-old effort to biologically control Gypsy Moth populations, and specifically, to the release of the multivoltine generalist parasitoid *Compsilura concinnata* (Diptera: Tachinidae). In manipulative experiments, they recorded astonishingly high parasitism of Cecropia and Prometheus (*Callosamia promethea*) and suggested that long term persistence of these species in Massachusetts was not viable with such mortality. Subsequent manipulative experiments by my laboratory with the same (*C. promethea*) and additional species of silkmoth (*Antheraea polyphemus*, *Hemileuca maia*, and *Anisota senatoria*, as well as the gregarious notodontid *Datana ministra*) have validated some, but not all, of Boettner's results, painting a more complex story underlying silk moth decline in northeastern North America.

Wed-PM1-A-5

Genetic and Morphological Differentiation of Wolves and Coyotes in Northeastern Ontario

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In recent years, there has been increasing interest in restoring wolves (*Canis* sp.) to their historic ranges in northeastern North America. Central questions in this issue regard which wolf species historically occupied this region, and which would be best to reintroduce. In Ontario, Canada, hybridization between *Canis lupus* (Gray Wolves), and *C. lycaon* (Eastern Wolves), and Eastern Wolves and *C. latrans* (Coyotes) is extensive and has resulted in taxonomic uncertainty regarding which canid types occur where in the province. This taxonomic uncertainty complicates management of wolves and Coyotes in Ontario. For example, in the intent of minimizing incidental harvest of wolves, all three aforementioned canid species and their associated hybrids are presently managed as a single biological population in primary wolf range in Ontario. This management strategy is based on the perception that wolves and coyotes cannot be reliably distinguished because of hybridization, and the resulting restrictions on Coyote harvest are unpopular with farmers and hunters. We genetically and morphologically characterized a sample of sympatric wolves and Coyotes ($n = 143$) harvested from northeastern Ontario in 2006–2009 to test the hypothesis that these species cannot be reliably distinguished. We found that wolves and Coyotes in northeastern Ontario were genetically and morphologically distinct with minimal introgression between them. Considering alongside evidence that northeastern Ontario is outside the primary range of the Eastern Wolf, our results suggest not only that separate management of wolves and Coyotes is biologically possible there, but also that managing these animals as a single biological population in northeastern Ontario does little to enhance conservation of Eastern Wolves. Our findings also have implications for wolf recovery planning for the northeastern United States. Specifically, reintroduction of the Great Lakes Wolf, a relatively common Gray wolf x Eastern Wolf hybrid (i.e., *C. lupus lycaon*) would minimize the potential for hybridization with Coyotes relative to what would likely occur if Eastern Wolves were reintroduced in the Northeast.

Tue-AM1-B-2

Exposure to Polychlorinated Biphenyls (PCBs) Causes Alterations in Serotonin and Leptin Concentrations in Swiss-Webster Mice

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Endocrine disrupting chemicals (EDC) released into the environment cause harmful effects on wildlife and humans. Polychlorinated biphenyls (PCB) are environmental contaminants that persist in the environment and are identified as EDCs. The hormones leptin and serotonin are intimately linked to many physiological processes including reproduction and metabolism. Therefore, exposure to EDCs that alter these hormones can cause deleterious effects in animals that could ultimately impact future generations. We have previously shown that serotonin n-acetyltransferase (NAT), the enzyme catalyzing the production of melatonin, and melatonin are disrupted by developmental exposure to a mixture of polychlorinated biphenyl congeners, Aroclor-1254. The purpose of the present study was to determine the impact of Aroclor-1254 as well as individual congeners on serotonin and leptin in developing and adult mice. Adult female Swiss-Webster mice were housed under controlled conditions and fed a ground rodent diet containing 0 ppm control or 5 ppm of Aroclor 1254, PCB 136, or OH-PCB for 60 days. Developing animals were exposed to 1.25 ppm Aroclor 1254, 12.5 ppm Aroclor 1254, or 5 ppm OH-PCB during gestation and lactation until 15 or 30 days of age. After 60 days of treatment in adults and 15 or 30 days postnatally in pups, brain and serum serotonin was determined using a commercially available radioimmunoassay kit (RIA) (MP Biomedical, Solon, OH). Serum and adipocyte leptin was determined using RIA techniques. Serotonin concentrations were significantly depressed after exposure to Aroclor 1254 ($P < 0.01$) and OH-PCB ($P < 0.05$) but remained unchanged in PCB 136-exposed animals when compared with control animals. Serum leptin concentrations were significantly depressed at 15 days ($P < 0.05$) and in adult animals ($P < 0.05$) but significantly elevated at 30 days ($P < 0.001$) when compared with controls. This alteration indicates that the decline in reproductive success in animals exposed to PCB could be caused induced by interruptions in serotonin and leptin production. Future research will focus on the impact of PCB mixtures and hydroxylated PCB congeners on brain chemistry, reproductive success, and behavior in F0, F1, and F2 generations.

Wed-PM2-C-2

Community Structure of Native and Exotic Earthworms Varies Between Two Adjacent Regions of New York State

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Exotic earthworms have documented impacts on northeastern forests, but the species mixes vary, and little is known about how novel earthworm communities are formed and distributed. We compared earthworm community structure along headwater streambanks in two regions of eastern New York State: Catskill State Park and Helderberg Plateau. Seven sites in each region were studied during 6 periods over two years, in timed searches over fixed locations (50-m reaches). Numerous new regional findings were recorded, with up to 16 earthworm species observed per site. The pooled Catskill sites contained a subset of the Helderberg species pool (19 species), with 14 species in common. *Octolasion tyrtaeum* was the most numerous in the Helderbergs and was the second most abundant species in Catskill State Park. Other species that were numerous in both regions include *Aporrectodea tuberculata*, *Dendrobaena octaedra*, *Eiseniella tetraedra*, and *Lumbricus rubellus*. Those found at greater abundance in the Catskills were *Dendrobaena octaedra*, *Dendrodrilus rubidus*, and *Eisenoides lonnbergi* (the only reputed North American native). Cluster analysis indicated two relatively distinct community patterns associated with the two regions, and overall diversity (rank-abundance patterns and species evenness) was higher in the Helderbergs. Measured environmental variables (elevation, sediment pH, litter composition, and tree species relative abundances) were correlated with site-specific differences in worm species composition, but not regional differences. These results may suggest that these formative earthworm communities are structured by historical factors, such as invasion histories or previous land use.

Tue-PM1-B-4

Food Chain Inception in Tidal Marshes

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The success of early stages of many tidal marsh-based fish life cycles are dependent on the integrity of high marsh terrain. *Fundulus heteroclitus* (Killifish) begin their life in the upper high marsh of a typical tidally divided salt marsh. Adult Killifish lay their eggs on the high ground, commonly replete with *Spartina patens*, when flooded monthly, both during a full moon and new moon. The adult Killifish then retreat with the outgoing tides, and the eggs are abandoned among hollow, broken or detached stems of *Spartina alterniflora*, among mussel shells, or on algal mats. Subsequently, newly hatched fish larvae are left to fend for themselves during the tide-free interval in the high marsh. High marsh, during its periodic unsubmerged state provides an optimal platform for the settlement of small puddles and panes of water that are shallow and still. It is here that newly hatched Killifish larvae encounter newly hatched *Ochlerotatus sollicitans* (Salt Marsh Mosquito) larvae. Day-old Killifish commence consuming Salt Marsh Mosquito larvae. Thus, the puddle and panne environment that produce Salt Marsh Mosquitoes also provides habitat for a natural monitor of predatory fish that temper mosquito populations upon inception. Seclusion of these small-scale puddles and panes from larger stationary bodies of water provides an isolation effect that protects the young Killifish from the cannibalistic adult Killifish. Mosquito control efforts that channelize marshes to expedite access of adult Killifish to mosquito larvae puts succeeding generation of Killifish at risk. Likewise, efforts to eliminate high marsh puddles and panes and replace them with larger supplementary man-made ponds undermine the natural procession of fish life cycles and the natural predation association in healthy salt marsh ecology.

Mon-AM1-B-1

Deleterious Impacts of Salt Marsh Restoration

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Ecological restorations entail a variety of tools and techniques depending upon the subject ecosystem, the prioritization of species, and the goals of the project. Restoration projects in salt marshes that include the objective of diminishing mosquito populations may yield compromised function of the marsh and decreased marsh terrain. Such projects alter the topography of the marsh, affect tidal flow across its surface, and rearrange the degree and juxtaposition of standing water on the high marsh. Restructuring of salt marshes to control mosquitoes include regrading high marsh to yield a planar surface, excavation of ponds, and trenching the surface with a system of gullies that are referred to as ditches, channels, or creeks. The aim of these techniques is to increase accessibility to the high marsh for mosquito-eating Killifish and eliminate mosquito breeding areas. However, such modifications eliminate Killifish breeding sites, expose larval and juvenile Killifish to the cannibalistic adult Killifish, undermine the integrity of marsh structure and increase the volume of water at the expense of marsh mass. Such restoration techniques may be imprudent at a time when we are currently experiencing accelerated trends in marsh loss.

Mon-AM1-B-3

Forest Communities along Acid Deposition, Soil, and Climate Gradients of the Appalachian Trail

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Acid deposition occurs when airborne industrial pollution returns to earth, a phenomenon that has lasting effects on remote landscapes. The Appalachian Mountains are particularly susceptible to this phenomenon, both because of their thin, easily acidified soils and because of their geography (i.e., high elevation and position downwind of pollution sources). The Appalachian Trail (AT) Mega-Transect Atmospheric Deposition study examines the status and susceptibility of the AT corridor with respect to acid deposition. The AT corridor is a contiguous, mostly forested, publicly managed recreational area, which affords a unique opportunity to study montane ecosystems on a sub-continental scale. The present research comprises the forest ecology component of the Mega-Transect project. The goal is to quantify multiple drivers of understory plant community composition across broad biogeographical gradients such as latitude, elevation, climate, soil type and chemistry, and acid deposition. Thirty (30) sites were selected within three major forest types: northern hardwood ($n = 12$), dry oak ($n = 9$), and spruce-fir ($n = 9$). All sites were characterized with respect to understory composition, overstory stand structure, herbivory, on-site microclimate, light environment, underlying geology, and modeled acid deposition. Trends in the data suggest that understory composition is shaped by the dominant overstory tree species, but also by broad regional environmental gradients. Understory species richness appears negatively correlated with latitude in northern hardwood stands, but not in spruce-fir or dry oak sites. Acid deposition and soil characteristics appear to play a more subtle role in structuring understory plant communities than variables such as forest type, latitude, elevation, climate, and herbivory; however, more detailed analyses are currently in progress.

Wed-AM1-B-1

The Influence of Geology and Substrate on Plant Life in Northeastern North America

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Within a given climatic regime, geology plays a central role in the distribution and ecology of plant species and their associated biota. The most significant causes of localized or unusual plant distributions are discontinuities in geology. Abrupt changes in geologic conditions can also set the stage for processes generating plant diversity. The study of plants growing on unusual geologies and substrates has contributed much to ecological and evolutionary theory. While much attention has been paid to the influences of geology and substrate on plant life worldwide, such literature for eastern North America is scant. The work we have recently conducted on plants of serpentine and granite outcrops, seabird guano deposits, and metal-enriched mine tailings in Maine suggests a unique substrate effect on the regional flora at taxonomic, physiological, and community levels. Our research highlights the need to better document the floras of other under-explored substrates of the region, including limestone, dolomite, and gypsum, and soils overlying metal-enriched geologies, including mine tailings and waste-rock piles. These island-like habitats with unusual chemical and physical soil features can provide unique settings for the assembly of distinct plant communities, consisting of rare and endemic species and physiologically distinct ecotypes of more regionally common species. These edaphically restricted species can provide ample opportunities for descriptive and experimental studies in botany, ranging from cellular and organismal to population, community, and ecosystem levels.

Wed-PM1-C-1

Potential Method for Assessing Black Bass Condition at Capture and Release Tournaments

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Developing effective methods for evaluating the status of fisheries and the health of the fish within them has been a major concern for fisheries managers in both marine and freshwater environments. Even though blood chemistry is the fundamental way to evaluate fish condition, it is not a feasible technique, given the temporal and spatial restraints present in field operations. In order to examine and quantify the condition of fish tagged at local black bass tournaments, we are currently developing an in situ assessment of fish condition. This index is based off 3 major parameters: barotrauma and its factors, wounding and its factors, and reflex impairment. 488 Largemouth and 732 Smallmouth Bass were examined. Overall, Largemouth Bass had a higher proportional occurrence of reflex and wounding factors. The utilization of reflex impairment, barotrauma indices, and wounding indices as a mechanism to collectively assess fish condition is a concept not yet developed for freshwater systems. We anticipate that this index may have a positive impact on management of bass tournaments.

Wed-PM1-B-1

Ecology of Roadside Mosses

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With 6.3 million km of public roads in the United States, roughly 1% of the land surface is directly impacted by the presence of roads, making them one of the most prevalent features of the modern landscape. Mosses are widely and easily dispersed, high in abundance, sensitive to their microhabitat, and one of the few types of plants that are capable of growing in the highly disturbed areas along roadsides. We tested the hypothesis that mosses may be used to describe roadside soil chemical and physical conditions. Twenty-four locations of varying road types were sampled across central Vermont and New Hampshire, and Northern New York. Replicate plots were sampled at four distances from the road edge. Sample plots were measured for ground cover (soil, rock, litter, tree/shrub, herbaceous, graminoid, and cryptogams), soil physical characteristics (depth, hardness, and texture), and soil chemistry (pH, CEC, organic matter, N, P, K, S, B, Ca, Na, Mg, Fe, Zn, Cu, Mn, and Al). All species of moss occurring in the plots were collected and identified. Plot ground cover and soil chemical and physical measurements differed among the three states. Presence of moss colonies was significantly correlated with selected plot ground cover, soil chemical measurements, and distance from road edge. Moss species differed in their response to ground cover, soil physical measurements, and soil chemistry, suggesting that mosses may be useful indicators of roadside microenvironments.

Mon-PM2-C-1

Restoring Eastern Lake Ontario Wetlands through Habitat Creation and Control of Invasive Species

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A number of wildlife species and community types have been declining in eastern Lake Ontario coastal wetlands over the last few decades. This decline is linked to decreasing habitat quality from the expansion of dense homogenous stands of invasive *Typha x glauca* (cattails) due to stabilized lake levels and a decrease of keystone species like the *Ondatra zibethicus* (Muskrat). The Nature Conservancy is coordinating a restoration project with Ducks Unlimited to restore wetland function and provide access to breeding and spawning habitat for 3 indicator species through invasive species control and habitat restoration throughout the eastern Lake Ontario Dune and Wetland complex, Lakeview Marsh Wildlife Management Area (WMA), Ellisburg, Jefferson County, NY. This project compliments similar restoration work underway in the St. Lawrence Seaway and will be compared with lake-wide monitoring of performance indicators related to a newly proposed water regulation plan for Lake Ontario. This project began in 2011, with wetland habitat at Lakeview Marsh WMA being restored through the excavation of 2743 m (9000 linear ft) of meandering channels and a series of open water potholes, while invasive species throughout the region were mapped and managed using various control techniques (manual control and foliar herbicide use). The response of indicator species which include *Chlidonias niger* (Black Tern), *Ondatra zibethicus* (Muskrat), and *Esox Lucius* (Northern Pike) are being monitored during summer 2011–2013. The restoration techniques employed, the monitoring programs, and the results from the first year of this three-year project will be discussed.

Wed-AM2-C-2

Mercury Bioaccumulation within Terrestrial Foodwebs in the Adirondack Park, NY

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A potent neurotoxin, mercury has been shown to impact the behavior, growth and reproductive success of wildlife through bioaccumulation within foodwebs. The detrimental effects of mercury contamination have been extensively documented in aquatic ecosystems, but it is equally important to understand the impacts that mercury deposition may have on biota within the adjacent, surrounding landscape. Relatively few studies have focused on the mechanisms of mercury bioaccumulation in terrestrial ecosystems. From 2008–2011, intensive field studies were conducted at several Adirondack northern hardwood forest, montane forest, and *Sphagnum* bog habitats to trace the movement of mercury through sensitive terrestrial foodwebs using songbird species as biological indicators for ecological health.

Wed-PM2-C-1

Plant Demography in Wetland Canopy Gaps: Nonlinear and Indirect Responses

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There is a strong, decades-long interest in how understory plant populations respond to forest canopy gap formation. Gap-dependent plant populations often respond to increased light with increased population growth rates, as in the textbook example, *Primula vulgaris* (Primrose). By examining the population dynamics of the gap-dependent wetland plant *Trollius laxus* (Spreading Globeflower), we demonstrate that this textbook gap response may be applicable only at low light levels. We used projection-matrix modeling to probe 6 years of monitoring data from *T. laxus* subpopulations within 11 created, experimental canopy gaps and 9 control areas in a forested wetland. We examined the relationship between gap brightness (diffuse and direct light) and population growth rate, comparing our results to those obtained for *P. vulgaris*. We found a non-linear, unimodal relationship between diffuse light and population growth rate for *T. laxus* under the wide range of light levels encountered at our populations (4–58% diffuse photosynthetic photon flux density [PPFD]). There was no significant relationship between direct light and population growth rate. However, both diffuse and direct light had strong negative linear relationships with population growth rate in the experimental canopy gaps alone, where light levels were generally greater than 20% PPFD. In the case of *T. laxus*, indirect effects of gap formation (understory competition and litter accumulation) seem to be more important than the main direct effect of gap formation (increased light transmittance). Thus, the effects of canopy gaps on understory plant populations can be nonlinear and indirect. In general, gap effects are likely to be highly variable, depending upon gap characteristics such as size and rate of closure. In many wetland forests, it will be necessary to consider the effects of both light and hydrology on understory plant demography.

Tue-PM2-C-3

European Research May Apply to North American Fen Management

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Recent studies have shown that a number of European plant species are in decline as a result of changes to historical small-scale, moderate-intensity agricultural practices, such as mowing, grazing, and coppicing. These traditional practices tended to reduce tree canopy cover and limit herb-layer biomass and litter accumulation. Demographic studies of these declining European plant populations may be applicable to the conservation of plants in North American calcareous fens, which are groundwater-fed, species-rich wetlands of conservation concern. *Trollius laxus* (Spreading Globeflower; Ranunculaceae), a rare calcareous fen perennial, is believed to decline with succession, as fens transition from open- to closed-canopy habitats. We used projection-matrix modeling and life-table response experiments to examine the subpopulation dynamics of *T. laxus* in created experimental canopy gaps and paired controls in a forested fen in central New York. We compared the population dynamics of *T. laxus* to those of European perennial herbs that occupy traditionally managed fens and wet grasslands. On average, *T. laxus* subpopulations responded to experimental canopy gaps with first increasing, then declining stem and flower production and population growth rates. Competition from surrounding understory vegetation and litter accumulation—but not canopy closure or hydrological changes—were likely the major factors causing the declines. Growth and stasis were more important than fecundity and retrogression in explaining differences in population growth rate among the *T. laxus* subpopulations. The demography of *T. laxus* was similar in several key ways to the demography of European species from fens and wet grasslands, suggesting that active management is needed in many North American fens in order to conserve the rare and uncommon species that are characteristic of these habitats.

Mon-AM1-B-2

Carbon Sequestration by *Phragmites australis*

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Carbon sequestration as an ecosystem service has received attention as a climate-change mitigating strategy. The restoration of wetlands has also been an integral part of US management policy since the passage of the Clean Water Act. How restoration impacts carbon sequestration, however, has seldom been reported. A record of over three years of net carbon exchange measured via the eddy-covariance technique from a restored urban temperate wetland in 1999 shows that atmospheric carbon fluxes decreased by 50% concomitant with the management of *Phragmites australis*. The convention of atmospheric carbon fluxes measured via the eddy-covariance system is negative flux for CO₂ uptake from the atmosphere and positive flux when there is a release from the soil and vegetation into the atmosphere. All aboveground biomass of this invasive plant was eliminated by 2011. Aboveground biomass of the planted *Spartina alterniflora*, the restored, native species, decreased over the same time period by 60%. The majority of the biomass resides belowground for *Spartina alterniflora*, as determined by excavation in 2011. Comparison between the currently managed urban wetland and a currently unmanaged but a recently restored site in 2007 nearby, where *Spartina* spp were restored, shows that the atmospheric carbon fluxes in the unmanaged wetland in 2011 were triple those of the managed wetland. Thus, managing wetlands by removing *Phragmites* may diminish their carbon sequestration.

Wed-AM2-B-1

Habitat Assessment and a New Approach for Evaluating Development Impacts

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What we see in a landscape is a snapshot of some of the obvious components of biological diversity: trees, flowers, a Great Blue Heron at the edge of a pond, or a turtle crossing the road. These are connected to a myriad of organisms and habitat characteristics that are less obvious but are necessary for healthy ecosystem functioning. Many development projects (residential, commercial, energy) affect ecological systems to some degree; some of these impacts are obvious, but many are not. In many cases, development impacts are inadequately described during the impacts-assessment process because information about ecological interrelationships and ecosystem functions—especially those that are less obvious—is generally not evaluated. The tendency of traditional environmental impact assessment has been to generate lists of species observed on a project site without examining life-cycle habitat needs, species-habitat interrelationships, or impacts on ecosystem functions. Inadequacies in the ecological characterization of a site usually lead to corresponding inadequacies in the evaluation of impacts from development activities, and subsequently to inadequate mitigation and protection measures. For one township in New York State, it became clear that the traditional environmental impact assessment process was resulting in inadequate protection of the town's habitats and species of conservation concern. To address this, provide a foundation for looking at impacts on local resources, and to provide potential developers with clear and consistent information requirements early in the project review process, a group of local representatives developed Habitat Assessment Guidelines as a non-regulatory policy document for planning board endorsement. The Guidelines are also an attempt to balance local municipal authority for protection of the common welfare with what is reasonable for individual property owners. This talk describes the original habitat assessment guideline process, and takes it one step further, demonstrating how it can be used to correlate specific development activities with their effects on habitats, species, and ecosystems. This approach is intended to enable project reviewers to more effectively evaluate development impacts (direct, indirect, and cumulative) on ecosystems and their functions—and ultimately on the benefits they provide for human communities.

Mon-PM1-B-4

Influences on the Herbaceous Layer in Deciduous Forests: Small Mammals and Canopy Tree Neighborhoods

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The herbaceous layer in temperate deciduous forests is influenced by small-scale variations in light and soil conditions, and the importance of animals, mainly insects, as seed dispersers has been well established. However, few studies have investigated if seed or seedling predation by small mammals such as mice, voles, or chipmunks affects herbaceous species. In 1994, we established 36 1- x 2-m fenced small-mammal exclosures, paired with similar-sized control plots, under the major canopy tree species found at Great Mountain Forest, in Norfolk, CT. In 2005, after 10 years of small-mammal exclusion, we returned and sampled the vegetation in both the fenced and unfenced plots. We found that after 10 years of protection from small mammals abundance of herbaceous plants increased inside the exclosures ($F = 5.585$, $P = 0.023$), as did the proportion of plants flowering ($t = -2.11$, $P = 0.039$). However, species richness and Shannon-Wiener diversity (H') were similar inside and outside of exclosures. At one site, species of canopy tree did impact species richness ($F = 5.107$, $P = 0.002$), independent of exclosure. *Fraxinus americana* (White Ash) had the highest species richness (average number of species = 7.5) and *Tsuga canadensis* (Eastern Hemlock; average number of species = 2.25) and *Quercus rubra* (Northern Red Oak; average number of species = 1.5) had the lowest. These results demonstrate that small-mammal herbivores affect the abundance and reproduction of herbaceous species directly, and that local conditions (such as the surrounding canopy tree neighborhood) are also important in the maintenance of the herbaceous layer in temperate deciduous forests.

Mon-AM2-A-3

Effect of Wetland Restoration on Bird, Invertebrate, and Plant Communities at Long Point, Lake Erie

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Decreased wetland interspersed and need for dredging of lower Great Lakes coastal wetlands results from encroachment of open water by invasive *Typha x glauca* (hybrid cattails), *T. angustifolia* (Narrowleaf Cattail), and *Phragmites australis* (Common Reed). To increase wetland interspersed and wildlife habitat at Long Point, Lake Erie, ponds (0.4–4.0 ha) were restored by dredging cattail and Common Reed (hereafter Cattail-Reed), 2008–2010. We determined if bird, aquatic macroinvertebrate, and plant communities differed among restored ponds, natural ponds, and areas of monotypic Cattail-Reed to investigate effects of dredging, May–August 2011. Marsh-bird relative abundance was 40% greater at restored and natural ponds than Cattail-Reed areas and richness was at least 16% greater at restored ponds than natural ponds and Cattail-Reed areas. Relative abundance of macroinvertebrates was 77% greater in restored than natural ponds. Plant species richness were 57 and 54% greater, respectively, and diversity 42% greater at restored ponds than natural ponds and Cattail-Reed areas. Our comparison of restored ponds with natural wetland habitats highlights that dredging to restore interspersed and manage monotypic Cattail-Reed in lower Great Lakes wetlands can be beneficial to marsh-nesting birds and habitat resources used by fish and wildlife.

Wed-AM2-C-3

Response of Sciurids to Climatic Variation in North America Over the Past Century

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Bergmann's rule, which describes the tendency for body size of animals to increase with increasing latitude and elevation, has recently been explored across temporal gradients to assess the relationship between body size and environmental conditions. Changing climates provide a unique challenge or opportunity that may result in a shift in body size of populations, consistent with the causal explanations for Bergmann's rule (i.e., increasing during periods of cooling and decreasing during periods of warming). The purpose of this research is to assess the capacity of members of the Family Scuridae (squirrels) to respond in an adaptive manner to recent climate change through shifts in body size of their populations. We predict that body size shifts over time will be inversely related to changes in mean annual temperatures. Specifically, we compared the body size (condylobasal length) of over 320 specimens of eight Sciurid species, where each species was collected at the same location over the past century. A majority of the 11 sites across North America where these species were collected experienced warming over the period in which specimens were collected. Two California populations of *Callospermophilus lateralis* (Golden-mantled ground squirrel) demonstrated significant shifts in body size during the collection periods (Mann-Whitney test, p -value < 0.05). These shifts (one increase and one decrease) were inversely related to changes in five year-averaged maximum summer temperatures and minimum winter temperatures, suggesting that changes in extreme temperatures may be driving changes in body size. Given the fundamental importance of body size, our research will enhance our ability to predict potential evolutionary responses to future climatic change and provide transformative insights for conserving the natural character of species, including their body size and capacity to adapt to future environmental change.

Wed-PM2-A-3

Sex, Age, and Seasonal Differences in Refueling Rates of Migratory Songbirds During Stopovers in New York

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Stopover refueling rate may be a proximate mechanism underlying sex-related and seasonal variation in the migration speed of birds, but this is difficult to assess using traditional mark-recapture and regression methods of measuring mass gains at stopover sites. The sensitivity of these methods may also be insufficient to identify differences that may exist between the refueling performance of juvenile and adult birds. Plasma metabolite profiling has increasingly become the standard contemporary technique for assessing stopover refueling rates, but few studies have yet to employ the technique to examine potential sex, age, or seasonal variation in this important aspect of migration. We used blood plasma triglyceride (TRIG) and betahydroxybutyrate (BUTY) levels of Nearctic-Neotropical passerines to measure instantaneous stopover refueling rates and test hypotheses that males refuel faster than females during spring, adults refuel faster than juveniles during autumn, and migrants refuel more rapidly during spring than autumn. Model selection based on Akaike Information Criterion indicated that males had higher refueling rates than females in the Common Yellowthroat (*Geothlypis trichas*) and Yellow-rumped Warbler (*Setophaga coronata*), the two species we examined during spring. Juvenile and adult refueling rates did not differ during autumn in Swainson's Thrush (*Catharus ustulatus*), Common Yellowthroat, Yellow-rumped Warbler, or White-throated Sparrow (*Zonotrichia albicollis*). In the Ovenbird (*Seiurus aurocapilla*), Northern Waterthrush (*Parkesia noveboracensis*), Common Yellowthroat, and Yellow-rumped Warbler, season was important for explaining variation in TRIG, and TRIG levels indicated faster refueling during spring than autumn. Season had less effect on BUTY, although differences were in the expected direction for each species except Swainson's Thrush. Our results provide some of the first evidence that variation in stopover refueling rate at least partially explains the means by which males arrive on breeding grounds ahead of females and birds complete migration in less time during spring than autumn. We found no evidence, however, to support the commonly held idea that juvenile refueling performance is inferior to that of adults during autumn.

Tue-PM1-A-1

Survey of Vermont Ticks: Species, Life Stages, and Seasonal Activity

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The Black-legged Tick (*Ixodes scapularis*) is a known vector for a variety of human diseases such as Lyme disease, Babesiosis, and Anaplasmosis. Rarely documented in Vermont until recently, Black-legged Ticks now appear to be spreading throughout the state. Similar expansions have been noted across the northern USA, southern Canada, and northern Europe. Effective management of tick-borne diseases will depend heavily on understanding the underlying causes of tick range expansion. We established a systematic sampling regime to collect baseline data on Black-legged Tick abundance at five sites along the Connecticut River in Vermont. Sites ranged from Ascutney in the south, to Guildhall in the north. We sampled for ticks by "dragging" a set of 100-m transects every 14 days at each of the five sites from June to December 2011. Black-legged Ticks are to be PCR tested for *Borrelia burgdorferi*. Although Black-legged Ticks were found at all sites, they were more abundant at southern-most sites. Seasonal variation in tick activity by life stage mirrored previously published reports. In 2011, temperatures remained mild into to the month of December, delaying the onset of winter snow pack. We continued to collect ticks until frequent snowfall made "dragging" impractical on December 5th. Black-legged Tick abundance also seemed to be positively associated with the presence of several invasive plants including Common Buckthorn (*Rhamnus cathartica*) and Tartarian Honeysuckle (*Lonicera tartarica*). Our results confirm that the Black-legged Tick is well established in southeastern Vermont, but may be on the verge of expanding into northeastern Vermont. Incidences of several tick-borne diseases are expected to increase should the tick population continue to expand.

Mon-AM1-A-1

A Part of Nature, not Apart from Nature: Indigenous Influences in Natural Landscapes

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Past influences on natural landscapes by indigenous people are seldom acknowledged in contemporary ecological studies. In North America, a myth has been perpetuated that European settlers encountered a vast unoccupied and untouched continent. Traditional ecological knowledge from surviving indigenous cultures is only just now gaining recognition as accurate and important sources of natural history information. There is much need for research to better understand how indigenous people shaped natural landscapes and the distribution of species. As part of a broader study to identify the structure and function of historical indigenous corn hills at sites in the northeastern United States, we found an apparent ecological relationship between this agricultural technology and exiting bryophyte communities. We hope to further study this phenomenon to better understand how past human influences have helped to create natural landscapes. This research may also help to characterize predictions about the future impacts of contemporary human perturbations. The role of Native Science as a method of inquiry may play a role in influencing the interpretations of both past and present environmental influences by humans.

Mon-PM1-A-4

Monitoring Bog Turtle Population Viability and Habitat Quality in New York

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As part of the endangered species recovery process, biologists must develop reliable indicators of habitat quality and population viability and must specify threshold criteria above which populations may be considered secure (e.g., minimum habitat requirements and minimum abundance). A viable complex of Bog Turtle (*Glyptemys muhlenbergii*) populations was recently confirmed in eastern New York thereby enabling researchers to characterize baseline conditions and thereby clarify recovery criteria for this globally threatened species. We used capture-recapture data collected over 10 years and one season of radiotelemetry ($n = 22$ individuals) at this complex to develop metrics of habitat quality and population viability and to specify conservation thresholds. Based on population models, stable Bog Turtle populations were characterized by abundance > 20 individuals and juvenile:adult ratio of approximately 1:1. Bog Turtles generally selected microhabitats with relatively high coverage of woody shrubs (mean = 35%), relatively tall vegetation (mean = 0.62 m) and relatively low distance to water within open-canopy fen habitats (mean = 0.46 m). Although Bog Turtle conservation strategies generally focus on restoring open-canopy nesting habitat within fens, our results suggest that a more comprehensive approach would also promote fen habitat areas with abundant woody shrubs and other low ground cover with deep mucky soil and ample wet burrows and root spaces. With small home-range size, and demographic models suggesting high probability of persistence at low abundances, high-quality fen habitats of 1 ha or less should be capable of supporting viable Bog Turtle populations.

Mon-PM2-A-1

The Elements of Science-based, Adaptive Bird Conservation and the Public Trust Doctrine

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As we approach the centennial of the Migratory Bird Treaty Act (1918), it seems timely to consider modern, American bird conservation efforts in the contexts of science-based conservation, adaptive resource management, and the Public Trust Doctrine. In 1993, the US Supreme Court established the Daubert Standard for assessing "good science". In 2008, the US Department of the Interior formally adopted adaptive resource management to guide its activities. Peer review is a key element of the Daubert Standard, and adaptive resource management identifies a mechanism for accountability based upon progress toward measurable goals and objectives. The Public Trust Doctrine asserts that wildlife resources are held in trust for the Public by state and federal conservation agencies. Modern, populist bird conservation efforts and nongovernmental organizations (NGOs), however, have been slow to embrace the Daubert Standard and adaptive approaches to conservation. In particular, the popular mantra, "Birds are a lot like ducks", (a vague reference to the North American Waterfowl Management Plan by Partners in Flight) is misguided and uninformed. In addition, NGOs that accept money for memberships, asserting through advertising that they are achieving bird conservation, without showing progress toward measurable conservation goals and objectives (faith-based conservation), may be committing fraud. I contend that modern bird conservation would benefit from greater attention being given to conservation-by-demonstration (adaptive, science-based conservation) by both NGOs and state agencies. For state agencies, in particular, a failure to do so could be construed to be a violation of the Public Trust Doctrine.

Mon-PM1-B-5

Rooftop Biodiversity: The Effects of Green Roof Vegetation on Arthropod Communities in New York City

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Urban development has dramatically decreased habitat for arthropods. A potential solution is to re-create ecosystems on green roofs. Most green roofs are planted with a mixture of non-native succulent plants (mostly the genus *Sedum*), but more complex ecosystems based on native plants can be created with deeper growing media. We studied the differences in abundance and diversity of arthropods found on green roofs planted with *Sedum*, mixtures of native and exotic flowering plants, and unvegetated roofs. The 18 roofs studied were spread across New York City's five boroughs. Preliminary results show that mixed native communities support a greater richness of arthropods, but that patterns in insect communities are quite heterogeneous across the city.

Wed-PM2-B-2

Survey of the Patterns of Nest Box Use among Squirrels (Sciuridae) in Managed Forest Stands in Clinton County, New York

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Both natural and artificial habitat enhancements can be structural components that increase the fitness of squirrels (Sciuridae) and thus warrant study. These structures can provide useful demographic and community information about wildlife populations, such as occupancy rates, litter size, habitat preference, as well as species richness and abundance estimates. This artificial nest box study aims to investigate the nesting patterns of squirrels from late winter through early fall 2011 in managed mixed forest stands within Clinton County, NY. It is known that squirrels are very sensitive to forest disturbance, hence we compared sites of varying silvicultural impacts (e.g., managed for logging and maple sugaring versus a control). A total of 48 nest boxes (16 per site) were constructed, across 4 stands. Weekly measurements of abiotic variables were recorded and biotic variables were examined which included wildlife point counts and nest-box occupancy. Occupancy may be a function of nest-box height (≈ 3.5 m and ≈ 5 m) and site-specific tree cavity/snags/drey abundance; thus, they were surveyed. Of nest boxes, approximately 81%, 44%, and 13% in the control, logged, and maple sugar sites, respectively, had visual confirmations of *Glaucomys sabrinus* (Northern Flying Squirrel), with one observation of *Sciurus carolinensis* (Red Squirrel). The first noted incidence of nest-box occupancy was observed on 20 March 2011, approximately two weeks after erection at the control site. Additionally, approximately 63% of nest boxes show evidence of wildlife visitation (e.g., scat, crushed seeds, or nesting material), 50% of the high boxes versus 29% of the low boxes were utilized, and 17% of all occupancies contained multiple individuals. This survey provides additional multi-season occupancy data for an elusive group of mammal species under managed habitat regimes. We suggest forest managers and conservation biologists attempt to reduce the removal rate of snags and trees with cavities in their daily practices, as these features can enhance the nesting success of squirrels. Additionally, if faced with logging, managers should implement habitat enhancements (e.g., nest box addition) to offer long-term housing and protective refugia for squirrels.

Mon-AM2-A-2

Historic Reconstruction of Habitat Loss and the Extinction of the Passenger Pigeon

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Assessing the extinction risk of seemingly abundant and common species is an activity that should not be overlooked by conservation biologists, particularly when rapid changes in land use or land cover may be impacting the habitat of those species. Once the most abundant bird species in North America, *Ectopistes migratorius* (Passenger Pigeon) was so numerous many at the time did not believe it was at risk of extinction, even after decades of intensive exploitation and habitat modification. Throughout the 19th century, human population growth and migration, as well as agricultural and industrial development, reduced and fragmented the hardwood forests which were the primary nesting habitat for Passenger Pigeons. At the same time, commercial hunters and trappers targeted breeding colonies for a largely unregulated market. The species was extinct in the wild by the beginning of the 20th century. Over-harvest and habitat loss have both been proposed as the primary factor leading to the extinction of the Passenger Pigeon. Because these factors occurred simultaneously, they have been difficult to tease apart to determine the probable conditions that lead to the extinction of this species. Within a temporally dynamic modeling framework, I developed a species distribution and habitat model for Passenger Pigeon in order to quantitatively explore the likelihood of different extinction scenarios involving habitat loss. The baseline species distribution model based on climate variables and vegetative cover illustrates the breeding range and available habitat of the species prior to the westward expansion of European settlement. I modeled habitat loss based on historical records of human population growth and land use. This dynamic habitat model illustrates a possible trajectory for the amount and spatial pattern of habitat loss for the Passenger Pigeon throughout the 1800s.

Mon-PM1-B-1

Environmental Variables and Biodiversity within New York City Parks

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While urban park users predominantly cite individual and social benefits as the primary services provided by green space, there are significant environmental and conservation benefits that are often overlooked. Urban planning that incorporates public parks with green space has a valuable positive effect on preserving biodiversity within urban environments. In fact, each of the five boroughs in New York City has at least one large park (area greater than 450,000 m²). In traditional thinking about urban ecology, these large parks should serve as "anchors" of both biodiversity and populations of wildlife that may disperse from these regions to other smaller parks in the region. We are here reporting on the early stages of a long-term study of the biodiversity of parks within New York City. The initial phase of our project was a GIS analysis of the New York City parks using Google Earth Pro. We calculated the amount of different communities and surface features distinguishable from the satellite photos. Total area, perimeter, wooded area, lawn area, water, and other features were measured and analyzed for patterns. The next phase in the project was to do botanical surveys of the parks to test for biodiversity correlates with these landscape features. Our initial work did not find significant socioeconomic patterns in park size or environmental quality. Our preliminary plant data (21 parks in Manhattan) failed to disprove the null hypothesis that plant alpha diversity does not vary with park size. This seems to be due to the large number of ornamental plantings in nearly all New York City parks. We are continuing this work and plan to expand to faunal surveys over the next year. It appears that water will turn out to be the most important correlate of biodiversity in the city parks, but such a conclusion is hypothetical at this point.

Wed-PM2-B-1

Natal Origin and In-river Movements of River Herring in New York Waters

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Young-of-year (YOY) river herring (i.e., Alewives [*Alosa pseudoharengus*] and Blueback Herring [*A. aestivalis*]) and water samples were collected from multiple sites (17 water-sampling sites and 7 fish-collection sites) throughout the Hudson River and Long Island watersheds on multiple dates throughout the summers of 2009 and 2010. Aqueous concentrations of Ca, Sr, Ba, and $\delta^{18}\text{O}$, and 87:86 Sr isotopic ratios show good separation of water chemistries from Long Island, the Hudson River, and its major tributaries including the Mohawk River, where Blueback Herring spawn and rear. This finding suggests it is possible to separate origins within these water bodies, using otolith chemistries that reflect water chemistry. Sagittal otoliths were removed, daily ages determined, and analyzed for the same suite of elements and isotopes as water samples. These unique signatures will be used to assign fish to natal habitats by multivariate methods. Based on otolith chemical signatures of Long Island juveniles, some fish make forays into marine environments and then return inland; these behaviors are documented by changes in elements associated with movement among salinity gradients.

Mon-AM2-B-3

Winter Bat Populations, Cave Microclimate, and Implications for the Management of White-nose Syndrome in New Brunswick

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Information on bat populations and hibernacula is important for understanding the impacts of white-nose syndrome (WNS), a fatal fungal disease of bats. Pre-WNS bat population estimates are presented for 2009–2011 for the most significant bat hibernacula known in New Brunswick. Winter surveys of hibernating bats suggest that a minimum of 7000 bats over-wintered in the province before the arrival of WNS. The majority of hibernating bats in New Brunswick caves are *Myotis lucifugus* (Little Brown Bat) and *M. septentrionalis* (Northern Long-eared Bat), with low numbers of *Perimyotis subflavus* (Tricolored Bat). The New Brunswick hibernacula that appear to be preferred by these species have little temperature variation, average winter dark-zone temperatures of 4–5 °C, and a minimum dark-zone temperature no lower than 3.1 °C. New Brunswick caves with these temperature patterns characteristically have ≥ 140 m of main passage and lack both running water and multiple entrances. Since few cave sites in the province meet these criteria, and because New Brunswick winter bat counts appear to be well below estimated summer bat populations, we propose that a significant portion of the summer bat population migrates out of the province annually to locate suitable hibernacula. This apparent annual movement of cave bats in and out of the province will have implications for the spread and management of WNS, now present in New Brunswick.

Mon-AM2-A-1

Stable Isotope Analysis as Evidence of Niche Partitioning Among Mammalian Carnivores in the Adirondack Park

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Stable isotope analysis, a relatively new ecological tool, has been underutilized in studies of mammalian community ecology. We present stable isotope analysis as a method to explore species competition among mammalian carnivores. Guard hair samples were collected from pelts of *Lynx rufus* (Bobcat), *Canis latrans* (Coyote), *Urocyon cinereoargenteus* (Gray Fox), and *Vulpes vulpes* (Red Fox) legally trapped in 2010 within the central Adirondack Park, NY. Carbon and nitrogen stable isotope ratios ($\delta^{13}\text{C}$ and $\delta^{15}\text{N}$, respectively) in hair samples were used to explore resource use and niche differentiation among these four sympatric carnivores. Enrichment along the $\delta^{13}\text{C}$ axis was expected to be correlated with use of human food sources (reflecting a *Zea mays* [corn] subsidy), and by extension, tolerance for human-modified environments. Enrichment along the $\delta^{15}\text{N}$ axis was expected to reflect a higher level of carnivory, a second mechanism by which these species may achieve a dynamic coexistence. Although Bobcats were the only obligate carnivore, all 4 species share a similar $\delta^{15}\text{N}$ space. In contrast, Bobcats had a lower and more distinct $\delta^{13}\text{C}$ signature compared to foxes, consistent with their being less tolerant of human activities. Isotope signatures for Coyotes largely overlapped the other three species in both $\delta^{13}\text{C}$ and $\delta^{15}\text{N}$ space, indicating their potential competitive influence on this suite of native carnivores

Tue-AM2-B-4

Plant Rarities at West Point: A 200-Year Overview, Including Details from Intensive Surveys in 2011

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West Point (WP), in the Hudson Highlands of Orange and Putnam counties, NY, encompasses approximately 6400 ha of land, much of which is undeveloped. In 2011, we conducted intensive botanical survey work, did herbarium research, and reviewed relevant literature related to rare plants at WP. A total of 187 populations involving 51 rare plant taxa are known, at least historically, from WP. In 2011, we surveyed 107 of these populations, involving 36 taxa. Sixty-one of these populations and nine of these taxa are new reports for WP. Of these nine taxa, three are new reports for Orange County and two are new to the Hudson Highlands. We deem erroneous 50 previously reported WP populations involving 31 rare taxa. For 25 of these 31 taxa, all of the reported populations are erroneous. This amounts to 33% of all rare taxa that have been reported from WP. As a result of the huge number of new finds and unearthing of erroneous reports, a significantly different picture of the status of rare plants emerges for WP. We suggest some management considerations regarding deer browse and conservation of intertidal habitat. Finally, we recommend that our study be scaled up to include all of New York in order to work towards the conservation of the flora of the state.

Tue-PM2-C-2

The Importance of One Great Lakes Wetland to the Continental Population of a Species: The Little Gull (*Larus minutus*) at Oshawa Second Marsh, Ontario

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Larus minutus (Little Gull; LIGU) is the world's smallest gull; it is a very rare bird in most of North America (NA) but relatively common in parts of northern Europe and Asia. It has been known in Canada and NA since the first Franklin Expedition (1819–1820). The first LIGU nest in NA was found in 1962 at Oshawa Second Marsh (O2M), east of Toronto, ON. From 1962–1989, it nested irregularly in small numbers in wetlands in the Great Lakes area. Nests have been found sporadically in the Canadian Subarctic where it is believed all of the current NA population now nests. In NA, there are few locations where LIGUs can be seen predictably. The single best location, where it occurs in relatively large numbers, is O2M in spring. The purposes of this paper are: 1) demonstrate the abundance of the LIGU in NA, southern Ontario, and O2M and 2) to detail its numbers, period of occurrence and behavior at O2M. Data were obtained from eBird, Christmas Bird Counts (CBCs), and direct observations at O2M during April–May 2001–2011 by T. Hoar. Seventy-three percent of 1887 eBird reports of LIGUs from across NA were from Ontario, and 95% of those were from Durham Region, i.e., the Oshawa area. Forty-two percent of all LIGUs reported on 22,147 CBCs across NA, 1999–2010, were from southern Ontario—twice as many as from any other jurisdiction. LIGUs were recorded at O2M on 228 of 308 survey days (74%) averaging 13 birds/day. This is the greatest rate of occurrence of any LIGU long-term dataset in NA. LIGUs arrive at O2M in late March, peak in late April (>50 birds/day), and leave by late May. The maximum count was 114 LIGUs on 29 April 2002. Aerial courtship was observed on 43 occasions from 12 April–5 May 2001 to 2011. Such courtship by LIGUs has not been recorded anywhere else in NA. O2M is the largest known spring staging area for LIGUs in NA and, hence, of immense importance.

Wed-AM2-A-1

Invasive Species Control: Why?

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Decades of invasives management in New York have shifted ecological axes in both terrestrial and aquatic systems. Collateral reduction of non-target species have led to ecological release and system inequilibrium including density-independent bottlenecks and permanent loss of richness within previously healthy demes. One mobile link species' inadvertent, localized eradication leading to eradication of a specific predator species indicate the potential for a more multi-disciplinary, populational viewpoint shift in invasive species management. Potential solutions are discussed.

Tue-AM1-A-1

Northern Cricket Frog Overwintering

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The state-listed "Endangered" Northern Cricket Frog (*Acris crepitans*) is NY's smallest vertebrate. In its terrestrial habitat, the Northern Cricket frog is active during the Spring and Fall, especially on warm, sunny days; and has been found as far as 450 m from the nearest known calling and breeding sites. Cricket Frogs have recently been observed entering upland refugia in December and basking near the same refugia in early February, suggesting upland overwintering success in this specific, recent study. Hibernacular type, distance from summer habitat, prey preference, and survey methods are discussed.

Mon-AM2-C-1

The Politics of Protection: A Bog Turtle Case Study in New York

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Mon-PM2-A-3

Investigating Demographic Compensation in an Eastern Coyote Population

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Despite a long history of persecution, *Canis latrans* (Coyote) continue to thrive throughout their range in North America. Although wildlife managers and the public are realizing that Coyotes are here to stay and that learning to co-exist is necessary, concerns regarding public safety and predation by Coyotes on game species, such as *Odocoileus virginianus* (White-tailed Deer), continue to increase. Effective and efficient management of Coyotes requires a thorough understanding of their population dynamics—specifically, context-dependent information on mortality, reproduction, and dispersal. Accordingly, the primary objective of this study is to determine the relative contributions of demographic compensation and source-sink dynamics in allowing Coyotes to sustain relatively high levels of human harvest. Specifically, we are seeking to determine 1) if eastern Coyote populations exhibit compensatory mortality and/or natality in response to human exploitation, and 2) if heterogeneous harvest of eastern Coyotes induces de facto source-sink dynamics at the scale of the local population. Since May 2010, we have radio-collared 100 Coyotes in Prince Edward County (PEC), a predominantly agricultural area in southeastern Ontario. We are mapping variation in harvest intensity of Coyotes across our study area and are testing hypotheses related to demographic compensation, and source-sink dynamics, by spatially relating Coyote mortality risk, reproductive success, territory turnover, and dispersal patterns to landscape variation and differences in harvest intensity. Preliminary results highlight the predominance of anthropogenic causes as a mortality source for Coyotes in southern Ontario.

Tue-AM2-B-3

Modeling Old-field Succession in Central New York: A LIDAR-based Approach

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As part of a larger study to understand the impacts of simultaneous climate change and land-use change on biodiversity, we are developing a landscape-level successional model for central New York based on field sampling and airborne LIDAR. The 30-m-resolution successional model will simulate future changes in vegetation structure that will, in turn, fundamentally shape wildlife habitat suitability as well as other landscape and ecosystem characteristics. The model is based on the classic "space-for-time" approach, but is coupled with regionally extensive LIDAR data, which provides a much larger "footprint" to characterize regional successional dynamics. Here we present initial observations from our field studies, which measured vegetation in old fields in central New York. During summer 2011, landowner interviews and GIS analyses were used to establish a network of 32 old fields across central New York with varying ages since abandonment (3–111 years). Fields were only selected when there had been no management post-abandonment. We established one hundred 20-m diameter plots in this network of old fields to measure vegetation using a field methodology we developed specifically to couple vegetation measurement and LIDAR ground-truthing. Within each plot, the dominant vegetation layers—herbs/grasses, shrubs, subcanopy, canopy—were identified and their cover estimated. Height, composition, and spatial location of the vegetation in each layer in the plot were measured with a laser rangefinder, providing a detailed three-dimensional sampling of vegetation structure. Our initial analysis of the field data found dramatic differences among old-fields in vegetation structure and composition changes through time. For example, we found some old-fields to be characteristic of young forests after only 31 years, while others remained persistent shrub communities for over 50 years. There appear to be complex interactions between age since abandonment, invasive species, and site variables that differ among old fields.

Mon-PM1-B-3

A Decline in the Abundance of Monarch Butterflies

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The annual migration of *Danaus plexippus* (Monarch Butterfly) through eastern North America, with overwintering colonies on mountains in central Mexico, is an endangered biological phenomenon. We have recently found a significant decline in the abundance of the migratory population despite their high reproductive potential. Losses in both the breeding and overwintering habitats are implicated in this decline. Our studies of the dense overwintering aggregations have shown how the butterflies take advantage of thermal buffering within the forest canopy and how degradation of the forest reduces the likelihood of survival during this part of the annual cycle. The breeding habitat has been degraded, too, by the expansion of herbicide resistant crops and subsequent decline in the availability of milkweeds. The overall decline in population size is not yet apparent here in the Northeast because the abundance of Monarchs we see depends so much on growing conditions during the summer, but if this trend continues, northeastern Monarchs will start to decline.

Wed-PM1-A-4

***Carex kobomugi* (Asiatic Sand Sedge): A Case Study on the Complexities of Evaluating the Relative Costs and Benefits of an Invasive Species**

Louise Wootton (Georgian Court University, Lakewood NJ; woottonL@georgian.edu)

Non-native species are often vilified within the conservation community, cast in the role of unmitigated “villain” in the battle between good (healthy, resilient native ecosystems) and evil (damaged ecosystems which no longer are able to provide the services that we desire of them). This reputation is not wholly unwarranted. Many non-native species have done enormous harm to the ecosystems they have invaded. However, as with many stories, the truth is not quite so “black and white” on a broader scale. The invasion of *Carex kobomugi* (Asiatic Sand Sedge) into Eastern North American dune ecosystems provides an interesting example of a species whose invasion has both significant costs and real benefits. In this presentation, I will discuss both the positive (dune stabilization, tolerance to foot traffic) and negative (loss of biodiversity, differences in dune geomorphology) impacts that this species has on dune ecosystem function, and the management implications of the net balance between these. I will also review some other cases in which invasive plants have had beneficial as well as negative effects on ecosystem function, especially with regard to soil stabilization. I will argue that effective management of our precious remaining natural resources requires a balanced consideration of both risks and potential benefits of non-native species within those systems. This, in turn, presents researchers with two new challenges: (1) Collecting sufficient data on potential “problem species” to allow an accurate, and potentially context-specific, assessment of the relative risks and benefits that each poses to the ecosystem, and (2) Ascribing values to the services and costs associated with that species that are sufficiently objective to allow consensus to be developed as to the net cost/benefit of each species within the invaded system in question.

Wed-AM2-B-2

Relationships among Adirondack Songbird Communities, Calcium Availability, and Acidic Deposition

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The depletion of soil calcium, an important macronutrient, by acidic deposition has been linked to changes in plant and invertebrate communities, as well as to reproductive declines in some avian species. To investigate the effects of calcium depletion on overall avian abundance and diversity, we sampled bird communities at 13 sites representing a soil calcium gradient of upland northern hardwood forests in the Adirondack Mountains, NY. We found evidence that avian abundance may be linked to mineral soil calcium availability. Some species may favor higher calcium sites with lower acidic deposition inputs for establishing breeding territories. However, there was no relationship between species diversity and soil calcium concentration or acidic deposition levels. These preliminary results indicate that some species may be more sensitive to calcium availability and acidic deposition than others. We will discuss how avian communities at low calcium sites may differ from communities at high-calcium sites. The study can provide guidance for conservation efforts in the Adirondack Mountains, elucidating whether highly buffered sites may act as neoreugia for biodiversity by retaining potential for long-term acidification resistance and recovery.

Wed-AM1-B-2

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