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 [Thu = Thursday, Fri = Friday] – Time slot [A1 = early morning session, A2 = late morning session, P1 = early afternoon session, P2 = late afternoon session] – Room number - Presentation sequence. For example, Thu-P1-5-3 indicates: Thursday early afternoon session in room 5, 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

THUR	THURSDAY APRIL 7, 2011					
8:15–9:45	**Concurrent Sessions - Early Morning**					
	Room 1	Room 2	Room 3	Room 4	Room 5	Room 7
	Ant Ecology I	**The National Biological Survey I: What Types of Data Exist**	**Ecological Interactions of Freshwater Fish**	**Natural History of The New York Botanical Garden: Interpreting an Urban Old Growth Forest**	**Small Mammals**	**Botany**
10:30–12:00	**Concurrent Sessions - Late Morning**					
	Room 1	Room 2	Room 3	Room 4	Room 5	Room 7
	Ant Ecology II	**The National Biological Survey II: Collaborative Institutional Involvement**	**Freshwater Ecology**	**Science and Stewardship in New York State Parks**	**Bryophyte Ecology and Evolution**	**Plant Ecology**
1:30–3:00	**Concurrent Sessions - Early Afternoon**					
	Early Afternoon	Room 2	Room 3	Room 4	Room 5	Room 7
	Quaternary Environments of the Northeast	**Biology of Invasive Species**	**Ecological Status and Recovery of Acidified Adirondack Surface Waters I**	**Shawangunk Mountains Geology, Climate Change and Evolution**	**Conservation and Ecology of Bats**	**Floristics**
3:45–5:30	**Concurrent Sessions - Late Afternoon**					
	Room 1	Room 2	Room 3	Room 4	Room 5	Room 7
	Quaternary Environments of the Northeast II	**Invasive Species: Ecological Management and Restoration**	**Ecological Status and Recovery of Acidified Adirondack Surface Waters II**	**Shawangunk Mountains Forest and Habitat Dynamics**	**Migratory Landbird Ecology**	**Room closed this session**

FRI	FRIDAY APRIL 8, 2011					
8:15–9:45	**Concurrent Sessions - Early Morning**					
	Room 1	Room 2	Room 3	Room 4	Room 5	Room 7
	Malacology	**Colonial Waterbirds of the Northeast: Gulls, Cormorants, and Egrets**	**Northern Cricket Frog Decline: Research and Recovery Strategies**	**Forest Health and Deer Management: Local Perspective**	**Reconnecting with Nature: Grassroots, Students, and Citizen Science**	**Conservation of an Urban Oasis: Albany's Pitch Pine Scrub Oak Barrens**
10:30–11:00	**Concurrent Sessions - Late Morning**					
	Room 1	Room 2	Room 3	Room 4	Room 5	Room 7
	Freshwater Invertebrates	**Colonial Waterbirds of the Northeast: Terns**	**Amphibian Ecology and Conservation**	**Forest Health and Deer Management: Regional Perspective**	**Climate Change and Biodiversity**	**Conservation of an Urban Oasis: Albany's Pitch Pine Scrub Oak Barrens**
1:30–3:00	**Concurrent Sessions - Early Afternoon**					
	Room 1	Room 2	Room 3	Room 4	Room 5	Room 7
	Biology and Ecology of Dragonflies and Damselflies (Odonates)	**Urban Ecology**	**Reptile Ecology and Conservation I**	**The Future of Deer Management in New York: Roundtable Discussion**	**Monitoring and Mitigating Human Impacts**	**Biodiversity Conservation**
3:45–5:15	**Concurrent Sessions - Late Afternoon**					
	Room 1	Room 2	Room 3	Room 4	Room 5	Room 7
	Rare Insects and Their Conservation	**Boreal Forest Birds**	**Reptile Ecology and Conservation II**	**Forest Ecology**	**Biological Impacts of Hydraulic Fracturing in the Marcellus Shale**	**Tools and Research to Facilitate Conservation and Management**

Westchester County Parks: Implementing a Regional Deer Management Program

Dan Aitchison (Westchester County Parks, Recreation and Conservation Division, Mount Kisco, NY)

Overabundance of White-tailed Deer (*Odocoileus virginianus*) is becoming a common issue in New York, with far-reaching ecological consequences. Based on recommendations of the Westchester County Citizens Task Force on White-tailed Deer and Forest Regeneration, an Adaptive Deer Management Program was initiated in 2009 in two Westchester County parks. The program implemented controlled bowhunting as the safest, most effective method to reduce the deer herd while keeping parks open to the public. Mandatory proficiency tests and orientation meetings ensured only qualified hunters were admitted. With 45 harvested deer and positive public response, the success of the 2009 season helped the program expand in 2010 to two additional parks, adding 3800 acres. These parks typically see very high public usage during the fall, so hunting was restricted to certain dates, times, and areas to prevent possible conflicts. Despite these limitations, 168 deer were harvested in 2010, suggesting that bowhunting is a viable method for population control in high-use areas.

Fri-A1-4-4

Spatial and Temporal Eynamics of Interactions between Slavemaking Ants and their Hosts

Jennifer Apple, Sara Lewandowski, Sarah Dzara, Daniel Kane, and Bridget Neary (SUNY Geneseo, NY)

Slavemaking ants raid colonies of other ant species to obtain larvae and pupae which will become a workforce 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-hectare Roemer Arboretum on the SUNY Geneseo campus hosts two species of slavemaking ants, *F. subintegra* and *F. pergandei*, which both parasitize the locally abundant mound-nesting ant species, *F. glacialis*. For two 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. While almost 500 *F.glacialis* nests have been mapped at the site, only about 60% appear to support active colonies. We documented the raiding activity of 11–12 slavemaker colonies over two summers and discovered a high rate of activity: the number of raids conducted per colony in summer 2010 ranged from 4 to 19, with some raids targeting host colonies over 50 m from the slavemaker nest. Some host colonies suffered multiple raids in a season. Slavemaker ant colonies exhibited considerable mobility. At least six colonies moved nest locations once during the two-year period by invading existing host nests, while two colonies moved more than once in a single season. Our field data are complemented by analyses of genetic variation using microsatellite markers. By comparing intracolony relatedness coefficients of free-living host colonies to those of slave populations of slavemakers, we can derive a minimum estimate of the number of host colonies exploited to assemble the slavemaker workforce. Estimating intracolony relatedness also reveals colony structure of free-living hosts. From our limited sampling so far, the *F. glacialis* population includes both monogynous and polygynous colonies, though monogyny may be more common. Our ongoing collection of field and molecular data will allow us to describe the ecological processes that give rise to patterns in spatial distribution, temporal dynamics, and genetic structure in these ant populations.

Thu-A2-1-7

Laying the Foundation for Freshwater Pool Construction: The Effects of Bottom-up Factors on Amphibian Development

Meredith Atwood, James Gibbs, and Kimberly Schulz (SUNY, Syracuse, NY)

Small, freshwater pools in forested landscapes provide habitat for wildlife, facilitate animal movement, and have high biological productivity. Despite their importance, over half of wetlands in the contiguous United States have been lost since European colonization and small wetlands have been most vulnerable. Restoration efforts have been hindered by an incomplete understanding of the mechanisms driving food webs of freshwater pools. While productivity is supported by basal resources such as sediment and allochthonous inputs of plant litter, little is known regarding how these resources influence pool dynamics. The purpose of this study was to assess how basal resources (sediment and plant litter) in small freshwater pools affect their food webs, including nutrient flows, primary producers, and primary consumers. We used in-pool enclosures to manipulate type of sediment (organic, mineral) and plant litter (grass, hemlock, mixed deciduous, no litter control, and boiled-spinach control), and assessed nutrient levels, periphyton biomass, and larval Wood Frog (*Lithobates sylvaticus*) performance. Periphyton biomass was positively influenced by nitrogen in plant litter, but was reduced in all litter treatments compared to controls (spinach and no litter). Mineral sediment reduced larval survival, while expediting development. Wood Frog larvae fed boiled-spinach controls had the highest survival, fastest development, and were largest at metamorphosis, suggesting that amphibian larvae feeding on natural litter in freshwater pools may be resource-limited. There were no differences in performance among larvae in the natural plant litter treatments, but lower densities and higher nutrient availability improved performance. Our results counter previous mesocosm experiments that demonstrated differences in amphibian performance based on plant litter type. This suggests that conditions in a given pool, such as nutrients or periphyton, may be of larger importance to the food web than litter type. Furthermore, venue should be carefully considered when studying amphibian development. Future studies should assess the nutritional quality and contribution of periphyton and plant litter to the diet of larval amphibians. This study's primary implication for pool restoration is to maximize periphyton biomass and to use organic sediment amendments to provide nutrients to the pool community.

Fri-A2-3-5

Vegetation Response to the 2008 Overlooks Wildfire in the Shawangunks

Michael Batcher (Buskirk, NY)

The 2008 Overlooks Wildfire burned nearly 3000 acres and was the largest wildfire in the Shawangunks since 1947. The Chestnut Oak forest there is one of the largest in New York, harbors several rare species, and provides the matrix forest for other natural communities including Pitch Pine communities. The fire resulted in conversion of large areas of Chestnut Oak forest to open woodlands. In 2008, tree density in burned Chestnut Oak forest plots was 487.7/ha compared to 578.2/ha in unburned plots. By 2010, tree mortality reduced density in Chestnut Oak forest plots to 244.0/ha and created open woodlands with a density of 38.9/ha. Density in burned Pitch Pine-oak-heath rocky summit plots was 732.8/ha in 2008 compared to 414.3/ha in unburned plots and 273.7/ha in 2010. Based on the proportion of canopy scorched, the Chestnut Oak forest experienced large variation in fire intensity. By contrast, the Pitch Pine-oak-heath rocky summit uniformly experienced high intensity fire. Red Maple and Sassafras were dominant seedlings and saplings in all three communities, with very little oak or Pitch Pine recruitment. Red Maple constituted 61.4% and Sassafras 26.1% of seedlings in Chestnut Oak forest plots, 7.3% and 89.0% in open woodlands, and 60.9% and 32.1% in Pitch Pine-oak-heath rocky summit plots. Red Maple constituted 50.0% and Sassafras 40.0% of saplings in Chestnut Oak forest plots and 22.8% and 69.3% in open woodlands. High intensity fire resulted in significantly lower average cover of tall shrubs (2–5 m) in burned Chestnut Oak forest plots than unburned plots in 2008. Average short shrub (<2 m) cover in 2008 burned plots was significantly lower than for unburned plots. By 2010, short shrub cover for burned plots was significantly higher than in 2008 due to regrowth, but there was little recovery of tall shrubs. Recruitment of Red Maple and Sassafras coupled with limited recruitment by oaks will likely shift large areas from oak forest to mesic forest or woodland. Intervention will be needed to restore open woodlands to oak forest, and monitoring will need to track vegetation trends and measure management effectiveness.

Thu-P2-4-3

The Effect of Invasive Macrophytes on Macroinvertebrate and Zooplankton Communities in Lake Champlain

Casey Binggeli and Tim Mihuc (Lake Champlain Research Institute, SUNY Plattsburgh, NY)

There are 48 invasive species in Lake Champlain. Thirteen of the 48 invasive species are plants, and yet very little research has been done, on the effects of invasive aquatic macrophytes on associated macroinvertebrate communities in Lake Champlain. The purpose of this study was to determine the impact invasive macrophytes have on macroinvertebrate and zooplankton communities. Invasive macrophytes examined during this study include *Trapa natans* (Water Chestnut), *Myriophyllum spicatum*(Eusrasian Watermilfoil), *Hydrocharis morsus-ranae* (European Frog-bit), and *Nymphoides peltata* (Yellow Foating Heart). Native species included *Nymphaea odorata*, *Ceratophyllum demersum*, *Vallisneria americana*, and *Elodea canadensis*. Plant and macroinvertebrate communities were collected using a 250-μm veliger net. Zooplankton samples were collected using a 63-μm Wisconsin net. Macorinvertebrate communities colonizing on invasive plants were compared to native plants that had a similar structure. Each plant species sampled had a unique macroinvertebrate composition. Differences between macroinvertebrate communities found on native versus invasive macrophytes included an increase in Amphipoda, Coleoptera, Ephemeroptera, and Hemiptera in native plants.

Thu-A2-3-3

Mapping the Flora of New England

David Boufford (Harvard University Herbaria, Cambridge, MA)

The Atlas of the Flora of New England is a project to depict the distribution at the county level of the vascular plants growing outside of cultivation in the six New England states of the northeastern United States. All species, subspecies, varieties, and hybrids, but not forms, are mapped at the county level based on specimens in the major herbaria of Maine, New Hampshire, Vermont, Massachusetts, Rhode Island, and Connecticut, with primary emphasis on the holdings of the New England Botanical Club Herbarium (NEBC). Brief synonymy to account for names used in recent manuals and floras for the area, habitat and chromosome information, and common names also are provided. The New England states range in latitude from 41°N to 47°28'N, in longitude from 67°W to 73°5'W, and in elevation from sea level to 1898 m (6228 ft) at the summit of Mt. Washington, NH, the highest mountain in eastern North America outside of North Carolina. Installments of the Atlas have been published in *Rhodora*, the journal of the New England Botanical Club, but the most recent installment—the eighth—was published in the online journal *Phytoneuron* (www.phytoneuron.net/). The Atlas is maintained and regularly updated online at http://neatlas.org/. The online maps are in color and show topography; lowest elevations are in green, with higher elevations becoming progressively brown, and the highest elevations purplish and white. Thoughts on future development of the web Atlas, using examples from the project, Biodiversity of the Hengduan Mountains Region, China, are discussed.

Thu-A1-2-1

How Cornell is Addressing Deer Damage to Forest Regeneration and Other Associated Impacts

Jay Boulanger (Cornell University, Ithaca, NY)

Management of overabundant White-tailed Deer (*Odocoileus virginianus*) populations in suburban landscapes remains controversial, and deer-reduction techniques in these areas are often impeded by public attitudes and safety concerns. Cornell University is implementing a 5-year study using a combination of surgical sterilization and hunting to mitigate deer-related impacts on campus and surrounding lands near Ithaca, NY. University lands have been divided into two zones: a suburban core campus area (446 ha) and outlying lands where deer hunting is permitted (722 ha). Surgical sterilization is the primary technique used to reduce deer abundance in the core campus zone; increased harvest of female deer is implemented in the hunting zone through an Earn-a-Buck program. Presented here are results from the first three years of this study. Eighty-two female deer were spayed and 56 of these deer were marked with radio transmitters to monitor movements and survival. For a comparison of fawning rates and survival, another 25 control deer were captured and radio-collared. To date, a total of 257 deer (69–99 each hunting season) have been harvested. Using infrared-triggered cameras, 92 (81–105) and 82 (71–94) deer were estimated on the core campus during 2009 and 2010, respectively. These data suggest that the core campus deer population has been stabilized. Deer populations in the hunting zone will continue to be monitored using a deer-sighting log and biological data collected at a mandatory deer check station. In both zones, browse surveys using sentinel Red Oak seedlings and deer-vehicle accident monitoring will help ascertain deer impacts.

Fri-A2-4-4

The Hudson River Eel Project: Fish Conservation through Citizen Science

Chris Bowser and Sarah Mount (NYSDEC Hudson River Estuary Program and Research Reserve, Staatsburg, NY)

Each spring, over two hundred trained citizen-scientists research migratory American Eels in nine streams on the Hudson River estuary. This project connects outreach, research, and management with a unique migratory fish that many scientists feel is imperiled coast-wide. Species face conservation challenges not just in far-away places but in our local waterways as well. American Eels are important migratory fish along the entire Atlantic Coast, yet recent declines are poorly understood. The Eel Project, initiated by the NYSDEC Hudson River Estuary Program, involves over 200 diverse community members in shared goals and methodologies to study juvenile eels during their migrations from sea to stream. March through May, fyke nets staked in nine tidal stream mouths are checked daily by teams of trained citizen-scientists from high schools, colleges, nature centers, and watershed groups. Thousands of one-year-old glass eels newly arrived from the Atlantic, are counted, weighed and released above barriers, while environmental conditions and herring sightings are also recorded. Participants answer questions about eel recruitment along 150 miles of tidal estuary from urban streams to quiet creeks. Three years of data yield information about the timing and condition of eel migrations, suggest favorable conditions, and help managers prioritize restoration efforts like barrier passage. A highly diverse group of citizen-scientists is supported by trainings, classroom and community presentations, and a strong interest by state agency scientists. Those involved experience real benefits to themselves and help fisheries science by submitting data to the NYSDEC and following coast-wide-effort protocols.

Fri-A1-5-3

Year of the Turtle: Development of a New Conservation Paradigm

Alvin R. Breisch (Partners in Amphibian and Reptile Conservation, Altamont, NY), Deanna H. Olson (Pacific Northwest Research Station, Corvallis, OR), Priya Nanjappa (Association of Fish and Wildlife Agencies, Washington, DC), Terry Z. Riley (National Park Service, Fort Collins, CO), and Kathryn Ronnenberg (Pacific Northwest Research Station, Corvallis, OR)

The designation of 2011 as “Year of the Turtle” by Partners in Amphibian and Reptile Conservation and their turtle conservation partners emerged as a novel paradigm for conservation and raising awareness in North America, with tendrils beginning to extend around the globe. Momentum of the campaign is increasing as the year progresses, drawing together dozens of partners including government agencies, conservation organizations, research scientists and citizen scientists, veterinarians, the pet industry, trade organizations, and the public. The heart of the program is the empowerment of individuals and independent groups to work within the scope of their own influence to facilitate additional focus and activities on turtle conservation, research, and education. With almost 50% of world freshwater turtles and tortoises threatened with extinction, the attention is past due. However, prognosis for many conservation success stories is optimistic within this taxon, especially in North America, where the overall threat rate is lower. In addition, cultural values for retaining our turtle natural heritage are great, and appreciation for turtles among the public is high. Highlights of the Year of the Turtle can be found at www.yearoftheturtle.org and include monthly newsletters,a photo contest and associated monthly calendar, USA turtle mapping project, State of the Turtle report, and more.

Fri-P1-3-1

The Effectiveness of Artificial Cover Objects as a Herpetofaunal Survey Technique in the Albany Pine Bush

Kirstin Russell (Chateaugay, NY), Andrea Chaloux (Natural Heritage Program, Albany, NY), and **Alvin R. Breisch** (Partners in Amphibian and Reptile Conservation, Altamont, NY)

Searching under cover objects, such as rocks and logs, is a standard method of surveying for amphibians and reptiles. The abundance of termites and ants, which quickly consume downed logs, and the lack of rocks in the sand plains of the Albany Pine Bush results in habitats with very little natural cover. We conducted a series of studies to determine presence of amphibians and reptiles by monitoring artificial cover objects as a substitute for natural cover. The surveys were conducted in five areas of the Pine Bush where the target species, Smooth Green Snake (*Opheodrys vernalis*), Eastern Hognose Snake (*Heterodon platirhinos*), Eastern Worm Snake (*Carphophis amoenus*), and Eastern Spadefoot Toad (*Scaphiopus holbrookii*), had previously been recorded. Cover objects tested included plywood, 2" x 10" lumber, metal roofing, and discarded construction debris. Artificial cover was found to be readily used by Smooth Green Snakes and occasionally used by Eastern Worm Snakes. Eastern Hognose Snakes and Eastern Spadefoot Toads were never encountered under artificial cover objects. Three other species of snakes, four species of salamander, one species of toad, and one species of frog were also found under the artificial cover.

Fri-A1-7-4

The Pine Bush as Laboratory for Innovative Pine-Oak Barrens Management

Jason Bried (Albany Pine Bush Preserve Commission, Abany, NY)

New ecological management approaches for restoring a northeast endemic barrens community are being tested in the Albany Pine Bush Preserve. Approaches include herbicide control of native aspen encroachment, mowing and herbicide restoration of open-canopy shrub barrens, and estimating crown-fire risk in Pitch Pine stands. I will discuss the rationale for each approach and provide completed or preliminary data evaluations. The findings and management recommendations extend beyond the Pine Bush to the world's few other locations of inland Pitch Pine-Scrub Oak barrens. This work also serves as a backdrop to the special session, which will showcase new wildlife research staged in the Pine Bush.

Fri-A1-7-1

Spatial, Seasonal, and Diel Distribution Patterns of *Hemimysis anomala* in New York State's Finger Lakes

Meghan Brown (Hobart and William Smith Colleges, Geneva, NY), Richard Morse (State Museum of New York, Albany, NY), and Kerry O'Neill (Hobart and William Smith Colleges, Geneva, NY)

With this contribution, we report on the continued and rapid spread of *Hemimysis anomala* (Crustacea: Mysidae) to inland waters of New York State within the Laurentian Great Lakes watershed. In the spring and summer of 2010, we detected *Hemimysis* at multiple locations in Seneca Lake, spanning the lake's 61 km length, and in the Seneca-Cayuga Canal, 7 km downstream of the canal's source at Seneca Lake. We did not detect *Hemimysis* in any of the other ten Finger Lakes. The pattern of range expansion suggests jump dispersal to Seneca Lake, followed by passive dispersal in the Seneca-Cayuga Canal. This range expansion highlights the potential of this emerging invader to spread throughout the New York State Canal system that links the Great Lakes with the Hudson River watershed and a number of large inland lakes via the Erie Canal and its tributaries. During our nighttime sampling campaign on Seneca Lake, densities of *Hemimysis* exceeding 2500 ind./m^3 were associated with littoral rocky structure, docks, and piers. At a reference site near the source of the Seneca-Cayuga Canal, we observed demographic shifts from an adult-dominated population in early spring to a juvenile-dominated population from late-spring to autumn. We also observed strong nocturnal behavior for all stages, with juveniles rising earlier than adults in the evening and remaining higher in the water column near dawn. These demographic and behavioral characteristics, combined with the extensive hydrogeographic network in the Great Lakes, contribute to the species rapid range expansion and the mechanism of its spread.

Thu-P1-2-4

Freshwater Limpets in Northeastern United States

John Burch and Diarmaid Foighil (Museum of Zoology, University of Michigan, Ann Arbor, MI) and Andrea Walther (Kalamazoo College, Kalamazoo, MI)

Freshwater limpets, characterized by tiny, cap-shaped shells, are common and widely distributed snails in North America. However, because of their very small size and low silhouette, limpets are often over-looked in mollusk surveys. And when they are found, they sometimes are subsequently misidentified. In North America, four freshwater snail families have species with limpet shells, the Acroloxidae, Ancylidae, Lymnaeidae, and Planorbidae. The shells of the limpet members of these four families are easy to distinguish, and cannot be easily confused. The Acroloxidae, Lymnaeidae, and Planorbidae have relatively few limpet species, and these are limited in their geographic distributions. The Ancylidae, on the other hand, have many nominal species, which, as a group, are widely distributed in North America. In Northeastern USA, only the ancylid limpets are known to be present. Recent molecular phylogenetic studies have clarified relationships within the Ancylidae, and have relegated various of the nominal species to synonymy (and taken several species out of alleged synonymy). Currently, only three species of freshwater limpets are known to occur in the Northeast, *Ferrissia rivularis*, *Ferrissia fragilis*, and *Laevapex fuscus*. All three species are common and, with proper preparation, are easy to identify.

Fri-A1-1-2

Zombie Turtles in our Cities

Russell Burke (Department of Biology, Hofstra University, Hempstead, NY)

Turtle population persistence is typically very sensitive to adult mortality, yet turtles persist in the wetlands of many urban green spaces. This finding is largely because of Red-eared Sliders and the persistence of native turtles despite low recruitment. Turtle populations may persist even without successful recruitment because turtles are long-lived; these populations are the "walking dead" or "zombies". I have been conducting a mark-recapture study of terrapins in Jamaica Bay, New York City since 1998 and have marked over 600 adults. Hatching success of eggs under good field conditions is >80%; however, we found that Raccoons predate 95 -98% of nests. Hatchlings are also predated by Norway Rats. The number of nesting females in the population has remained fairly constant at about 965 adults. However, the number of nests has been dropping steadily and is now 37% lower than in 1999. It appears that the number of nests/females is decreasing, which has not been documented in any other turtle population. This shift may be a response to decreasing resources, due to the rapid erosion of Jamaica Bay salt marshes. It appears that anthropogenic factors influence recruitment in this urban population both indirectly, through declining resources, and directly, through subsidized predation, natural predators, and nest failure.

Fri-P1-2-2

Abundance and Body Condition of *Plethodon cinereus* in the Adirondack Park: A Multivariate Analysis of Habitat Use

Alexander Byrne, Jenna Daub, Ryan Deibler, Benjamin Eck, Kimberly Forrest, Alexander LeCheminant, Lydia Naccarato, and Celia Evans (Paul Smith's College, Paul Smiths, NY)

Much research has been conducted with respect to the influence of forest management on the widely distributed terrestrial salamander *P. cinereus*. However, very little is known about optimal habitat characteristics in established second growth forests concerning the relative abundance and fitness of *P. cinereus*. We established plots ($n = 49$) in a mixed northern hardwood forest in the northern Adirondacks and collected a suite of habitat variables and measured abundance and body condition of *P. cinereus* to determine the specificity of habitat use. Hanski's rule states that organisms with broad distributions will be locally abundant. One suggested hypothesis for this pattern is that species with broad distributions are habitat generalists. We hypothesized that *P. cinereus* abundance and body condition would not be strongly correlated to single habitat variables and would only be weakly described by a multivariate approach, thus suggesting they are habitat generalists. Using multiple regression and examining all possible models, we found that <50% of the variance in abundance of *P. cinereus* was explained by 5 habitat variables (number of tree species in a plot, area of coarse woody debris (CWD), proportion of deciduous basal area, and total basal area (BA) of the plot). Only 15% of variance in body condition (a fitness surrogate) could be explained by 4 variables (number of tree species in a plot, soil pH, standard deviation of litter depth and, proportion of deciduous BA). In working to specify what the abundance of *P. cinereus* indicates, we must consider differences in life stages and the spatial scale on which measurements are made. Salamanders of different life stages had significantly different body conditions, likely due to a combination of allometry and habitat quality. Adult and young-of-the-year salamander body condition was significantly greater for salamanders found under CWD than those found in the leaf litter, suggesting that microhabitat variables may be more important than plot-level variables in defining quality habitat. Our data suggest that at the plot level in second growth forests, *P. cinereus* are relative generalists in their habitat requirements; however, at the microhabitat scale greater differences in fitness are apparent.

Fri-A2-3-4

Four-hundred Years of Forest Stewardship at The New York Botanical Garden, or Why Was This Not Made Firewood?

Wayne Cahilly (The New York Botanical Garden, Bronx, NY)

Native Americans managed the northeastern forest to accommodate their needs leaving faint indications of their passing visible to us today; European settlers radically altered the landscape and eliminated much of the forest during the first one-hundred years following settlement. Within The New York Botanical Garden on the banks of the Bronx River lies fifty acres of forest largely intact since pre-colonial times. The southern branch of the Westchester Indian Trail, still discernable on the land, traversed the Garden ground and the Bronx River less than one-thousand feet beyond the southern boundary of this Forest. During the American war for independence, the woodland lay between two warring neighbors, no-mans land, and survived uncut though the British army in Manhattan paid teamsters to bring wagonloads of firewood from fifty miles away through rebel-held New Jersey. Industrialization brought the creative and appreciative Lorillard family and their growing tobacco business to this land and the Forest became part of their 661-acre estate. Through much of Lorillard tenure, quarrying of stone for construction and the building of trails for recreational horse-riding took place; dams were constructed and powerful mills were driven by the Bronx River, and yet the Forest remained mostly intact; the ancient trees and massive outcrops of gneiss and schist forming and framing the rugged river gorge so necessary for the water-power of industry. Toward the close of the nineteenth century, the City of New York acquired the Forest as parkland during a time of growing interest and appreciation in the serene beauty of the Hudson River valley and the Adirondack Mountains. The forest of mature oak, beech, chestnut, and a dark grove of majestic hemlock was cited among the reasons why two-hundred fifty acres of land in the northern portion of Bronx Park were given in 1895 as the site for The New York Botanical Garden. Through conflict, benign neglect, active stewardship and in spite of industrial and recreational land-use, this remnant of old-growth forest has arrived in the twenty-first century. This presentation will survey the historical context surrounding and impacting the preservation of the New York Botanical Garden Forest.

Thu-A1-4-2

Beech Thickets Impact Northern Hardwood Forest Biodiversity

Jonathan Cale, Stacy McNulty, Stephen Teale, and John Castello (SUNY Environmental Science and Forestry)

Beech bark disease (BBD) has dramatically altered hardwood forest structure and composition across northeastern North America. Bark lesions, crown dieback, and death of American Beech, are common symptoms of BBD. Extensive overstory mortality has resulted in prolific root suckering in some stands, leading to understory thickets of small-stemmed beech. Beech thickets may lead to changes in forest biodiversity, but this has not been adequately evaluated. We hypothesized significant differences in diversity of groundcover flora, small mammals, amphibians, and craneflies between plots with and without beech thickets. Twenty paired plots were established in northern hardwood forest stands at two sites in the Adirondack Mountains of New York State. We sampled five 1-m^2 nested quadrats along a 16-m transect to measure groundcover .The small-mammal community was sampled using a 5- x 5-point trapping grid, while amphibians and craneflies were sampled using timed searches over 8-m radius plots and 1-m^2 pyramidal emergence traps, respectively. Discriminant analysis showed a significant difference between treatments and identified beech sapling abundance, leaf-litter depth, and coarse woody debris volume as important variables in treatment separation. Using simple linear regression, beech sapling density was found to be negatively correlated with each of three metrics for groundcover plant diversity. Sapling density explained 41%, 31%, and 15% of the variance in species richness, Shannon-Weiner, and Inverse Simpson index values, respectively. Using a Mann-Whitney U-test, we found no significant differences in the diversity of faunal communities.

Fri-P2-4-1

A Draft Wetland Stewardship Act for Massachusetts

Jerome Carr (Carr Research Laboratory, Inc. Wellesley, MA)

Right now the Massachusetts Wetlands Protection Act is the weapon of choice to oppose any project in Massachusetts because it is a "Protection Act" only. The sciences of limnology and telmatology have advanced so far in the past 30 years, that everyone should drop the obstructionist view that wetlands ecosystems are too fragile and too important to touch. For example, a managed wetland in Poland offered a 40% decrease in peak flows when compared to an adjacent wetland which had never been altered. In another case, in the state of Michigan, when a shrub swamp was converted into a well-designed wetland complex, the total number of animal species increased by 66% and the total number of special status species increased by 123%. Massachusetts is thus losing far too many jobs, and it has the one of the highest housing costs, which discourages young, well-educated people from staying in the state. Note also that President Obama is now proposing a coastal and large-lake stewardship program that will apply to much of the USA. However, what the Massachusetts legislature has ignored to date is that Massachusetts treats coastal wetlands and all banks, beaches, and coastal flooded areas with the same types of obstructionist regulations as they do for freshwater wetlands. Thus, much of the benefits from federal funding may be lost due to obstructionism.

Fri-P1-5-4

Changes in Phytoplankton Assemblages in 30 Adirondack Mountain Lakes in Response to Decreasing Acidic Deposition

Donald Charles, F.A. Acker (Patrick Center for Environmental Research, Philadelphia, PA), P.A. Bukaveckas (Virginia Commonwealth University), and C.W. Boylen, and S.A. Nierzwicki-Bauer (Rensselaer Polytechnic Institute, Troy, NY)

Phytoplankton assemblages in 30 Adirondack lakes changed from 1994 through 2006 in many complex ways. Possible responsible factors are related to reduction in acidic deposition, climate change, and shifts in year-to-year weather patterns. Because assemblage data were from integrated samples of the epilimnion collected two times each summer (late June to early September), there was often important year-to-year variation within a lake because samples were collected at different stages of species succession and because depth and characteristics of the epilimnion changed among years. These sources of variability make it more difficult to determine the relative roles of acidic deposition, climate change, and weather patterns. The average number of phytoplankton taxa increased during the study period, reflects increasing lake pH, and suggests some recovery from acidification. In addition, we evaluated many of the patterns in species composition involving smaller sets of lakes, shorter sets of time intervals, and trends in major functional and taxonomic groups (e.g., flagellates, coccoid cyanobacteria). We attempted to determine if these were consistent with other trends indicating decreasing lake acidity. This research is part of the EPA-funded Adirondack Effects Assessment Program (AEAP), a multi-disciplinary study assessing biological recovery from acidification.

Thu-P2-3-1

A Comparison of the TIME (Summer) and ALTM (Year-round) Programs during 1992–2008

Kevin Civerolo (New York State DEC, Division of Air Resources, Albany, NY), Karen M. Roy (New York State DEC, Division of Air Resources, Ray Brook, NY), and Gopal Sistla, (New York State DEC, Division of Air Resources (retired), Albany, NY)

In this presentation, we compare surface water chemistry in the Adirondack region of New York measured by the Temporally Integrated Monitoring of Ecosystems (TIME) and Adirondack Long-Term Monitoring (ALTM) programs, which have been tracking changes in surface-water chemistry since the early 1990s. This work has been performed by the Adirondack Lake Survey Corporation (ALSC). The TIME program utilizes a probability-based approach to assess chronic acidification using one summer sample per year. The ALTM tracks changes in both chronic and episodic acidification across a gradient of lake types, using monthly samples. The ALTM project has two important attributes that contrast with the TIME program in the Adirondacks: higher temporal resolution (monthly versus once during the summer or fall), and speciation of Al. In particular, the ALTM analysis provides inorganic monomeric aluminum (AlIM), the fraction of Al that is most biologically relevant. The monthly sampling of the ALTM program includes the spring snowmelt period when acid neutralizing capacity and pH are near their lowest and Al levels are near their highest. We compare chemistry trends (1992–2008) at the six lakes common to both programs. It is suggested that, if resources allow, the TIME sampling in this region of the country be modified appropriately to allow for additional sampling of selected waters during the early spring. The speciated Al data from the ALTM program also illustrates the value of the complementary monitoring efforts in the Adirondack region. Selected additional sampling would augment both projects.

Thu-P1-3-2

Fidelity and Site Persistence of Ring-billed Gulls to Non-breeding Areas in Massachusetts

Dan Clark (MA Department of Conservation and Recreation, MA)

Ring-billed Gulls (*Larus delawarensis*) are common inland residents and are strongly associated with freshwater lakes, ponds, and reservoirs. While past research has studied the ecology, foraging, and movements of breeding Ring-billed Gulls, little research has been conducted during the non-breeding season. As part of a large ecological study of Ring-billed Gulls in Massachusetts, winter site fidelity and site persistence was assessed. Ring-billed Gulls were captured during the non-breeding season (October–March) from 2008–2010 and fitted with an aluminum federal leg band, a uniquely coded colored leg band, and uniquely coded colored wing-tags. In addition, a small number of gulls were fitted with leg bands and a satellite transmitter. A total of 858 gulls was captured and fitted with wing-tags from two study areas. In addition, 19 gulls were fitted with solar-powered satellite transmitters. From February 2008–January 2011, over 3000 sightings of wing-tagged gulls were reported. This paper will focus on results from just the Wachusett study area. Of the 544 gulls captured and wing-tagged, 363 individuals were re-sighted at least once during the non-breeding season. Site fidelity of wing-tagged gulls to their specific capture site was 5.1%; however, fidelity to the study area was 26.2%. Site persistence was determined using within-season sightings. Forty-seven percent of wing-tagged gulls were seen at least once in the study area less than 8 weeks after capture. Only 16.8% were re-sighted in the study area more than 8 weeks after capture. Approximately 22% of the wing-tagged gulls were re-sighted outside the study area less than 8 weeks after capture, and 16.5% were sighted outside the study area more than 8 weeks later. Of the 19 gulls satellite-tagged, 9 were on the air for at least 12 months. All 9 of these gulls showed fidelity to either the capture site or study area. Study-area site persistence of satellite tagged birds ranged from 4 to 167 days. Implications and limitations of the study will be discussed.

Fri-A1-2-3

Evidence for a Facultative Mutualism between *Aphaenogaster picea* and a Guild of New England Myrmecochores

Robert Clark (Wesleyan University, Middletown, CT) and Joshua King (Central Connecticut State University, New Britain, CT)

Myrmecocohory is a mutualism typified by ant-mediated dispersal of plant seeds. In northeastern US forests, ants in the genus *Aphaenogaster* are extremely abundant and the primary disperser of a large diversity of herbaceous plants in secondary hardwood forests. *Aphaenogaster picea* is the locally abundant member of the *A. rudis* species complex. Laboratory cultures of *A. picea* ant colonies were fed three treatments: a mixture of only elaiosomes, a supply of only insect protein, and a combination diet of both elaiosomes and insect protein for a season (five months). This cafeteria style treatment assessed the quality of elaiosomes as a food source relative to a known nutritional source (insect protein). First, a mixture of elaiosomes from four myrmecochorous species provided sufficient nutrition comparable to that of insect protein. *A. picea* not only consumes elaiosomes, but also can be sustained for a growing season on elaiosomes alone. Second, colonies fed both elaiosomes and insect protein did not yield more productive colonies than colonies fed insect protein or elaiosomes alone. It appears that *A. picea* can utilize elaiosomes as a substitute for insect protein, but does not apparently gain additional benefit when combined with insect protein.

Thu-A2-1-5

Snail Shell Size and Morphology Affect Crayfish Ingestion Methods

Travis Cobb and Thomas McCarthy (Utica College, Utica, NY)

Snails may avoid predation by exhibiting behavioral responses or by using shell morphology as defenses against predators. Shell morphology and size may influence the susceptibility of snails and predation by altering the way predators handle and consume snail prey. We hypothesized that the manner by which crayfish consume different snail species will be influenced by shell characteristics (shape, size), and consequently, predation rates may differ among snail species. To test these hypotheses, we examined the method by which crayfish eat large and small aquatic snails (*Physa acuta*, *Physa gyrina*, and *Helisoma trivolvis*) by studying the shells after the crayfish had consumed the snail to see if the crayfish had pulled the snail body out through the aperture leaving the shell intact, crushed the shell, broke the bottom of the shell off to pull the snail out from the back, or used a combination of methods. We found that within species of snails, there was no significant difference in the method for consuming large or small snails. However, larger snails were more often consumed than smaller snails, except for *H. trivolvis,* which showed no significant difference. There was a significant difference in method of ingestion based on species of snail, such that, snails that were plain-spiral shape were ingested significantly more often by having the bottom of their shell broken compared to snails that are cone-shaped, which were most often crushed by crayfish predators. Our results suggest that crayfish eat snails differently depending on the species of snail and shell morphology.

Fri-A1-1-3

The Effect of Disease and Weather on Activity Patterns in White-footed Mice

Chris Collins and Roland Kays (New York State Museum, Albany, NY)

A wide range of factors can influence an animal's behavior and how it attempts to negotiate the inherent risks (such as disease, parasites, and adverse weather) and rewards (such as food, reproductive opportunities) associated with activity. Activity level is one measure of behavior that directly influences disease transmission and overall community ecology. White-footed mice (*Peromyscus leucopus*) are an important reservoir for *Borrelia burgdorferi*, the causative agent of Lyme disease, as well as a variety of other parasites, including Bot Fly (*Cuterebra fontinella*) larvae and several intestinal helminthes. The degree to which these pathogens influence activity levels is poorly understood. In this study, we determined the disease and parasite load of individual mice and continuously monitored activity levels through the use of an automated radio telemetry system. Overall, both gender and infection affected activity level, with male mice being less active than female mice, *Borrelia* infection decreasing activity, and Bot Fly and intestinal parasitism leading to increases in activity. Weather also influenced activity, with mice being more active on rainy nights or warm nights, compared to dry nights or cool nights. Our study shows that the activity levels of White-footed Mice are influenced by both intrinsic and extrinsic factors, including disease and weather. This variation in activity levels may translate into changes in disease transmission dynamics by influencing disease vector encounter rates.

Thu-A1-5-4

The Phylogeography of *Marstonia lustrica*: Glaciation and the Evolution and Distribution of a Rare Snail.

Thomas Coote (Bard College at Simon's Rock, MA)

Marstonia lustrica is a poorly understood aquatic snail, relatively rare throughout its range and listed in the State of Massachusetts as Endangered (NHESP 2010, Hershler et. al 1987). It is the northern-most cold-temperate species of its genus, with other members of the genus occurring along the southern edge of its range (Thompson 1977). The current range of *M. lustrica* appears to follow the maximum extent of the Laurentide Glacier (20–25 kya), extending from Minnesota to western Massachusetts. Research regarding the distribution, ecology, and phylogeny of *M. lustrica* in the State of Massachusetts and eastern New York raised the possible role of glaciers and pro-glacial lakes in the establishment and distribution of the snail, leading to the hypothesis that its distribution and evolution may be dependent upon glacial processes, forces, and time scales that are typically overlooked in research and conservation. A full range survey was completed in 2007 and 2008, with populations identified in 20 water bodies from Minnesota to Massachusetts. Fifty-seven specimens from the 20 populations were then sequenced for two mtDNA markers (COI and NDI), developing both phylogenetic trees and haplotype networks. Here I present those trees and networks, and correlate the distribution of these populations and their representative haplotypes with both glacial events and contemporary watersheds, using AMOVAs and mantel tests to examine several phylogeographic models.

Fri-A1-1-1

NatureServe Database Achievements in Freshwater Species Conservation

Jay Cordeiro (NatureServe and UMass Boston, Boston, MA)

In order to practice on-the-ground conservation, it is necessary to know the species at risk of extinction, their location, threats, habitat, etc. For the past 35 years, The Nature Conservancy, and now NatureServe, in collaboration with a network of partners, have worked to develop this information and inform conservation of at-risk species. Today, this network includes 82 independent natural heritage programs in the United States and conservation data centers throughout the Western Hemisphere, with nearly 1000 dedicated scientists and a collective annual budget of more than $45 million. NatureServe Explorer (NSE) (http://www.natureserve.org/explorer) is an acclaimed website providing authoritative conservation information for more than 70,000 plants, animals, and ecological communities in every US state and Canadian province. InfoNatura (http://www.natureserve.org/infonatura) maintains similar information on bird, mammal, and amphibian species in 44 countries and territories in Latin America and the Caribbean. A dynamic, searchable database houses data for thousands of freshwater animal species including 95 large branchiopods, 387 crayfish, 501 odonates, 594 mayflies, 672 stoneflies, 1451 caddisflies, 341 freshwater mussels, 835 freshwater snails, ≈800 freshwater fishes, plus various amphibians and reptiles. Information is maintained on classification, conservation status, IUCN Red List, national statuses (USESA, COSEWIC, NatureServe), and distribution. NSE represents a "snapshot" of dynamic data continually refined through input of hundreds of natural heritage scientists and collaborators, and is updated centrally three times annually to reflect new data from field surveys, taxonomic treatments, and conservation status assessments. Working enhancements include the addition of more detailed habitat requirements and ecological information, guidelines for assessing population viability, an index of climate change vulnerability, invasive species assessment protocols, predictive range mapping with interactive maps, and online images. One of our primary goals is to help make biodiversity a mainstream consideration in all significant conservation and natural resource management decisions by making it simple for conservationists, government agencies, corporations, and landowners to access and use high-quality biodiversity information.

Thu-A1-2-2

Origins, Biogeography, and the Effects of Climate Change on a Hotspot of Temperate Odonate Diversity in the Northeastern US

Jeff Corser, Erin White, and Matthew Schlesinger (NY Natural Heritage Program, Albany, NY)

In order to determine the factors governing Odonata distributions at regional scales we analyzed New York's recently completed statewide Odonata survey (Atlas). Using multivariate linear ANOVA models in conjunction with other species-specific datasets, we assessed the factors affecting current and recent distributional changes of all 193 species in New York Sate. We found that the length of the adult flight season is the key driver of the distributional extent of Odonate ranges at broad regional scales. We also found some support for the hypothesis that these larger-scale distribution patterns could be related to larval and adult habitat preferences. Because Odonates have conclusively been demonstrated to be tightly coupled to thermal regimes at organism to ecosystem scales, they are an ideal taxon to serve as a barometer of past, as well as ongoing, climate and ecological change.

Fri-P1-1-2

Waterbird Foraging Behavior in an Urban Estuary: A Stable Isotope Approach

Elizabeth Craig (Cornell University, Ithaca, NY and New York City Audubon, NY, NY), Susan Elbin (New York City Audubon, NY, NY), and Jed Sparks and Paul Curtis (Cornell University, Ithaca, NY)

Stable isotope analysis is a valuable tool in the study of diet and foraging ecology of birds. Isotopic signatures observed in feathers reflect a bird's diet and foraging habitat at the time of feather formation. We used isotopic signatures of carbon (δ13C) and nitrogen (δ15N) to monitor diet, relative trophic position, and foraging habitat of waterbirds nesting in New York Harbor. From 2007 to 2010, we collected feathers from nestlings at four islands colonies within the Greater NY Harbor. We measured δ13C and δ15N in feathers from six of the harbor's most numerically abundant waterbird species, including three wading birds (Black-crowned Night-Heron, Great Egret, and Glossy Ibis) and three seabirds (Double-crested Cormorant, Great Black-backed Gull, and Herring Gull). We found significant inter- and intraspecific differences in δ13C and δ15N. For example, five species nesting on Hoffman Island in the lower NY Harbor differed significantly in δ13C and δ15N ($P < 0.0001$) suggesting differences in foraging habitat, variability of prey selection, and trophic position of the prey. Also, significant variation was observed within species over time ($P < 0.0001$) and among nesting colonies ($P < 0.0001$). We conclude that stable isotope analysis of feathers is a powerful and non-invasive tool for studying foraging ecology of waterbirds in urban systems. Combining results from this study with foraging behavior observations and diet studies will improve our understanding of the foraging landscape used by waterbird species in the harbor, and will help guide resource managers in protecting important foraging habitat and prey base for these charismatic flagship species.

Fri-A1-2-1

A Comparison of Removal Techniques in Eliminating *Berberis thunbergii* and Reducing Subsequent Germinations

Tyler Cross and Jeffrey Corbin (Union College, Schenectady, NY)

Removal of invasive species can cause substantial disturbances to the ecosystem that can influence future community composition. This study compared several methods to remove *Berberis thunbergii* from forested understories, and compared both the effectiveness of the removal and the post-removal plant community. Adult *B. thunbergii* individuals in Minnewaska State Park, NY were removed either manually or using herbicide. Following the primary removal, half of the plots were sown with Perennial Wild Rye (*Lolium perenne*) (+ SEED) while the other half received no supplemental seed (-SEED). While neither herbicide nor manual removal was found to be significantly more efficient at removing the adult individuals than the other, several differences were discovered in the relationships between the treatment combinations in terms of the species composition and abundance of germinations in the following years. Herbicided plots had nearly half as many *B. thunbergii* seedlings as plots where shrubs were removed manually, but also had fewer seedlings of the native species *Acer rubrum* and *Parthenocissus quinqufolia*, and lower species diversity. The presence of Wild Rye grass (+SEED) decreased the abundance of non-native *Alliaria petiolata* and also the number of species; the effect of SEED was greater in the first year than the second, owing to lower grass density over time. It did not affect the abundance of *B. thunbergii* seedlings or species diversity. Our results indicate that a trade-off exists between the selection of a method that facilitates the germination of native species and the prevention of reinvasion by *B. thunbergii*.

Thu-A2-7-1

Species Introductions and the Effect on Native Fish Distribution in Adirondack Lakes

Robert Daniels (New York State Museum, Albany, NY), James Sutherland (New York State Department of Environmental Conservation, Albany, NY), and Charles Boylen (Department of Biology and Darrin Fresh Water Institute, Rensselaer Polytechnic Institute, Troy, NY)

Twenty-six taxa of fish were taken in eighteen lakes in the southwestern quadrant of the Adirondack Park, Herkimer and Hamilton counties, NY. Species richness in the lakes ranged from 1 to 18 species. Although the lakes studied are in one ecoregion and often in the same subdrainage, species composition differed among lakes, and composition and abundance differed within lakes over time. Most lakes support a rich, viable assemblage, although all but one includes, and many are dominated by, exotic species. We compare current species composition to that reported in surveys conducted in the lakes over a 75-year period. Assessments of the fish assemblage composition in these lakes, when compared over time, showed marked differences. These differences might be the result of several factors, but the presence of exotic taxa and extirpation of native fishes can explain gross changes in fish assemblage composition in these Adirondack lakes. We review the status of native fishes in these lakes, discuss the current distribution of these fishes, and relate that to environmental conditions and the distribution of exotic species.

Thu-P2-3-3

How Native are the Ants of Broadway? Urban Ecology of our Terrestrial Neighbors

James Danoff-Burg (Columbia University, NY, NY) and Pecarevic, Marko (State Institute for Nature Protection, Zagreb, Croatia)

Each year, a larger proportion of the Earth's surface is urbanized ,and a larger proportion of the people on Earth live in those urban areas. The every-day nature that humans encounter in cities, however, remains poorly understood. Here we consider perhaps the most urban green habitat—street medians. We sampled ants from forty-four medians along three boulevards in New York City and examined how median properties affect the abundance and species richness of native and introduced ants found on them. Ant species richness varied among streets and increased with area, but was independent of the other median attributes measured. Ant assemblages were highly nested, with three numerically dominant species present at most medians, and additional species present at a subset of medians. The most common ant species were the introduced Pavement Ant (*Tetramorium caespitum*), and the native Thief Ant (*Solenopsis molesta*), and Cornfield Ant (*Lasius neoniger*). The most common introduced species on the medians responded differently to natural versus disturbed elements of medians. *Tetramorium caespitum* was most abundant in small medians, with the greatest edge/area ratio, particularly if those medians had few trees, whereas *Nylanderia flavipes* was most abundant in the largest medians, particularly if they had more trees. Many of the species encountered here were similar to those found in other large, North American cities, such that a relatively small subset of ant species probably represent most of the encounters humans have with ants in North America.

Fri-P1-2-1

A Model of Snowmobile Traffic on a National Wildlife Refuge in Northeastern Vermont

John Davis (University at Albany/SUNY, NY)

Snowmobile travel is a traditional form of winter recreation throughout New England, but concerns remain about possible impacts on wildlife, habitat, air quality, and visitor experience. Managers of natural areas frequently find it difficult to quantify snowmobile traffic because the trails form complex networks spread over large areas of relatively remote country. As one example, the Nulhegan Basin Division of the Silvio O. Conte National Fish and Wildlife Refuge (Nulhegan Refuge), located in northeastern Vermont, includes about thirty-five miles of snowmobile trails and provides connecting links with the larger statewide trail system. Since December 2000, refuge staff have monitored snowmobile traffic using electronic counters and stratified random samples of one-hour direct observations. Direct observations were averaged to produce estimates of the relative fraction of snowmobile traffic on each of the trails per unit time for each stratum. These relative fractions were then compared with data for traffic counters on three trails during the 2009–2010 snowmobile season, yielding an estimate of the number of snowmobiles per unit time on each refuge trail, and the total number of visitors to the refuge for the entire season. Average daily and weekly patterns were surprisingly predictable and well-described by a set of Gaussian functions, with peak values occurring each day between 13:00 and 14:00 hours, and each week on Saturday. Monthly and seasonal patterns appear to be associated with varying snow conditions and occurrences of holidays and special events. The model was validated using data from two traffic counters operated by the Vermont Association of Snow Travelers. Predicted travel patterns will also be tested against traffic-counter data now being collected for the 2010–2011 season. The significance of the model is that it reduces the total effort required to monitor a large trail network compared to using either direct observation or traffic counters alone, and allows resource managers to identify specific trails that may need more intensive monitoring.

Fri-P1-5-1

A Hexagonal Grid Layer for Natural Resource GIS in NY State

John Davis (University at Albany/SUNY, NY) and Lori Cornell (College of Environmental Science and Forestry/SUNY, Syracuse, NY)

The US Environmental Protection Agency (USEPA) produced a hexagonal tessellation of the conterminous United States in the 1990s as part of the sampling protocol for the Environmental Monitoring and Assessment Program (EMAP). An array of hexagons is isotropic, provides even spatial coverage, and is less likely to be coincident with anthropogenic features such as parcel boundaries or roads. Nested hexagon grids of larger and smaller scale can easily be generated. These advantages have led a number of investigators to use hexagonal grids for conservation analyses at varying scales. A hexagon-based model of terrestrial wildlife habitat suitability has been developed for Montgomery County, NY. Each hexagon had an area of approximately 10 square kilometers, an analysis unit coarse enough to encompass a mosaic of landscape features, corresponding to scales at which many conservation data sets can be used, including hydrographic features, roads, and Natural Heritage Program records. In order to extend this work to other counties in New York, we have produced a state-wide hexagonal grid at the same scale, using the original EMAP grid algorithm to generate hexagon vertices, and ESRI ArcMap 9.3.1 to create the hexagons from the points and project them to the NYS UTM coordinates. Individual hexagons were edited to remove gaps or areas of overlap. The final feature class is therefore topologically correct, with 13121 hexagons covering New York State (mean area = 1013.3 ha ± 0.1%.) For analyses at the landscape scale, this exceeds the accuracy of available biological and physical data. Potential applications for natural resource conservation will be explored.

Fri-P2-7-3

Swarms of the Ponto-caspian Mysid *Hemimysis anomala* in Montreal Harbour, St. Lawrence River, Canada

Yves de Lafontaine (Environment Canada, Montreal, QC, Canada)

The mysid *Hemimysis anomala* (HA) has recently invaded the Great Lakes watershed including the St. Lawrence River. This study was designed to determine the relative abundance and the spatial distribution of HA in Montreal Harbour (St. Lawrence River) and to compare the sampling efficiency of two plankton nets for future monitoring of the species. Plankton samples were collected at 21 stations including harbor and non-harbor sites at nighttime in September and October 2009. Dense swarms (>1000/m^2) of HA were found along the harbor piers in well-protected sites, while open harbor sites along the river mainstream were characterized by very low densities (<1/m^2). HA was not found at non-harbor sites. The distribution of HA was not related to spatial variation in water quality parameters. The high abundances observed close to walls indicate the importance of habitat characteristics providing either shelter, food sources, or both. Sampling gear comparisons revealed that densities and species occurrences were higher when sampled with the large-aperture plankton net. The large densities of HA in a relatively confined area of Montreal Harbour and the absence of the species at upstream sites suggest that the species might have been present in the Montreal area for a number of years as a result of local introduction rather than drift of individuals from upstream.

Thu-A2-3-2

Innovations and Challenges with Compiling a Spatial Data Set of Invasive Species

Jennifer Dean (New York Natural Heritage Program, Albany, NY)

Invasive species, non-native organisms that negatively impact biodiversity, human health, and the economy, have become a ubiquitous challenge for those tasked with managing lands and waters. Deciding whether to manage invasive populations and identifying the most effective techniques are best made with accurate, up-to-date information about the distribution of species across the landscape. Comprehensive baseline data on invasive species locations are also crucial for detecting pathways of invasions, responding rapidly to new populations, and understanding the effects of climatic changes on invasiveness. In New York, the state invasive species database (iMapInvasives) presents an effective, GIS-based, mechanism for aggregating and sharing data. However, even with this valuable mapping tool, creating an accurate and inclusive set of invasive species data has many challenges. Limited resources prevent many regions from being mapped, creating a disproportionate spread of data that is not representative of the actual distribution of some species. Also, the accuracy of incoming data needs to be verified, which is a difficult task essential to maintaining a quality database. To overcome these challenges, we are developing technologies to facilitate data entry, compiling existing data, and reaching out to groups in regions lacking data. We are also creating a data verification process for incoming reports of invasive species. These projects will increase the impact of the iMapInvasives dataset for land managers, researchers, policy makers, and educators concerned with invasive species.

Thu-P2-2-4

Ant Species Diversity Along a Latitude and Elevation Gradient in the Northeastern United States

Israel Del Toro (University of Massachusetts Amherst) and Aaron M. Ellison, (Harvard Forest, Harvard University)

The relationship between species diversity and latitude and elevation gradients has traditionally been a topic of much investigation for ecologists and biogeographers. We use ants (Hymenoptera: Formicidae) to evaluate how species richness patterns change along latitudinal and elevation gradients in the Northeastern United States. We test two main hypotheses: 1) diversity patterns of ants in the Northeastern US are partially explained by the interaction of latitude and elevation across broad geographic landscapes, and 2) community assembly across broad geographic ranges can also be explained by latitude and elevation. To test our hypotheses, we sampled ants at 70 sites between 37°N and 46°N during the summer of 2010. We used pitfall traps and systematic hand collecting to sample ants in two habitat types (open fields and forests). Based on the data collected, we show that an interaction between latitude and elevation can help to predict the total number of species collected at each site. We also present preliminary findings about community assembly and similarity across the entire latitudinal gradient. These findings contribute to the understanding of species' range limits, diversity patterns along geographic gradients, and ant community assembly in the eastern forests of the United States.

Thu-A1-1-1

Bee Diversity in Scrub Oak Patches Two Years after Mow and Herbicide Treatment

Amanda Dillon and Jason Bried (Albany Pine Bush Preserve Commission, Albany, NY)

Little is known about the diversity and management response of native solitary bees in globally rare barrens restricted to the northeastern United States. Here we assess solitary bee diversity in Albany Pine Bush shrub barrens two years after a mowing and herbicide treatment. Standard bowl-trap and sweep-net surveys were repeated six times during June–August in four treated scrub oak patches and a nearby untreated scrub oak patch. We captured 88 bee taxa including several species endemic to sandy soils and a first New York State record of *Nomada tiftonensis*. Bee richness and total abundance did not differ appreciably between the treated and untreated scrub oak. However, fewer shared taxa and/or greater disparities in species' abundances were found between control and treated areas than among treated areas. Potential increased apparentness of nectar resources and sandy areas post-treatment may underlie the compositional effect. Although not a surrogate for fire, we expect mowing and herbicide treatment to delay the return of closed-canopy thicket, lower the costs of prescribed fire maintenance, and allow greater recovery time for bees and other management-sensitive animals.

Fri-A1-7-2

Linking Plant Traits to Stress and Resource Gradients in Inland Salt and Freshwater Marsh Communities

Anthony Eallonardo, Donald Leopold, and John Stella (SUNY, Syracuse, NY), and Jason D. Fridley (Syracuse University, Syracuse, NY)

Inland salt marshes of the northeastern US are non-tidal, emergent wetlands that occur in areas affected by saline groundwater such that halophytic species are present. They are highly imperiled with a total spatial extent in the Northeast of less than three hectares. They offer a unique opportunity to examine the linkages between species traits, evolutionary trade-offs, and relative abundance along extreme stress gradients. The goal of this study is to understand the ecophysiological underpinnings of inland salt marsh assembly, facilitating management and restoration. In a field study of the three remaining inland salt marsh sites in New York State, we asked: 1) what are the environmental gradients underlying species sorting from freshwater marshes to inland salt marshes?, 2) does salinity tolerance constitute an axis of plant specialization that is distinct from an axis based on resource availability?, and 3) how do relationships between environmental gradients and traits or trait syndromes affect species sorting? Multivariate analyses of community composition indicated that soil electrical conductivity, Na:K ratio, pH, and total N were the primary environmental variables underlying the species sorting and that inland salt marshes existed under an extreme range of biogeochemical conditions (i.e., soil electrical conductivities ranging from 40 to 100 dS m-1, pH from 4 to 8.5, and soil sodium concentrations 200- to 300-fold greater than potassium). Principal components and fourth-corner analyses suggested a secondary axis of plant specialization related to salinity tolerance, orthogonal to a primary axis related to soil nutrient availability. Plant species scoring high on the secondary (salinity) axis tended to have high leaf nitrogen per area, small leaf size, and elevated tolerances of soil electrical conductivity (EC) and Na:K ratio. We suggest that the overall tradeoff underlying salinity tolerance is inefficient nitrogen use in exchange for efficient water use and tolerance of potentially toxic soil sodium levels. This tradeoff may underlie the reciprocal relationship between salt tolerance and competitive ability in non-saline settings, and thus explain the high levels of rarity of inland salt marsh species.

Thu-A2-7-2

Brook Trout (*Salvelinus fontinalis*) Habitat Assessment and Dispersal Patterns in True Brook, NY

Justin Ecret and Tim Mihuc (SUNY, Plattsburgh, NY)

Minimal research involving Adirondack Brook Trout habitat and movement patterns within headwater streams has been conducted, leaving managers with an information gap regarding the specific habitat conditions necessary for sustainable Brook Trout populations in Adirondack streams and rivers. By means of electrofishing, we examined size-class-specific microhabitat requirements and reach-scale movement patterns for Brook Trout (*Salvelinus fontinalis)* populations within two northern Adirondack streams. An additional goal of this research was to assess the effects of road crossings on fish habitat selection and seasonal movement patterns. Water depth, water velocity, and substrate-size requirements were observed to be similar among two Brook Trout size classes (size class1 [SC1] represents Brook Trout less than 14.5 cm and size class2 [SC2] represents Brook Trout greater than 15.5 cm). Both size classes exhibited selection patterns within deeper-slower moving pool habitats; however, older Brook Trout were found to be associated with smaller sized substrates within one of our study sites. These habitat selection patterns were also supported by determining and comparing stream hydrologic conditions, including stream depth and Froude number. A total of 788 Brook Trout were tagged throughout a four-month period and consisted of both sedentary and highly mobile individuals. Brook Trout movement patterns varied between size classes as well as between seasons. Younger trout exhibited increased movement during the spring, while older trout were found to be more mobile and move more frequently during early fall. Lastly, we examined the proportion of Brook Trout moving upstream/downstream and found a greater frequency of younger Brook Trout moving upstream during late summer. The primary goal of this study was to provide sufficient knowledge of the adequate conditions that allow for a strong and sustainable fish habitat, thereby allowing for future assessment protocols for road crossings on Adirondack Brook Trout populations.

Thu-A2-3-1

Long-term Waterbird Monitoring in the New York Harbor

Susan Elbin (New York City Audubon, NY, NY), Elizabeth Craig (New York City Audubon, NY, NY, and Cornell University, Ithaca, NY), Andrew Bernick (New York City Audubon, NY, NY), and Nellie Tsipoura (New Jersey Audubon Society, Bernardsville, NJ)

NY City Audubon has conducted colonial waterbird nest surveys since 1982. Species surveyed included: Great Egret (*Ardea alba*), Snowy Egret (*Egretta thula*), Cattle Egret (*Bubulcus ibis*), Black-crowned Night-Heron (*Nycticorax nycticorax*), Yellow-crowned Night-Heron (*Nyctanassa violacea*), Little Blue Heron (*Egretta caerulea*), Tricolored Heron (*Egretta tricolor*), Green Heron (Butorides virescens), Glossy Ibis (*Plegadis falcinellus*), Double-crested Cormorant (*Phalacrocorax auritus*), Great Black-backed Gull (*Larus marinus*), and Herring Gull (*Larus argentatus*). By 1986, colonies occupied 4 of 17 suitable island sites; 7 in 1996; and 11 in 2010. The harbor-wide wading bird population peaked in 1993 (n = 2283 pairs) and has remained at about 1700 pairs (SE = 143) through 2010. Cormorant colony dynamics follow the same pattern: increasing site use from 3 to 8 islands. The population peaked in 1995 (n = 1806) and has maintained a harbor-wide population of 1201 pairs (SE = 171) through 2010. Since 2006, monitoring effort has included research and surveys that describe the nutritional landscape, including assessment of adult diet, nestling provisioning, and seasonal carry-over effects. NYC Audubon and NJ Audubon Society engage citizen scientists to monitor and describe activity at foraging sites. Monitoring nesting activity provides important basic population information, but additional components addressing foraging dynamics and diet are needed in a monitoring program to fully guide management and conservation of colonial waterbirds.

Fri-A1-2-2

Observations at the Roof: Effects of Powerful Lights on Birds Migrating over New York City on September 11

Susan Elbin and John Rowden (New York City Audubon, NY, NY), and Andrew Farnsworth (Cornell University, Ithaca, NY)

Visual study of nocturnal migration provides critical insights into behaviors of migrating birds. Coupling observations with recordings of flight calls provides unique information for species identification. During the past six years, we observed migrating birds in Battery Park, NY as they encountered powerful ground-based lights, NYC's Tribute in Light Memorial. We counted the number of birds seen in the beams from dusk on September 11 to dawn on September 12 using instantaneous scan sampling. We gathered contemporaneous local climatic data to review any effects of weather on the night's movement. Whereas rainy skies in 2009 resulted in only 12 birds observed, migration conditions in 2010 were favorable and resulted in 9435 birds counted. In 2010 we also positioned an SM2 autonomous recording unit on the roof to record migratory flight calls; this device recorded audio in 16-bit, 24,000-Hz sampling rate from sunset to sunrise. Simultaneous flight-call monitoring yielded over 10,000 flight calls of at least 35 species. In 2010, the lights were dimmed five times because of a high volume of birds circling the beams. The number of species and number of calls were positively correlated with the lighting periods. Artificial lights may attract migrants under a large range of atmospheric conditions, highlighting the need for additional research on the effects of artificial lighting on migratory birds.

Thu-P2-5-5

The Ants of Nantucket and the Ants of New England: Relationships between Local and Regional Faunas

Aaron Ellison (Harvard Forest, Harvard University)

The New England states have been the focus of intensive study of ants and other invertebrates for over a century, and a comprehensive inventory and a species-level *Field Guide to the Ants of New England* is being completed this year. As part of this inventory, collections from state repositories, universities, and museums throughout the northeast have been reviewed and data-based, and unsorted material from comprehensive monitoring programs have been sorted, identified, and catalogued. As of March 2011, nearly 20,000 species-occurrences and 137 species have been reviewed and mapped from the six New England states, and these data provide an excellent opportunity to explore regional biogeographic patterns in the distribution and abundance of ants—the little things that run the world. One set of previously unsorted material represents six years (2004–2009) of collections from Nantucket Island, south of Cape Cod. This sample occurred nearly 80 years after the last published report describing the ants of Nantucket. The 1928 species list included 17 species, most represented by a single individual, whereas the new sample includes 57 species from ≈32,000 individuals (2833 species-occurrences). Nantucket has only 0.4% of the area of all of New England, but 41% of the region's ant fauna can be found on this island alone, including warm-climate species that are uncommon elsewhere in the region (*Camponotus americanus*, *Lasius subglaber*, *Solenopsis* cf. *texana*). Although nine exotic species have been found throughout New England, only two, the common pavement ant *Tetramorium caespitum* and its rare parasite *Anergates atratulus*, have been recorded from Nantucket. Species' relative-abundance distributions are similar on Nantucket and throughout New England, suggesting that similar processes structure ant assemblages at both local and regional scales. Similarly, the occurrence of rare species—those represented by only one or two individuals—is similar on both Nantucket and across New England,suggesting that several more species remain to be found both on the island and throughout New England. Finally, similar to the broader New England region, habitats on Nantucket include bogs and other wetlands, sandplains and grasslands, and shrublands and closed-canopy forests, and at both scales, ant species segregate predictably among habitats. The combination of intensive and repeated sampling at small (local) scales and extensive unreplicated sampling at larger, regional scales provides complementary datasets that enrich our understanding of ecological processes underlying patterns of species distributions.

Thu-A1-1-2

Gigantism in Organisms from the Ice Caves at Sam's Point Preserve

Luis Espinasa and Amy Cahill (Marist College, Poughkeepsie, NY)

The Ice Caves at Sam's Point Preserve, NY are very young caves formed less than 12,000 years ago. Unlike caves formed by limestone dissolution through the millennia, the ice caves were the result of tectonic fracturing associated with postglacial events. The caves consist of fractures in the bedrock and voids under the jumble of boulders and talus blocks that have fallen from the face of the cliffs. Snow enters the caves through the openings at the top and cold air is trapped inside throughout the year. This refrigerated environment preserves ice that blockades passages for large portions of the year. The relative young age, a length of less than 150 m, and the harshness of the environment should make these caves an unlikely place to find troglobitic cave-adapted organisms. Nonetheless, Ice Caves' crustaceans (amphipoda: *Stygobromus* sp.) have adapted to the darkness and lack pigmentation and eyes. The amphipods' most distinguishing character is their unusual size. Without apparent predators, the Ice Cave amphipods are not limited to a size that enables them to hide in cracks and under rocks. They have thus grown to "gigantic" proportions.

Thu-P1-4-4

Snowshoe Hare Browse Behavior in the Adirondacks: The Role of Availability, Preference, and Forest Structure

Celia Evans and Jorie Favreau (Paul Smith's College, Paul Smiths, NY)

Snowshoe Hares (*Lepus americanus*) browse potential food sources in winter in response to a suite of factors including availability, quality, and predator avoidance. Little is known about hare browse preference in the southern part of the distribution, where forests are more structurally heterogeneous and more rich in species of woody browse. To determine hare browse choices and preference in mixed northern hardwood forest in the Adirondacks of NY, we examined species-specific in-situ browse intensity in 4- X 4-m plots and along 50-m transects in northern Adirondack forests where snowshoe hare tracks had been observed in the past several years (2009–2010). We also examined preference in feeding arrays for wild hares (cafeteria style). We asked: 1) what are the dominant woody species that hares browse in-situ; 2) what are the relationships among proportion of browsed twigs, the relative availability of browse species, and nutrient content; and 3) how does in-situ browse choice compare with preference shown in feeding arrays that contain species less commonly found in high-density browse areas. The proportion of available hardwood twig tips browsed increased linearly with availability. Of the most locally abundant species, Striped Maple and Red Maple appear to be browsed in slightly greater proportion relative to availability than American Beech. However, when feeding arrays were offered that contained more choice, hares showed significant preference for Paper Birch, Yellow Birch and Sugar Maple over the commonly available Striped and Red Maple. These data, in conjunction with cover data, suggest that Snowshoe Hare trade-off gathering preferred browse in favor of browsing available food sources in the areas where they are safer from predators in winter. Preliminary chemical analyses of woody browse suggest that, while nitrogen content is highest in the most preferred browse and lowest in the least preferred, there are some anomalies that suggest other factors influence preference.

Thu-A1-5-2

Top-down Effects By Deer and Moose on Forest Regeneration in Southern New England

Edward Faison and David Foster (Highstead and Harvard Forest, MA), and Justin Compton (Mount Ida College)

Where abundant, White-tailed Deer (*Odocoileus virginianus*) and Moose (*Alces alces*) can have "ecological landscaping" effects on vegetation structure, composition, and diversity. Despite the influential role of these herbivores in some ecosystems, widespread vegetation changes have often been attributed to ungulates when the connections have not been rigorously established and alternative, abiotic drivers of vegetation have not been adequately considered. We examined top-down (browsing) and bottom-up (abiotic resources) drivers of tree seedling regeneration in areas of southern New England where ungulates are most abundant: intensively harvested forests of central Massachusetts where Moose attain their highest densities and unlogged forests of southwestern Connecticut where deer reach their highest densities (except for some islands; >12/km^2). We used experimental exclosures to examine the effects of browsing on two size classes of tree regeneration (30–99 cm and >1 m) in recently harvested patch cuts. We also compared White Oak (*Quercus alba*) regeneration (>30 cm) in mature oak-hardwood forests of southwestern Connecticut to similar forests in central Massachusetts where deer densities are relatively low (<5.8/km^2). In patch cut harvests, the size of the cut (proxy for solar radiation and soil temperature) controlled density and richness of small tree seedlings (30–99 cm), whereas herbivore browsing was the dominant control of the density and richness of large seedlings (>1 m). In mature oak-hardwood forests, White Oak seedling density was significantly lower in southwestern Connecticut than in central Massachusetts, despite a longer growing season, a more open understory (proxy for available light), and greater White Oak basal area (available seed source) in southwestern Connecticut. We conclude that top-down effects by deer and Moose are important determinants of tree regeneration in intensively harvested forests where Moose are abundant and in parts of the region where White-tailed Deer exceed 12/km^2. More research is needed to determine the role of low-moderate densities of deer and Moose in partial harvests and in unharvested forests the most representative herbivore and forest type conditions in southern New England.

Fri-A2-4-1

Go Botany! An On-line Flora of New England

Elizabeth Farnsworth and William E. Brumback (New England Wild Flower Society, Framingham, MA.

Imagine being able to identify plants in the field and learn all about them using an innovative set of keys on your mobile device or desktop computer! That is the vision of a new, four-year New England Wild Flower Society project to develop the definitive on-line Flora of New England, funded by the National Science Foundation. Together with the Yale-Peabody Museum, Chewonki Foundation, Montshire Museum of Science ,and other educational partners, we are creating Go Botany, a set of web tools for use in schools, field classes, citizen-science networking, trail guides, and museum displays. We will provide a preview of the richly illustrated, multiple-access, interactive key we are developing for more than 3000 plant taxa native and naturalized in New England. The key uses an innovative intelligent keying algorithm based on information gain theory. This key will also interface with traditional dichotomous keys. We are also designing an on-line citizen-science collaboration tool called "MyPlants" and an app for mobile devices. We will offer teacher-training workshops throughout the Northeast to promote classroom use. Go Botany can develop site-specific checklists and is a model for developing floras across the country.

Thu-P1-7-4

Brooktrout Lake Fisheries and Macroinvertebrates from the Hydroacoustic Perspective

Jeremy Farrell, James Sutherland, Brian Keleher, Charles Boylen, and Sandra Nierzwicki-Bauer (Darrin Freshwater Institute, Troy, NY)

During the early 1900s, Brooktrout Lake (Hamilton County, NY) anecdotally had a thriving Brook Trout (*Salvelinus fontinalis*) community. Through the surveys of the 1900s the fishery was completely decimated by the influx of acid deposition, with the last recorded catch in 1975. By 1990, the US Congress passed the Clean Air Act Amendments that curtailed much of the acid deposition in the Adirondack Park. The EPA-funded Adirondack Effects Assessment Program (AEAP) began monitoring the chemical and biological response to the legislation in 1994 and noted that by the mid-2000s Brooktrout Lake had undergone enough "recovery" to possibly support fish again. In 2005, a fish reintroduction experiment was initiated, and to date, a total of 4000 fingerlings and 19 adult fish have been stocked in the lake. Hydroacoustic surveys have been conducted on the lake since that time to assess the impact, survivability ,and sustainability of this reintroduced fish population. Early hydroacoustic estimates of fish populations were hindered by the small number of adult fish and a large population of phantom midge larvae (*Chaoborus americanus*) that masked the signal of the fingerlings when using a high frequency transducer (430 kHz). The hydroacoustics signal along with towed nets and zooplankton traps have been used to extensively map this phantom midge population diurnally and seasonally since 2005. Starting in 2009, more accurate fish population estimates have been achieved through utilization of a lower frequency (70 kHz) transducer. Hydroacoustic fish estimates have been verified with gill netting concurrent with surveys when possible.

Thu-P2-3-4

The Efects of Cover and Food on Snowshoe Hare Movement Behavior in the Adirondacks

Jorie Favreau and Celia Evans (Paul Smith's College, Paul Smiths, NY)

Snowshoe Hares respond primarily to predation risk and browse needs, both of which are functions of surrounding vegetation. We radio-tracked and snow-tracked Snowshoe Hares. Hares had larger summer home ranges (mean = 47.9 ha) than winter home ranges (mean = 27.6 ha). On average, 62.8% of the winter home-range area was placed in coniferous stands, while 59.3% of summer ranges occurred in hardwood stands. Hares had a mean distance between summer and winter ranges of 673 m. As many as 6 hares overlapped their home ranges, and each home range overlapped each of the other hare's home ranges in winter (mean = 40.3%) and in summer (mean = 12.3%). On the smaller spatial scale of individual moves, preliminary analysis of backtracking data shows that hares rest in locations that are close to cover (distance to closest cover, P = 0.027, and distance to three closest covers, P = 0.059) but do not choose resting locations in response to percent canopy cover (P = 0.317). Hares travel through vegetation that provides greater percent canopy cover than the canopy cover at 5 or 10 m (P = 0.004). Travel paths of hares are not affected by distance to closest horizontal cover (P = 0.253) or snow depth. Hares move slower in coniferous than deciduous stands (P = 0.09). Hare movement rates are independent of canopy cover, horizontal cover as measured by distance to nearest cover, and average distance of three nearest conifers providing cover.

Thu-A1-5-1

The Geology of the Shawangunk Ridge on the Mohonk Preserve and Environs

Howard Feldman (American Museum of Nattural History, New York, NY), Jack Epstein (US Geological Survey, VA), John Smoliga (Boehringer Ingelheim Pharmaceuticals, Inc), and Brian Feldman (Touro College)

In the mid-Hudson Valley, NY, the Shawangunk Formation of Medial Silurian age, consists of light- to medium gray conglomerate, sandstone and shale, and lies unconformably above the dark-gray shales and graywackes of the Ordovician Martinsburg Formation. During the Ordovician Period, the Iapetus Sea began to close due to plate movements, and a deep basin developed into which thick muds and sands were deposited. These sediments were eventually lithified into the Martinsburg Formation. After the Taconic Orogeny, coarse sediments were transported westward from mountains in the east and deposited as the conglomerates and sandstones of the Shawangunk Formation across the eroded folds of the Martinsburg. The Shawangunk Ridge on the Mohonk Preserve is an ideal locality to study the geology of the region. Within a few miles of Mohonk, there are numerous examples of glacial features, various types of faults sometimes with associated mineralization, invertebrate fossils of Martinsburg age, and excellent examples of mechanical weathering. The five sky lakes on the ridge range in pH from 4 to 7. Interestingly, Lake Minnewaska pH changed from 4 to 6 within 20 years. Talus slopes, common in the area, are thought to be the result of gelifraction.

Thu-P1-4-1

Landscape Metrics of Indiana Bat (*Myotis sodalis*) Summer Habitat in Central NY

Michael Fishman (State University of New York, College of Environmental Science and Forestry, Syracuse, NY)

Habitat descriptions for the endangered Indiana Bat have historically focused at the spatial extent of individual roosts, or at arbitrary landscape scales unrelated to ecological function. Such descriptions fail to inform wildlife managers about how to identify Indiana Bat habitat on a useful landscape scale to enable relevant and effective management and land-use decisions. Organisms select habitat at multiple spatial scales, so it is important to understand habitat metrics for a given species at multiple spatial scales in order to develop useful models for identifying potential habitat for that species. Spatial scales should be related to specific ecological processes of the species being studied if the resulting data are to be relevant to the species and useful in its management. I radio-tracked Indiana Bats at multiple sites throughout Central New York to identify roosting and foraging ecological neighborhoods for this species. I characterized each neighborhood using 5 independent landscape metrics: cover-type diversity, or evenness, patch density, average patch compaction (perimeter:area ratio), average patch shape (linear vs. planar, based on length:width ratio), and patch perimeter complexity. I compared these metrics among bats and with randomly selected neighborhood areas of equal size to determine whether any of these metrics could be used to distinguish Indiana Bat habitat from the landscape matrix. I will outline the findings of this analysis, its potential application to management of Indiana Bats in Central New York, as well as needs for further work in this area of study.

Thu-P1-5-3

Leech Parasitism on the Painted Turtle and the Common Snapping Turtle in Upstate NY

Kelly Fitzsimmons (SUNY, Syracuse, NY) and Ashleigh Smythe and David Gapp (Hamilton College, Clinton, NY)

Leeches are known to be among the most commonly observed parasites of freshwater turtles. A total of 63 Painted Turtles (*Chrysemys picta*) and 24 Common Snapping Turtles (*Chelydra serpentina*) were captured during the spring and summer (May to September) of 2009 in aquatic habitats in Albany, Oneida, and Madison counties in upstate New York. Comparative differences in prevalence, distribution, and intensity of leech parasitism were assessed between species, sexes, and age and size classes of host turtles. Incidence of leech parasitism on *Chelydra serpentina* was 92 percent compared to 48 percent on *Chrysemys picta*. Total leech load was significantly higher ($P < 0.05$) in *Chelydra serpentina*, a bottom-dwelling species, than in *Chrysemys picta*, which spends considerable time basking on surfaces out of the water. Other differences in patterns of parasitism, while not significant, were noted. Regarding leech species found attached to turtles, a much higher diversity of leeches was recorded in this study than commonly reported in the literature. This study recorded attachment by seven species representing three genera. Included among these were three species of predatory leeches: *Glossiphonia elegans*, *Helobdella papillata*, and *H. modesta*, the latter two having not been previously reported on turtles. Whether these species were actually parasitizing the turtles or attached for some other reason is not yet known, but this finding suggests that further research is warranted.

Fri-P2-3-2

The Impact of Oil and Gas Development on Large Mammals: Lessons From the West

Jacqueline Frair (SUNY College of Environmental Science and Forestry, Syracuse, NY) and Mark Hebblewhite (University of Montana, Missoula, MT)

The push to reduce dependence on foreign energy has caused rapid and widespread proliferation of oil and gas development in the western United States and Canada. For terrestrial mammals, the ecological footprint of development includes exploration transects, roads, well pads, and pipeline corridors, and associated with each of these is some level of human disturbance. Despite extensive research into the effects of industrial activity on Caribou, Elk, Pronghorn Antelope, and Mule Deer, we remain unable to direct development so as to balance the life-history needs of ungulates with the growing demand for resource extraction. Even under best management practices, in the coming decades, we will witness the extinction of several forest Caribou herds due to the ecological changes wrought by industrial development. Careful consideration of studies focused on ungulates in the west reveal five key failures: 1)misdirected focus on short-term behavioral responses of individuals (e.g., activity patterns during development) rather than multiple-year studies that account for time lags between development and population-level responses (e.g., survival, recruitment, emigration); 2) failure to consider both direct effects (i.e., outright habitat loss by conversion) and indirect effects (i.e., habitat loss through behavioral avoidance, increased competition or predation); 3) conceptual and technical difficulties in evaluating the cumulative effects of multiple land-use changes (forest fragmentation, development of well sites, pipelines, and roads) whose effects are spatially and temporally confounded, and the multiple pathways of possibly interacting effects (habitat conversion, disturbance, altered ecological processes); 4) the great need for but poor ability to conduct studies that examine “context-sensitive” responses and ecological thresholds; and 5) restricted inference due to short-term studies, insufficient sample sizes, lack of controls and replication, and improper choice of response variables. At the root of these problems lies the fact that research into oil and gas impacts has been reactive rather than proactive, and that management policies have focused on false assumptions regarding animal behavior and population processes. We illucidate these issues using case studies, highlight issues of broad applicability to other species and systems, and provide direction for research into the burgeoning development pressures in the eastern US.

Fri-P2-5-2

Taxonomic Status of Stout Smartweed, *Persicaria robustior* (Polygonaceae)

James Furlaud, Daniel Atha, and Robert Naczi (New York Botanical Garden, Bronx, NY)

The genus *Persicaria* (Polygonaceae) comprises 120 species distributed throughout the world, particularly eastern North America and Asia. Dotted Smartweed, *Persicaria punctata* is a common wetland plant throughout the Americas. It is morphologically variable and a number of the more distinctive entities are recognized. The most distinctive element is a rare robust entity occurring throughout the Northeastern United States and Southeastern Canada, and reported to occur in Central America, the West Indies, and Northern South America. Known as Stout Smartweed, *Perscaria robustior* has been recognized as a separate species and as a variety or form of *P. punctata*. The status of these plants remains unresolved. The purpose of this research is (1) to determine if the two taxa are morphologically distinct, (2) to determine which characters distinguish them, and (3) to determine the appropriate taxonomic treatment for the two groups. We measured 9 vegetative and 5 reproductive characters on 119 herbarium specimens. Eleven of the measurements were continuous and 2 were categorical. We investigated characters that had been suggested in the literature, as well as characters that seemed diagnostic based on personal observations. The characters measured were leaf blade width and length, stem width, ocreae cilia length, tepal length, and achene length and width. We also recorded achene shape and the type of rootstock. In addition, we combined a number of measurements to create 4 variables representative of cilia, density, and overlap of the ocreolae. Univariate analyses revealed a number of the characters, such as leaf size, stem width, tepal length, and ocreolae overlap, to be significantly more robust in *P. robustior*. Principal components analysis revealed morphological differences but no clear distinctions between the two plants, suggesting that *P. robustior* may be a variety of *P. punctata*. Analysis is ongoing, and a clearer picture of the taxonomic status will emerge.

Thu-A1-7-4

Use of Abandoned-pasture-trees (Wolf-trees) by Birds and Mammals in Second-growth Forests of Vermont

Michael Gaige (Malta, NY)

Complex structure is important to forest wildlife all over the world, including forests of the Northeast. Structural complexity in forest ecosystems generally increases in quality as a forest ages. The Northeast generally lacks old forests but it does contain old trees. Scattered throughout the second-growth forests are large, old, wide-spreading trees that formerly stood in open pastures. Commonly called wolf-trees, these cultural legacy trees are characterized by their large size, horizontal structure, hollows, cavities, and rugose bark. The use of these structural anachronisms by wildlife is not well understood, and forest management often suggests removing such trees in favor of cultivating valuable timber. Others suggest that the trees may have wildlife or aesthetic value. I investigated use of abandoned-pasture-trees by birds and non-volant mammals in second-growth forests of Vermont. I selected 28 legacy trees and 28 paired control trees and sampled for wildlife using four methods: time-constrained observations; time-constrained searches for sign; small-mammal trapping; and motion-sensing cameras. The number of observations or detections for birds and mammals were higher at legacy trees (n = 368) than control trees (n = 153). Use duration by birds at legacy trees (11,140 sec.) was greater than use duration at control trees (1170 sec.). Feeding, singing, and nesting behavior by birds was more common at legacy trees. Small-mammal use was not significantly different. The number of species using legacy trees was higher (n = 46) than the number using control trees (n = 27). The results of this study highlight the attractiveness of abandoned-pasture-trees for wildlife in the Northeast and call for appreciation of individual malformed trees as important wildlife features. While managed forests inherently remain in a relatively young successional stage, the retention and encouragement of legacy trees can add important old-growth type features to an otherwise structurally simple forest.

Fri-P2-4-4

Adapting to Climate Change in the Northeast

Hector Galbraith (Manomet Center for Conservation Sciences, Dummerston, VT)

The northeastern states have been leading the nation in developing methods for evaluating the likely vulnerabilities of species and habitats to the changing climate, which is vital information if we are to plan and implement long-term conservation of important resources. While we have had major success in this endeavor, we need to rapidly move forward to the next two steps: going beyond state-specific vulnerability assessment to regional evaluation, and beginning to test and implement our theoretical ideas about how we will adapt to climate change by applying them at sites.

Fri-A2-5-4

A New Paradigm for Locating Native Biocontrols for Non-native Invasive Plants

Richard Gardner (Bernville, PA)

Current ecology theories are in place which explain why native biocontrols for non-native invasive plants are possible and in some cases probable. Locating the native biocontrols requires time, patience, and an understanding of why they have not been located along with deep understanding of local environmental conditions. This presentation aims at offering ideas on why native biocontrols are not recognized and to suggest alternatives to the current and dangerous practice of introducing additional non-native species to control already present invasive non-native species.

Fri-P1-7-3

Stable Isotope Analysis of Fall Migration Stopover by Passerines on an Inland Pitch Pine Scrub Oak Barrens

Jeremy Kirchman (New York State Museum, Albany, NY), Joel Ralston (University at Albany, NY), and **Neil Gifford** (Albany Pine Bush Preserve Commission, Albany, NY)

Inland pine (*Pinus* spp.) barrens are rare, isolated habitats know to support unique assemblages of breeding bird species, but their importance as migratory stopover sites has not been studied. During the fall migration periods of 2007–2009, we conducted mist-net surveys of migrating songbirds on the 1300-ha Albany Pine Bush Preserve (APBP), a fire-managed inland Pitch Pine - Scrub Oak barren in east-central New York. We present data on the composition of the fall migrant avifauna, summarizing the timing of arrival and departure from our study site by 32 non-resident passerine species. We estimated the breeding-site origin of six species (a kinglet, four warblers, and a sparrow) using stable hydrogen isotope measurements from flight feathers. Within each species, we found a broad range of isotope ratios, indicating that the catchment area of the APBP is very large, in some cases extending several hundred km north and west of the stopover site. In one of the first isotope-based tests for a stopover site in Eastern North America, we find no evidence for geographical structure of the timing of migration through the APBP; slopes of regression lines for capture date versus isotope ratios were not statistically different from zero. This result is in contrast with previous isotope research that found both leapfrog and chain migration patterns in different warbler species at stopover sites in the western US. We conclude that pine barrens may be important stopover sites, but additional isotope and survey data are needed to examine geographic and temporal patterns within species.

Fri-A2-7-1

Correlations among Anthocyanin and Chlorophyll in Senescing Leaves of Red Maple

Justin Gill and Jack Tessier (SUNY Delhi, NY)

Acer rubrum (Red Maple) is a red-senescing hardwood. To determine the role of anthocyanins (red pigments) in the senescence process, we collected leaves from each of 24 trees weekly through the fall of 2010 and ground them in alcohol. We ran the resultant tinctures through a spectrophotometer to measure for the percent absorption in the wavelengths that anthocyanins and chlorophylls A and B are known to absorb. All spectrophotometer readings increased as time went on, both in measure and correlation between the chlorophylls and anthcyanins. These results support the hypothesis that anthocyanins serve to protect and extend the life of chlorophyll and the leaf.

Thu-A1-7-3

Intensive Rotational Targeted Grazing of Sheep as a Control for the Spread of P*ersicaria perfoliata*

Caroline Girard and Gary S. Kleppel (University at Albany SUNY, Albany, NY)

The invasive species *Persicaria perfoliata* (Mile-a-minute) is threatening native plant communities by displacing indigenous plant species in 11 of the coterminous United States including New York. This study investigated the effectiveness of a novel protocol, intensive rotational targeted grazing (IRTG), for controlling the spread of *P. perfoliata*. Three Romney ewes (*Ovis aries*) were deployed into a system of four "Experimental" paddocks, each approximately 200 m^2, at sites invaded by *P. perfoliata* in the Ward Pound Ridge Reservation (Cross River, Westchester County, NY). The ewes were moved from one experimental paddock to the next at 2–3 d intervals. Four ungrazed reference paddocks, each adjacent to one of the grazed experimental paddocks, were also delineated. A suite of plant community attributes (cover classes, species richness, and composition), as well as attributes of individual *P. perfoliata* plants (stem density, inflorescence) were monitored in the experimental and reference paddocks from 24 June to 7 August 2009. Mean *P. perfoliata* cover in the experimental ($0.020 + 0.014$ m^2 m^{-2}) and reference ($0.051 + 0.023$ m^2 m^{-2}) paddocks were significantly different (ANOVA: $F = 17.024$; $n = 200$; between group df = 1; within group df = 198; $P < 0.01$) following grazing. *P. perfoliata* inflorescence was significantly lower ($chi^2 = 98.019$, $n = 50$; df = 1; $P < 0.001$) in experimental than reference paddocks after completion of the grazing phase of the study. Species richness following grazing was greater in experimental (S = 48) paddocks relative to Reference paddocks (S = 32). These results suggest that IRTG of livestock may be useful in the management of *Persicaria perfoliata*.

Thu-P2-2-2

Foresters' Perceptions of Forest Regeneration and Barriers to Regeneration in NY State

Gary Goff, Nancy Connelly, Peter Smallidge, and Paul Curtis (Department of Natural Resources, Cornell University, Ithaca, NY)

The primary purpose of this study was to estimate the extent of deer damage compared with other impacts on forest regeneration in NY State. To do this, all impacts to forest regeneration must be considered, not just deer. Obtaining actual field measurements on a statewide basis is cost prohibitive, so we took an indirect approach to gauging impacts on forest regeneration. A statewide mail survey, with a telephone follow-up to a sample of nonrespondents, was implemented to gather the expert opinions of foresters currently working in New York. A total of 278 people responded to the questionnaire, 197 completed the survey, and 81 indicated they were not currently practicing in the field, for an adjusted response rate of 54%. Foresters practicing in NY State estimated that forest regeneration, in stands opened up for regeneration, was moderately or highly successful only 30% of the time. Nonrespondents to the mail survey indicated that they thought regeneration was a bit more successful than respondents, so the overall success rate statewide might be a bit higher than 30%. Deer browsing and interfering vegetation were the biggest problems for regeneration statewide. Foresters indicated that 72% of the marginally successful or completely failed stands statewide were impacted by deer browsing. Half were impacted by interfering vegetation. The value of achieving successful regeneration by implementing management practices (primarily deer control and control of understory competition) was estimated at an increased sawtimber harvest value of $32 to $75 per acre per year (in 2009 dollars) until the next harvest. Foresters generally recommended a specific timber harvest method, or timber stand improvement (TSI) control of less desirable stems to encourage successful regeneration. In areas outside the Adirondacks, most foresters also recommended antlerless deer harvest. Fencing to exclude deer was rarely recommended, presumably because of the probibitive cost. The full report may be found at: <http://www2.dnr.cornell.edu/hdru/pubs/HDRUReport10-2.pdf.

Fri-A2-4-2

Bias of Reduced-effort Diversity Surveys for Adult Odonata of Lentic Waters

Jason Bried (Albany Pine Bush Preserve Commission, Albany, NY), **Barbara Hager** (Cazenovia College, Cazenovia, NY), Pamela Hunt (Audubon Society of New Hampshire, Concord, NH), Jennette Fox (Carleton University), Heather Jensen (Superior National Forest), and Kelly Vowels (Bernheim Arboretum and Research Forest)

Repeat surveys are needed to capture a representative spectrum of adult odonate diversity at a site, but specifics on frequency and duration of surveys and associated information costs are poorly understood. Here we report on information biases at competing levels of temporal survey effort, focusing on rates of data loss and effects on among-site comparisons. Weekly one-hour surveys were repeated at least 15 times at 19 ponds, lakes, and wetlands scattered throughout North America. For each site, we calculated the data remaining when the weekly survey frequency was reduced to 75% (every 1.5 weeks), 50% (biweekly), 33% (triweekly), and 25% (monthly), and the length of each survey was reduced from one-hour to 50-, 40-, 30-, 20-, and 10-min subsets. Reducing the original effort by half (i.e., to 30-min biweekly) retained about 80% of the species on average. The smallest effort (10-min monthly) retained about 49% of species. The greatest rate of information loss occurred between 20- and 10-min survey times. Across-site analysis found that data subsets correlated to the original data set ($r > 80\%$) despite up to 50% species loss. Strong correlations ($r \geq 98\%$) remained with 10–15% species loss. Biweekly surveys lasting 20–40 min each may provide a representative and cost-effective sample of adult odonate diversity in lentic study sites. Losing a handful of species should not greatly undermine richness and compositional comparisons among sites, with the possible exception of comparing rare species diversity.

Fri-P1-1-3

BioMap2: Conserving the Biodiversity of Massachusetts in a Changing World

Sarah Haggerty (Natural Heritage Information Manager,The Commonwealth of Massachusetts), Henry Woolsey (MA Natural Heritage and Endangered Species Program), Andrew Finton (The Nature Conservancy, Massachusetts Program), and James DeNormandie (Mass Audubon Ecological Service)

BioMap2 is an updated and enhanced biodiversity conservation blueprint designed to protect the state's full breadth of biodiversity in the context of a changing climate. This presentation will describe the process and results of identifying, mapping, and geographically balancing Core Habitats and Critical Natural Landscapes across the state. This collaborative project between the Natural Heritage and Endangered Species Program (NHESP) and The Nature Conservancy has built on the success of NHESP's initial BioMap and Living Waters biodiversity conservation plans to produce an enhanced, updated, and more comprehensive BioMap. BioMap2 and supporting data focus on the state's rare species as well as additional species and habitats of conservation concern as described in the Division of Fisheries and Wildlife's State Wildlife Action Plan (SWAP). Additionally, BioMap2 includes an analysis of large intact landscape areas which may increase resilience to climate change, as well as a spatial analysis of potential impacts of sea-level rise to coastal areas in Massachusetts. The BioMap2 updates, enhances, and integrates the successful Massachusetts BioMap and Living Waters biodiversity conservation plans to re-define and taxonomically and conceptually expand "core habitat" areas; evaluates, delineates, and incorporates into the revised core habitats the most vulnerable, imperiled, and fine-scale SWAP habitats, non-listed SWAP species, and priority natural communities; delineates "critical natural landscapes" to define certain medium and large-scale SWAP habitats and buffering habitat areas; incorporates ecological resilience into habitat delineation as a strategy to mitigate the impacts of climate change and other stressors on wildlife, and to define habitats that will support wildlife populations and ecological processes over long time periods; considers likely climate change impacts and habitat/species vulnerability in habitat definition and spatial delineation; and incorporates local and regional connectivity.

Fri-P1-7-2

Reconnecting Children and Nature: A National and State Grassroots Movement

Paul B. Hai (SUNY-ESF,Northern Forest Institute, Newcomb, NY)

There is broad awareness of, interest in, and scientific support for increasing children's exposure to nature. Many efforts are underway nation-wide to create a fundamental societal shift towards increasing the value given children's need to interact with nature. From formal inclusion in an educational environment to unstructured outdoor play time, the positive effects of increased exposure to nature are being recognized in improved physical, emotional, and psychological health, academic performance, and quality of life. This session will explore what is being done in New York State and beyond to address what Richard Louv called "Nature Deficit Disorder" in his 2005 book *Last Child in the Woods*.

Fri-A1-5-1

Unravelling the Enigma of an Atlantic Prairie: Evidence from Phytophagous Bugs (Auchenorrhyncha)

Andy Hamilton (Canadian National Collection of Insects, AAFC, CEF Ottawa, ON, Canada)

The presence of localized grasslands on the Atlantic coastal plain, including an extensive "tallgrass prairie" on Long Island remote from the "prairie peninsula" has never been explained. Eight species of phytophagous bugs (Hemiptera, Auchenorrhyncha) restricted to prairie grasses, including a flightless spittlebug, have been found on sand plains from NH south to RI, but not on LI. The distribution of these and another 25 Cercopidae, Cicadellidae, and Caliscelidae specializing on 15 genera of prairie grasses support evidence that sand-adapted prairie grasses came eastward to glaciated New England by following Wisconsinan moraines before forests re-established themselves in the area. Atlantic grasslands distinct from southeastern grasslands supplemented a pre-existing "periglacial grassland" that is now limited to alvars in the vicinity of Lake Huron.

Thu-P1-1-3

Macroinvertebrates of Intermittent Surficial Waters of Northern Stark County, Ohio

Robert Hamilton IV (Kent State University at Stark, North Canton, OH) and Peter Kourtev, Christopher Post, Jacqueline Dillard, Kate J. Knepper, and Robert Cowart (Central Michigan University, Mt. Pleasant, MI)

Natural habitats are increasingly being developed for housing, recreation, or agriculture, or degraded by human use and/or pollution, causing many organisms to leave or become extinct. This degradation, in turn, changes the community of organisms in that location. One habitat at particular risk is the vernal pool. A vernal pool is defined as any wetland that fills annually from precipitation, runoff, or rising groundwater, does not have a permanent outlet stream, does not contain fish, and dries out during some part of the year during most years. Vernal pools often contain rare and unique herpetofauna and are the only reported habitat for fairy shrimp. The unique herpetofauna feed primarily on aquatic invertebrates. Vernal pools, small streams, and emergent wetlands in northern Stark County, OH, were sampled over a two-year period to characterize the seasonal macroinvertebrate communities and hydrologic characteristics of each habitat type. Results suggest that macroinvertebrate community variability is greater between habitat types than within, and that macroinvertebrate abundance and diversity differ significantly with season. Virtually all sites were dominated by generalists and showed little endemism. Univariate and multivariate statistical analyses show that dissolved oxygen and conductivity explained a significant portion of the variability in macroinvertebrate community structure. Our results suggest that in this geographic area dissolved oxygen and conductivity have a greater role in macroinvertebrate community structure than habitat type or hydrology.

Fri-A2-1-3

Restoring the Threatened Common Tern by Improving Nesting Habitat in Buffalo Harbor and on Lake St. Lawrence, NY

Lee Harper (H. Riveredge Associates, Massena, NY) and Jeff Gerlach (New York Power Authority, White Plains, NY)

The New York Power Authority (NYPA), in cooperation with the New York State Department of Environmental Conservation, the St. Lawrence Seaway Development Corporation, and the US Army Corps of Engineers, has improved nesting habitat for the threatened Common Tern at 14 sites in Erie and St. Lawrence Counties, NY. These sites include three Buffalo Harbor breakwaters and 11 navigation or ice-boom structures on Lake St. Lawrence. These Habitat Improvement Projects (HIPs) will increase the numbers of breeding pairs of terns by enhancing existing nesting sites and by creating new tern nesting habitat. Over 5500 square feet of gravel was placed in Lake St. Lawrence nesting colonies and 10,500 square feet of gravel was placed on Buffalo Harbor breakwaters. In 2010, there were 669 nesting pairs of terns on Lake St. Lawrence and over 1800 nesting pairs in Buffalo Harbor. Tern breeding success has increased through the addition of nesting gravel, fencing, vegetation thinning, and chick shelters. The success of these enhancements was demonstrated in 2010 when a spring storm with winds over 60 mph destroyed all tern nests in Buffalo Harbor except those on the enhanced nesting sites. Average productivity of terns nesting on unimproved areas was 0.0 compared to an average productivity of 1.6 chicks fledged per nest in the enhanced nesting areas. Since enhancements were initiated, the number of nests on the Old Breakwater North increased from 487 in 2008 to 882 in 2010, an increase of 81%. The number of nests on Lake St. Lawrence increased from 406 in 2004 to 669 in 2010, an increase of 65%. These restoration efforts are the largest and most successful of their kind in the Great Lakes. Continued cooperative management of these colonies will help restore this threatened species to New York's Great Lakes and Rivers.

Fri-A2-2-3

The Ecology of Wrack: Decomposition and Use by Invertebrates on Natural and Engineered Shorelines of the Hudson River

Cornelia Harris, David Strayer, and Stuart Findlay (SUNY Albany, Albany, NY and Cary Institute of Ecosystem Studies, Millbrook, NY) and Gary Kleppel (SUNY Albany, NY)

Organic matter that is washed onto shore, or "wrack" is an important component of shoreline ecosystems. It provides habitat for invertebrates, which attracts birds and other predators, and provides soil organic matter and nutrients to the upland terrestrial communities. However, wrack along freshwater shorelines has not been studied extensively, and shoreline modification continues without taking into account this essential ecosystem element. The decomposition rates and invertebrate communities of wrack were investigated on four different types of Hudson River shorelines: two natural (sandy and rocky) shorelines and two human-made (riprap and cribbing) shorelines. A significantly faster decay rate and a lower density of invertebrates was observed on cribbing shoreline, while decay and invertebrate density on riprap were similar to that of the rocky shoreline. The sandy shoreline had the highest invertebrate numbers. Invertebrate diversity was higher on sandy, rocky, and riprap shorelines than on cribbing shorelines. As managers seek to restore and protect shorelines from future sea level rise, this study suggests that riprap is a suitable alternative to natural rocky shorelines, cribbing will decrease overall ecological function, and natural sandy shorelines are unique and irreplaceable by cribbing or riprap.

Fri-A2-1-4

More than an Ecological Footprint: Students Collect Data to Understand their School Ecosystem

Cornelia Harris, Megan McLean, Alan Berkowitz, Angelita Alvarado, and Jen Rubbo (Cary Institute of Ecosystem Studies, Millbrook, NY)

Ecological footprints are a common teaching tool in classrooms of all ages, and while thinking about your impact in such a way is useful as a conceptual mechanism, we believe that a scientific approach which focuses on the local ecosystem provides a more powerful way to encourage environmental citizenship. We have been working with a K–12 school district in the Hudson Valley for the past 1½ years to develop the "Eco-Initiative", where we examine the school buildings as an ecosystem and create an Environmental Scorecard each year based on student-collected data. We wanted to answer basic questions such as: How much food, water, and energy do we use? How much waste do we create? What is the biodiversity of our schoolyard? Where do our water, energy, and food come from? Activities such as sampling invertebrates in the schoolyard, measuring energy use from appliances, calculating water use, and weighing waste in the cafeteria and classrooms allow students to see baseline data from which we can then measure how stewardship projects change our overall impact. The school district is now embarking on a composting program, redesigning its recycling program, and working towards garbage-free lunches in the school cafeterias. We hope to see these changes reflected positively in this year's Environmental Scorecard data.

Fri-A1-5-2

Investigating the Presence and Prevalence of Borrelia burgdorferi in Peridomestic Bird Populations of Poultney, VT

Lindsay Herlihy (Green Mountain College, Poultney, VT)

Many researchers have established that birds play host to larval and nymphal forms of *Ixodes scapularis*, the tick species that is implicated as the main arthropod vector of Lyme disease. The primary role of birds in the ecology of Lyme is thought to be the transport of infected ticks during both everyday movements and seasonal migration to previously Lyme-free areas. However, some bird species have been shown to be capable of harboring the Lyme disease pathogen (*Borrelia burgdorferi*), and although the reservoir competence of most bird species has not been deeply investigated, some species, including American Robins, are considered competent reservoirs. It is likely that there are other species that are adequate enough reservoirs to infect previously *B. burgdorferi*-free ticks, which then have the capability of infecting a future human host with Lyme disease. The purpose of this study is to determine the presence and prevalence of *B .burgdorferi* in bird populations that are closely associated with human habitation. Data has been collected from thirteen avian target species. The birds were mist-netted, banded, blood-sampled, and searched for the presence of ticks. Blood samples are being tested for evidence of *B. burgdorferi* infection using polymerase chain reaction (PCR). Ticks found to be parasitizing sampled birds were also removed from the birds and may be tested for *B. burgdorferi*. This study will attempt to elucidate trends of avian *B. burgdorferi* infection across all four seasons, which will provide insight into the role these species play in the ecology of Lyme disease. This research in progress provides the basis of a senior thesis for an undergraduate degree program in biological systems research.

Thu-P2-5-1

From Assessment to Implementation: The Role of Climate-Smart Demonstration Sites to State and Regional Climate Adaptation Planning

Christopher Hilke (Climate Adaptation Program, National Wildlife Federation, Montpelier, VT)

Global climate change is one of the most significant conservation issues of our time. The impacts of climate change are occurring rapidly and are projected to exacerbate over the coming century, from increases in sea level rise and erratic disturbance regimes to marked changes in vegetation phenology. Preparing for and managing these impacts—referred to as climate adaptation—is emerging as a fundamental co-strategy to mitigation. As the focus of climate adaptation shifts from planning to implementation, it is important that projects initiated by natural resource managers are supported by case study. Climate-smart demonstration sites benefit implementation by providing lessons learned to inform on-the-ground decision-making. Further, these showcase climate adaptation projects often exemplify the practical application of big-picture concepts and ideas like Resistance and Resilience. While vulnerability assessments are frequently a precursor to state and regional climate adaptation planning, climate-smart demonstration sites serve to reinforce the validity of the adaptation strategies undertaken in those plans. Through this presentation, attendees will learn about several showcase northeast projects, how they inform a suite of climate-smart guidelines, and the value of these demonstration sites as examples of applied science.

Fri-A2-5-5

Robert G. Wehle State Park: What do you do When You, are Awash in a Sea of Swallow-wort?

Casey Holzworth (NYS Office of Parks, Recreation and Historic Preservation, Saratoga Springs, NY), Edwina Belding (NYS Office of Parks, Recreation and Historic Preservation, Albany, NY), and John Shultz (NYS Office of Parks, Recreation and Historic Preservation, Henderson, NY)

Pale Swallow-wort (*Cynanchum rossicum*), a non-native invasive member of the milkweed family, has established itself in the Eastern Lake Ontario and upper St. Lawrence River basins in New York State. This toxic, densely growing, twining vine capable of almost totally excluding native vegetation, dominates much of the 1067-acre Robert G. Wehle State Park. New York State Parks staff have been challenged with managing Swallow-wort at the Park while working to provide recreational opportunities for Park patrons in a setting with significant natural and cultural resources, surrounded by public and private lands also infested with Swallow-wort, and with one full-time permanent staff member at the Park. State Parks staff are expanding mowing operations and educating patrons as a means of seed suppression, facilitating the work of USDA Agricultural Resource Service scientists in developing a potential biocontrol agent, and conducting mechanical removal field experiments. Ultimately, it will likely take a combination of all of these strategies on a scale much larger than Robert G. Wehle State Park to address this Pale Swallow-wort invasion.

Thu-A2-4-1

Studies of Impacts of Marcellus shale drilling in Pennsylvania

Richard Horwitz, Frank Anderson, Jerry Mead, and David Velinsky (Academy of Natural Sciences, Philadelphia, PA)

The environmental and associated human health impacts of Marcellus shale drilling activities are one of the most contentious current regulatory and management issues facing Pennsylvania and other states. There is extensive information on environmental effects of shallow wells. Impacts of Marcellus wells will differ because of higher water use via hydrofracking and impacts associated with transport, holding and treatment of hydrofracking water (HFW). While effects of accidental spills and incidents of major groundwater contamination have received the greatest attention, significant effects may be associated with effects of "typical" drilling activities. Potential effects relate to land cover (forest fragmentation and hydrological changes), water contamination by HFW from holding lagoons or treatment facilities, and groundwater effects. Understanding the distribution of effects among wells and watersheds will be necessary to measure cumulative risk of different impacts. We report a pilot study comparing water chemistry and biological assemblages in watersheds with high and low densities of well pads in north-central Pennsylvania. Reference sites with no drilling were used for comparisons. Water conductivity in streams with high density of wells was about 67% higher than that of reference and low-density streams. Streams with high density had lower diversity and family richness of benthic macroinvertebrates and lower abundance of aquatic salamanders. Because of the small sample size, this study had relatively low statistical power. In 2011–2012, the Academy will conduct an expanded study of drilling effects in the Susquehanna and Delaware watersheds. Approximately 40 sites will be sampled, split among first- and second-order streams in high well density, low well density, and reference watersheds. Water chemistry and diatom, macroinvertebrate, salamander, crayfish, and fish assemblages will be monitored. The use of conductivity as a simple tracer of impacts will be investigated, as will fingerprinting of major and minor chemical components of the water. Because of the complex array of chemicals potentially occurring in HFW, impacts are likely to go beyond known relationships between conductivity and aquatic impacts.

Fri-P2-5-3

ESF F.O.R.C.E.S.: A Model for Engaging College Students in Natural Resource Stewardship Projects

Tom Hughes (NYS Office of Parks, Recreation and Historic Preservation, Jamesville, NY)

Since the spring of 2008 and the launch of OPRHP's Natural Resource Stewardship and Environmental Interpretation Initiative, nearly 300 State University of New York College of Environmental Science and Forestry (ESF) students have participated in Volunteer F.O.R.C.E.S. (Friends Of Recreation, Conservation and Environmental Stewardship). Through this model volunteer program, OPRHP has significantly enhanced its partnership with SUNY-ESF faculty, staff, and students for natural resource and park improvement projects. Projects students have contributed to include the removal of Japanese Stilt Grass and Pale Swallow-wort from Selkirk Shores; fish surveys at Clark Reservation and Two Rivers; environmental education at the NY State Park at the Fair and Environmental Field Days at Green Lakes; and three successive years of ESF Saturday of Service that featured removals of invasive plants from Green Lakes, Clark Reservation, and Chittenango Falls. The overall goal of ESF F.O.R.C.E.S. is to enhance regional NYS Parks involvement with SUNY-ESF and other interested partners. The program intends to inspire students to explore careers in environmental science and public service, including NYS Parks. In this presentation, I will provide an overview of the ESF F.O.R.C. E.S. program, highlight its accomplishments, and discuss current and future projects. In addition, I will outline the keys to success for engaging students in community service projects. Lastly, I will suggest how this model volunteer program can be expanded regionally or utilized elsewhere in the state to involve more students, staff, and faculty from SUNY and other academic institutions.

Thu-A2-4-2

Using Auditory Detections to Assess Habitat Use in the Eastern Whip-poor-will (*Caprimulgus vociferus*)

Pamela Hunt (NH Audubon, Concord, NH)

Populations of the Eastern Whip-poor-will (*Caprimulus vociferus*) have been declining across most of its range since at least the 1960s. Among the hypotheses proposed to explain this decline has been the loss or maturation of the edge or open forest habitats that the species prefers. Testing this hypothesis requires detailed information on habitat preferences, but because Whip-poor-wills are nocturnal, traditional methods of assessing habitat use, such as spot mapping, are not effective. Radiotelemetry has been used with much success, but poses additional costs and logistical challenges. Here I present a modified version of spot mapping, triangulation mapping, that was developed to delineate Whip-poor-will home ranges at two study areas in New Hampshire. Results from three breeding seasons including comparison to limited telemetry suggest that this method can effectively identify home ranges, and can provide information on broad habitat associations. However, it is limited because only calling males are usually detected and it is not always possible to distinguish between individual birds. More extensive use of radiotelemetry is planned in coming seasons to further investigate the suitability of triangulation mapping as a tool for rapid assessment of local habitat use by this species.

Thu-P2-5-4

Use of Exuviae to Determine Dragonfly Species Distributions along New Hampshire's Major Rivers

Pamela Hunt (NH Audubon, Concord, NH)

Because northeastern rivers have been heavily altered by a long history of human use, many riverine plant and animal species are considered conservation priorities. Among these species are several dragonflies (Odonata, suborder Anisoptera) whose larvae spend 1–4 years in lotic systems. Detecting riverine dragonflies, and by extension estimating abundance, presents several challenges. Larvae use a wide range of microhabitats, and can often only be effectively sampled by dredging, while adults may spend considerable time high in trees or over river channels. As a result, the distributions or population status of many species are often poorly known. Beginning in 2006, most of New Hampshire’s larger rivers have been surveyed for dragonflies using both exuviae searches and observations of flying adults. Data collected to date indicate that most species are more common and widely distributed than previously reported, and that some species considered conservation priorities in neighboring states do not warrant as much concern in New Hampshire. For the majority of species, exuviae provided the bulk of records, indicating that reliance on adult detections leads to significant underestimates of abundance or distribution.

Fri-P1-1-4

New York State Deer Management: Addressing Ecological Impacts of Deer

Jeremy Hurst (NYS Department of Environmental Conservation, Albany, NY)

New York State Department of Environmental Conservation (DEC) manages deer populations with consideration to human land uses, public safety, recreation, and ecological impacts. DEC's deer program provides a tiered system of management options to address diverse stakeholder objectives and control deer populations across varying spatial scales. While DEC has several programs for land managers to address site-specific deer-related impacts to forest regeneration or rare plant communities, DEC also seeks to manage deer to promote healthy and sustainable forests at a landscape scale. Historically, DEC routinely assessed browse impacts of deer in winter concentration areas. However, these field investigations were primarily limited to the Adirondack and Catskill Regions, and DEC's ability to conduct browse impact surveys waned as staffing levels decreased over time. Since the early 1990s, DEC has used citizen task forces (CTFs) to engage stakeholders in dialogue about the deer-related impacts and to generate recommendations for change in local deer populations. Yet, ecological interests were frequently under-represented in past CTFs. Thus, large-scale assessment of deer impacts on forests and integration of those data with the CTF process is a critical need for future deer management in New York. This presentation describes the various options available to land managers for site-specific deer management in New York and discusses potential avenues for integrating data of deer impacts on forests into broader deer-management decision making.

Fri-P1-4-1

Review of the Introduction and Establishment of the Eastern Gray Squirrel (*Sciurus carolinensis*) in Nova Scotia, Canada: Biological and Conservation Implications

Howard Huynh (Texas Tech University, TX), Geoffrey Williams (Dalhousie University, NS, Canada), and Richard Thorington (Smithsonian Institution National Museum of Natural History, Washington, DC)

The Eastern Gray Squirrel, *Sciurus carolinensis*, is one of the most recognized and abundant sciurids in North America. Historically restricted to Eastern North America, gray squirrels are continuing to expand their geographic range westward. Human-sponsored introductions have also greatly facilitated the range extension of gray squirrels across North America and around the world, often resulting in significant negative impacts to the integrity of native ecosystems. Since the 1930s, apparently isolated sightings of Eastern Gray Squirrels in Nova Scotia, Canada have been attributed to captive releases or escapes. Despite reports of multiple introduction events over the past decades, many scientists believe the species has not become established in the province. However, our recent trapping efforts have demonstrated otherwise, and have resulted in the first voucher specimens recorded for the province. These specimens provide first evidence that the Eastern Gray Squirrel is now present as a wild breeding mammal in Nova Scotia, Canada. Although the future ecological impact of the Eastern Gray Squirrel in Nova Scotia is unknown, it seems likely that this species will continue to expand its range and increase in abundance in the province in the decades ahead. We discuss the biological impacts of this highly adaptable species in non-native habitats.

Thu-A1-5-3

Does Adirondack Old-growth Contain Forest Interior Plants

Jerry Jenkins (Wildlife Conservation Society Adirondack Program)

The Adirondack Forest Preserve contains approximately 500,000 acres of forests that have either had little or no logging. The composition and structure of these forests have had considerable study, but the ground-layer floristics much less. In the fall of 2009, we examined 450 plots in central Adirondacks forests. Some were in old-growth, some in once-harvested lands that had had no recent logging, and some in commercial forests. Our goal was to find out if the old-growth and the once-harvested forests were distinguished in either floristic composition or ground-layer diversity from the harvested forests. In particular, we were looking high-diversity floras and forest-interior species, which we defined as species that were largely or wholly restricted to undisturbed forests. Our results were largely negative; ground-layer vascular diversity was in fact lower in unharvested forests, and while there were may disturbance species in the logged woods, there were apparently no forest-interior species in the unlogged ones. Ground-layer bryophyte diversity was also similar in harvested and unharvested forests, and the dominant species were similar in both. The tree-bark species were, as other studies have suggested, quite different: three genera, *Anomodon*, *Porella*, and *Neckera*, were common on the trunks and bases of trees in the unharvested forests, and almost absent from harvested ones. Our conclusion is that the unharvested forests of the central Adirondacks do not contain areas of high vascular plant diversity, have few rare vascular species, and no vascular species that are forest-interior specialists. The Adirondacks do contain high-diversity floras with ecologically specialized species, but these floras are not in old-growth, and not in the central Adirondacks.

Thu-P1-7-3

The Climate-driven Decline of *Anemone multifida*, a Subarctic Plant at Its Southern Range Limit

Jerry Jenkins (Wildlife Conservation Society Adirondack Program)

Anemone multifida is a small buttercup with a subarctic distribution. It is rare in the eastern United States; the southernmost eastern population is in a river gorge in Winooski ,VT. We have monitored this population since 1988. The demographic pattern is one of overall decline; during our study, the population is has declined about 5% per year from over 500 plants to about 100 plants. The rate of decline is controlled by summer temperature and rainfall. In cool, wet years, the plant survives and increases modestly. In hot, dry ones, the population declines dramatically. While immediate driver of the decline is the frequency of hot, dry summers, the overall rate of decline also reflects the low recruitment rate in cooler summers; there are no longer any really good years in between the bad ones. We suggest that this kind of episodic decline, which can only be detected by by monitoring for a decade or more, may be occurring, and as yet unrecognized, among other range-limit species.

Fri-A2-5-2

Status and Distribution of Lowland Boreal Birds in the Adirondack Park

Michale Glennon and **Jerry Jenkins** (Wildlife Conservation Society, Adirondack Program, NY)

New York State's Adirondack Park is a large, intact breeding ground for numerous migratory bird species, several of which are declining throughout their range. A unique component of the Adirondack avifauna is the birds inhabiting the boreal peatlands of the park. Climate change is now widely recognized as the pre-eminent threat to biodiversity in the 21st century. At the southern range extent for this ecosystem type and many of its avian inhabitants, the Park is a valuable location from which to monitor changes in bird populations from a warming climate. The Wildlife Conservation Society (WCS), a global conservation organization which protects wildlife and habitat through careful science, has been studying the distribution and abundance of birds in lowland boreal habitats of the Adirondacks in order to inform long-term conservation planning for these species. Our work offers the first comprehensive assessment of the status and trends in occupancy for a suite of target species throughout the Park and has resulted in several key findings. Among the migratory species on our target list, the Lincoln's Sparrow, Yellow-bellied Flycatcher, Yellow Palm Warbler, and Olive-sided Flycatcher have the highest predicted rates of occupancy of lowland boreal habitats, while Cape May, Tennessee, and Bay-breasted Warblers appear to have much lower occupancy rates in the Park. Among those species for which adequate data were obtained to calculate trends, only Lincoln Sparrow has demonstrated a pattern of increasing occupancy over the course of 2007–2010, while Yellow Palm Warbler has remained relatively stable within the last 3 years, and Yellow-bellied and Olive-sided Flycatchers are demonstrating patterns of decline. Though declining occupancy rates are modest, they are cause for concern for species already rare in the region, and made more troubling by observed declines in occupancy of other, nonmigratory species in the same habitats (i.e., Black-backed Woodpecker, Boreal Chickadee, and Rusty Blackbird). Analysis of the influence of local- and landscape-scale habitat covariates on boreal bird occupancy indicated that wetland size and context were most important in determining boreal bird occupancy, raising important implications for metapopulation dynamics as well as potential conservation strategies.

Fri-P2-2-3

Alternatives to Barriers and Ecopassages in Reducing Turtle Road Mortality

Glenn Johnson (Department of Biology, SUNY Potsdam, Potsdam, NY), Angelena Ross (Department of Environmental Conservation), Lee Harper (Riveredge Associates), and Jeff Geller (New York Power Authority)

Blanding's Turtles, a threatened species in New York State, are notorious for suffering high levels of road mortality caused by terrestrial migrations to breeding, wintering or summering habitat. Loss of just a few adult female Blanding's Turtles from a local population can have huge negative impacts on population viability. Mitigation measures designed to reduce the impact of roads on wildlife populations, such as barriers and ecopassages over or under roads, are very expensive. Warning signs designed to alter driver behavior by reducing speed or increasing awareness may be effective to reduce mortality. Similarly, placement or enhancement of attractive nesting habitat in configurations designed to minimize the likelihood of road crossing may reduce road mortality. Here we present data on hotspots of Blanding's Turtle road mortality in northern New York detected over the period 2003–2008 and results of comparisons of mortality rates, average driving speed, and traffic volume before and after installation of turtle crossing signs at 10 areas of concern in 2009 and 2010. Results of habitat enhancement efforts at one location in northern New York show promise to increase high-quality nesting opportunities for this species while reducing risky overland movements.

Fri-P1-3-5

Potential Habitat Impacts of Current and Future Marcellus Shale Natural Gas Drilling in Pennsylvania

Nels Johnson (Pennsylvania Chapter of The Nature Conservancy, PA)

Natural gas development has rapidly emerged as one of the biggest conservation challenges in Pennsylvania and other states with Marcellus Shale deposits. The Nature Conservancy and partner organizations assessed the potential habitat impacts of current and future Marcellus Shale natural gas drilling in Pennsylvania (<http: //www.nature.org/paenergy>www.nature.org/paenergy). We used maximum entropy modeling to produce a surface representing the probability of conversion to Marcellus gas development. We then generated and mapped low, medium, and high scenarios for future Marcellus drilling in Pennsylvania. By 2030, sixty thousand new Marcellus gas wells could be drilled in Pennsylvania alone, directly clearing between 34,000 to 85,000 acres of forest and creating between 81,000 and 203,000 acres of additional forest edge habitats where the risk of predation, changes in light and humidity, and expanded presence of invasive species could threaten forest interior species. This development could transform the region's iconic forests and impact many thousands of acres of key habitat for songbirds, salamanders, and trout. We simulated an ecological approach to Marcellus development by modifying the gas well configuration from our medium-scenario projections to avoid interior forest habitat. The results demonstrated that incorporating conservation measures into the planning and development of Marcellus gas infrastructure can considerably reduce forest fragmentation. Building on these results, The Nature Conservancy is partnering with conservation groups, energy companies, and research/training organizations to design and implement new tools for integrating conservation measures into Marcellus gas development plans in priority conservation landscapes, an effort we believe could significantly reduce impacts to interior forests.

Fri-P2-5-4

Evaluating the Success of Seed Sowing in a New England Grassland Restoration

Chad Jones and Glenn Dreyer (Connecticut College, New London, CT), and Nels Barrett (USDA/NRCS Connecticut Office)

Grassland habitat has been declining over the past century in the northeastern United States. While these grasslands are likely of cultural origin, they play an important role in conserving biodiversity in this region. There is considerable interest by land managers in conserving and restoring grassland habitats in the northeast. However, unlike the Midwest and Europe, informative evaluations of existing restoration sites are few, making it difficult to improve new restoration projects. Here we evaluate meadow restoration at Connecticut College, New London, CT to determine if sowing with a mixture of 23 native grasses and forbs led to successful establishment of these species, increased cover and diversity of the grassland community, and reduced colonization by non-native and woody species. Mechanical clearing of ≈2 ha in 2004–05 removed a sixty-year growth of native and invasive woody plants. Selective herbicide applications in 2005-06 controlled the regrowth of woody plants. The seed mixture containing five native grasses and 18 native forbs was planted in late June 2006. In the third (2008) and fifth (2010) growing seasons, we conducted a detailed floristic inventory on the planted site, an unplanted zone within the planted field, and an adjacent unplanted field. Twenty of the 23 sown species established by 2010, although several others remained uncommon. Cover of the sown species increased from 50% of the total vegetation in 2008 to 70% in 2010. Big Bluestem (*Andropogon gerardii*) established aggressively, becoming the dominant species in the sown meadow. Vegetation in the sown meadow was dominated by graminoids, reflecting the predominance of grasses in the seed mixture (79% by weight). Despite the successful establishment of most sown species, species richness and diversity were no higher in the sown meadow than in adjacent unseeded areas. However, the sown meadow contained lower cover of non-native and invasive species. This study shows that the combination of clearing, selective removal of woody and invasive species and sowing native species can successfully lead to the development of an ecosystem dominated by native herbaceous vegetation after only a few years, but that this may not necesarily increase plant diversity within restored meadows.

Fri-P2-7-4

Impacts of Acidic Deposition on Water Chemistry and Fishes in the Honnedaga Lake Watershed

Daniel Josephson, Justin Chiotti, Kurt Jirka, Jason Robinson and Clifford Kraft (Cornell University, Adirondack Fishery Research Program, Ithaca, NY)

Honnedaga Lake, located in the southwestern Adirondacks, supports one of nine remaining heritage strains of Brook Trout designated in the State of New York. During the past century, acidic deposition has altered the water chemistry and fish community within the Honnedaga Lake watershed. Brook Trout were the only fish species known to inhabit Honnedaga Lake prior to European settlement. Stocking in the late 1890s resulted in the establishment of reproducing populations of Lake Trout, Round Whitefish, Creek Chub, and White Sucker, but all of these species—with the exception of Brook Trout—disappeared from the lake between 1930 and 1955. By 1980, surface waters were chronically acidified (pH < 5) with inorganic monomeric aluminum at lethal levels (>200 ug/L) for Brook Trout. Yet during this period of chronic acidification, Brook Trout were able to survive in limited numbers in a small number of thick-till, groundwater-fed tributaries to Honnedaga Lake with pH > 5. Amendments to the Clean Air Act in 1990 led to decreased SO_4, increased pH (>5), decreased clarity, and decreased inorganic monomeric aluminum (>50 ueq/L) of lake surface water with a coincident modest recovery of the Brook Trout population in the lake. The zooplankton community is currently characterized by low species diversity and low *Daphnia* densities typical of acid-impaired lakes. Chemical recovery in the lake and persistent chronic acidification of tributaries observed at Honnedaga Lake has been documented in other lakes and streams throughout the southwestern Adirondack region. The continued chronic acidification of numerous tributaries likely limits young-of-year survival and recruitment and, consequently, adult Brook Trout abundance in Honnedaga Lake. Honnedaga Lake remains highly sensitive to acidic inputs due to low buffering capacity within the lake and surrounding watershed.

Thu-P1-3-3

Design and Analysis of a Salt Marsh Restoration in the Medouie Creek Wetland Complex, Nantucket, MA

Jennifer Karberg, Karen Beattie, Danielle O'Dell, and Kelly Omand (Nantucket Conservation Foundation, Inc., Nantucket, MA)

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. The Massachusetts Office of Coastal Zone Management Wetlands Restoration Program (MWRP) designated this wetland as a high priority wetland restoration site. Historic hydrologic alteration decreased soil pore water salinity, impounded freshwater, and decreased tidal action disturbance to the marsh, potentially allowing the establishment of the non-native, invasive plant species *Phragmites australis*. 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 to tidal influence. Rigorous monitoring protocols established before restoration allow for examination of changes in vegetation communities, pore water salinity, and water level variation. Water-level fluctuations pre-restoration indicated tidal influence only in the front salt marsh. Since restoration efforts, tidal influence has been demonstrated throughout the previously restricted marsh, particularly in conjunction with high-tide events. Soil pore water salinity in the restricted marsh differed significantly post-restoration as monthly salinity averaged 0–4 ppt pre-restoration and 15–22 ppt post-restoration. Pre-restoration, the dominant plant composition was *Spartina patens-Spartina alterniflora* in the unrestricted portion of the marsh and *Typha-Phragmites* in the restricted portion of the marsh. Post-restoration monitoring revealed significant dieback of freshwater vegetation, including *Phragmites australis*. High sulfide levels are often a concern in restored salt marshes, but soil-pore water chemistry, examined only post-restoration, showed moderate to low levels of sulfide within the previously restricted marsh. Initial post-restoration monitoring indicates positive trends towards the reestablishment of salt marsh ecology. 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 salt marsh restoration projects in Massachusetts have such an extensive monitoring protocol, making Medouie Creek a unique case study for future restoration efforts.

Fri-P2-7-5

Camera Trap Surveys Comparing the Diversity and Abundance of Wildlife in Suburban and Wild Forests

Roland Kays and Scott LaPoint (New York State Museum, Albany, NY), Joseph Chase (Tech Valley High School), and Laura Beth Licht (University at Albany, NY)

Urban and suburban forests are typically seen as inferior wildlife habitat because they offer small fragments of natural area bisected by roads and development, with higher human activity. Wildlife surveys have shown that certain sensitive species are absent from urban areas, especially larger predators. However, less is known about the community-wide response to urbanization. Here we will present the results of a camera-trap survey of suburban forests around Albany and Schenectady, NY (including the Pine Bush Preserve) with the nearby wild areas of Grafton Lakes State Park and Pittstown State Forest. We deployed motion-sensitive cameras traps for 2 weeks each in January and February of 2011 at 20 wild and 20 urban sites. Each site was randomly selected within forested habitat to allow direct comparison of diversity as well as abundance. Preliminary analysis suggests that the suburban forests contain a higher diversity of wildlife species, and a higher density for many, than the wild forests. We will present our final results of this comparison and discuss the potential for camera traps in broad-scale wildlife monitoring programs.

Fri-P1-2-4

Seasonal Upland Habitat Use of Northern Cricket Frogs in NY State

Gregg Kenney and Kelly McKean (New York State Department of Environmental Conservation, New Paltz, NY)

New York State marks the northern edge of the range of Northern Cricket Frogs (*Acris crepitans,* hereafter NCF). NCF populations have been in decline over the past several decades and they are listed as Endangered in New York State. Their distribution and many aspects of their life history are still poorly understood. Over the past two years, the NYSDEC has conducted basic research to better understand the timing and extent of upland habitat use of NCF in New York State. Visual encounter surveys were undertaken at two locations in Orange County, NY to evaluate seasonal differences in habitat utilization. NCF were found to heavily use woodland pools and riparian corridors after emergence from hibernation. Some of these pools were at considerable distances from breeding areas. NCF moved to breeding areas by June and were not found upland again until September. NCF were found migrating or dispersing in September through November. NCF were found to utilize a wide variety of habitats during fall movement and moved considerable distances from breeding habitats.

Fri-A1-3-4

Introducing the New York State Conservation Lands Database

Brent Kinal (New York Natural Heritage Program, Albany, NY)

The State of New York contains over 6 million acres of land protected for the purpose of conservation, recreation, and open-space. Clear, consistent, and regularly maintained data on public and private conservation lands have been found to be one of the most valuable and requested spatial datasets for many of New York's neighbors; however, until recently no single compiled statewide database existed to document these holdings within New York. The New York Natural Heritage Program (NYNHP) with the help of partner organizations, including NYS Department of Conservation, NYS Office of Parks, Recreation, and Historical Preservation, The Nature Conservancy, and SUNY ESF, have developed a comprehensive and regularly maintained statewide database of public and private conservation, recreation and open-space lands. The development of the conservation lands database presented many conceptual and technical challenges. From the beginning, the framework of the database had to be established by deciding what lands to include in the database and whether the database should include only protected lands or if unprotected lands that provide valuable ecosystem function should also be included. The technical challenges included combining spatial and attribute data from disparate data sources and formats, data accuracy, database design, and topology. Conceptual challenges were addressed though researching how other states developed their databases and by building consensus among partner organizations. Technical challenges were met through the use Geographic Information Systems, Python Scripting, Spatial Modeling, and several hundred hours of manual data review and manipulation. The New York Natural Heritage Program is happy to share the New York State Conservation Lands Database to all interested users and hope it will become a valuable tool for land protection and ecological research. We plan to maintain and update the database on a regular basis and welcome user feedback ,which we hope will lead to on-going improvements.

Fri-P2-7-2

Pursuing the Links between Ants, Plants, and Ecosystem fFunction in sSouthern New England Forests

Joshua King (Central Connecticut State University, New Britain, CT)

A key biotic component of the nitrogen cycle in New England forests is myrmecochorous, or ant-dispersed, plants, which make up a significant portion of the herbaceous ground cover. Aphaenogaster species of ants are the primary dispersers of these seeds and are also an important predator of termites and a prey item for salamanders. In sum, the ants, termites, and salamanders make up a large portion of the animal biomass, while the plants are vital for ecosystem-scale retention of nutrients. Preliminary findings and future directions will be discussed.

Thu-A1-1-4

Historic Decline of Genetic Diversity in the Adirondack Population of Spruce Grouse (*Falcipennis canadensis*)

Jeremy Kirchman (New York State Museum, Albany, NY)

Spruce Grouse (*Falcipennis canadensis*) are distributed across North America's boreal forest belt and isolated in disjunct populations at the southeastern periphery of their range in Vermont and New York. The number of individuals in these peripheral populations has been declining for over a century. Spruce Grouse was added to the New York State threatened species list in 1983 and was listed as endangered in 1999. The New York population is intensively monitored, and wildlife managers are considering augmentation with birds from Canada. I report the first DNA sequence data obtained from New York Spruce Grouse. Genetic diversity of New York Spruce Grouse is very low compared to a modern population sample from Quebec and compared to DNA sequences obtained from historic museum specimens up to 130 years old. These data indicate that genetic diversity was substantially higher in New York only a century ago. Haplotypes currently found in Quebec have gone extinct in New York in the 20th century, suggesting that these populations may be genetically compatible if conservation agents choose to introduce Canadian birds in New York.

Fri-P2-2-1

Framework for Assessing Biodiversity Impacts of Hydraulic Fracturing in the Marcellus Shale

Erik Kiviat (Hudsonia Ltd, Annandale, NY) and Karen Schneller-McDonald (Hickory Creek Consulting)

The Marcellus shale formation underlies roughly 85% of West Virginia, 65% of Pennsylvania, 25% of Ohio, 25% of New York, and small parts of Maryland and Virginia. Although hydraulic fracturing (fracking) for natural gas is proliferating across this region, cumulative impacts of fracking on biological resources are poorly understood. Activities including construction of drilling pads and roads, disposal of fracking return water, and high water use may lead to fragmentation of forests and other habitats, degradation of water quality, and changes in water regimes of streams and wetlands. Potential effects on habitats and species in the Marcellus region may be analyzed in several ways. Species with geographic ranges concentrated in the region may be at higher risk. Even widespread species may have concentrations of population in the Marcellus. Habitats likely to be most affected by fracking, such as streams, wetlands, and forests, support many vulnerable species including aquatic and pool-breeding salamanders, Brook Trout, and freshwater mussels. Wide-ranging species such as turtles and raptors, and area-sensitive species such as forest-interior songbirds, may be affected by habitat fragmentation. Biodiversity assessments should focus on state lists of species of greatest conservation need and State Natural Heritage Program-tracked species as well as economically valuable species (including game mammals, birds, fishes, birds of particular interest to birdwatchers, and medicinal plants). Little-known species with small geographic ranges are also of concern, and new species continue to be described. General sensitivities to industrial environments of taxa such as orchids, *Carex* sedges, submergent aquatic plants, stoneflies, and land snails may be used to predict risk from fracking. Nonnative invasive species may follow fracking disturbances and penetrate fragmented forests or polluted streams. Research linking specific fracking activities with cumulative impacts on habitats and species is necessary for analysis of true costs, development of effective mitigation and restoration, and long-term regional conservation planning.

Fri-P2-5-1

Invasive Plant Control with Livestock: From Targeted Eradication to Ecosystem Restoration

Gary Kleppel, C.B. Girard, E.R. LaBarge, and S. Caggiano (University at Albany,SUNY, Albany, NY)

Targeted grazing (TG) is the controlled use of livestock to achieve specific management objectives such as invasive plant control. We report on studies of the application and outcomes of different TG protocols in a variety of landscapes in New York's Hudson Valley. In the first study, Boer goats were used to control Multiflora Rose (*Rosa multiflora*) in a cattle pasture at Glynwood Center in Cold Spring, NY. The goats grazed heavily on the rose (42% of diet) and killed most of the plants within two seasons. However, the goats also overgrazed the pasture and required substantial nutritional supplementation within 2 months of deployment each season. An alternative protocol, intensive rotational targeted grazing (IRTG), is potentially less harsh and damaging to the non-target plant community. With IRTG, the infested landscape is subdivided into a system of small, fenced paddocks and livestock, at densities 3–4 times typical agricultural stocking densities, are rotated through the paddocks at high frequencies (2–3 d/paddock), mimicking the spatio-temporal distributions of wild, herd-forming ungulates. Invasive plant control with IRTG, using sheep as the grazers, was studied in a wet meadow infested with Purple Loosestrife (*Lythrum salicaria*) and Reed Canary Grass (*Phalaris arundinacea*), a riparian landscape infested with *Phragmites australis*, and an upland landscape infested with Mile-a-minute (*Persicaria perfoliata*). Plant community structures in grazed and ungrazed (reference) paddocks were compared. Invasive plant cover declined in grazed paddocks by as much as 41% after less than 15 days of grazing. In reference paddocks, invasives usually spread during the growing season. Significant reductions in the heights of Purple Loosestrife, Reed Canary Grass and *Phragmites* were observed after fewer than 6 weeks of grazing and the near complete failure of flower production was noted in Purple Loosestrife and Mile-a-minute (median inflorescence = 0). In addition, species richness increased by 25–62% in grazed paddocks relative to ungrazed reference sites, suggesting the restorative influence of grazing in these ecosystems.

Fri-P1-7-4

Floodplain Forests of Columbia and Dutchess County, NY: Distribution, Biodiversity, and Classification

Claudia Knab-Vispo and Conrad Vispo (Hawthorne Valley Farmscape Ecology Program, Ghent, NY)

Floodplain forest is a rare and little-studied ecological community of potentially great conservation value in New York. We recently completed a 3-year study in two adjacent counties in the Hudson Valley to quantify the extent and document the biodiversity of floodplain forests. In collaboration with Hudsonia Ltd., we remotely mapped the ancient (forested at least since the 1930/40s) and recently reforested non-tidal, non-swamp floodplain forests in Columbia and Dutchess counties. We found, that in both counties, currently only 1/3 of the suitable alluvial sites have floodplain forest. Only 10% (2600 acres) and 16% (4000 acres) of the suitable alluvial sites (in Dutchess and Columbia counties, respectively) were also forested in the 1930/40s and can be considered ancient floodplain forests. We described the microhabitats, and systematically inventoried the trees, shrubs, and herbaceous plants of 31 sites in ancient and recently reforested floodplain forests in both counties. The 15 ancient floodplain forest sites in Columbia County were also systematically surveyed for breeding birds, mammals, amphibians and reptiles, butterflies, dragonflies, ground beetles, and other invertebrates. We classified our study sites according to their tree composition and propose the distinction of five different types of non-tidal, non-swamp floodplain forest in our region. This study documented the diversity of plants and animals that occur in floodplain forests and highlighted those species that seem to be closely associated with this habitat. We conclude with some insights into the main differences between ancient and recently reforested floodplain forests and some thoughts about floodplain forest conservation.

Fri-P2-4-2

Restoration of Regional Tern Populations: A Model from the Gulf of Maine

Stephen Kress and Scott Hall (National Audubon Society, Ithaca, NY)

Populations of Common, Arctic, and Roseate Terns in the Gulf of Maine were in decline during much of the 20th century and reached historic lows by 1977. Prior to 1984, few sites were actively managed for terns. The restoration of one historic tern colony at Eastern Egg Rock, ME proved that the combination of predator management and social attraction was an effective method for establishing new colonies. However, the benefits of restoring a single colony were limited over time due to catastrophic events, especially predation by Herring and Great Black-backed Gulls, Great-horned Owls, Black-crowned Night-heron, and mink that occasionally impacted nesting success. In 1984, seabird biologists from throughout the Gulf of Maine adopted multiple-site management as the preferred method for attaining regional population growth. Since 1984, fourteen historic tern colonies were actively restored and managed for terns. In 2009, 19,411 pairs of Common Terns, 4080 pairs of Arctic Terns, and 249 pairs of Roseate Terns nested at 32 Gulf of Maine sites, where 75% of Common Terns, 99% of Arctic Terns, and 100% of Roseate Terns occupied sites where resident stewards live on the islands to carry out active management, especially predator and vegetation control. This 25-year program demonstrates the benefits of a regional approach to tern management as terns can readily renest at nearby sites when events force them to abandon their first nesting attempt of the season. New challenges such as burgeoning Laughing Gull populations, increasing numbers of Bald Eagles and deterioration of quality nesting habitat due to rank vegetation are emerging threats to these populations. Regional management at multiple sites will likely be necessary into the foreseeable future in the Gulf of Maine and within other tern populations, especially near large human populations where suitable habitat is limited and predators and nest-site competitors are abundant.

Fri-A2-2-1

Management of Common Terns on Lake Champlain, VT

Mark LaBarr (Audubon Vermont, Huntington, VT)

Nesting Common Terns *(Sterna hirundo)* have been documented on 1–6 small islands (<0.5 ha each) in northern Lake Champlain, VT since at least 1892. Breeding terns on Lake Champlain have experienced problems similar to those in other colonies including predation, competition for nesting space with Ring-billed Gulls and Double-crested Cormorants, and human disturbance. These factors have contributed to this population's chronic low breeding success, which combined with reduced numbers of adult breeders during the 1970s and 1980s threatened the viability of this species in Vermont. The Common Tern was legally designated a Vermont state endangered species in 1989. Improved understanding of the population's ecology and its limiting factors, combined with long-term management efforts and the successful use of several management techniques have reduced levels of predation, inter-specific competition by gulls, and human disturbance. These efforts have resulted in a steady increase in population size, reproductive success, and productivity. Common Tern numbers have risen from a low of about 50 pairs in 1988 to more than 225 in 2010, and productivity levels have also improved. High annual site fidelity of breeding adults, recruitment of chicks fledged from this population, and immigration of terns from other inland colonies also contributed to the rise in the number of breeding pairs. Although recent management techniques have met with success, the long-term viability of Vermont's Common Tern population continues to be negatively impacted by predation. Continued management of this population will be necessary to maintain recent population gains.

Fri-A2-2-4

Ecological and Behavioral Adaptations in Urban Fisher (*Martes pennanti*)

Scott LaPoint and Roland Kays (New York State Museum, Albany, NY)

Fisher (*Martes pennanti*) have traditionally been considered a wilderness species. While their populations in western North America are classified as rare and threatened, their northeastern populations are robust, and recently have started colonizing urban and suburban forests in parts of New England and New York. We are using remote cameras and GPS tracking collars to study the ecological and behavioral adaptations that have allowed Fisher to live in the human-dominated landscapes in and surrounding the Albany Pine Bush Preserve near Albany, NY. Preliminary results suggest that these urban Fisher have an abrupt nocturnal activity pattern compared to wild Fisher, which are more active during daylight hours. All Fisher show a strong preference for forested habitat, avoiding developed areas and open fields, and frequently move between multiple urban forest fragments to find sufficient habitat. Our high-resolution (>2 minutes) GPS location data allows us to identify functional movement corridors and to pinpoint the locations where animals cross roads. Field-investigation of these road-crossing sites reveals a high use of drainage culverts and under-road tunnels. Tri-axial accelerometer data help us distinguish rest sites from predation sites, which we then investigate in the field to describe. Our study will provide valuable information on how a threatened species can adapt to encroaching human development over the scale of just a few decades, and will also provide valuable information to land managers attempting to provide landscape connectivity.

Fri-A2-7-3

Comparison of Methods for Estimating Critical Loads of Acidic Deposition in the Western Adirondack Region of New York

Gregory Lawrence (US Geological Survey, Troy, NY), T.J. Sullivan (E & S Environmental Chemistry, Inc), K.C. Weathers (Institute of Ecosystem Studies), B.J. Cosby (University of Virginia), and T.C. McDonnell, (E&S Environmental Chemistry, Inc.)

Acidic deposition via wet, dry, and cloud deposition continues to impair a large number of surface waters in the Adirondack region of New York. Methods for quantifying effects and recovery potential can be developed from the concept of the critical load (CL), which most commonly is defined as the rate of acidic deposition, in the form of sulfur and nitrogen, that, when exceeded, causes harm to an ecosystem. The CL provides a straightforward framework for the translation of research results into information that can be useful to legislators and policy makers. A variety of modeling approaches designed around the CL concept are currently being applied to ecosystem acidification, but the various approaches provide different types of information about current and future ecosystem condition, and there remain limitations and significant uncertainties in virtually all of the current approaches. Therefore, the objective of this study was to compare and evaluate three approaches for estimating the CL of sulfur (S) and/or nitrogen (N) needed to avoid current and future stream acidification in the Adirondack region of New York. A large database of stream and soil chemistry was available for this work through the NYSERDA-supported projects with the following abbreviated titles: Western Adirondack Stream Survey, (the WASS Project); The Buck Creek Watershed Monitoring project, and The Adirondack Sugar Maple Assessment. The three CL approaches are referred to as 1) the empirical CL, 2) the dynamic CL, and 3) scenario modeling for estimating future acid-base chemistry conditions. The empirical CL results were consistent with the dynamic CL results in that the 6 most acidified streams were estimated to be currently receiving acidic deposition above their CL for Al mobilization, and that would not change by 2050. Scenario modeling indicated that under aggressive emissions controls, all modeled streams were projected to have positive ANC by the year 2050, but the projected ANC for six streams was approximately 50 μeq L^{-1} or less in 2050 and four of these streams were projected to be unable to attain ANC above 50 μeq L^{-1} over the next 300 years.

Thu-P1-3-4

Behavioral and Spatial Patterns of *Formica glacialis* Ants in the Context of Parasitism by Slavemakers

Sara Lewandowski and Jennifer Apple (SUNY Geneseo, NY)

Formica glacialis ants in SUNY Geneseo's Roemer Arboretum are host to two species of parasitic slavemaking ants. These slavemaking ants steal the developing host brood and raise it in the slavemaker nest to forage, maintain the nest, and care for the slavemaker offspring. We used behavioral, spatial, and genetic analyses to investigate the structure and interactions of this host population in the context of slavemaker presence. Approximately 300 active host nests and 11 slavemaker nests have been located and mapped in the Roemer Arboretum using GPS equipment. The slavemakers conducted over 50 successful raids per year in 2009 and 2010. Nestmate recognition assays were conducted between ants from different *F. glacialis* nests to investigate the factors contributing to aggressive versus passive intraspecific interactions, which could have implications for host nest survival during a slavemaking raid. Host ants that flee from their nest during a slavemaking raid may be able to seek refuge in a neighboring host nest. Patterns of aggression between nests were compared with spatial distances and genetic distances estimated using DNA microsatellites. Preliminary results suggest a positive relationship between genetic distance and aggression, independent of spatial distance. Spatial analyses of the host and slavemaker nest distribution revealed that slavemaker nests tend to be further from their nearest neighbors than are host nests, while the host nests show an overall clustered pattern. The clustering of host nests could be a result of polydomy, in which multiple nests are part of one large colony, but this explanation is not supported by a comparison of spatial and genetic distances. Additional sampling is required to confirm that polydomy is not a contributing factor. These trends in spatial distribution, which differ from many ant communities that lack slavemakers, suggest that slavemaking pressure may influence host nest distribution, creating open areas around slavemaker nests where parasitism pressures are high and denser clusters of nests further away from the slavemakers. These findings highlight some of the many ways in which slavemaker presence may shape the structure of their host population.

Thu-A2-1-6

Pollen Distribution Across a Major Metropolitan Area

Eric Littmann and Tamer Abulebda (Fordham College at Lincoln Center, New York, NY), Arryana Olavarri (South Bronx Preparatory High School, Bronx, NY), Pamela Polanco (City College of New York, New York, NY), Alexander Yorke (Oberlin College, Oberlin, OH), Mary Egan (Montclair State University, Montclair, NJ), Kate Weinberger (Columbia University), and Guy Robinson (Fordham College at Lincoln Center, New York, NY)

The distribution of modern airborne pollen at a regional level is scarcely understood, yet the public health consequences are significant. During early to late spring of 2010, we deployed 25 pollen sampling traps throughout the New York City Tri-state Area to establish the geographic pattern of pollen deposition at a regional and neighborhood level. The samplers are a simple, low-cost design modified from the original device described by Henrik Tauber, so they collect airborne pollen and particulates by passive deposition. Samples were processed by acetolysis, and the residues slide-mounted and analyzed at 400x magnification. We also compared these pollen spectra to the cumulative results of two active Burkard aerobiology samplers covering the same period. From the Tauber trap samples, we identified more than 30 pollen types dispersed in the region during the period from March to late May. Oak pollen, a known allergen dominated the spectra throughout urban, suburban, and rural settings, often comprising more than 60% of the total. The appearance of birch, also allergenic, was more variable but usually low, especially in urban settings. Pine was low in urban areas, and *Platanus* (London Plane, Sycamore) was a significant presence throughout New York City, yet remained low in rural samples. We noted a broad similarity between Tauber and Burkard results where the devices were located side by side. Furthermore, the Tauber sample deployed in New Rochelle NY had very similar pollen spectrum to the uppermost sediment sample of a pollen core extracted from a local swamp.

Thu-P1-1-2

Albany Pine Bush Habitat Restoration Reduces the Risk of Lyme Disease: A Cost-Benefit Analysis with a Novel Benefit

Kathleen LoGiudice and Stephen Schmidt (Union College, Schenectady, NY) and Scott Morlando (Stratus Consulting)

The Albany Pine Bush Commission has restored almost 200 acres of habitat formerly invaded by the Black Locust Tree (*Robinia pseudoacacia*), and has approximately 500 acres still awaiting restoration. Such habitat restorations are costly, and it is often necessary to justify the monetary costs with evidence of benefits to society. These benefits are difficult to quantify because they are measured in terms of ecosystem services rather than dollars and cents. We documented a novel ecosystem service resulting from the Pine Bush restoration: a reduction in the risk of tick-borne disease. Drag sampling of Black-legged Ticks (*Ixodes scapularis*), the vectors of Lyme disease, in restored habitat and Black Locust clones demonstrated that the restoration reduced tick density by approximately 98% in restored areas. We then conducted a cost-benefit analysis of the Pine Bush habitat restoration project employing a cost-of-illness study to calculate the costs averted by preventing each case of Lyme disease. This analysis showed that the restoration would be financially justifiable if it averted 75 cases of Lyme disease per year. Given the Lyme disease rate in Albany County (0.21%) and the visitation rate to the Preserve (100,000 per year), the habitat restoration can plausibly be justified solely on the benefit of Lyme disease cases averted. However, since we do not know how many cases of Lyme disease are actually contracted in the Preserve, we also established the perceived value of protecting biodiversity using a contingent valuation survey in which local residents were asked how much they were willing to pay annually to protect biodiversity. Results show that residents were willing to pay a significant fraction of the net cost of restoration for the preservation of biodiversity alone. When these benefits are taken into account, the number of cases of disease that must be averted to justify remediation is reduced. This exercise spotlights an unanticipated benefit of restoring the Pine Bush habitat and demonstrates strong public support for the restorations.

Fri-A2-7-4

Managing Invasions over the Long Term. Lessons from Eight Years of *Phragmites australis* Control

Karen Lombard (The Nature Conservancy, Massachusetts Chapter, Boston, MA)

Phragmites australis was mapped and treated with herbicide in 99 (14.2-ha) interdunal seasonal wetland swales at Sandy Neck barrier beach on the north shore of Cape Cod, MA from 2002–2009. Swales range in composition from unvegetated or lightly vegetated wetlands to graminoid-dominated swales and shrub wetlands. *Phragmites* was treated with glyphosate herbicide by spraying, swiping, or using a cut and drip method depending on the amount and type of native vegetation present. When we started the control effort, swales were fairly equally divided into low (34%), medium (37%), and densely (28%) invaded swales. Currently 52% of swales are at a low level of density of *Phragmites*, 16% at medium density, and 4% at high density. Of the 52 low-density swales, 73% had less than 50 stems in 2009. Twenty-seven percent of invaded swales have no *Phragmites* remaining. Personnel hours, costs, and the amount of chemicals needed decreased over the life of the project. Monitoring methods had to be adjusted over time to adequately capture treatment results. Although we treated swales for eight years with significant success, containment of *Phragmites* is more likely than eradication. Follow-up monitoring and control will be needed for many years and perhaps in perpetuity.

Thu-P2-2-1

Thirty Years of Forest Change in the Mohonk Preserve, New Paltz, NY: The Fate of American Chestnut (*Castanea dentata*) (Marsh) Borkh.

Thomas J. Sarro (Department of Biology, Mt. Saint Mary College, Newburgh, NY) and. **Les M. Lynn** (Department of Biology, Bergen Community College, Paramus, NJ)

Ten permanent plots were established in the Mohonk Preserve, Shawangunk Mountains, New Paltz, NY, in 1977 by D. Guertin and K. Beard to sample American Chestnut trees >4 cm dbh and sprouts <4 cm dbh. All trees and sprouts within the plots were measured and counted. These plots were sampled again in 1982 by K. Beard and S. Wright for chestnut as well as the other arboreal and understory components. The present authors visited these sites in 2004 and 2010 to determine the status of chestnut and accompanying arboreal and understory elements. Chestnut continues to decline probably due to deer browse and other stresses that reduce root and sprout vigor. The importance values indicate that while Chestnut Oak (*Quercus prinus*) has shown no decline, Red Oak (*Quercus rubra* L.) has declined steadily. Of particular concern was the fact the little to no regeneration was observed for both of these species. It is speculated that the generalist Red Maple (*Acer rubrum* L.) will eventually become the dominant arboreal species.

Thu-P2-4-2

Virtual Paleoecology: From Sediment Sampling to Pollen Analysis in Two Hours

Terryanne Maenza-Gmelch (Barnard College, New York, NY) and Ryan Kelsey and Alice Cox (Columbia University, New York, NY)

A web-based paleoecology module was created to provide a virtual palynological experience for an undergraduate course in the Environmental Science Department at Barnard College. The fundamental idea was to take the pollen, plant macrofossil, and radiocarbon data from the actual Sutherland Pond sediment core and put them into a simulation so that students could learn the discovery process inherent in reconstructing a forest's ecosystem using paleoecological techniques without the time and resource constraints that make actual sediment coring and pollen processing impossible in a classroom setting. A pollen identification tool was designed to introduce students to pollen morphology and the use of a diagnostic key. The 15 most common pollen types from the real core are used. Plant macrofossil images are also included. The sediment sampling tool allows students to visualize the core and select sampling levels. Once selected, a pie chart of the most abundant pollen types and their percentages at a given core level is shown. Multiple samplings and review of the corresponding pie charts facilitate the visualization of changes in the abundance of various taxa over time. Students can then choose to download the entire excel spreadsheet of Sutherland Pond pollen percentage data and select various taxa from this top 15 to graph against the AMS radiocarbon data that are also provided. As a teaching and learning strategy, this module provides key interactive and inquiry-based learning opportunities for students, facilitating synthesis of key palynological concepts and skills within the time frame of one or two class meetings. The majority of surveyed students said that the simulation was, engaging, exploratory, and fun. All surveyed students this spring (n = 15) thought the module would be a better learning tool than just a lecture.
The paleoecology module is one of many ecological and environmental science learning modules currently being developed by the Columbia Center for New Media Teaching and Learning in collaboration with Barnard College and Columbia University faculty. These modules are part of CCNMTL, Virtual Forest Initiative at Black Rock Forest (http://blackrock.ccnmtl.columbia.edu/paleoecology/).

Thu-P2-1-3

European Frogbit (*Hydrocharis morsus-ranae*) in the Adirondack / Lake Champlain Region: Reproductive Biology, Ecology, and Eradication

Christopher Martine, Sasha Dow-Kitson (SUNY Plattsburgh, NY), and Stephen Langdon (Shingle Shanty Preserve and Research Station)

Hydrocharis morsus-ranae L. (European Frogbit; Hydrocharitaceae) is an invasive aquatic plant species first introduced to North America in 1932. The species spreads rapidly by the production and growth of stolons, which enable growth through clonal reproduction, and turions (overwintering buds) that allow the populations to reestablish themselves each spring. Studies conducted with students at SUNY Plattsburgh are focused on three areas of research: 1) surveys of wild populations to determine breeding system and gender status (dioecious/staminate, dioecious/pistillate, or monoecious) and natural fruit/seed set; 2) efficacy of, and community response to, hand-pulling eradication efforts in local incursions; and 3) effects of nutrient levels in surface water on growth and reproduction. Populations of *Hydrocharis* in the Adirondack/Lake Champlain region are likely to be source populations for downstream regions of the Northeast. As such, the data gathered in these studies is likely to be useful for early detection and rapid response plans for areas that have not yet been invaded but are likely to be so in the future.

Fri-P1-7-5

Establishing a Museum-based Biodiversity Inventory Program in the Protected Natural Areas of New Brunswick, Canada

Donald McAlpine (New Brunswick Museum, Saint John, NB, Canada)

The Jacquet River Gorge Protected Natural Area (JRG PNA), at 26,022.1 h, is currently the largest of a growing network of PNAs representative of the terrestrial habitats of New Brunswick. Situated in eastern Canada (47º46'02"N, 66º01'00"W) and established as a protected area in 2003, the JRG PNA includes the heavily forested, hilly plateaus and deep river gorges that characterize the Northern Uplands Ecoregion of the province. As is the case with all of New Brunswick's 60 PNAs, the species diversity of the JRG was poorly known upon its establishment as a conservation area. Poor understanding of the biodiversity of New Brunswick's PNAs presents a serious impediment to the development of management plans and reduces the effectiveness of efforts to encourage public stewardship of these important conservation areas. It also limits opportunities for specific research projects and ecosystem monitoring in the PNAs. In an effort to address deficiencies in knowledge of the biodiversity of the JRG and other PNAs in the province, an intensive long-term program of volunteer-supported biological inventory was initiated in 2009 by the New Brunswick Museum. Here I review known species diversity for the 10 largest New Brunswick PNAs, using these figures to estimate the effort required to fully inventory the sites. I describe how the current inventory program is organized and funded and share some of the results of the trial program of biodiversity inventory in the JRG PNA conducted in 2009–10.

Fri-P2-7-1

Nantucket Island American Burying Beetles: Will a Reintroduced Population Survive Without Our Help?

Andrew Mckenna-Foster (The Nantucket Maria Mitchell Association, Nantucket, MA) and Lou Perrotti (Roger Williams Park Zoo, Providence, RI)

The American Burying Beetle (ABB), *Nicrophorus americanus* (Silphidae), is a federally listed endangered beetle once common throughout the eastern half of the United States and now surviving in only a few isolated or undisturbed habitats in eight states. This species relies on carrion weighing between 80 and 180 grams on which to rear its young. It also shows some of the highest levels of parental care among insects. As part of an 18-year project, under the supervision of the US Fish and Wildlife Service, the Roger Williams Park Zoo (RWPZ) and the Nantucket Maria Mitchell Association (MMA), have worked to reintroduce the ABB to Nantucket Island, MA. This effort is the longest, on-going reintroduction program for this species range wide and probably one of the most intensive endangered insect recovery efforts in the United States. It is one of the few successful invertebrate reintroductions in the world. Since 1994, the RWPZ has developed a highly successful captive-rearing program that has provided over 2900 ABBs for the reintroduction effort. Reintroductions stopped in 2006 and intensive trapping, pairing, and carrion supplementing efforts over the last seven years have shown a steadily increasing total annual capture for new beetles, as well as dispersal from the original release site. The development of a successful reintroduction methodology is the result of assessing capture rates, over winter survival rates, physical beetle measurements, brood sizes, and dispersal patterns over several years. The trap rate for 2010 increased 39% over 2009 and based on this success, we will begin evaluating how dependent ABB reproduction is on carrion supplementing efforts. RWPZ and MMA will not be provisioning beetles with carrion in 2011, but will continue monitoring the population through trapping efforts. It will be the first test of whether this population can survive on its own with out human aid.

Fri-P2-1-3

Habitat Associations of Adirondack Lowland Boreal Birds

Kevin Jablonski (SUNY, Syracuse, NY), **Stacy McNulty** (SUNY, Newcomb, NY), Michale Glennon (Wildlife Conservation Society - Adirondack Program), and Matthew Schlesinger (New York Natural Heritage Program)

We studied lowland boreal birds in New York's Adirondack Park. The study objective was to determine habitat features associated with 12 species, 6 of which are state species of greatest conservation need (SGCN). In 2008, we conducted 65 point counts at 9 sites. In 2009, we performed 30 point counts on Spring Pond Bog Preserve, a large wetland complex in Franklin County. We compiled digital spot maps on five 9-ha grids in Spring Pond Bog visited 5 times each from May–July. Ecological community variables were measured at 22 plots associated with clusters of bird detections in grids, including plant species, height, tree diameter, ground moisture, and soil type. We used the Kolmogorov-Smirnov test to identify differences in habitat features between sites where a species was detected and sites where it was not ($P < 0.05$). We detected 148 individuals of seven species, including 12 detections of Olive-sided Flycatchers (OSFL) and 14 of Rusty Blackbirds (RUBL), both SGCN. Only Palm Warblers (PAWA) and Lincoln's Sparrows (LISP) were detected in sufficient abundance to statistically assess habitat associations. LISP were found in dense (60–87% cover) shrub cover and Sphagnum hummocks where trees were sparse (0–2%). PAWA associated with bog edges where Black Spruce, Tamarack and Balsam Fir are sparse (3–45%) and stunted. Yellow-bellied Flycatchers associated with dense conifer saplings and tall shrubs and moderate coniferous canopy cover. OSFL used the forest-emergent wetland ecotone where mature conifers and snags were present. RUBL also used edges of this habitat where minerotrophic wetlands are interspersed with shorter conifers. Gray Jays showed no associations (other than a general linkage to spruce-dominated lowlands) and may select habitat on a landscape rather than local scale. Other bird species were detected few times or not at all. Our study concurs with others in that most Adirondack lowland boreal birds are indeed rare. While these birds are often grouped together for research and management purposes, we found species associated with different structural and compositional aspects of a forested boreal wetland. This finding presents interesting management challenges and opportunities, as the protection of the habitat for one species could alter suitable habitat for another.

Fri-P2-2-4

Late-glacial to Holocene Climate Variability and Drought in the Mid-Hudson Valley Region of New York State

Kirsten Menking (Vassar College, NY), Dorothy Peteet (Institute for Space Studies, NASA/Goddard, New York, NY and Lamont Doherty Earth Observatory, Columbia University, Palisades, NY), and Roger Anderson (Department of Earth and Planetary Sciences, University of New Mexico, Albuquerque, NM)

Sediment cores from Lakes Minnewaska and Mohonk in the Shawangunk Mountains of southeastern New York were analyzed for pollen, plant macrofossils, macroscopic charcoal, organic carbon content, carbon isotopic composition, carbon/nitrogen ratio, and lithologic changes to determine the vegetation and landscape history of the mid-Hudson Valley region since deglaciation. Pollen stratigraphy generally matches the New England pollen zones identified by Deevey (1939) and Davis (1969), with boreal genera (*Picea*, *Abies*) present during the late Pleistocene yielding to a mixed *Pinus*, *Quercus*, and *Tsuga* forest in the early Holocene. Lake Minnewaska sediments record the Younger Dryas and possibly the 8.2 cal kyr BP climatic events in pollen and sediment chemistry along with an ≈1100-cal yr interval of wet conditions (increasing *Tsuga* and declining *Quercus*) centered about 6400 cal yr BP (5600 14C yrs BP). Mohonk Lake reveals a protracted drought interval in the middle Holocene ≈5900–4700 cal yr BP (≈4900–3900 14C yrs BP), during which *Pinus rigida* colonized the watershed, lake level fell, and frequent fires led to enhanced hillslope erosion. Together, the records show at least three wet-dry cycles throughout the Holocene and both similarities and differences to records in New England and western New York.

Thu-P1-4-2

Decline of *Acris gryllus* in Sympatry with A*cris crepitans* in North Carolina and Virginia

Jonathan Micancin and Aniko B. Toth (College of William and Mary, Williamsburg, VA), Rachel B. Anderson (University of California-Davis, Davis, CA), and Jeff Mette (North Carolina Museum of Natural Sciences, Raleigh, NC)

Widespread declines at the northern range limits of *Acris crepitans* (Northern Cricket Frog) in the Northeast and *A. blanchardi* (Blanchard's Cricket Frog) in the upper Midwest have been observed for decades, even in protected areas. Habitat loss, climate change, pollution, disease, and many other causes have been proposed to explain these declines. None has been determined, perhaps because habitats surrounding different populations of these widely-distributed species have likely experienced different suites of changes that obscure the true causes of decreased survival or reproduction. Using acoustic surveys of *A. crepitans* and *A. gryllus* (Southern Cricket Frog) and a discriminant function to identify museum specimens from the mid-20th century, we recently identified the extirpation of *A. gryllus* (Southern Cricket Frog) in sympatry with *A. crepitans* from a large area in North Carolina and a reduction of *A. gryllus* breeding choruses in the adjacent area of Virginia. The decline of *A. gryllus* resembles declines of other *Acris* species by occurring near the northern limit of the range. However, this decline has occurred in sympatry and syntopy with *A. crepitans*, which remains in large numbers at breeding sites that previously contained *A. gryllus* or both species. This situation presents an opportunity to identify the habitat features that correlate with the decline of one *Acris* species where another species remains stable, and more broadly, to identify the habitat preferences of both species. In turn, this study could provide specific hypotheses and an empirical blueprint for investigating the decline of *A. crepitans* in the Northeast.

Fri-A1-3-2

Movements of Timber Rattlesnakes in Metapopulations Divided by Major Roadways

Kathy Michell, Tom Michell, George Banta, and Gerard Salmony (New York Center for Turtle Rehabilitation and Conservation, Inc., Narrowsburg, NY)

One of the ways that Timber Rattlesnakes establish their home range is by following scent trails of other rattlesnakes. In areas within their range which have habitat suitable for all their life history needs such as basking, gestation and foraging, this home range can radiate in any direction from their overwintering den. When anthropogenic landscape alterations, such as major roadways, divide suitable habitat and metapopulations, it has been surmised that snakes moving in those directions are often killed, thus resulting in the loss of scent trails. Movements of the populations would then be mostly limited to directions in which the snakes successfully travel and scent trails would lead younger generations to those safe directions. Radiotelemetry studies were conducted on two southern New York Timber Rattlesnake metapopulations during 2006 and 2007. Twenty-eight rattlesnakes from six potentially interbreeding dens were tracked in one study, and 24 rattlesnakes from five dens in the second study. In both cases, major roadways to the east of these populations separate them from other rattlesnake populations within the distances generally accepted as interbreeding and foraging ranges. Most snakes were captured at or near their dens, and a few snakes were captured mid-season near residences or roadways. Location data were recorded approximately twice weekly and mapped. The movement data showed that the majority of snakes limited their movement to the western 180º arc from the dens as predicted. Several distinct movement corridors were identified during the study as well as areas of potential genetic interchange which occurred within the foraging ranges. In one study, historic records of road-killed snakes and observed crossings from a smaller nearby roadway were consistent with movement corridors identified through the radiotracking.

Fri-P2-3-4

Evidence of Potential Emerging Snake Disease

Kathy Michell (New York Center for Turtle Rehabilitation and Conservation, Inc., Narrowsburg, NY)

It has been well-documented that some snakes entering into cold, damp hibernation conditions can develop a temporary bacterial infection of the belly scales, commonly known as "blister disease". This disease is common among captive snakes and is usually caused by unsanitary and damp conditions. In the wild, post-emergent snakes avail themselves to open transient basking areas where they can sun, raise their body temperatures and undergo ecdysis, usually resolving any hibernation blisters. In recent years, a growing number of snakes have been observed in the wild with a set of clinical signs that include reddish granulomatous facial lesions often involving the eye, pit organs, mouth, and neck, not characteristic of "blister disease". Some of the snakes observed with lesions immediately prior to a delayed hibernation ingress were not observed during spring emergence or in subsequent years, leading to the suspicion that they may have succumbed to the progress of the disease during hibernation. Other snakes have been observed to retain the lesions following a shed cycle. The condition has been observed in the northeast in several species of snakes, including the Timber Rattlesnake, Eastern Ratsnake, Eastern Racer, Ringnecked Snake, and Copperhead. Some preliminary testing has been conducted on samples from several of these snakes, and a number of pathogenic organisms were identified, which may be primary or secondary infections. A recently described fungal organism, *Chrysosporium ophiodiicola*, was identified by PCR testing in several of the snakes. More testing of snakes exhibiting these lesions is necessary to determine whether there is an individual causative agent or whether a complex set of factors such as suppressed immunity, climate change, diminished habitat, or environmental contaminants may be predisposing snakes to disease. In light of recent wildlife disease introductions such as the devastating white nose syndrome in bats, caution should be taken to prevent the spread of any potential pathogens between snake populations.

Fri-P2-3-5

An Introduction to the Study of Aquatic Insects (Ephemeroptera, Plecoptera, Trichoptera) in New York State: Past and Present

Tim Mihuc (Lake Champlain Research Institute SUNY Plattsburgh, NY) and B. Kondratieff (Department of Bioagricultural Sciences, Colorado State University, Fort Collins, CO)

During the early 19th century, the state of New York and its aquatic habitats were one of the most-reported and best-studied regions for aquatic insects in North America. The foremost North American authorities in mayfly (Ephemeroptera), stonefly Plecoptera), and caddisfly (Trichoptera) (EPT) taxonomy and biology conducted research in New York and published their results. However, little work on these three aquatic insect orders, other than descriptions of additional taxa from the region and taxonomic clarifications are available from the state since that time. Recently, a broad survey of New York mayflies, stoneflies, and caddisflies has begun with a focus on habitats in eastern New York. Initial results include numerous new state records from each order and a greatly improved assessment of the regional fauna. A review of historical collections will be presented followed by broad review of each order.

Fri-A2-1-1

The Effect of Fuels Reduction and Habitat Restoration of Pitch Pine-Scrub Oak Barrens on Native Bees

Joan Milam and David I. King (Department of Environmental Conservation, University of Massachusetts, USDA Forest Service, Amherst, MA)

Managers of Pitch Pine-Scrub Oak barrens have an obligation to reduce fire risk and conserve biodiversity, and routinely adopt and employ practices to accomplish these goals. We undertook a study of the effects of these management practices on native bees on the Montague Plains Wildlife Management Area in Massachusetts by comparing bee diversity and abundance among representative habitats, including Pitch Pine forest, Pitch Pine forest thinned to 10–30% canopy coverage, scrub-oak barrens, powerline corridors, and sand pits. Our analyses indicate that native bees are more abundant in Pitch Pine forest that has been thinned to reduce the risk of catastrophic fire compared to unthinned Pitch Pine forest, and more abundant in Scrub Oak thickets that have been mowed or treated with prescribed fire compared to untreated Scrub Oak thickets. In addition, we discovered two new parasitic bee species during this project.

Fri-P2-4-3

Living on the Edge: How Prairie Warbler Fecundity is Affected by Edge Effects

Nancy Miorelli, Neil Gifford ,and Jennifer Bishop (Albany Pine Bush Preserve, Albany, NY)

Prairie Warblers (*Dendroica discolor*) nest in early successional habitat which is characterized and maintained by disturbance. Early successional habitat is declining regionally and is restricted to roadsides, preserves, and regenerating timber forests due to land development, silvicultural practices, and fire suppression. Prairie Warblers, listed as a Partners in Flight Watchlist species, are also experiencing regional concomitant declines. For this reason, the Albany Pine Bush Commission began a study monitoring Prairie Warbler fecundity in a locally important early successional habitat, the Albany Pine Bush Preserve, during the 2009 and 2010 breeding season. Through observation, territory mapping, nest searching, nest monitoring, and landscape analysis, the Albany Pine Bush Commission plans to assess whether the Albany Pine Bush Preserve is a source or sink habitat for Prairie Warblers. The focus of my study is to determine whether edges affect Prairie Warbler fecundity. Landscape features, such as roads, trails, development, and stands of trees, were delineated from an aerial orthophotogaph in ArcGIS 9.3. Territory size, nest locations, nest success, and parasitized nests were examined relative to landscape features. Generally, the size of a male's territory depended on the amount of vegetation available, with the largest territories containing the least amount of vegetation. Out of the 70 territories located, nests were found in 34 of them (48.6%). Of the nests found in 2009, 12.5% fledged Prairie Warblers, compared to 45.4% in 2010. The 2009 success rate was low due to the frequent hail storms that left many nests damaged or abandoned. Brown Headed Cowbird (*Molothrus ater*) parasitism was also analysed using ArcGIS to determine whether nests in closer proximity to edges had a greater likelihood of parasitism. In 2009, 33.3% of the nests were parasitised by cowbirds, and 27.3% were parasitised in 2010. Nests located closer to trails were parasitised significantly more than other nests (P value < 0.001), but proximity to roads, trees, or development was insignificant.

Fri-A2-7-2

Long-term Conservation Management of Common Terns in Ontario: Three Case Studies

David Moore and Chip Weseloh (Canadian Wildlife Service, ON, Canada), Karen McDonald (Toronto Regional Conservation Authority,ON, Canada), and Ralph Morris (Brock University, Catharines, ON, Canada)

We present case studies, outlining the conservation approaches, techniques employed, and outcomes of long-term management efforts to conserve Common Terns, at three urban colonies in the Canadian waters of the lower Great Lakes: Port Colborne breakwall (PC, 1977–2007) on Lake Erie and Hamilton (HH, 1985–2010) and Toronto (TH, 1971–2010) harbours on Lake Ontario. Tern conservation efforts have included the creation of new breeding habitat, in the form of nesting rafts (at TH) or artificial nesting islands (at HH and TH), and annual management of colony sites, which begins prior to the arrival of terns each spring. Annual management procedures have included: enhancement of nesting substrate, control of vegetation, the use of plastic sheeting (at HH) and tethered raptors (at HH and PC) to prevent nesting by gulls (which arrive earlier at breeding sites), removal of Ring-billed Gull eggs and nests (at PC and HH) and placement of chick shelters. Despite management efforts, there has been a long-term decline in the number of tern nests at all three locations. At PC, there was a decline from a peak of 1311 nests in 1987 to abandonment of the colony by 2008. At HH, there was a drop from a peak of 1028 nests in 1990 to a low of 200 nests in 2005; numbers have since rebounded to 626 nests in 2010. At TH, nests declined from a peak of ≈1500 in the early 1980s to <200 in the early 1990s; the number of nests has remained stable (200–500) since active management of the site began in 1992. Predation and competition for nest space with co-nesting species were both factors that negatively impacted tern nesting success and site fidelity, but are not the sole reason for the observed declines. The success of conservation efforts was tied to the intensity of visitation during the pre-arrival period. At all three sites, nest numbers remained stable, declined at slower rates, or rebounded during periods of intensive research, monitoring or management (visits at 1–2 day intervals); rates of decline accelerated during periods when investigator/manager presence was reduced.

Fri-A2-2-2

Genetic Connectivity of White-footed Mouse Populations is Associated with Urban Canopy Cover in New York City

Jason Munshi-South, J(Baruch College, City University of New York, New York, NY)

In this study, I use a landscape genetics approach to examine competing models for spatial associations between urban canopy cover and multiple measures of genetic connectivity between White-footed Mouse populations in New York City. In general, isolation-by-resistance models outperform both isolation-by-distance and least-cost-path models. Genetic estimates indicate that recent migration (i.e., within the last few generations) is rare to nonexistent between most White-footed Mouse populations, and requires high levels of canopy cover (>80%). Historical migration rates were higher, and are associated with potential historical corridors of 40–60% urban canopy cover. In the Bronx, the centrally located native forest of the NY Botanical Garden has played a key role in maintaining connectivity between two of NYC's largest parks: Van Cortlandt and Pelham Bay. These results have implications for understanding the impacts of urbanization trends on native wildlife, as well as for urban reforestation efforts that aim to improve urban ecosystem processes.

Thu-A1-4-4

Mercury Spatial Patterns in Food Webs of Fishing Brook (Upper Hudson River Basin, NY)

Karen Riva Murray (US Geological Survey, Troy, NY) Lia S. Chasar (US Geological Survey, Tallahassee FL), Douglas A. Burns (US Geological Survey, Troy, NY), Paul M. Bradley (US Geological Survey, Columbia, SC), and Martyn J. Smith (US Geological Survey, Troy, NY)

Recent studies of streams across the nation have revealed a widespread occurrence of fish mercury concentrations that are elevated in relation to human-health and wildlife-health guidelines. Many of these occur in forested landscapes to which the principal source of mercury is atmospheric deposition, and which have environmental characteristics that favor the transformation of atmospherically-deposited elemental mercury into methylmercury, which is the toxic and bioavailable form. Methylmercury is biomagnified in aquatic food webs such that long-lived and predaceous organisms can have mercury concentrations many orders of magnitude higher than surface-water concentrations. The purpose of our study was to investigate the linkages between mercury bioaccumulation in streams and factors associated with the production and transport of methylmercury to those streams. We evaluated spatial variation of methylmercury in biota and water across a relatively heterogeneous 26-square-mile headwater catchment of the upper Hudson River basin. Several functional feeding groups of macroinvertebrates (scraper, shredder, and predator), and fishes (omnivorous, invertivorous, and piscivorous) were collected from eight sites in the Fishing Brook catchment (Hamilton and Essex counties, NY). Samples were collected seasonally during 2007–2009, in conjunction with the collection of water samples. Invertebrates were analyzed for methylmercury, and fish were analyzed for total mercury; both were analyzed for stable isotopes of carbon and nitrogen. Mercury concentrations increased with trophic (feeding) level in all sites, but concentrations within most functional feeding groups were highly variable among the sites. Mercury concentrations in aquatic biota within functional feeding groups were strongly related to measured concentrations of aqueous methylmercury and dissolved organic carbon. In the heterogeneous landscape of the Fishing Brook catchment, the spatial patterns of methymercury concentrations in biota were strongly related to hydrogeomorphic factors such as catchment slope that indicate favorable conditions for methylmercury production.

Fri-P1-5-3

A Regional Review of Ephemeroptera, Plecoptera, and Trichoptera Biodiversity in the Adirondack Park and New York State

Luke Myers (Lake Champlain Research Institute, SUNY Plattsburgh, NY), B. Kondratieff (Department of Bioagricultural Sciences, Colorado State University, Fort Collins, CO), and Tim Mihuc (Lake Champlain Research Institute, SUNY Plattsburgh, NY)

The first extensive study of Adirondack aquatic insects was provided by James Needham and Cornelius Betten in 1901. This was one of the first studies of aquatic insects in North America, providing life-history information for a number of taxa, and descriptions of 10 new species and two new genera of aquatic insects. However, since this early publication, relatively little taxonomic research and field surveys have been conducted on aquatic insects in the Adirondack Park. Distributional records used in our study were obtained from primary literature, institutional collections and field surveys. During our four-year study of the Park, more than 25,000 specimens from 465 locations were examined. We report 510 species of EPT from the Adirondack Park, of which 99 are reported from New York State for the first time. Our field surveys have also resulted in the discovery of several species new to science and numerous species of conservation concern.

Fri-A2-1-2

Condition and Diet of Larval American Shad in Four Different Shallow-Water Nursery Habitats in the Hudson River, NY

Christopher Nack and Karin Limburg (SUNY-ESF, Syracuse, NY)

Declines in the Hudson River American Shad population have raised many questions about the management and restoration of the species. One possible cause for this decline in American Shad may be the lack of suitable nursery habitat for early life stages (i.e., larvae). We looked at the differences in the condition and diet of larval American Shad in four shallow-water habitat types found in the Hudson River. We compared the abundance, growth rates, and relative condition of larval shad caught in the four habitat types. Comparisons of these parameters can be used to classify habitat and identify areas of quality nursery habitat. Results from this study may help improve the management of the species by identifying areas for protection and providing data to help habitat recovery programs.

Thu-A1-3-2

New Manual of Vascular Plants of Northeastern United States and Adjacent Canada

Robert Naczi (The New York Botanical Garden, Bronx, NY)

The most recent Flora for northeastern North America is Gleason and Cronquist's *Manual of Vascular Plants of Northeastern United States and Adjacent Canada* (1991). Great advances in botany in the past two decades have made the time ripe for its revision. Particularly compelling justifications for revision are: 1) improvements in understanding relationships among families and genera; 2) continued taxonomic discovery in the region at the specific and infraspecific level; and 3) field discoveries of an increasing number of non-native species that have become established in the region, including invasive plants. The goals of this project are to produce a compact, one-volume manual intended for field use, similar to Gleason and Cronquist, as well as to create an accompanying online Flora. The online Flora will expand on the contents of the manual by including discussions, photographs, citation of literature, etc. The region of coverage for the new manual is the same as for Gleason and Cronquist, a vast area of northeastern North America: the entirety or portions of 22 states of the USA (CT, DE, IA, IL, IN, KY, MA, MD, ME, MI, MN, MO, NH, NJ, NY, OH, PA, RI, VA, VT, WI, WV) and 5 provinces of Canada (NB, NS, ON, PE, QU). The total area covered is ca. 860,500 mi^2, which is equivalent to 29% of the area of the 48 contiguous states of the USA. The botanical scope of the new manual is the same as its predecessors: all vascular plants growing spontaneously and established in the geographic area covered. Included will be an estimated 5000 species and 200 families of vascular plants (ca. 25% of all North American species and ca. 65% of all North American families). Relative to Gleason and Cronquist, several innovations distinguish the new manual, including collaboration by a team of taxonomic and floristic experts, and inclusion of etymologies of generic names and specific epithets, conservation status for each species, morphologic synapomorphies for families, and new identification tools.

Thu-L-7-NYFA

Status and Conservation of the Brook Floater (*Alasmidonta varicosa*) in New England

Ethan Nedeau (Biodrawversity, Amherst, MA) and Barry Wicklow (Saint Anselm College, Manchester, NH)

The Brook Floater (*Alasmidonta varicosa*) is one of the rarest freshwater mussel species in the Northeast. Most of its populations are thought to be declining due to habitat fragmentation, streamflow alterations, water quality, and changes to thermal regimes and geomorphic processes of streams and rivers. In New England, more than 30 percent of its known populations are currently considered extirpated, terminal, or critically endangered; status of Brook Floaters is considered even more bleak in the middle and southern parts of its historic range. The best remaining populations generally occur in small to medium-sized, high-quality rivers of interior central and northern New England. However, long-term studies have revealed startling population declines (50–95%) in rivers in this region that were thought to support robust populations only 10–20 years ago, suggesting the possibility that Brook Floaters are experiencing region-wide population collapses that has largely been undocumented because of the lack of long-term monitoring. More research is needed to provide resource managers with information on the status, trends, critical habitats, and factors contributing to declining populations of this species.

Fri-A1-1-4

Discovery and Eradication/Management Strategy for Asian Clam Invasion of Lake George

Sandra Nierzwicki-Bauer and Jeremy Farrell (Darrin Fresh Water Institute and Department of Biology, Rensselaer Polytechnic Institute, Troy, NY), Dan Marelli (Scientific Diving International), and Steven Resler (InnerSpace Scientific Diving)

On 19 August 2010, *Corbicula fluminea* (Asian Clam) was discovered in Lake George, NY. Subsequent to its discovery, a substantial effort to delineate its distribution within the lake was undertaken. Distribution surveys included SCUBA point-intercept coring, SCUBA transects, and Ekman dredging. Through this series of surveys the Asian Clam population was mapped to a distribution of less than 3.5 ha and within a 500-m proximity to its initial discovery. A working group of numerous agencies (APIPP, APA, FUND for Lake George, ISSD, LCBP, LGA, LGPC, SCIDI, NYSDEC, RPI/DFWI, LGWC, VTDEC) was formed, and steps to identify potential eradication or management strategies were initiated. Benthic barrier installation was identified as a promising strategy that should be explored because only limited research on the effectiveness of benthic barriers for killing Asian Clams exists. Therefore, a study was conducted to test the efficiency of different benthic barrier types (Rubber (EPDM), PVC, Torn PVC repaired with Gorilla Tape, Torn PVC repaired with adhesive patches) and duration of deployment (15 days, 30 days, 45 days, and 45 days with an interruption at day 15) at two sites within the infested zone. Results were compared with a control area at each site (no treatment). Dissolved oxygen and ammonia concentrations were quantified from 9 locations under each mat type plus three from the control areas on each of the first five treatment days and every fifth day thereafter, concluding after 45 treatment days. Clam mortality was quantified by analysis of sediment cores collected from locations near to where samples were collected for the chemical analyses. Results from the delineation mapping and this initial benthic barrier pilot study will be discussed and are being used to guide a larger-scale management effort that will be carried out in Spring 2011.

Thu-P2-2-3

Aggressive Aerial Interactions in the Ruby-throated Hummingbird at Artificial Feeding Stations

Lindsay Nightingale (Hoosic Valley Central School District, NY)

Aerial interactions are the complex activities that birds perform midair. This study focused on the aggressive aerial interactions of the Ruby-throated Hummingbird (*Archilochus colubris*). While the aerial interactions of some hummingbirds such as the Calliope and Rufous have been described in published scientific literature, there is little such literature on the Ruby-throated Hummingbird. The purpose of this project was to describe the aggressive aerial displays used by Ruby-throated Hummingbirds at a typical feeding station. Several sites were set up, and the interactions were filmed. The video clips were analyzed for specific behaviors and divided into two different groups, intimidation and attack. A chi square analysis test was performed which showed a significant difference between the two groups of behaviors.

Thu-P2-5-2

Karner Blue Butterfly Recovery at the Eastern Edge of its Range

Robyn Niver (US Fish and Wildlife Service), Kathy O'Brien (New York State Department of Environmental Conservation), Neil Gifford (Albany Pine Bush Preserve Commission, Albany, NY), and Chris Zimmerman (The Nature Conservancy)

The Karner Blue Butterfly (*Lycaeides melissa samuelis*) was federally listed as an endangered species in 1992. A recovery plan was finalized in 2003. In the Northeast, there are 2 federal recovery units for the species (Glacial Lake Albany and Merrimack/Nashua River). I will provide an overview of the status of the species and recovery efforts conducted in the Northeast, with a focus on the Glacial Lake Albany Recovery Unit. I will highlight the habitat restoration/management and captive propagation efforts underway and provide a summary of where we are headed.

Fri-P2-1-1

The Effectiveness of Field Teams in Creating Invasive Species Prevention Zones

Robert O'Brien and Alyssa Reid (Minnewaska State Park Preserve, New Paltz, NY)

Since 2008, Minnewaska State Park Preserve has placed emphasis on the creation of an invasive species prevention zone (ISPZ). The goal is to significantly reduce the level of terrestrial invasive species to less than 5% on any one acre within the ISPZ and to monitor and maintain this level both in the zone and a 50-m buffer created around the zone. The Minnewaska ISPZ is comprised of 16,025 acres of quality habitat along the Shawangunk Ridge in Ulster County, NY and includes neighboring public lands. Discussed is ISPZ delineation, prioritization, control methods, Early Detection and Rapid (Strike Team) Response, and the overall effectiveness of invasive plant management teams. This effort provided an opportunity to develop a process by which costs can be minimized and benefits maximized in controlling invasive plant infestations that threaten native species and their habitats on both large and small landscapes.

Thu-A2-4-3

Beyond the Loon: Mercury Concentrations in Songbirds of the Northeastern US

Carrie Osborne and David C. Evers (Biodiversity Research Institute, Gorham, ME)

Mercury (Hg) is a global pollutant associated with acid rain deposition and point-source emissions that is known to have harmful effects on fish, wildlife, and human health. Survival, reproduction, immune response, song, and endocrine function are all aspects of avian ecology that may be adversely affected by elevated blood Hg levels. Mercury bioaccumulates within the food web, and therefore, birds occupying higher trophic levels, such as piscivorous birds, have long been used as indicators of Hg availability; however, recent research reveals that invertivores are also useful gauges of Hg exposure. Between 1999 and 2010, we measured the blood Hg levels of 1993 songbirds (83 species) within 22 sampling regions of 11 New England and Mid-Atlantic States. Blood Hg levels ranged from 0.009 ppm (American Goldfinch [*Spinus tristis*] in southwest Virginia) to 9.418 ppm (Red-winged Blackbird [*Agelaius phoeniceus*] at a Superfund site in eastern Massachusetts). Some species of conservation concern, such as the Saltmarsh Sparrow (*Ammodramus caudacutus*) and Rusty Blackbird (*Euphagus carolinus*), appear to bioaccumulate greater amounts of Hg than other species. Indeed, our results show that foraging guild, habitat type, elevation, and geographic location are important variables to consider when assessing risk of Hg exposure among songbird species.

Fri-P1-5-2

Rediscovering the Flora of the New York Botanical Garden Forest, Using the Steere Herbarium

Matthew Pace (The New York Botanical Garden, Herbarium, Bronx, NY)

The New York Botanical Garden (the Garden) Forest is a heavily impacted, uncut, urban ecosystem. Since the founding of the Garden in 1891, the Forest flora has undergone massive change due to disruption, visitation, pollution, invasive species, and climate change, resulting in the extirpation of many native species. Using the collections of the Garden's William and Lynda Steere Herbarium in concert with late 19th and early 20th century floras of the Garden and New York City, the original flora of the Garden's Forest has been illuminated, yielding many surprises. Of the 387 native species originally listed as growing within the Garden Forest, 202 (53%) were not found during field work in 2009–2010. Ninety-seven of these species have been documented from historic herbarium specimens and are presumed to be extirpated; an additional 50 species originally listed as occurring within the Garden are represented by herbarium specimens from nearby areas of the Bronx. Of the six species listed in an 1889 Torrey Botanical Society field report describing the land that would become the Garden, four are extirpated. In Families such as the Ranunculaceae, Orchidaceae, Scrophulariaceae, Violaceae, and Fabaceae, nearly every native species has been extirpated, often replaced with an exotic counterpart. Families including Asteraceae, Poaceae, and Cyperaceae have each lost nearly half of their original species. During this time, the number of exotic species in the Garden has grown from 97 in 1889 (20.00% of the total flora), to 181 in 2011 (39.18% of the total flora). The total number of species (native and exotic) has decreased by 4.70% since 1889, while the number of native species as part of the total flora has decreased from 387 species in 1899 (79.79%) to 265 species in 2011 (57.36%).

Thu-A1-4-3

Why Call Pine Barrens Home? The Enigmatic Ecology of the Barrens Buckmoth (*Hemileuca maia*)

Dylan Parry (State University of New York, College of Environmental Science and Forestry, Syracuse, NY) and Brian Hoven (Finger Lakes Community College, Canandaigua, NY)

Barrens Buckmoth (Lepidoptera: Saturniidae) is an iconic inhabitant of pine barrens ecosystems throughout the Northeast. Although listed as a species of concern in several states, primarily because of threats to this unique habitat, it can be locally common. In the Albany Pine Bush Preserve, Barrens Buckmoth is most abundant where Scrub Oak (*Quercus ilicifolia*) and dwarf Chestnut Oaks (*Q. prinoides*), its only ovipositional hosts at this latitude, are dominant. However, habitat partitioning is evident, and it appears to favor areas where these shrubs are younger and not as dense. Over the past 6 years, we have tried to understand the factors underlying the fine-grained partitioning of suitable habitat and the effects that ongoing barrens restoration and management strategies may have on this species. Larval mortality inflicted by avian predation and insect parasitoids (both native and exotic) and pupal predation caused by invertebrate and vertebrate predators does not offer a satisfying explanation for the distribution of buck moth in the Pine Barrens Preserve. Short-term feeding bioassays to assess host-plant quality relative to successional stages and elevational gradients also did not provide a ready explanation, although this needs to be explored further. Based on the geographic range of this species, we propose an alternative hypothesis for its fine-scale distribution.

Fri-A1-7-3

Not Just Any Old Pile of Dirt: Evaluating the Use of Artificial Nesting Mounds for Turtles

James Paterson (Laurentian University, Sudbury, ON, Canada) , Brad Steinberg (Algonquin Provincial Park Whitney, ON, Canada), and Jacqueline Litzgus (Laurentian University, Sudbury, ON, Canada)

The viability of a turtle population is largely dependent on the survivorship of reproducing females. However, road mortality that occurs as females move to terrestrial nesting sites is decimating many freshwater turtle populations via direct mortality and lowered recruitment. One possible solution is to install artificial nesting mounds that may increase recruitment and decrease the risk of mortality for gravid females by enticing them to nest closer to aquatic habitats. Before the widespread implementation of this conservation tool, incubation conditions and nest success at artificial nesting mounds should be compared to natural nests. We installed four artificial nesting mounds in Algonquin Provincial Park, ON, Canada and transplanted clutches of Painted Turtle and Snapping Turtle eggs from natural nests to these mounds. Hatching success was significantly higher in nests transplanted to artificial mounds (81% ± 8.0) than in natural nests (51% ± 11) for Snapping Turtles, despite no differences in heat units, moisture, or canopy cover between treatment groups. Painted Turtle clutches had very high hatching success (85% ± 7.7), and both treatment groups experienced similar hatching success and incubation conditions. Hatchlings of both species emerging from artificial nesting mounds had similar body conditions and deformity rates compared to natural nests. High hatching success, low deformity rates, and healthy hatchlings emerging from artificial nesting mounds suggest promise for the use of these sites as conservation tools. However, low rates of mound use by females at our study site suggest that future studies should identify spatial attributes that could increase encounters with and attractiveness of artificial nesting mounds.

Fri-P1-3-3

Warm Ants: Ant Responses to Warming Across Northeastern US Forests

Shannon Pelini and Aaron Ellison (Harvard Forest, Harvard University, MA), Sarah Diamon and, Robert Dunn (NC State University, Raleigh, NC), Nicholas Gotelli (University of Vermont, Burlington, VT), and Nathan Sanders (University of Tennessee, Knoxville, TN)

Arthropods such as ants comprise a dominant fraction of forest ecosystems and provide and influence several ecosystem services. Their sensitivity to temperature suggests that ants will respond to rapid climate change. However, while important, little empirical work has examined how the abundance, composition, and behavior of ants and other arthropods may change under climate warming. Furthermore, experiments that examine responses of any taxa across large geographic areas are lacking. In order to understand how ants may respond to climate warming across large geographic areas, we performed controlled, common-garden experiments with and thermal tolerance assays for ants of eastern US forests. We collected ant colonies along a latitudinal gradient between Massachusetts and North Carolina and placed them in common conditions that resemble average temperatures near the northern (Harvard Forest, MA) reach of the species' geographic ranges, near the southern (Duke Forest, NC) reaches of the species' ranges, and locales farther south (Florida). We tracked brood production and mortality for three months and quantified the thermal tolerances of colonies used in the common-garden experiment to determine if ant abundance and assemblage composition will be affected differently across large geographic areas. Our findings suggest that ant responses to warming will vary by species and latitude. Overall, survival and brood production were reduced in the warmest temperature treatments, particularly for colonies collected in northern locales. At the warmest temperatures, *Aphaenogaster rudis* colonies had high mortality within two weeks, potentially due to over-exertion from increased foraging. However, the other species studied had relatively high survival at this stage of the experiment. The thermal tolerance of southern ants had a greater mean and variance than the ants collected from more northern locales. These results suggest that ants at northern locales may not benefit from warming and therefore may decline rather than shift northward under climate change, and the composition of local ant assemblages may be altered since responses differ by species. These alterations in distribution may lead to disproportionate changes in some ecosystem services, such as seed dispersal, provided by ants.

Thu-A1-1-3

Edaphic and Phytosociological Factors Influencing Moss Species Distributions in a Mixed Hardwood Forest

Warren Perdrizet (St. Lawrence University, Canton, NY)

In this study, we worked to elucidate edaphic and phytosociological factors controlling the distribution of 43 moss species found in an upland woodland. The soil chemistry, soil and plot physical measurements, tree importance values, and plot understory percent cover were analyzed for 171 quadrats (m^2) located along two 1-km transects in Glen Meal State Forest, Canton, NY. Moss species occurrence was recorded at each plot. Relationships between edaphic characteristics and species presence were evaluated with non-metric multidimensional scaling as well as ANOVAR. Calcium, magnesium, pH, light intensity, occurrence of Eastern Hemlock (*Tsuga canadensis*), occurrence of Red Oak (*Quercus rubra*), percent living cover, and percent litter cover were observed to exert the strongest influence on species assemblages.

Thu-A2-5-2

Nantucket Island American Burying Beetles: Will a Reintroduced Population Survive Without Our Help?

Andrew Mckenna-Foster (The Nantucket Maria Mitchell Association, Nantucket, MA) and **Lou Perrotti** (Roger Williams Park Zoo, Providence, RI)

The American Burying Beetle (ABB), *Nicrophorus americanus* (Silphidae), is a federally listed endangered beetle once common throughout the eastern half of the United States and now surviving in only a few isolated or undisturbed habitats in eight states. This species relies on carrion weighing between 80 and 180 grams on which to rear its young. It also shows some of the highest levels of parental care among insects. As part of an 18-year project, under the supervision of the US Fish and Wildlife Service, the Roger Williams Park Zoo (RWPZ) and the Nantucket Maria Mitchell Association (MMA), have worked to reintroduce the ABB to Nantucket Island, MA. This effort is the longest, on-going reintroduction program for this species range wide and probably one of the most intensive endangered insect recovery efforts in the United States. It is one of the few successful invertebrate reintroductions in the world. Since 1994, the RWPZ has developed a highly successful captive-rearing program that has provided over 2900 ABBs for the reintroduction effort. Reintroductions stopped in 2006 and intensive trapping, pairing, and carrion supplementing efforts over the last seven years have shown a steadily increasing total annual capture for new beetles, as well as dispersal from the original release site. The development of a successful reintroduction methodology is the result of assessing capture rates, over winter survival rates, physical beetle measurements, brood sizes, and dispersal patterns over several years. The trap rate for 2010 increased 39% over 2009 and based on this success, we will begin evaluating how dependent ABB reproduction is on carrion supplementing efforts. RWPZ and MMA will not be provisioning beetles with carrion in 2011, but will continue monitoring the population through trapping efforts. It will be the first test of whether this population can survive on its own with out human aid.

Fri-P2-1-3

Strengths and Weaknesses of Sutherland Pond vs. Fen Archive, Black Rock Forest, NY

Dorothy Peteet (Lamont Doherty Earth Observatory, Palisades, NY) and Terryanne Maenza-Gmelch (Barnard College, New York, NY)

Sutherland Fen, approximately the same size (4 ha) as adjacent Sutherland Pond, NY, is located in Black Rock Forest, southeastern NY. A previous study documented the pond paleovegetational history. We utilize a new pollen stratigraphy coupled with a high-resolution (2-cm) macrofossil record from the fen to improve our understanding of the local and regional signature of vegetation in both depositional environments. Both records indicate initial sedimentation about 15,000 years ago, and while the pond clays indicate a sparse pine-tundra pollen assemblage lacking macrofossils, tundra/spruce forest is represented in the fen clays (willow, spruce). The A-123 pollen zone features similar percentages of pine (up to 50%) and oak (up to 20%) in both environments, and a *Pinus banksiana* needle is present in the fen. However, spruce pollen % is higher in the fen where needles are abundant locally, while fir percentages are higher in the pond, reflecting the upland preference for the latter. The overlying colder Younger Dryas (A-4) zone contains both spruce and fir macrofossils in the fen. But as pine pollen percents decline in the pond, birch and alder pollen increases are pronounced there, reflecting regional disturbance. Lack of fen shallow aquatics suggests deeper water. The warming Holocene (B zone) is marked by significant increases in pine (up to 60% in pond, 40% in fen) and oak (up to 30%) concurrent with the demise of spruce and fir, and abundant White Pine macrofossils in the fen. Herbs and sedge percentages are extremely low, implying a drier climate. While the overlying oak-hemlock zone (C-1) records fen increases in oak pollen to 35%, oak achieves 70% in the pond, showing regional significance. Pitch Pine needles in the fen are characteristic of this zone, signifying a drier climate, while alder macrofossils also become abundant. The oak-hickory (C-2) zone records peak drought with similar pollen percentages to the previous zone, but the aquatics give way to emergent fen taxa such as *Chamaedaphne* and *Cephalanthus*. The uppermost oak-chestnut zone (C-1) records declines in pine percentages in the fen only, and pond increases in human-induced disturbance species (i.e., ragweed).

Thu-P2-1-2

An Ordination and Parsimony Analysis of Fish from Five Sites in the Saw Mill River, Westchester County, NY

Joseph W. Rachlin (Lehman College, Bronx, NY) and Barbara E. Warkentine (SUNY Maritime College, Bronx, NY)

Presence/absence data of 11 species of fish collected, during 2009 and 2010, from five stations along the Saw Mill River, Westchester County, NY were analyzed using several multivariate techniques and parsimony analysis. These techniques allow one to visualize community structure. The length of the river sampled extended from its northern source in Chappaqua (river mile 22.9) south to Executive Boulevard (river mile 3.97) in Yonkers, a distance of approximately 19 miles. The different multivariate analyses show that the stations aggregate in species space essentially following a north–south trending. Both hierarchical cluster analysis and parsimony analysis clearly aggregate the stations into three northern ones (Chappaqua, Hawthorne, and Rumbrook) and two southern ones (Lawrence Street and Executive Boulevard). Further, the parsimony analysis, which treats each collection site as if it were a taxon and the presence /absence of the fish as character states of those taxa, allows one to distinguish aspects of the fish distributions along the length of the river and the ichthyofaunal community structure present at each collecting site. Both Blacknose Dace (*Rhinichthys atratulus*) and White Sucker (*Catostomus commersonii*) are found at all sites along the stretch of the river sampled in this study. Rock Bass (*Ambloplites rupestris*) was found only at the Lawrence Street station (approx. river mile 6.6) in Ardsley, NY. Brown Trout (*Salmo trutta trutta*) was found only at the Hawthorne Cinema site (approx. river mile 16.3) in Hawthorne, NY, and the Fathead Minnow was found only at Rumbrook (approx. river mile 10.6) in Elmsford, NY. The three northern stations (Chappaqua, Hawthorne, and Rumbrook) are all united by the presence of the Creek Chub (*Semotilus atromaculatus*). The Longnose Dace (*Rhinichthys cateractae*) is only found in the southern reaches of the river from Rumbrook south to Lawrence Street, although a previous survey during the summer of 2003 had this species extending south to Yonkers. The Tessellated Darter (*Etheostoma olmstedi*) is found from Executive Boulevard in the south to Rumbrook in the north, and the Largemouth Bass (*Micropterus salmoides*) can be found at all sites along the freshwater reaches of this river.

Thu-A1-3-4

The Current Status of *Palaemon macrodactylus,* an Exotic Visitor to the NY City Estuarine System

Barbara E. Warkentine (SUNY Maritime College, Bronx, NY) and **Joseph W. Rachlin** (Lehman College, Bronx, NY)

In 2001, we initially collected and have since reported on the first occurrence of the oriental shrimp, *Palaemon macrodactylus*, from the eastern coast of North America. Following this, we continued to find members of this species in the waters of the Bronx and East Rivers. Females are routinely found holding eggs, which supports the fact that these organisms have maintained themselves as viable members of these local aquatic systems. In this area, the species has been found to have close to a 1:1 sex ratio. During the summer of 2010, we obtained specimens from the lower Hudson River and have come to understand from colleagues working in the waters off Connecticut that *P. macrodactylus* may be present there as well. Given that this species has been in the NY City area for at least a decade, an assessment of its population abundance with respect to native shrimp species is in order. During the summer of 2010, we sampled a 1000 m^2 area of the East River off of the SUNY Maritime College Campus (40°48'18.85"N, 73°47'41.36"W). In this survey, we collected a total of 419 shrimp. Of these, 301 were C*rangon septemspinosa*, 100 were *Palaemonetes vulgaris*, and 18 were *Palaemon macrodactylus*. Therefore, *P. macrodactylus* represented only 4.3% of the total shrimp population but 15.2% of the Palaemonidae shrimp. In contrast, during the 2001 collecting period, a total seasonal sample of 2999 Palaemonidae yielded 4.2% of the population being *P. macrodactylus*. Currently it appears that *P. macrodactylus*, while slightly increasing in population size with respect to members of the *Palaemonetes* spp., is non-invasive. However, continued monitoring is warranted.

Thu-P1-2-2

Forecasting the Effects of Climate Change on Genetic Diversity in a Boreal Forest Bird

Joel Ralston (University of Albany and New York State Museum, Albany, NY)

Many species of boreal forest birds breed in disjunct, high-elevation populations south of their contiguous range. As species ranges shift in response to climate change, these peripheral populations are expected to decrease in size or be extirpated. The level of genetic variation and number of private alleles held within these populations can be used as a measure of the potential risk of climate change on intraspecific genetic diversity. I use GIS-based models to project distributions of 15 boreal bird species onto future conditions under two climate change scenarios to predict how ranges will shift and whether local mountain populations will become extirpated. I use DNA data collected from wild populations of Blackpoll Warblers (*Dendroica striata*) to determine whether populations predicted to go extinct hold high levels of genetic variation or unique alleles. GIS models predict that all species ranges will shift northward, and most will increase in area. Mountain populations at the southern periphery of all species are predicted to decrease or be extirpated by 2080. Mountain populations of Blackpoll Warblers predicted to go extinct have high genetic diversity and hold unique alleles not found in other populations. However, these differences account for only a small percentage of the overall genetic variation in the species, and conservation action will likely not be needed, despite the potential for loss of local populations.

Fri-P2-2-2

The Road to Immortality: Exploring Resting Stages of Native and Non-Native Zooplankton in Seneca Lake, NY

Taylor Raufus and Meghan Brown (Hobart and William Smith Colleges)

In the Finger Lakes of New York, the non-native crustacean, *Cercopagis pengoi* (Fishhook Water Flea), a predatory plankton from the ponto-caspain region, is well established and has impacted the native crustacean zooplankton genera, including *Bosmina*, *Ceriodaphnia*, and *Daphnia*. Many freshwater zooplankton produce resting eggs as a means to disperse across an environment or to persist during harsh conditions (e.g., winter, intense predation) by switching from asexual to sexual reproduction. This study aimed to answer the following questions: (1) What is the timing and magnitude of resting-egg production of *Cercopagis*? (2) How does this phenology compare to three native taxa of zooplankton in Lake Seneca (*Bosmina*, *Ceriodaphnia*, and *Daphnia*)? And, (3) how does egg production compare to population density within the water column? In the field, two automated sediment traps were deployed at the north end of Seneca Lake (water column depth = 115 m) from May 2009 to November 2010. The traps were positioned on a single mooring with one near the thermocline (19 m below the surface) and one very near the lake bottom (112 m below the surface). In the lab, samples were sieved, and the portion greater than 50 microns was searched in entirety for the resting stages of crustacean zooplankton. We noted several interesting patterns. *Cercopagis* produced resting stages when their planktonic populations were declining in density. *Cercopagis* was the only species to present two pulses of egg production, one in summer and another in autumn, but the magnitude of its cumulative egg production was less than that of most the native herbivorous species. Egg density for all taxonomic groups was greater in the hypolimnion than in the epilimnion trap, indicating that eggs deposited on the sediment surface are concentrated from a broad area in the pelagic zone. Knowledge about the location, timing, and magnitude of resting-egg production provides valuable information to limit the spread of *Cercopagis* to other regional lakes, which is facilitated by the resting-egg stage.

Thu-A2-3-5

A Two-year Survey of the Fish Parasites of Otsego Lake, NY

Florian Reyda (SUNY College, Oneonta, NY)

Results of a two-year fish parasite survey of Otsego Lake, NY are presented. Otsego Lake, an oligotrophic finger lake, is part of the Mid-Atlantic drainage basin. It serves as the headwaters of the Susquehanna River, which drains into the Chesapeake Bay. Fish were collected by hook and line, seine, or by gill net during fall, winter, spring, and summer. Over five hundred individual fish representing 15 species were necropsied for helminths with the assistance of undergraduate students from the State University of New York College at Oneonta. Fish species examined included: *Micropterus salmoides* (Largemouth Bass), *Micropterus dolomieu* (Smallmouth Bass), *Ambloplites rupestris* (Rock Bass), *Lepomis macrochirus* (Bluegill), *Lepomis gibbosus* (Pumpkinseed), *Lepomis auritus* (Redbreast sunfish), *Perca flavescens* (Yellow Perch), *Sander vitreus* (Walleye), *Etheostoma olmstedi* (Tesselated Darter), *Esox niger* (Chain Pickerel), *Catostomus commersoni* (Common White Sucker), *Cyprinus carpio* (Common Carp), *Alosa pseudoharengus* (Alewife), *Rhinichthys atratulus* (Blacknose Dace), and *Salvelinus namaycush* (Lake Trout). Multiple species of arthropods, nematodes, monogeneans, digeneans, cestodes, and acanthocephalans were encountered in or on the fish examined. Among these, the acanthocephalan *Leptorhynchoides thecatus* was the most common in terms of prevalence, and it was the least host specific. Adult *L. thecatus* were encountered in nine of the 15 fish host species examined, and gravid *L. thecatus* were found in four fish host species. Fish helminth diversity (or lack thereof) is discussed with respect to other studies in similar North American lakes.

Thu-A1-3-5

Does Nitrogen Content of Blue Lupine Leaves Affect the Reproductive Success of the Dependent Karner Blue Butterfly?

Steven Rice and Rivka Fidel (Union College, Schenectady, NY)

Larvae of the federally endangered Karner Blue Butterfly (KBB; *Lycaeides melissa samuelis*) feed exclusively on leaves of the Blue Lupine (*Lupinus perennis*), and the growth environment of the host plant has been shown to affect KBB reproductive success. We hypothesized that management strategies that influence the growth environment and phenology of Blue Lupine leaves would alter leaf N content and that this difference would affect fecundity of KBB whose larvae fed on those leaves. Using a randomized block design ($n = 5$), six treatments were established in 10-m x 10-m plots in a restoration site in New Hampshire containing an herbaceous community with moderate to dense Blue Lupine cover. Treatments included one control, two burn (April 15 and May 1), two mow (May 1 and May 15), and one deadhead (May 15). Leaves were collected weekly from each plot and analyzed for leaf mass per area (LMA), N and C content. Leaves from each plot were also fed to larval KBB individuals and tracked through adult stage in a breeding facility. Leaves from the early burn treatment maintained significantly elevated concentrations of N through June 6 relative to the control. In addition, the early mow treatment had N concentrations intermediate between, but not significantly different from, the early burn treatment and the control. KBB whose larvae fed on foliage from the earlier burn and mow treatments had increased oviposition rates during the first 3 d following emergence and higher predicted rates of population growth. However, the eggs hatched and larvae fed following the period when leaf N content was elevated. Consequently, management strategies affect KBB larvae feeding and reproduction mediated through leaf nutritional quality. However, direct factors other than leaf N are likely responsible.

Fri-P2-1-2

Too Hot, Too Cold, or Just Right: Evaluation of a Common Turtle Conservation Technique, Nest-Caging

Julia Riley and Jacqueline D. Litzgus (Laurentian University, Sudbury, ON, Canada)

Conservation biology's primary goal is to mitigate anthropogenic impacts on natural ecosystems. It follows that conservation techniques themselves should minimize their impacts on target species. A commonly used conservation technique in turtle conservation is nest-caging, which is implemented to protect turtle nests from depredation. Nest-predator abundance has increased due to human influence. Anthropogenic food resources, such as crops and garbage, increase predator numbers which pushes nest depredation to unnatural levels. Nest-caging counteracts this effect of human presence by enhancing nest success, and increasing potential recruitment of hatchlings. Despite documented benefits, shortcomings have also been identified. Entrapment in cage wire can cause death of young turtles, and anecdotal evidence suggests some nest-caging methods may reduce the incubation temperature when compared to non-caged nests. The first goal of this study is to determine whether two commonly used nest-caging methods have different effects on the environment of the nest chamber. The second goal is to determine if nest-caging, and the resulting incubation environment, has an effect on hatching success and hatchling morphology. This research is being conducted in Algonquin Provincial Park, ON, where Painted Turtle (*Chrysemys picta*, $n = 31$) and Snapping Turtle (*Chelydra serpentina*, $n = 36$) nests were assigned to one of two treatment groups or a control: above- or below-ground wire nest cages or no nest cage, respectively. A data logger was placed in each nest to record incubation temperature. Once hatching occurred, incubation duration, hatching success, frequency of deformities, hatchling body condition, and locomotor performance were quantified. Preliminary analyses indicate that incubation temperature, variation in incubation temperature, and hatching success did not differ between nest-caging treatments and the control. It is crucial for effective management, protection, and recovery of at-risk species to analyze conservation methods to comprehend their long-term population-level implications.

Fri-P1-3-2

Between the Mountains and the Sea: An Exploration of the Champlain Sea and Paleoindian Land Use in the Champlain Basin

Francis Robinson (University at Albany-SUNY, NY)

Recent research has demonstrated that the Champlain Sea, an inland arm of the North Atlantic Ocean, was coeval with most or all of the Paleoindian period in the far Northeast (ca. 13,000-9500 cal yr BP). As part of a larger program of research, the author analyzed Paleoindian occupations through time relative to Champlain Sea margins in the eastern Champlain Basin. The results of these findings and what they suggest about traditional and emerging settlement and subsistence models will be briefly discussed.

Thu-P1-1-4

Biodiversity Distributions in NY State Parks

George Robinson (State University of New York at Albany, NY)

The concept of stewardship responsibility (SR) rankings, in which conservation portfolios are evaluated on the basis of species distributions, has been proposed as a tool for conservation planning. I applied a modified version of this tool to assess biodiversity distributions in NY State Parks, using records collected by the NY Natural Heritage Program. Comprehensive surveys were conducted among 150 parks over a decade, leading to a database of 1074 records for 312 rare species and 98 significant ecological communities. I applied SR ranks in a nested design—agency-wide, among regions within the agency, and across the state (comparisons with other management entities). Subsets of parks and regions ranked more highly than others, but most parks contain at least one rare species and significant ecological community, indicating a broad distribution of important biological resources. Statewide, the agency maintains a very high SR rank profile in proportion to its land area (<1% of the state), with 43% of all NY rare species found in at least one state park, and 30 species fully or primarily dependent on the agency for their protection. Taking this information a step further, I developed a set of park-by-park Natural Heritage Biodiversity Profiles, which emphasize unique contributions of each park in ways designed to inform the general public. Although many state and provincial park systems emphasize their recreational features, probably all make critical contributions to biological conservation, and tools like these can be used to illustrate and enhance those contributions.

Fri-P1-7-1

A Late Occurrence of *Cervalces scotti* Pollen Stratigraphy and AMS Dating

Guy Robinson (Fordham University, New York, NY), Alexander Yorke (Oberlin College, Oberlin Ohio), Monique Wilson (South Bronx Preparatory High School, Bronx, New York), and Mary Egan (Montclair State University, Montclair, NJ)

Bones of an extinct Stag-moose (*Cervalces scotti*) were discovered protruding from the side of a drainage ditch beside a fallow field near Goshen NY in October 2007. Although the largely complete skeleton had been removed by this time, investigation of the site in May 2008 showed three principal sedimentary units: a glacial gray clay, overlaid by the bone-bearing unit of peaty clay with graminoid fiber and snail shells, and a fine black peat forming the uppermost unit. Samples were taken at 5-cm intervals from the open section and then by bucket auger to a depth of 260 cm, where resistance prevented further sampling. Loss on ignition shows that organic accumulation is low for a long period following glacial retreat, but begins to rise sharply in the bone-bearing peaty clay that formed in the latest Pleistocene. Carbonates reach a maximum of 25% in this unit, but decline upsection at the black peat boundary. Pollen analysis shows a herb zone in the gray clay, dominated by sedges, with some spruce and pine. In the overlying peaty clay layer, spruce, pine, and oak are the principal pollen types. The Younger Dryas climatic reversal at 11,000 radiocarbon years before present (14CyrBP) forms the upper part of this unit, indicated by elevated levels of birch and alder. Spruce declines rapidly by the black peat boundary and is replaced by white pine, hemlock, and oak, indicating the warmer climate of the earliest Holocene; organic carbon content also rises steadily. Sediment removed from the frontal bone sinuses of the Stag-moose had a pollen spectrum reflecting an environment of the late Pleistocene, and suggests the animal lived at the beginning of the Younger Dryas. Results from AMS analysis of a rib fragment have confirmed this assessment, yielding a date of 11,040 ± 110 14CyrBP.

Thu-P1-1-1

Immigration and Contemporary Dispersal of the Peat Moss, *Sphagnum pylaesii*, in the Adirondack Mountains

Sean Robinson (SUNY-Albany, NY), Norton Miller (New York State Museum, Albany, NY), and Steven Rice (Union College, Schenectady, NY)

In bryophytes, spores are considered to be the primary agents of long-distance dispersal, whereas asexual propagules, such as shoot fragments, are thought to have shorter dispersal distances. However, many bryophytes rarely or never produce spores, especially in environmentally harsh habitats such as alpine summits, but very little has been done to assess fragment dispersal in such ecosystems. *Sphagnum pylaesii* reproduces primarily by fragmentation, yet it maintains large populations on several of the Adirondack alpine summits. The importance of vegetative fragments in the dispersal of this species was evaluated in parallel comparative studies of *S. tenellum* using direct and indirect methods. *Sphagnum tenellum* occupies similar habitats but differs in sexual condition and amount of spore production. Samples of both species were collected from nine alpine summits in the Adirondack High Peaks. To determine dispersal ability experimentally on alpine summits, branch fragments were coated with ultraviolet fluorescent dye and released from specific locations on two alpine summits. Distances traveled by fragments were measured after being located during evening surveys using ultraviolet LED light sources 24 h after initial release. A frequency distribution of fragment dispersal distances fitted a power function showing a high number of fragments near the point of origin followed by a rapid decline and a long tail. Fragments dispersed a maximum distance of 54 m, the longest distance measured for wind dispersed bryophyte fragments. Dispersal ability of *S. pylaesii* fragments was assessed further by releasing fragments in a wind tunnel at varying wind speeds. These experiments support the field experiments, showing maximum fragment dispersal at wind speeds below mean wind speeds measured on the summit of Mt. Marcy. Population genetic structure was inferred from variation in 17 microsatellite loci, and dispersal from gene flow estimates. Molecular data show high differentiation and low gene flow between populations of *S. pylaesii* throughout its North American distribution. However, comparisons between Adirondack summits show a lack of differentiation with high gene flow. These results reveal that gametophytic fragments play an important role in the dispersal of *S. pylaesii* on and between alpine summits.

Thu-A2-5-1

Deer Management in State Parks: The Letchworth Model

Mark Rogers (New York State Office of Parks Recreation and Historic Preservation, Albany, NY and, Meg Janis and Roland Beck (New York State Office of Parks Recreation and Historic Preservation, Castile, NY)

White-tailed Deer (*Odocoileus virginianus*) are a keystone species capable of having significant impacts of forest vegetation that can cascade through a whole forest ecosystem. At high population densities, deer have been shown to change forest structure and composition, decrease biodiversity, and increase invasive species. The preferred management method for controlling negative impacts due to deer overabundance is to reduce the deer density through a hunting program, which can be controversial on state park lands. At Letchworth State Park, located in western New York, high deer densities have led to significant deer impacts in the southern portion of the park that was closed to hunting since the 1970's. Using permanent vegetation monitoring plots and deer exclosures, State Parks has been able to develop a management program to reduce deer densities through the establishment of an archery season in the southern portion of Letchworth.

Thu-A2-4-4

The Influence of Larval Amphibians on Mosquitoes in Temporary Forest Ponds: Can Protecting Wetland Biodiversity Help to Minimize Human Disease Risk?

M.J. Rubbo (Teatown Lake Reservation, NY), Jessie Lanterman (Hiram College , NY), Richard C. Falco (Arthropod-Borne Disease Program, NY State Department of Health), and Thomas J. Daniels, (Fordham Univeristy)

Wetlands provide a variety of services beneficial to society; however, their use as breeding habitat for mosquitoes has caused concern that these ecosystems pose a risk to human health. As mosquito-borne diseases are undergoing a resurgence throughout the world, there is a need to better understand the factors that naturally limit mosquito production in wetlands. Temporary forest ponds offer a model system in which to study mosquito production in wetlands, as they provide ideal breeding habitat for many mosquito species and contain a number of potential regulatory factors. In the northeastern US, Spotted Salamanders (*Ambystoma maculatum*) and Wood Frogs (*Lithobates sylvatica*) are the top consumers in these ponds and may affect mosquito growth and survival through predation (larval salamanders) and competition (Wood Frog tadpoles). To examine the relationship between larval mosquitoes and larval amphibians in temporary forest ponds, we conducted surveys of natural ponds and found that larval mosquito densities were lower in ponds with higher densities of larval salamanders. We then conducted experiments on mosquito oviposition and larval mosquito survival, which found that mosquitoes avoid ovipositing in habitats containing larval salamanders and tadpoles and had extremely low larval survival in the presence of larval salamanders. These data indicate that predation by larval salamanders can influence the breeding distribution of mosquitoes by imposing selective pressure on ovipositing adults. Therefore, developing conservation measures to protect amphibian breeding assemblages in temporary ponds may contribute to controlling mosquito production in wetlands, potentially minimizing disease risk to humans.

Fri-A2-3-1

Status and Conservation of an Imperiled Tiger Beetle Fauna in New York State

Matthew Schlesinger (New York Natural Heritage Program, Albany, NY), and Paul Novak (New York State Department of Environmental Conservation, Schenectady, NY)

New York has 22 documented species of tiger beetles (Coleoptera: Cicindelidae). Over half of these species are considered rare, at risk, or potentially extirpated from the state. These rare species specialize on three sandy habitat types under threat from human disturbance: beaches, pine barrens, and riparian cobble bars. In 2005, we began a status assessment of nine of New York's rarest tiger beetles, examining museum records, searching the literature, and conducting over 130 field surveys of historical and new locations. Significant findings included 1) no detections of four of the nine taxa, 2) no vehicle-free beach habitat suitable for reintroducing *Cicindela dorsalis dorsalis*, 3) *C. hirticollis* at only 4 of 30 historical locations, 4) *C. patruela patruela* at only one site statewide, and 5) *C. ancocisconensis* at only 3 of 28 de novo survey sites. Additional species that might be declining deserve our attention, as do some threats to tiger beetle habitats, such as lack of beach wilderness, fire suppression in pine barrens, and river damming. Rarity in tiger beetles is a result of varying ecologies, which suggest different conservation strategies. Future inventory and documentation of tiger beetle occurrences need to take into account the metapopulation structure and imperfect detectability of these rare insects.

Fri-P2-1-4

Vulnerability of At-risk Species to Climate Change in New York

Matthew Schlesinger, Jeffrey Corser, Kelly Perkins, and Erin White (New York Natural Heritage Program, Albany, NY)

Vulnerability assessments are rapidly becoming an essential tool in climate change adaptation planning. As states revise their Wildlife Action Plans, the need to integrate climate change considerations drives the adoption of vulnerability assessments as critical components. To help meet this need for New York, we calculated the relative vulnerability of 100 of New York's species of greatest conservation need using NatureServe's Climate Change Vulnerability Index (CCVI). We aimed to select species spanning taxonomic groups that we thought might be susceptible to climate change, would be good indicators of vulnerability of species in similar habitats, and would have sufficient data to allow running the index. The CCVI treats climate-change vulnerability as resulting from two factors: exposure and sensitivity. Direct exposure to climate change is assessed using predictions of future changes in temperature and moisture availability based on averages of global circulation models. Indirect exposure considers predicted sea-level rise, existence of barriers to movement, and effects of alternative energy development. Sensitivity is assessed using a variety of factors, including dispersal capability, known sensitivity to changes in temperature and moisture regime, reliance on interspecific interactions, genetic diversity, and expected phenological shifts with changing climate. Finally, the CCVI incorporates documented and modeled effects on the target species. The output is one of five categories of vulnerability: extremely vulnerable, highly vulnerable, moderately vulnerable, not vulnerable/presumed stable, or not vulnerable/increase likely. The CCVI also provides a confidence estimate for the information provided. In New York, SGCN ranged from highly to extremely vulnerable (e.g., Frosted Elfin, Brook Floater, Tiger Salamander) to presumed stable (e.g., Timber Rattlesnake, Russet-tipped Clubtail, Spotted Turtle). Comparisons to results in other northeastern states, where available, are provided.

Fri-A2-5-3

Aspects of the Biology of Oriental Weatherfish (*Misgurnus anguillicaudaus*) in the Hudson Valley, New York

Robert E. Schmidt and Alec J. Schmidt (Bard College at Simon's Rock, MA)

Data were collected on the distribution, sex, size, fecundity, and food habits from a newly discovered population of Oriental Weatherfish (*Misgurnus anguillicaudatus*) in the Hudson Valley, NY. Oriental Weatherfish are distributed throughout the Dwaar Kill in Orange and Ulster counties and at least seven km of the Wallkill River. Males are smaller than females and possibly have shorter life spans. Mature males have pronounced dorsolateral ridges on at least the posterior third of the body. Females that have spawned have abrasions dorsal and anterior to the vent. Females are batch spawners, with up to 17,000 eggs ready to spawn at any one time. Oriental Weatherfish are generalist aquatic macroinvertebrate feeders. They are habitat specialists found in soft substrates at stream margins. This species does not seem to be affecting other vertebrates where currently found, but they could be serious competitors in tidal freshwater marshes.

Thu-A1-3-1

The Invasive Chinese Mitten Crab in Hudson River Tributaries

Robert E. Schmidt and Alec J. Schmidt (Bard College at Simon's Rock, MA)

The Chinese Mitten Crab (*Eriocheir sinensis*) was first reported from a Hudson River tributary in 2008. Mitten crabs (primarily exuviae) collected from the Saw Kill in Dutchess County indicated that individuals were one year old. Subsequent collections in three tributaries demonstrated that mitten crabs grew to reproductive size in 2009 and 2010. The catch per unit effort of mitten crab exuviae and live individuals decreased by an order of magnitude from 2008 through 2010. This change is due partially to reduced recruitment and partially from predation.

Thu-P1-2-3

Introduction to "The Natural History of The New York Botanical Garden" Project

Jessica Schuler and Rob Naczi (The New York Botanical Garden, Bronx, NY)

The Forest at The New York Botanical Garden is the largest remnant of old-growth forest in New York City. The Forest is a unique resource that provides abundant opportunities to teach Garden visitors about native ecosystems, showcase active research, and implement best practices in natural resource management and conservation. Since the Garden's establishment on its current site in 1895, Garden staff, visiting experts, and enthusiastic members of the public have studied the history, plant life, wildlife, geology, climate, soils, and ecology of the Forest. These past studies had been conducted separately; until now, no comprehensive or integrated project on the Garden's natural history has been attempted. This project, "The Natural History of The New York Botanical Garden" involves a multi-institutional team of researchers studying the physical setting, biota, ecology, management, and ethnobotany of the Forest. The goal of the project is to survey, document, assemble, and disseminate all this information, and to publish it in a website and field guide. Results generated from the project will be incorporated into curriculum and interpretation development for the dynamic Forest Program that is being developed. This Program will teach the importance of nature and of this remnant of the original forest nearly consumed by one of the world's great cities.

Thu-A1-4-1

Tests for Call Restoration in the Gray Treefrog, *Hyla versicolor*

Joshua Schwartz (Pace University, Pleasantville, NY)

A high level of background noise is not only a feature of many natural environments, but also a growing problem due to a variety of human activities. It is therefore especially important that we understand how animals that communicate using sound cope with noise. Phonemic restoration, a form of temporal induction, occurs when the human brain compensates for masked or missing portions of speech by filling in obscured or non-existent sounds. We tested for temporal induction and related abilities in females of the Gray Treefrog, *Hyla versicolor*. Pulse number (call duration) is used by females for assessment of males. Accordingly, an ability to "restore" or interpolate between masked or otherwise sonically degraded portions of calls could help females during mate choice in noisy choruses or when exposed to bouts of anthropogenic noise. In phonotaxis experiments, we employed unmodified calls and those that had centrally placed gaps, regions overlapped by portions of other calls or filtered noise, or regions replaced with filtered noise. When offered call alternatives with equivalent numbers of clear pulses, we found that females discriminated against calls with gaps two or more times greater than the natural 25-ms interpulse interval. When gaps were replaced with zones of call overlap or noise (so, again the call durations of the alternatives were unequal), females discriminated either in favor (overlap) of the modified stimuli or failed to discriminate (noise). However, when the unmodified and modified stimuli were the same duration, females discriminated against the latter. Pulses formed from noise bursts were attractive, but less so than normal pulses. Our results therefore do not indicate that females of the Gray Treefrog employ a form of temporal induction that is fully restorative. However, the data indicate that acoustically anomalous sections of calls can retain attractive potential provided acoustic energy and pulses are present.

Fri-A2-3-2

Plant Macrofossil Evidence of Paleoclimate Events in No Bottom Pond, Nantucket

Kathrin Sears (Department of Earth and Environmental Science, Columbia University, New York, NY)

The singular study of modern ecosystems and climate systems is not sufficient for a full understanding of environmental shifts through time. The paleoecological record stored in the sediments of ponds, lakes, bogs, and marshes can be used to understand historical changes through the analysis of biological remains and sediment characteristics. Data from Nantucket is useful because of the magnified effects of climate events on island microclimate systems, making the impact on vegetation more significant. A previous paleoenvironmental study from the island of Nantucket, by Peter Dunwiddie, utilized pollen analysis to assess vegetational shifts through time. This study shows a new macrofossil and loss-on-ignition analysis for two pond cores from No Bottom Pond, Nantucket and the comparison to the previous pollen study. There are several sand layers in the core, seen at 2.71 m, 2.39 m, and 2.17 m, indicating a drier period. Pitch pine needles appear in intervals 2.83 m to 2.65 m and 2.55 m to 2.35 m, indicating periods of increased humidity and decreased temperatures. This record will be useful for the understanding and analysis of past, present, and future climate changes.

Thu-P2-1-1

Cutting the Fat: Migratory Songbirds also Gain Substantial Lean Body Mass during Stopover Refueling in New York City Parks

Chad Seewagen (Department of Biology, University of Western Ontario, London, ON, Canada; Department of Ornithology, Wildlife Conservation Society; Natural Resources Division, AKRF, Inc.) and Christophe Guglielmo (Department of Biology, University of Western Ontario, London, ON, Canada)

Fat is the primary fuel used by birds during migration, and it was at one time believed that fat was the only tissue to change in mass. More recently it has become clear that lean body mass is not homeostatic, but instead fluctuates considerably prior to and throughout migration. Most studies of lean mass dynamics in free-living birds, however, have focused on long-distance migrant shorebirds or Old World passerines at major geographical barriers where they are challenged to make the longest non-stop flight of their migration. Much less is known about lean mass changes in Nearctic-Neotropical passerine species, or in passerines when stopover habitat is more continuously available and shorter flights are possible. The role of lean mass in stopover refueling has also yet to be examined in an urban system. We examined lean-mass variation in New World passerines in an area where the distribution of stopover habitat does not require flights to exceed more than a few hours and most migrants stop flying well before fat stores near exhaustion. We used either quantitative magnetic resonance (QMR) analysis or a morphometric model to measure or estimate, respectively, the fat and lean body mass of migrants during stopovers in New York City. With these data, we examined (1) variance in total body mass explained by lean body mass, (2) hourly rates of fat and lean body mass change in single-capture birds, and (3) net changes in fat and lean mass in recaptured birds. Lean mass contributed to 50% of the variation in total body mass among White-throated Sparrows and Hermit Thrushes. Lean mass of refueling Gray Catbirds and White-throated Sparrows increased 1.123 and 0.320 g h^{-1}, respectively. Lean mass of Ovenbirds accounted for an estimated 33–40% of hourly gains in total body mass. On average, 35% of the total mass gained among recaptured birds was lean mass. Substantial changes in passerine lean mass are not limited to times when birds are forced to make long, non-stop flights across barriers. Protein usage during migration is common across broad taxonomic groups, migration systems, and migration strategies.

Thu-P2-5-6

Evidence for Zooplankton Recovery in Chemically Recovering Acidified, Adirondack Mountain Lakes

William Shaw, James Sutherland, Charles Boylen ,and Sandra Nierzwicki-Bauer (Darrin Freshwater Institute, Troy, NY), and Bahram Momen (University of Maryland)

Thirty lakes with pH ranging from 4.5–7.1 were studied during 1994–2006 to generate a data base to evaluate chemical and biotic recovery expected with implementation of the Clear Air Act Amendments of 1990. We used regression analysis of pH and zooplankton community variables over time in each lake to identify trends occurring during the 13-year study period. Significant improvements in pH were found in 19 lakes. Biotic recovery was assessed primarily by improvements in species richness and secondarily in species diversity and community evenness. Zooplankton recovery was evaluated by groups in terms of initial pH of lakes at the onset, acidic (pH < 5.7) or circumneutral (pH > 5.9), and by lake hydrotype, according to Driscoll and Newton, to be defined. Evidence for recovery in crustaceans was found in 12 lakes and for rotifers in 13 lakes, 8 of which were for species richness in both groups. All but two of the improvements for rotifers and crustaceans were in lakes with significant improvements in pH. The instances of recovery of crustaceans were relatively weak ($r^2 = 0.28–0.46$) and were largely restricted to the circumneutral lakes, whereas those for the rotifers were stronger ($r^2 = 0.59–0.71$) and generally were restricted to the acidic lake group. Evidence for recovery was greatest in the medium-till drainage lakes and mounded-seepage lakes regardless of DOC, was moderate in the low-DOC, thin-till drainage lakes, and absent in those with high DOC. The meaning of these results and the significance of the hydrotypes will be presented. It appears that rotifer recovery may be more intense and may precede crustacean recovery as formerly acidic lakes return to circumneutral conditions. Overall, the evidence for both chemical and biotic recovery from acidification in the study lakes was limited. Approximately one third of the study lakes did not show any improvement in pH, and only about one half showed any evidence of biotic recovery.

Thu-P2-3-2

Mapping the Status of Forest Regeneration in New York State

Rebecca Shirer and Chris Zimmerman (The Nature Conservancy,Albany, NY)

Forests depend on adequate regeneration of tree species to be healthy and sustainable. Regeneration can be limited by many factors including deer browse, competition with other species, and soil conditions. This study of regeneration in New York, using data and methods from the US Forest Service, found that regeneration was adequate in 68% of plots for canopy species and 43% of plots for timber species. Canopy regeneration was poorest in the southeast portion of the state, including Long Island, the southern Hudson Valley, and southern Catskill Mountains. Regeneration in the Adirondack Mountains was dominated by species with low timber value such as American Beech and Balsam Fir. These results suggest that insufficient regeneration is a problem for forests in many areas and is of particular economic concern for timber species in over half of the state. In order to maintain our forests in the face of increasing threats including climate change, invasive species, and air pollution, we should improve our understanding of the causes of limited regeneration. Specifically, we recommend intensification of USDA Forest Inventory and Analysis (FIA) monitoring plots, the gathering of additional regeneration data on FIA plots, and better incorporation of forest health measures when setting deer management objectives.

Fri-A2-4-3

Monitoring and Restoring Bog Turtle Metapopulations in NY

Kevin Shoemaker and James Gibbs (SUNY College of Environmental Science and Forestry, Syracuse, NY)

The Bog Turtle (*Glyptemys muhlenbergii*) is widely recognized as one of the most endangered freshwater turtles in North America. Extant population units are typically very small (estimated abundance < 50 individuals), suggesting that metapopulations may be necessary for long-term persistence and maintenance of evolutionary potential. However, population and metapopulation dynamics for Bog Turtles remains poorly understood. Our objectives were to (1) estimate demographic parameters for Bog Turtles using a long-term mark-recapture dataset, (2) project Bog Turtle abundance and occupancy dynamics over a wide range of metapopulation scenarios, and (3) contrast relative extirpation risk under alternative management regimes. Our results suggest that very small populations of long-lived reptiles such as Bog Turtles may be remarkably stable over time periods of 100 years (ca. 4 Bog Turtle generations) or more. Molecular data indicate high rates of gene flow at the study site (a complex with mean distance ca. 1 km between populations), suggesting that similar complexes should be conserved as single metapopulations. Regional simulation models indicate that (1) complexes of Bog Turtle populations comprising >4 inter-connected (annual dispersal rate ca. 1% or greater) populations of >20 individuals may persist for >100 years if core habitat is conserved, and that (2) a 10-year monitoring cycle is probably sufficient to identify imperiled Bog Turtle populations and mount a timely management response. Translocation of individuals from secure source populations to imperiled populations may enhance Bog Turtle recovery when paired with habitat improvement efforts. Regional conservation planning should focus on establishing and maintaining loosely connected networks of population complexes to mimic historical connectivity patterns and help ensure the long-term persistence of this diminutive yet charismatic species.

Fri-P2-3-1

Species and Climate Change at Mohonk, Ulster County, NY

Shanan Smiley (Mohonk Preserve, Daniel Smiley Research Center, New Paltz, NY)

Mohonk is a unique area in the northern Shawangunk Mountains of New York State where manual weather records have been taken daily since 1896. The National Weather Service's Cooperative Weather Station at Mohonk Lake has changed very little in 115 years. The weather box has never changed location, the original brass rain gauge continues its service, and the surrounding area has changed very little due to construction of new buildings or roads. There has been minimal change to instrumentation or methodology over the years. With this amount of continuity through its long service, this weather record is well-suited to investigate true changes to the local climate. The longevity of these data sets reveal how temperature, precipitation, and even the timing of the seasons has changed over the years. In addition to the weather record, species phenology records have been recorded in the same location since 1925. As the climate changes, so do the species. Coupling the weather data with dates of first bloom, and spring arrival dates of migratory birds illustrates how some species are reacting to the change in climate. The earliest spring ephemeral wildflowers and the earliest arriving birds have experienced the most amount of change. Several species once known to have a more southern range, have moved north. A few of these have not only extended their range, but have started breeding successfully, and a few have become year-round residents that no longer migrate south in the winter months.

Thu-P1-4-3

Rediscovery of Two Federally Listed Rare Plant Species in New York

Kimberly Smith and Stephen M. Young (New York Natural Heritage Program, Albany, NY)

Many of New York's rare plant species are currently considered historical (not seen in over 30 years) or extirpated from the state. However, recent increased survey efforts, combined with new techniques and improved technology, have yielded positive results. In 2010, two federally listed rare plant species were rediscovered in New York. A small population of Small Whorled Pogonia (I*sotria medeoloides*), a delicate, non-showy orchid, was found in an Appalachian oak-hickory forest in Orange County. In Stueben County, a small population of Northeastern Bulrush (*Scirpus ancistrochaetus*) was discovered in a small, isolated vernal wetland. Prior to these discoveries, Small Whorled Pogonia was last observed in New York in 1975 and was classified as historical, and Northeastern Bulrush was last seen in 1900 and thought to be extirpated from the state. We are currently analyzing habitat parameters such as soils, geology, and vegetation community type from known locations rangewide, and using GIS technology to help predict other locations where these species may occur. These efforts to characterize the habitats of these rare species will help direct future survey efforts and document their true distributions in New York.

Thu-P1-7-2

Long-term Shifts in the Timing of Autumn Migration by Songbirds in Southern New England

Susan Smith (Rochester Institute of Technology, Rochester NY) and Peter Paton (University of Rhode Island Kingston, RI)

Many species of migratory birds are initiating spring migration sooner and arriving earlier on their breeding grounds in response to climate change. However, much less is understood about the phenology of autumn migration among North American migratory birds and whether temporal changes in autumn passage dates are related to local temperature patterns. We investigated long-term trends in mean autumn capture dates of 19 species of migratory passerines including 11 long-distance migrants and 8 short-distance migrants. Birds were captured between 1960 and 2007 at a banding station in southern Rhode Island. We detected annual trends in the highest-ranked models, with mean capture dates of seven species significantly delayed by an average of 3.0 days per decade. We found no evidence of long-term shifts in autumn migration timing for seven species, and mean capture dates of five species exhibited non-linear annual trends. Mean autumn temperature was an important factor in explaining annual trends for eight species. Changes in annual capture rates for some species may have an equal or greater role than year or temperature in explaining long-term trends in autumn migration timing. Our analysis suggests that some migratory bird species are now departing the region later than in the 1960s. Important differences among species and regions are likely to influence species-specific responses to changes in climate patterns.

Thu-P2-5-3

Habitat analysis for New York State Bird Species of Greatest Conservation Need in the Northern Shawangunk Mountains

Elizabeth Spencer and Frederick Sechler (New York Natural Heritage Program, Albany, NY)

Ecologically based natural community management focused on managing for assemblages or groups of species requires information on the specific characteristics of habitats selected for breeding. Yet for many of New York's species of greatest conservation need (SGCN) this information is lacking. We surveyed a total of 41 plots, at Mohonk Preserve and Minnewaska State Park, selected via stratified sampling to capture both territorial and non-territorial areas of four bird SGCN (Canada Warbler, Black-throated Blue Warbler, Worm-eating Warbler, and Wood Thrush) in New York. We gathered data on vegetation composition, habitat structure, and site topography and used classification tree analysis implemented via Random Forests to investigate territorial habitat selection in these species. The SGCN were modeled collectively to test whether one model could adequately predict habitat preferences of these species as a single group. This aggregate predictive model performed poorly with an overall out-of-the bag prediction error rate of 53.7%. The individual species models performed better, but with prediction error rates varying widely from 9.8–41.5%. While variables differed substantially in their importance among the species models, two variables, short shrub (0.5–<2 m) cover class and the maximum height of the herbaceous layer, were important in all of the individual species models. Our results suggest that the four species' individual territorial habitats can be successfully predicted, and these predictions can be used as one of a suite of tools to inform specific management actions and decision making.

Thu-P2-4-4

Plants and People of New England: Our Contemporary Reliance on Traditional Knowledge

Hazel Stark and Nishanta Rajakaruna (College of the Atlantic, Bar Harbor, ME)

Connecting people to their natural world by helping them recognize plants as important unique species within our ecosystem is an essential aspect of conservation. However, the general public is unlikely to recognize the importance of plants by solely identifying species. While understanding species composition and biodiversity is vital for a variety of ecological purposes, the general public is more likely to understand the value of the plants in their environment by understanding the relationships between plants and humans. My research focus has been collecting plant-use stories and experiences from people—including contemporary herbalists, educators, and native people—rather than texts in order to create a book that contains current New England knowledge more likely to influence the general public. This book will serve as a companion guide to the recent publication, *Plants of Acadia National Park*, which does not include applied plant knowledge. Over half of the known plant species and plant communities that are found in Maine exist within Acadia National Park. The floristic diversity of this region has been well studied and points to the importance of conserving this region, yet the plant-people connections have not been incorporated into the rationale towards conservation. This guide will enable people not only to effectively identify the plants of the region and realize the diversity of plants in eastern Maine, but also to recognize the importance of local plants and to further act as stewards and conservationists of our ephemeral resources. Humans have always depended on plants for existence; preserving traditional ecological knowledge not only encourages conservation, but also insures future survival by learning from the past. Ethnobotanical information is vital for expanding our views of sustainability and increasing our resilience to climate change on both local and global levels.

Thu-A1-7-1

Movements and Body Temperature of the Eastern Black Ratsnake Utilizing Forest and Roadside Habitat

Anne Stengle (University of Massachusetts, Amherst, MA) and Tom Tyning (Berkshire Community College, Pittsfield, MA)

The Eastern Black Ratsnake (*Pantherophis alleghaniensis*) is widespread across the eastern United States and southeastern Canada. In New England, it reaches the northern edge of its geographic range in Massachusetts where the Black Ratsnake is listed as endangered, and this study was initiated as part of a rare species survey required by state regulation in response to a proposed roadway development project. Using radiotelemetry, we monitored habitat and home-range use of twelve adult ratsnakes in Western Massachusetts from September 2007 to May 2009. The study site consists of forested ridges and valleys surrounded completely by highways, residential areas, and a college campus. Use of forest openings may be critical to thermoregulation of Black Ratsnakes, especially at the northern edge of their geographic range. Recent innovations in technology provide new opportunities to examine the thermal ecology of free-ranging snakes. Beginning in June 2008, we monitored the body temperature of eight ratsnakes using implanted temperature loggers. For much of the summer, three snakes used roadside edge habitat, while five remained within closed-canopy forests. During the month of August, roadside snakes had both higher mean daily body temperatures (23.4 ± 0.5 ºC) and a narrower range of daily body temperatures (5.4 ± 0.3 ºC) than those using forest habitats (21.9 ± 0.5 and 7.0 ± 0.4 ºC, respectively). These results suggest there may be a thermoregulatory benefit for snakes using canopy openings associated with roadways, though it is possible that prey availability or other factors may attract snakes to roadsides. No automobile mortality of snakes was observed during the study, but this remains a potential risk. Ecological variation in thermal ecology has implications that may complicate the conservation of snake populations at the periphery of their range and our understanding of management practices commonly used for rare and endangered reptiles.

Fri-P2-3-3

Causes of Recruitment Failure in Pearly Mussel (Unionidae) Populations

David Strayer and Heather M. Malcom (Cary Institute of Ecosystem Studies, Millbrook, NY)

Elliptio complanata is the most widespread and abundant pearly mussel in streams and rivers of the Northeast. However, many of its populations have not recruited regularly or at all in recent years, and may soon disappear. We quantitatively documented the size- and age-structure of 13 populations of *Elliptio* in streams of southeastern New York, and found highly varied age-structures, including populations with no evidence of any recruitment in the last few decades. Surprisingly, other mussel species at these sites have been recruiting, suggesting that the recruitment failure is species-specific. We tested four possible causes of recruitment failure in *Elliptio*: excessive un-ionized ammonia in interstitial waters, excessive loading of fine sediments, recent outbreaks of the invasive Rusty Crayfish throughout the region, and disappearance of a primary fish host (American Eel, *Anguilla rostrata*). At this point, we can rule out fine sediments, Rusty Crayfish invasions, and inadequate eel populations as likely causes of recruitment failure of *Elliptio* populations. It appears that excessive interstitial un-ionized ammonia may be the primary cause of recruitment failure.

Fri-A1-1-5

Northeast Regional Floristic Quality Assessment Index

Kerry Strout (New England Interstate Water Pollution Control Commission, Lowell, MA) and Jason Bried (Albany Pine Bush Preserve Commission, Albany, NY)

With funding from the Environmental Protection Agency, an effort was undertaken to assign coefficients of conservatism to the complete vascular flora of New York and New England. This baseline effort will facilitate region-wide use of the Floristic Quality Assessment Index, an increasingly popular tool for monitoring wetlands. The conservatism coefficients, which estimate nativeness ratings of individual species, were assigned by nine of the region's best botanists. This talk will offer an early glimpse of the conservatism data, and will summarize the evolution and methods behind the project.

Thu-P1-7-1

Phylogeographic Analysis of the Blacknose Dace (*Rhinichthys*) in West Virginia

Samantha Taylor, Geoff Smith, Tom Jones, and Elizabeth Murray (Marshall University, Huntington, WV)

Blacknose dace (*Rhinichthys*) are one of the most common cyprinid fishes in eastern North America. They also have been a topic of debate for over 30 years because morphology-based systematics has failed to clearly define their taxa. Despite this, their classification has become a putative species. Taxonomists classify the species into two species and one subspecies: the eastern form, *R. atratulus atratulus*; and the western form *R. obtusus obtusus*, and southern form *R. obtusus meleagris*. These species are so closely similar that confident classification can only be done during the fish' three month mating season when each species displays a defined mating coloration. Even these colorations display a possible mixture of genes among the species complex. This research uses the mitochondrial cytochrome B gene and genomic RAG 2 gene in a phylogenetic analysis to help clarify species relations according to differences between each current species. Maps have been created to give a visual representation of how these fish may have evolved from one another in their respective stream locations in West Virginia, both by morphological and genetic characteristics. Current results indicate that there is a distinct separation between R. *atratulus atratulus* and *R. obtusus obtusus*. The difference between *R. obtusus obtusus* and *R. obtusus meleagris* is not as direct. In the collection of *R. obtusus obtusus*, a large range of differences were seen, from 0–14 bp changes. There was a distinct group that had 0–4 differences. A second grouping with 10–14 bp changes may show that there is overlap with the *R. obtusus meleagris* species, which have 14–18 changes. We also note streams with mixtures of both the eastern and western forms in the mitochondrial DNA distributions, which strongly indicates possible interbreeding among the fish species.

Thu-A1-3-3

Mechanisms Controlling Corm Depth in *Erythrnium americanum*

Jack Tessier (SUNY Delhi, NY)

Erythronium americanum is a spring ephemeral herb with deep corms. While it does not have contractile roots, corm growth and droppers have the capacity to lower the corm in the soil. I used experimental and descriptive approaches to quantify and compare this potential for both mechanisms. Corm growth lowered corms significantly less than did dropper growth (0.34 ± 0.012 vs. 4.24 ± 0.51 cm; mean ± standard error). Corms with droppers had a significantly smaller diameter compared to corms without droppers (5.47 ± 0.21 vs. 6.37 ± 0.23 cm), indicating movement of energy to the new corm forming at the end of the dropper. Corm depth was significantly and negatively correlated with dropper length, indicating a greater increment of descent for shallow corms relative to deep corms. These results suggest that droppers are the most powerful mechanism of corm descent in the soil profile, and corms can regulate their own depth.

Thu-A1-7-2

Hymenodon (Orthodontiaceae): Exploring Evolution and Disjunction in a Tropical Moss Genus

Michael Tessler (Institute of Systematic Botany, The New York Botanical Garden, Bronx, NY) and Lena Struwe (Rutgers University, New Brunswick, NJ)

A revision of the moss genus *Hymenodon* (Orthodontiaceae: Bryophyta) is presented based on morphological and molecular data. Until now, six species have been recognized, one of which is composed of three subspecies. Four of the species reside in Australasia (Malesia, southeastern Australia, Tasmania, New Zealand, and New Caledonia), while two species are found only in the Neotropics (one in southeastern Brazil and one in the Caribbean). All Hymenodon species grow, almost exclusively, on tree-fern root mantles and may have co-evolved with tree-ferns. Evolutionarily, Hymenodon may also represent the earliest diverging pleurocarpous lineage. The current species concepts are tested using detailed morphological analyses, and evolutionary patterns are evaluated using phylogenetic analyses that incorporate new morphological (30 characters) and molecular (rps4 gene and atpB-rbcL noncoding spacer) data. Parsimony and maximum likelihood methods were applied for phylogenetic analysis using *Leptotheca boliviana*, *L. gaudichaudii*, *Orthodontium lineare*, and *Orthodontopsis bardunovii* as outgroups. The genus and *Hymenodon* section *Hymenodon* were found to be monophyletic, whereas the *Hymenodon* sect. *Polystichella* was found to be paraphyletic. Because sect. *Polystichella* was paraphyletic, the sections are not accepted in the new classification. *Hymenodon pilifer* subsp. *sericeus* was found as sister to *H. chenianus*, and not to *H. pilifer* subsp. *pilifer*. Accordingly *Hymenodon pilifer* subsp. *sericeus* is reclassified here as *Hymenodon sericeus*. Taxonomic history, species descriptions, distribution information, and an online multi-entry key to the species are provided.

Thu-A2-5-3

Vegetation Dynamics of the Northern Shawangunk Mountains, NY Due to Changing Industry

John Thompson and Paul Huth (Daniel Smiley Research Center, Mohonk Preserve, Inc., New Paltz, NY) and Emily W.B. (Russell) Southgate (Hood College, Frederick, MD)

The northern Shawangunk Mountains support 35 natural communities (including three that are globally rare and eight New York State rarities) and 42 state rare species. The unique combination of climate, bedrock geology, soils, and physiography of the Shawangunk landscape give rise to a remarkable diversity of species adapted to these conditions. Higher elevations are dominated by ridgetop pine barrens and oak forest, and ravines have a predominance of Eastern Hemlock, with mesic deciduous forests at lower elevations. European settlement of the area in the 18th century led to farming of deeper soils and extraction of available natural resources such as tanbark, lumber, firewood, charcoal, barrel hoop poles, and berries. From the mid-19th to the early 20th century, nearly all land was cleared except for inaccessible talus slopes, cliffs, and remote swamps. Debris left from tree harvesting provided fuel for widespread, intense fires. Though this mountainous land was barely able to support the needs of local people, the raw materials produced contributed to the boom of industries in the region. Changes in technology resulting in declining demand for raw materials coincided with the rise of the resort industry. Resorts provided the first regular seasonal employment for locals, lessening people's reliance on cottage industries, while at the same time creating demand for firewood and other forest products into the mid-20th century. Property values rose and some people sold out and moved on. This led to expanded tree cover during the latter half of the 20th century. Eventually the "Gunks" became world-renowned for its recreational resources and again an important economic driver for surrounding communities. At the end of the 20th century, two main ecological forces began driving succession at higher elevations: fire suppression and overbrowsing by White-tailed Deer. The spatial arrangement of 21st-century ecological communities is similar to the pattern of ecological communities that existed before humans logged, burned, and farmed the land. Changes in forest structure and composition are affected by both past and current processes. Understanding the dynamics of this system will help land managers to make informed decisions about stewardship of this biologically rich landscape and connected landscapes throughout the region.

Thu-P2-4-1

Changes in Tree Sapling Composition within Powerline Corridors Appear to be Consistent with Climatic Changes in NY

Artem Treyger and Christopher Nowack (SUNY College of Environmental Science and Forestry, Syracuse, NY)

Despite emerging evidence that on-going climate change is affecting species physiology, distribution, and phenology, there are few studies that examine changes in tree sapling establishment as a response. Changes in tree species composition can be expected due to increasing temperatures, with subsequent effects on future forest compositions. This study's objective was to examine changes in relative density of tree species assemblages within powerline corridors from 1975–2003 in New York State. Powerline corridors in New York are commonly surrounded by forests, which creates constant tree pressure within a perpetual old-field environment. This unique combination of factors allowed us to examine tree sapling establishment in a nearly constant environment over a 28-year period, utilizing MANOVA and PCA as primary statistical analyses. Tree species dynamics varied across the four ecological provinces within New York over time. Northern pioneer species (*Betula populifolia*, *Fraxinus americana*, *Prunus serotina*, and *Tilia americana*) declined across the state over the past 28 years, while the southern pioneer species (*Betula lenta*, *Liriodendron tulipifera*, and *Sassafras albidum*) increased in the hot continental division. In the warm continental division, the pine-hemlock assemblage increased in the Northeastern Mixed Forest Province, while aspen-birch increased in the Adirondack Highlands Forest Province likely due to increases in precipitation. It appears that climate change may have had some influence on tree sapling composition that could affect future vegetation management decisions and expectations in powerline rights-of-way and forests.

Fri-A2-5-1

Long-term Ecological Monitoring at a Private Nature Preserve - Trends in Soil pH and Plant Dominance

Rick Van de Poll (Ecosystem Management Consultants, Sandwich, NH)

Twenty-five years of ecological research has taken place at a 167-ha private nature preserve in Keene, NH. A total of 51 permanent plots has been sampled every six years for tree dominance and growth rate, understory dominance and diversity, soil pH, and moss-lichen-fungi diversity and relative cover. Growth rates among the late successional oak-dominated canopy have averaged 2.46%, while sub-canopy hemlock dominance has increased an average of 2.2%. Since the Gypsy Moth infestation in the early 1980's, canopy closure has increased from 74.1% to 90.4%, while understory plant cover has decreased from 35.0% to 15.2%. Soil pH has dropped dramatically since accurate testing was initiated in 1997, with median levels dropping from 5.30 to 3.94 in the O or O/A horizon, 5.40 to 4.15 in the A horizon, and 5.60 to 4.41 in the upper B horizon. Meanwhile, the % cover of lichens and byrophytes has increased 4-fold. Macro-fungi diversity has followed weather patterns, with any as many as 522 species recorded for wet years (2003), and as few as 42 species in dry years (1997). The widespread decrease in soil pH and loss of calciphilic groundcover species, especially in this calcium-rich bedrock environment, has given some rise for concern.

Thu-A2-7-3

Vassar College: Responding to Local Deer Impacts: Case Study of the Vassar Farm and Ecological Preserve

Keri VanCamp, Lynn Christenson, and Margaret Ronsheim (Vassar College, Poughkeepsie, NY)

Overabundant populations of White-tailed Deer, *Odocoileus virginianus*, are negatively impacting biodiversity and forest regeneration throughout our region. Deer thrive in many urban/suburban areas where fragmentation and dense human populations make traditional management methods unfeasible. Many land managers are challenged with how to reduce deer impacts within a framework that is designed to work in more rural situations. The Vassar Farm and Ecological Preserve (VFEP) is a 530-acre open space that is located in urban/suburban Poughkeepsie, NY. High densities of deer have been documented throughout campus for a number of years. In 2008, we began a series of research projects designed to inform future management decisions. Deer exclosures, aerial infrared fly-overs, and forest monitoring were used to evaluate the conditions in our forest. In 2008, baseline data from deer exclosures showed that 100% of the species sampled in the browse zone were introduced shrubs and that no tree regeneration was occurring. Similarly, in 2009, our forest monitoring found only one native sapling, while 91% of the woody plants in the browse zone were introduced shrubs (in 100 m^2). These observations coupled with a locally high deer density made deer management a top priority for our site. In developing a management plan, a committee was formed to investigate management options and to make formal recommendations to the college. We attempted to engage all members of our community including students, nearby residents, and state and local officials in the development of our management plan. Through this process, we developed our first management plan, and our plan was put into action in January 2010. Implementation included the culling of deer using sharp-shooting over bait. The program was incredibly efficient and removed 64 deer in 12 hours. Over 2000 pounds of venison were processed and distributed by volunteers from local hunting organizations to people in need throughout the Hudson Valley. We are continuing to examine the impacts, density, health, and the movement of the deer on the VFEP. We are revisiting and debating the options available to us to maintain a healthy deer population into the future.

Fri-A1-4-3

Characterizing the Winter Bat Population, Microclimate, and Mycobiota of Hibernating Bats in New Brunswick Caves

Karen Vanderwolf, D.F. McAlpine, and G .Forbes (University of New Brunswick, Fredricton, NB, Canada), and D. Malloch (New Brunswick Museum, Saint John, NB, Canada)

A new and little understood fungal disease, referred to as white nosed syndrome (WNS), has been associated with the deaths of large numbers of cave-inhabiting bats in northeastern North America and is threatening local bat populations with extirpation. Originating in New York, WNS has now spread to multiple states and provinces and it is expected that Maine and New Brunswick will soon join this list. WNS has only been observed in the winter on hibernating bats in caves or mines and is named for the white fungal growth (*Geomyces destructans*) that is often observed on the faces and wings of affected bats. The origin of the fungus is unknown, but it may have been accidentally introduced by people visiting caves. Very little is known about the mycobiota normally associated with bats, and the natural mycobiota of caves, while better known, is still little studied. Such baseline data collected just prior to the arrival of WNS will advance our understanding of the environment *G. destructans* encounters and may provide insight for future management procedures. Therefore, preliminary data on the natural mycobiota of hibernating bats in 8 WNS-free New Brunswick caves will be presented. To date, a total of 109 microfungal taxa belonging to 74 genera were isolated from the external surface of the bats. The most common taxa isolated were, in decreasing abundance, *Geomyces pannorum*, *Mortierella* sp., *Mucor* sp., *Cephalotrichum stemonitis*, *Polypaecilum botryoides*, *Penicillium commune*, *Cladosporium* sp., and *Trichosporon dulcitum.*

Thu-P1-5-4

Movement Phenology of the Four-toed Salamander (*Hemidactylium scutatum*) in Massachusetts

Kimberly Vitale (University of Massachusetts, Amherst, MA), Paul Sievert (US Geological Survey, MA Cooperative Fish and Wildlife Research Unit), Jon Regosin (Natural Heritage and Endangered Species Program, Massachusetts Division of Fisheries and Wildlife), and Bryan Windmiller (Hyla Ecological Services)

Understanding the movement phenology of enigmatic species like the Four-toed Salamander (*Hemidactylium scutatum*) is essential to guide management practices for breeding habitat and the surrounding uplands. We examined the relationship between environmental variables and the directionality, timing, and magnitude of adult and juvenile Four-toed Salamander movements at two locations in eastern Massachusetts. Movements to and from breeding wetlands were monitored using drift fences with pitfall traps. Four-toed Salamanders move from upland habitats to wetland areas in early spring and move away from wetlands in late spring. Nights during which Four-toed Salamander adults moved were related to the amount of precipitation occurring 24 hours earlier and the phase of the moon at the time of movement. Juvenile movements were similarly affected, and in addition, juveniles were more likely to move when temperatures were warm and days long. The magnitude of adult movements could not be predicted by day length, mean temperature, precipitation, or lunar phase. As for many other amphibian species, management plans for Four-toed Salamanders must include the maintenance of suitable upland habitat near breeding wetlands. Our results can be used to implement management strategies aimed at reducing human-related impacts on migrating Four-toed Salamanders (e.g., road closures to reduce road mortality). To create a more complete management strategy for Four-toed Salamanders, additional research is needed to determine the distances adults and juveniles move through terrestrial habitats.

Fri-A2-3-3

Native Plants as Part of a Wildlife Hazard Management Plan for Airports

Donna Vogler and Kristin Baciuska (State University of New York, College at Oneonta, NY)

The use of native plants for ecological restoration and horticultural designs in public spaces has been embraced by a growing number of ecologists and landscapers, but has not been adequately explored in airport settings. The extensive vegetated surfaces at airports must be managed to have good erosion control at low height, but must also not attract wildlife including deer, Coyote, large birds, and their various prey species. The overall goal of this FAA-supported project was to evaluate several native plants against a conventional turf mix for degree of wildlife attraction or deterrence. In the spring of 2009, replicate 232-m^2 plots were hydroseeded at airports located in Oneonta, Rome, and Elmira, NY. Indian Grass (*Sorghastrum nutans*) and Little Bluestem (*Schizachyrium scoparium*) produced good cover (up to 60% and 30%, respectively) at the Oneonta airport and approached the coverage of the contractor's mix (with 91% cover). Neither the native grasses Poverty Oats (*Danthonia spicata*) and Crinkled Hairgrass (*Deschampsia flexuosa*) nor Thyme (*Thymus pulegiodes*) achieved above 25% cover in this first year at any of the airports. Motion-detecting infared cameras demonstrated that the contractor's mix attracted significantly more deer than an established plot of Indian Grass over a 2-month period ($\chi^2 = 44$, $P < 0.001$). Fecal-pellet count data from all airports followed the same pattern. Birds were preferentially attracted to plots of contractor's mix and Thyme significantly more than the native grasses ($\chi^2 = 32.2$, $P < 0.001$). Insect attractiveness to the native species plots was generally equal to or less than that of the contractor's mix plot and varied greatly across the season. The reduced attractiveness of the established native grass plots to wildlife observed in this study demonstrates some of the potential that native grasses have as a component of an integrated wildlife hazard management plan.

Fri-P1-2-3

White-nose Syndrome: A Status Update from the Northeast and Beyond

Ryan von Linden, Carl J. Herzog, and Kathleen E. O'Connor (NYS Department of Environmental Conservation, Albany, NY)

White Nose Syndrome (WNS) was first discovered in four New York bat hibernacula in Albany and Schoharie counties during early 2007; it has since spread to at least 14 states and 2 provinces. WNS was originally described as a collection of symptoms including the visible presence of a white fungus on the exposed skin surfaces of hibernating bats as well as several behavioral abnormalities. WNS is now understood to be an infection of a newly described psychrophilic fungus, *Geomyces destructans*. Genetic comparisons have suggested a possible Eurasian origin of the fungus. Since the appearance of WNS, Northeastern wintering colonies of Little Brown Bats (*Myotis lucifugus*) and Indiana Bats (*M. sodalis*), have declined by 93% and 42%, respectively. Of the four other species of Northeastern cave bats, two have suffered apparent declines of over 90%, while impacts to the remaining two are as yet unclear. In total, the presence of *G. destructans* has been detected on nine different bat species across the WNS-affected zone. Recent experimentation has demonstrated that *G. destructans* can remain viable and infective in the hibernaculum environment for a period of at least six months absent the presence of bats. Therefore, even in the event of the total extirpation of a winter colony, the site itself poses a potential risk to bats for some time. Investigations into methods of controlling the fungus have yet to yield positive results. In light of these factors and without clear evidence of a resistant portion within the populations of the affected species, WNS poses a threat for the regional extirpation of multiple species.

Thu-P1-5-1

Interaction of Invasive Plants and Herbivory on Tree Seedlings and Herbaceous Plants

Jeffrey S. Ward and Scott C. Williams (Department of Forestry and Horticulture, The Connecticut Agricultural Experiment Station, New Haven, CT)

Few studies have examined whether the effects of invasive species and herbivory on tree seedlings and herbaceous plants are synergistic, additive, or antagonistic. This study examined potential causal links between: invasive species, primarily Japanese Barberry (*Berberis thunbergii*); herbivory, primarily White-tailed Deer (*Odocoileus virginianus*); and a dearth of native regeneration in the ground and shrub layers. At three locations throughout Connecticut in 2007, invasive shrubs were treated twice, once, or were not treated. Half of each treatment area was protected with a 2.4-m polypropylene fence. Within each of the six treatment combinations, percent coverage estimates were made at ten 4-m^2 sample points in early summer from 2007–2010. Treating invasives twice resulted in a decrease of Japanese Barberry cover, but not other invasives, through 2010. Protection from herbivory had no effect on Japanese Barberry cover for the four years of the study. Cover of Bittersweet increased when protected by herbivory. Fencing and controlling invasives increased tree seedling number and quality (size). Plots where invasives had been treated twice and were protected from herbivory averaged 44,000 stems/ha (>30 cm tall), compared with only 7000 stems/ha on plots where invasives were not treated and there was no protection from deer browsing. Annual and biennial forb cover increased with protection from browsing and invasive treatments. Annual cover in 2010 averaged 4.1% where invasives had been treated twice and were protected from herbivory, compared with only 0.2% where invasives were not treated and there was no protection from deer browsing. Protection from deer browsing had no effect on cover of perennial cover, but invasives treatments increased cover. In contrast, grass cover was higher on plots that were not protected from deer browsing than on the protected plots, 13% vs. 7%, respectively. Grass cover was also increased by at least one invasive treatment compared to plots where barberry was intact, 15% vs. 2%, respectively. Protection from herbivory had no effect on fern cover, while controlling invasives decreased fern cover by 66%.

Fri-A1-4-1

Human Influences on Species Composition: Long-Term Change in Otsego Lake, NY

Holly Waterfield and Willard Harman (SUNY Oneonta Biological Field Station, Oneonta, NY)

Data sets collected and organized by SUNY Oneonta Biological Field Station personnel over the last 43 years illustrate a disturbing trend in human influence on habitat, the introduction of invasive species, and concurrent loss of native species in Otsego Lake. This trend parallels global trends in freshwater ecosystems as transportation technologies, world trade, and international recreation have become available to more segments of the human population. We are aware of 24 aquatic species that have been introduced into Otsego Lake since early in the 20th century. Likewise, we know of 54 species whose populations have been decimated during that time period. Significant losses can be directly attributed to stresses created by habitat alterations and aggressive exotic introductions.

Thu-A2-3-4

Current Understanding of Bat Activity and Mortality Patterns at Wind-Energy Facilities in the Northeastern United States

Kristen Watrous (Stantec Consulting, South Burlington, VT) and Trevor Peterson (Stantec Consulting, Topsham, ME)

Initial concern regarding impacts to wildlife from wind facilities focused primarily on birds. However, several high profile bat mortality events in 2003 and 2004 at wind facilities on forested ridges of the Appalachian Mountains raised concerns about the impacts to bats. Since then a large number of pre-construction and post-construction studies have been conducted in the Northeast, aimed at documenting bat activity and mortality through a variety of survey methods. Currently, 48 facilities are operational in the Northeast and account for 2714 megawatts (MW) of installed wind power generation, with 9 additional sites under construction. Impacts in the northeastern United States have been found to be highly variable, ranging from a few fatalities observed during studies in northern Maine to estimates of thousands along the Appalachian range. We will discuss current methods for documenting bat presence both before and after facility construction, and current patterns that are observed as a result of these studies. We review mortality rates across the Northeast region, patterns of mortality in relation to species composition and time of year, and turbine curtailment strategies used to mitigate these effects. Finally, we comment on the implications of these findings in predicting and monitoring impacts to bats, particularly in light of White Nose Syndrome.

Thu-P1-5-2

Use of Cameras to Monitor Deer Populations

Mark Weckel (Mianus River Gorge Preserve, Bedford, NY) and Robert Rockwell and Frank Secret (American Museum of Natural History, NY, NY)

Population estimation techniques, such as aerial inventories, thermal infrared sensing, or spot-light surveys, provide useful metrics for monitoring White-tailed Deer (*Odocoileus virginianus*) abundance but may not be appropriate for the scale of smaller management areas characteristic of fragmented suburban and urban environments. Here deer management can be highly localized, and wildlife professionals need accurate abundance estimates specific to individual properties to plan harvest goals and track population trends. Individual branch antlered male (IBAM) abundance estimator is a popular method suitable to this scale. Demographic ratios are estimated from raw photographic occurrences (RPO) of males, females, and fawns. Point abundance estimates of each group are generated by using said ratios to extrapolate from a count of uniquely identifiable males. However, 1) this method does not provide measures of uncertainty for parameter estimates, and 2) RPO ratios may be biased if groups of animals differ in their probability of being photographed (i.e., trap success). We propose modifications to Jacobson's IBAM method that generate measures of uncertainty for parameter estimates by bootstrapping camera stations and that standardize photographic occurrences (SPO) by detection to minimize bias. By evaluating RPO as a function of trap success, researchers can quantify differing detection rates among demographic groups and then, standardize photographic captures, thus providing less-biased estimates of non-male abundances. We generated estimates of sex-age ratios and abundances using both RPO and SPO. To evaluate the accuracy of using SPO in conjunction with the IBAM method, we independently estimated the abundance of a marked group of female deer using a Poisson log normal (PNE) mark-resight estimator. Abundance estimates across sex-age classes were most similar between PNE and IBAM when SPO demographic ratios were used. Owing to the greater trap success of females, using SPO discounted the relative abundance of females and thus lowered the female-to-male ratio and raised the fawn-to-female ratio. Uncertainty was broad across all approaches, yet accounting for trap success reduced the confounding variability owing to differences in detection probability and generated more accurate parameter estimates.

Fri-A1-4-2

The Status of the Highly Invasive Grass *Brachypodium sylvaticum* in Eastern North America

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Brachypodium sylvaticum a native grass from Asia, Europe, and northern Africa is considered to be highly invasive in North America (NA). Until recently, it was known in NA primarily from the Pacific Northwest, with the first collection in Oregon in 1939. We will present a review of its status in eastern NA. We have seen specimens from naturalized populations in eastern NA from Michigan (earliest 1984), Virginia (earliest 1992), and New York (earliest 1998). We will discuss our observations of the four known "populations" in New York, three of which are kilometers in length, as well as information about the Michigan and Virginia populations. It occurs in a very wide range of climates and habitats in its native range. Areas of eastern NA with corresponding climates to those in its native range include essentially all areas south of 50° north latitude. In eastern NA, it also grows in a wide range of habitats from deep shade to full sun, from wet to mesic soils, from successional to mature forests, and in old fields and urban environments. It thrives in deeply shaded forests under *Tsuga canadensis* and *Acer saccharum*. We have found evidence of this species being in cultivation from as early as 1933, although primarily in botanical gardens and primarily outside of NA. We have seen specimens collected from cultivation in botanical gardens in eastern NA from as early as 1949. It was in cultivation at least as recently as 2005 at the Missouri Botanical Garden. Nursery and plant supply companies offer this species for sale, although primarily outside of NA. At least one eastern NA company currently (2011) sells seeds. This grass is very conspicuous and should be easy to identify. Past misidentifications include: *Elymus*, *E. trachycaulus*, *E. trachycaulus* x *villosus*, and *Festuca* ,although in gross appearance it resembles a species of *Bromus*. Distinguishing characteristics include its generally arching spike-like inflorescence which has 3-12 very short-stalked (≤2 mm long) spikelets each with ≥5 florets; lemma awns 7-15 mm long; culm nodes pubescent; and leaf blades mostly 5-12 mm wide.

Thu-P1-2-1

Roosting Habits and Post-fledging Dispersal of Juvenile Great Egrets from the Lower Great Lakes

Chip Weseloh and Dave Moore (Canadian Wildlife Service - Environment Canada, Toronto, ON, Canada)

In Ontario, breeding Great Egrets (*Ardea alba*) have increased from one pair in 1952 to over 350 pairs in the 2000s. Since 2000, >1200 YOY have been colour-banded on the lower Great Lakes, and 118 were marked with orange wing-tags in 2010. The objectives of the project were: 1) to track the dispersal of egrets from their natal colonies, 2) to locate and monitor occupancy of post-breeding roosting sites to increase reporting of tagged egrets, and 3) to identify wintering areas of Great Lakes Great Egrets. A large roost (300+ individuals) was located at Luther Marsh, 100 km northwest of Toronto, ON, and occupied from late June to late September 2009 and 2010; duck hunters caused the egrets to vacate their roost in September. Twenty-eight other roosts were located or suspected. All roosts examined (n = 16) were in or adjacent to water on live or dead trees, bushes, or mudflats. Roost size varied from 2 to 400+ individuals. Modal nearest neighbor distance for 24 roosts was 8 km (median = 24 km). For wing-tagged egrets, 126 reports were received on 38 individuals (32.2% re-sighting) during July–October. The maximum number of sightings per individual was 15. The maximum duration of stay in a specific area was 45 days. Most reports came from southern Ontario with a few from western New York, Ohio, Michigan, and Wisconsin. There was very little northward post-breeding dispersal reported. Twelve egrets were reported outside the Great Lakes in winter, mostly from coastal Carolinas, Florida, and the Caribbean.

Fri-A1-2-4

Northern Cricket Frog Overwintering Habits: Results of 2007–2010 Survey at Glenmere Metapopulation Habitat Indicate Requirements for Protection and Recovery of NY Populations

Jay Westerveld (New York Natural History Council, Sugarloaf, NY)

The state-listed "Endangered" Northern Cricket Frog (*Acris crepitans*) has been found as far as 450 m from the nearest known calling and breeding sites in NY. Observed movements in the fall are generally away from breeding sites, while movements in the spring are generally towards these same habitats, suggesting that some cricket frogs overwinter well outside their breeding sites. In upland areas, cricket frogs are often found in association with ephemeral pools, rock outcrops, stumps, intermittent streams, and seeps. Northern Cricket Frogs and their habitats are impacted by development projects and other activities outside the 100-foot mandatory state regulated wetland buffer surrounding confirmed breeding sites; vernal/ephemeral pools and winter habitat are not afforded a protective buffer. Additional research on upland movements and habitat requirements is critically indicated to determine potential direct and/or indirect impacts to cricket frog populations. An educated public and well regulated citizen scientists have become increasingly important in providing information on status, distribution, and habitat usage; identifying threats; critically evaluating the contents, statements, conclusions, and qualifications of consultants preparing Habitat Assessments and Environmental Impact Statements; and working with agencies to protect cricket frogs and their habitats. Survey and potential threats, mitigation, and habitat enhancement are discussed.

Fri-A1-3-3

The Role of the Delphacid *Megamelus davisi* and the Collembolan *Podura aquatica* in *Acris* Migration and Population Sustenance

Jay Westerveld (New York Natural History Council)

In New York State, the Northern Cricket frog has evidenced acute decline since the 1970s. At *Acris'* largest remaining NY metapopulation node, the delphacid *Megamelus davisi* occurs en masse over hundreds of acres of wetland habitat. *Acris* are observed to predate *M. davisi* with near-exclusivity throughout the warmer months. Comprehensive surveying of other NY habitats with historic/extirpated *Acris* populations (in Harriman State Park, etc.), reveals a total absence of *M. davisi*. Much of this historic-extirpated habitat was (aerially) treated with pesticides in the 1970s to control *Lymantria dispar*; The Glenmere metapopulation site, centered around a public water supply, was spared the same *L. dispar* control. Unlike *L. dispar*, *M. davisi* is both a habitat specialist and flightless, and would be unlikely to repopulate treated habitat quickly. The eradication of *M. davisi* at many historic *Acris* habitats may help to explain the present site vicariance. The possible role of collateral *M. davisi* eradication in *A. crepitans* decline and the proactive reestablishment of *M. davisi* populations at planned *A. crepitans* repopulation sites is discussed, as is the role of *P. aquatica* dispersal in *A. crepitans* vernal migration.

Fri-A1-3-4

Keeping the Baby with the Bathwater: A Populational Approach to Invasive Species Management

Jay Westerveld (New York Natural History Council)

Decades of invasives management in New York have shifted ecological axes in both terrestrial and aquatic systems. Collateral reduction of non-target species have lead to ecological release and system inequilibrium, including density-independent bottlenecking 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.

Thu-P2-2-5

The New York Dragonfly and Damselfly Survey 2005–2009: Distribution and Status of the Odonates of NY

Erin White, Jeff Corser, and Matt Schlesinger (NY Natural Heritage Program, Albany, NY)

The New York Dragonfly and Damselfly Survey (NYDDS) concluded its fifth and final year on 31 March 2010. The Survey began in 2005 and relied heavily on citizen scientists to help NYS DEC and NY Natural Heritage staff to collect data over a large geographic area. Its primary goal was to document the current distribution of all odonate species in New York State. Survey efforts were directed toward under-surveyed regions, areas with potential high diversity, and locations with potential for harboring species of greatest conservation need (SGCN). Nearly 300 volunteers were trained in weekend workshops held throughout the state during the summers of 2005–2007. Data received were verified by experts for pre-determined species for which we required photo or specimen vouchers to ensure high data quality. Findings from the Survey included five species added to the list of known odonates for the state, bringing the cumulative total to 193 species. Participants visited over 2170 survey sites statewide, and NYDDS yielded over 1100 new county records when compared with pre-existing county-level data. A report was submitted to NYS DEC in early April 2010, and a database was finalized containing over 18,000 confirmed individual species records based on our verification protocol. A list of species was compiled for each county as well as a distributional map and phenology chart for each species ever detected in New York. Full species accounts are included in this report for New York's 48 SGCN. The report will become available on the project website at http://www.dec.ny.gov/animals/31061.html. Since odonates are noted indicators of water quality, biodiversity, and ecological change, our findings will help to inform future conservation efforts in freshwater habitats. Along with previous distribution information, it will provide excellent baseline information on the distribution and status of odonates in New York against which to measure future change. Monitoring of this sort may be the only way to know whether we are maintaining New York's dragonfly and damselfly biodiversity in the face of continuing global change.

Fri-P1-1-1

Nest Protection and Headstarting as Tools to Aid in the Recovery of a Declining Blanding's Turtle Population

Bryan Windmiller (Hyla Ecological Services, Inc., Somerville, MA) and John Berkholtz (Stone Zoo, Zoo New England)

One of the largest populations of Blanding's Turtles in New England, the Great Meadows population, occurs in a suburban landscape near busy roadways. This population was studied in the 1970s and 1980s and, more recently, by us since 2003. Blanding's Turtle numbers at Great Meadows have declined by more than 50% since 1973. Our results suggest that the greatest current threat to the population is a low recruitment rate of adults; 15 of 20 adult females captured in the past six years were marked as adults more than 20 years ago. As management interventions, we therefore locate Blanding's Turtle nests each year by radio-tracking gravid females, protect nests from predation and inadvertent human destruction, and, in the past three years, headstart some of the hatchlings for a period of eight months. We have also radio-tracked 46 headstarted juveniles after release. To date, survivorship from egg deposition to hatching in protected nests has been 73%, survivorship through the eight-month headstarting process has been 93%, and post-release survivorship of headstarted juveniles has been 91% to Dec. 31 of their year of release. The above survivorship levels are considerably higher than published data or estimates for Blanding's Turtle eggs and juveniles with no intervention. Data on the post-release movement and growth of headstarted juveniles indicates that a Beaver-controlled shrub swamp provides better habitat than nearby vernal pools and large, permanently flooded impoundments. Our project also has a strong educational outreach component; this year's hatchlings are being headstarted at 9 different schools as part of an integrated curriculum program.

Fri-P1-3-4

Long Term Changes in Acidity and Other Water Quality Parameters in Adirondack Lakes and Ponds

Jay A. Bloomfield and Scott O. Quinn (Division of Water, New York State Department of Environmental Conservation), and **David Winkler** (Keck Water Research Laboratory, Darrin Fresh Water Institute, Rensselaer Polytechnic Institute)

Between 1984 and 1987, the Adirondack Lake Survey Corporation (ALSC) in cooperation with the New York State Department of Environmental Conservation (NYSDEC), conducted a survey of 1469 lakes and ponds in the Adirondack Mountain ecological zone (http://www.adirondacklakessurvey.org/alscpage.html). In 1996, waters that were considered "fishless" due to acid deposition impacts, were added to the NY 303(d) List (http://www.dec.ny.gov/chemical/31290.html), The 303(d) List contains all the waters in the State with either use impairments or water quality standards violations. In 2006, as per requirements in the Federal Clean Water Act, a total maximum daily load (TMDL) (http://www.dec.ny.gov/docs/water_pdf/tmdlacidrain06.pdf) analysis was conducted for a subset of these fishless waters. Since that time, the NYSDEC has attempted to collect water samples in a standardized fashion for a subset of the waters on the 303(d) List that are listed as being impacted by acid deposition (≈160 waters). This presentation will discuss comparisons of the earlier ALSC data and the more recent NYSDEC data (2007–2010).

Thu-P1-3-1

Bark: A Field Guide to Trees of the Northeast

Michael Wojtech (Haydenville, MA)

The ability to identify tree species is important for professionals working on natural resource inventories, ecological studies, and other projects, as well as for nonprofessionals wanting to learn more about their local landscapes. Leaf, bud, and other traits typically prescribed for tree identification are often out of sight or seasonally absent. Bark characteristics are always visible, but are typically considered too complex to distinguish for all but the most practiced observers of trees. Many tree guides provide descriptions of bark, and some contain photos, but they generally do not represent the full range of appearances for each species. Few guides include bark characteristics in their identification keys. My field guide covers the multiple stages of bark appearance for sixty-seven native and naturalized tree species in New England and eastern NY State. Through field observation of trees and the study of bark morphology, I defined ten bark types and subtypes, which form the base of an illustrated bark key that is accessible to users at all levels of experience. Photographs and detailed descriptions of bark for each species are provided, along with supplementary information including leaf illustrations, range maps, and habitat. A chapter on bark ecology summarizes research from a wide range of sources on why such a variety of bark characteristics have evolved, and describes ways that many organisms, including humans, interact with bark. Users from beginning to seasoned naturalists can utilize this field guide to identify and better understand bark characteristics, and in the process become better connected with the landscapes in which they live and work. More information on this guide can be found at http://www.knowyourtrees.com.

Fri-P2-4-5

Exploring Patterns of Bird Distribution and Occurrence at Multiple Spatio-temporal Scales Using eBird

Chris Wood, Brian Sullivan, Marshall Iliff, Daniel Fink, and Steve Kelling (Cornell Lab of Ornithology, Ithaca, NY)

eBird (<http://www.ebird.org>http://www.ebird.org) is a global platform for recording and sharing information about birds gathered by birders throughout the world. All data collected may be viewed through a variety of visualizations and raw data may be downloaded from the Avian Knowledge Network. With thousands of active participants submitting over 1.5 million records per month, eBird has the capability of accurately depicting the fine-scale distribution and abundance of most migratory birds. eBird collects data year-round, allowing the mapping of seasonal distributions, migration corridors, and important stopover sites. With an easy-to-use and familiar user interface, direct linkage to the Avian Knowledge Network (AKN), and the ability to easily access quality-controlled data, eBird is an increasingly useful tool for a wide range of monitoring projects. All data collected in eBird are available to anyone for free, either as visualizations within eBird or as raw data which may be downloaded from the Avian Knowledge Network.

Thu-A2-2-

Finger Lakes Regional Stream Monitoring Program: Engaging Students In Field-Based Learning

Jordan Youngmann and Susan Cushman (Finger Lakes Institute, Hobart and William Smith Colleges, Geneva, NY)

In an effort to develop a longitudinal database of stream health and water quality of the Finger Lakes watersheds, the Finger Lakes Stream Monitoring Program was created as a comprehensive research and educational tool. This citizen science initiative focused on training and educating teachers and middle and high school students. The Finger Lakes Stream Monitoring Program seeks to help connect children and young adults back to nature in their local environment. By teaching the fundamental importance of stream networks within a watershed as a part of their curriculum, it succeeds in engaging students in hands-on experiential learning outside of the classroom. Students conduct physical observations of channel dynamics and habitat, chemical analysis of the water, as well as benthic macroinvertebrate sampling to determine overall stream health. Protocols combine accepted methodologies from the NY Department of Conservation and Hudson Basin River Watch. Using a two-tiered approach, our program allows schools to match their desired level of involvement with the educational needs of their classroom. Our program has taught 28 teachers from 26 regional schools through tri-annual training sessions that not only provided them with the skills and equipment to take their students into the field, but also curricular materials that assist with classroom preparation before and after field trips. Ultimately, all data collected by school groups will be uploaded so that local science teachers can access the database to compare watersheds and track longitudinal data. Furthermore, this resource may also provide stream ecologists with the opportunity to monitor changes in stream health throughout the Finger Lakes watersheds.

Fri-A1-5-4

Investigating the Ecology of Amphibians and Reptiles at The New York Botanical Garden

Erik Zeidler (University of Kansas, Lawrence, KS)

The New York Botanical Garden is an isolated “oasis”, providing a refuge for reptiles and amphibians that cannot survive in the surrounding city. The Garden offers a variety of both terrestrial and aquatic habitats, including the virgin Forest and the Bronx River. Ten confirmed species of herps have established populations at the Garden, including snakes, turtles, lizards, salamanders, and frogs. The Garden’s habitat offers a unique opportunity for people to see a diverse community of wild herps within one of the largest cities in the world. *Chelydra s. serpentina* (Common Snapping Turtle) is one of the few species that are able to survive in urban conditions. Two hundred twenty-five Snapping Turtles from Bronx, NY were captured through hand capture and trapping, and then sexed, measured, weighed, and marked for sampling. Four main populations from Van Cortlandt Park, Bronx Zoo, The New York Botanical Garden, and Pelham Bay Park were studied. The structure of each population was analyzed, and sampling methods were used to determine population size and population density. Average sizes for both sexes differed in each population. Turtles in some areas were very underweight. Sex ratios differed among each population, but were all male-dominated and correlated to the exposure of available habitat to humans. Population structure also differed, but adults of each sex were the most common size classes in all populations. Population density varied, but was inversely correlated to surface area of the available habitat. The conclusion was made that habitats with smaller surface areas had denser turtle populations, which can be attributed to the territoriality of males. An extremely dense population (125 turtles/ hectare) was discovered. This variance among the populations further supports the understanding that this species is very adaptable, and as a result each population exhibits different parameters. It was concluded that the biggest threats to urban Snapping Turtle populations are the dangers facing nesting females as a result of human disturbance.

Thu-A1-4-5

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