Poster Presentation Abstracts

Listed alphabetically by presenting author. Presenting author names appear in bold. Code following abstract refers to timing of poster presentation (Day [Sun = Sunday, Mon = Monday] – posterboard number. For example, Mon-18 indicates: Monday poster session on posterboard number 18. Presenters' contact information is provided in a separate list at the end of this document.

Forest Floor Mesofauna and Red-backed Salamander Populations between Paired Hemlock and Black Birch Forests

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Tsuga canadensis (Eastern Hemlock) is an important foundation tree species in the forests of eastern North America. The spread of the exotic insect pest *Adelges tsugae* (Hemlock Woolly Adelgid [HWA]) threatens to eliminate *T. canadensis* from many areas in coming decades, likely leading to substantial changes in ecosystem processes and forest floor environments. To investigate how the loss of *T. canadensis* might influence forest-floor animal communities, including leaf-litter mesofauna and *Plethodon cinereus* (Red-Backed Salamander), we established a series of closely paired forest plots in adjacent mature *T. canadensis* forest and young *Betula lenta* (Black Birch) gaps created by logging in the late 1980s at Smith College's MacLeish Field Station in Whately, MA. As *B. lenta* has been commonly observed to replace *T. canadensis* in southern New England forests impacted by HWA, these ≈25-year-old birch gaps represent a study system analogous to forests that may develop in the wake of HWA invasion. Nine 10- x 15-m plots were established, with 3 located in young *B. lenta* forest and 6 in adjacent mature *T. canadensis* forest. Each plot includes a 70-board cover-object array for salamanders and 10 forest-floor sample points for assessing the abundance of mesofauna in the organic layer. Forest-floor samples were collected in July 2012 and extracted using Berlese funnels; mesofauna collected were identified to broad functional groups, including Collembolans, Pseudoscorpions, Orabatid, and Mesostigmatic Mites. The cover-object arrays were surveyed for *P. cinereus* in October 2012. We found highly significant differences in the abundances of key mesofaunal groups between *T. canadensis* and *B. lenta* forest patches, with all groups being more abundant in *T. canadensis*-dominated plots. In contrast, *P. cinereus* abundance did not differ between cover-object arrays in *T. canadensis* vs. *B. lenta* forest patches. We hypothesize that mesofaunal populations may be higher in *T. canadensis* plots due to a more constant microenvironment and stable organic layer base. As a forest floor generalist, *P. cinereus* may not be as sensitive to these differences.

Sun- 18

Small Mammal Biodiversity and Forest Fragment Health in the Mid-Atlantic

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Given the increasing trend in urbanization and the associated high level of human influence, ecologists have been exploring the ecological impact of urbanization, on biodiversity loss, trophic interactions, disease, and resource competition. Urban forest fragments provide some of the only remaining habitat for mammal, bird, and insect species in Northern Delaware. The Forest Fragments in Managed Ecosystems (FRAME) project is a collaborative effort to better understand the ecological interactions on forest fragments within urban and suburban environments. As a subcomponent of the FRAME study, we aim to assess the biodiversity of small mammals in forest fragments, and compare these results to previously collected metrics of forest health such as invasive plant distributions, snail densities, and calcium availability. We used non-invasive track tubes to assess small-mammal occurrence and diversity in 10 northeastern Delaware forest fragments during the months of June, July, and August of 2012. The number of different small-mammal species in each site was determined by track identification and then regressed against results of a principle components analysis of forest health metrics. The regression showed a a significant increasing trend in the biodiversity of small mammals as forests approached mature stages and fewer invasive species were present. Our study provides a baseline for small-mammal species in future FRAME research and identifies small-mammal biodiversity as a potential indicator of forest health.

Sun- 19

The Sandy Brook Conservation Corridors Project

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The Sandy Brook Conservation Corridors (SBCC) Project is a partnership including conservation organizations from six towns within Massachusetts and Connecticut that is launching an ambitious and exciting plan to protect land within the Sandy Brook watershed. This 29,000-acre region encompasses all land and water corridors that connect Sandy Brook, its watershed, and all living things within these to the greater ecosystem of the southern Berkshires. Our plan encourages ecologically sound land management and the preservation of small and large parcels of land, which would otherwise be at risk of development or degradation. Stream water quality is protected not only by eliminating pollution and limiting development along the main stream, but by protecting the headwaters and wetlands that feed Sandy Brook. In order to provide healthy wildlife or rare plant habitat, it is necessary to have large blocks of open space connected to each other with smaller blocks of undeveloped areas. These lands must be primarily forests in our region, but include open farmland and wetlands, which can provide large areas for sustainable forestry and recreation. Over time, this will preserve significant amounts of undeveloped land and create large swaths of connected open space, in a corridor-like fashion, which specially benefit wildlife and plant populations. Additionally, this will help to maintain the region's natural beauty and rural character. Through this regional conservation partnership, we are better able to carry out the mission of open space and conservation easement acquisition. The partnership will also conduct public education programs about the resources of the region and utilize scientific research conducted within the focus area.

Mon- 26

Effects of Logging on Composition and Structure of Hemlock-dominated Forests in Maine

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Adelges tsugae (Hemlock Woolly Adelgid [HWA]) has well established populations in much of the Northeastern United States but has only recently been detected in Maine. When present, this insect has caused widespread mortality of *Tsuga canadensis* (Eastern Hemlock). Currently, the Maine HWA infestation is limited to southern portions of the state, providing a unique opportunity to collect baseline ecological data in and design proactive management strategies for uninfested forests in the northern regions of the hemlock range. The objective of this study was to quantify the changes to forest community composition and structure resulting from hemlock removal in order to inform management approaches for addressing future HWA infestation. At 50 sampling locations within 3 uninfested stands, we compared overstory, sapling, and understory structure and composition of intact hemlock-dominated stands with stands from which hemlock had been removed by selective logging. Logged stands were harvested 1–2 years prior to data collection and had significantly lower overstory basal area ($F_{3,46} = 15.01$, $P < 0.0001$) and stem density ($F_{3,46} = 5.11$, $P < 0.001$). Sapling density was more than three times higher in the unlogged plots than the logged plots and *Abies balsamea* (Balsam Fir) comprised 43% and 24% of the saplings in the unlogged and logged plots respectively. The unlogged stands were characterized, in order of abundance, by *Pinus strobus (*White Pine), *Acer saccharum* (Sugar Maple), and *T. canadensis*. The three most abundant species of woody seedlings in the logged stands were *A. balsamea* followed by *A. saccharum*, and *T. canadensis*. *Acer rubrum* was a minor component of seedling composition in both stand types. Unlogged stands had significantly more deciduous leaf litter ($F_{1,43} = 20.6$, $P < 0.001$) and greater leaf-litter depth than logged stands ($F_{1,53} = 5.3$, $P = 0.02$). Overall, *T. canadensis* regeneration appeared sufficient to maintain its dominance or co-dominance in these forests in the absence of HWA. Advance regeneration of *A. balsamea* in the logged stands suggests the potential for this species to replace *T. canadensis* in HWA-infested stands.

Sun- 17

The Feeding Ecology of Non-native Red Fox (*Vulpes vulpes*) on an Atlantic Barrier Island

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The Red Fox (*Vulpes vulpes)* is a non-native predator inhabiting most of North America and fragile ecosystems, such as Fire Island National Seashore (FINS), NY. Fire Island is an Atlantic barrier island with more than 330 species of birds that are both migratory and resident. FINS is also located along the Atlantic Migratory Flyway and is a prime nesting site for Piping Plover (*Charadrius melodus*). While Red Fox are known to prey on ground-nesting birds and small mammals elsewhere, almost nothing is known about fox food habits on Atlantic barrier islands, such as FINS, that are likely home to important migratory and resident species. We proposed a Red Fox diet study on FINS to look at differences in diet within residential areas and wilderness areas and to detect seasonal differences within the Red Fox diet. Our study highlights the degree to which endangered and threatened birds, and other sensitive species, are being consumed by Red Fox. Fox feces were collected from February 2011 to October 2012. There were 90 Red Fox feces samples collected. Feces were washed in a series of sieves and dried under a hood for two weeks. Prey items were classified into 7 major categories including: mammal, avian, insect, crustacean, plant, fish, and unknown. Mammalian bones and hair were identified to species, avian bones and feathers were identified to order and family, fish bones were identified to class, plants were identified to kingdom, and Crustaceans were identified to subphylum. This study is the first complete study on the diet of Red Fox inhabiting a fragile barrier island and will be a valuable tool in creating a management plan for sensitive island ecosystems.

Mon- 24

Goose Abundance and Nutrient Loading on Krystal Lake, Chazy, NY

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Nitrogen and phosphorus addition from fecal matter of *Branta canadensis* (Canada Goose)*, Chen cauerlescens* (Snow Goose), and other migratory waterfowl can impact water quality in a lake ecosystem. Krystal Lake is a 30-m-deep groundwater-fed abandoned limestone quarry located 2.14 km from Lake Champlain, in Chazy, NY. This small aquatic system allowed us to examine the effects of nutrient loading from waterfowl without major nutrient losses due to its limited inflow and outflow. Throughout fall 2012, we measured nutrient levels (nitrogen(N), phosphorus(P), sulfate, and chloride), biogenic oxygen demand, water temperature, and turbidity weekly from fixed buoy locations. We also estimated daily goose abundance using two methods: 1) once weekly visual point counts and 2) twice daily trail camera photos. Geese arrived on the lake 11 September and 17 Sept.ember (Canada Geese and Snow Geese, respectively). Calculations were based on nutrient concentrations of 1.57 g N and 0.49 g P excretion per goose per day, assuming 12 hours of residence (28 defecation events) in a 24-hour period for the average-sized eastern North American goose, as standardized in previous literature. We estimated that goose nutrient loading into the lake reached a maximum of 6283 g N and 1961 g P on 22 October, and typical monthly nutrient loading on the lake was 10,100 g N and 3152 g P. Nutrient loading for the study period totaled 40,401 g N (Canada Goose 27,862 g N; Snow Goose 12,538 g N) and 12,609 g P (Canada Goose 8696 g P; Snow Goose 3913 g P) from 25,360 total goose days (gd) (Canada Goose 17,747 gd; Snow Goose 7986 gd). Our analysis suggests that the changes in Krystal Lake geochemistry are not directly correlated with current goose nutrient inputs; rather the nutrient spikes reflect sediment release from the lakes destratification. Correlation between aquatic geochemistry and goose nutrient patterns require long-term monitoring, as patterns are not necessarily detectable in the course of one season. Species-specific goose abundance, residence time, and nutrient loading within this system, has the potential to be extrapolated across similar-sized lakes along their flyway.

Mon- 17

Using DNA Barcode to Identify Ants in a Small Urban Park

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An Ant survey was conducted in the fall of 2012, in St. Mary's Park, a small urban park located in Bronx, New York. A total of 316 ants were collected and identified using both traditional keys based on physical characteristics and DNA barcode molecular technique. Identifying ants based on physical characteristics alone is difficult for novices. DNA barcoding can provide an equally sophisticated method of identification for members of the scientific community who are not experts with traditional keys. Within the 316 ants collected, identification based on phenotypes resulted in 6 different species: *Formica* Sp. II, *Tetramorium caespitum*, *Nylanderia flavipes*, *Formica exsecetoides*, *Solenopsis molesta*, and *Brachymyrmex depilis*. Thirty-six ants were then barcoded using the COI gene from mitochondrial DNA, and 3 different species were identified: *Prenolepis imparis*, *Tetramorium caespitum*, and *Lasius claviger*.

Sun- 8

Do Pitfall Traps Reflect Local Ant Colony Density?

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Pitfall traps often are used to estimate the diversity and species composition of ground-dwelling arthropods in an environment. Pitfall trap uses are varied and have been implemented to assess ant diversity in the 8-ha Spencer J. Roemer Arboretum in Geneseo, NY. Ant diversity was studied in this site through recurrent pitfall trap sampling in May, July, and September 2011. Ants were collected from two transects spanning the research site: 32 traps were set located 10–15 m apart. A diverse group of ants were collected; *Formica glacialis* was among the most common ant species in the Arboretum. *F. glacialis* is a mound-nesting ant species that is exploited by the slavemaking ants *Formica subintegra* and *F. pergandei* at this site. Slavemaking ants raid colonies of their host species to steal their brood, which become workers in the slavemaker nest. In order to study this interaction in greater detail, each host and slavemaker colony in the Arboretum has been mapped in ArcGIS. The goal of this study is to determine if pitfall trap samples reflect the local density of *F. glacialis* ant colonies. The abundances of *F. glacialis* in pitfall trap collections for each month were compared to colony counts within a set radius of each pitfall trap corresponding to typical foraging distances for this ant taxon. Additionally, we investigated the possibility that raiding activity of slavemaker ants may suppress host foraging activity by comparing pitfall trap samples taken before and during the slavemaker raiding season. This study provides evaluation of the potential of pitfall traps to detect the impacts of slavemaking ants as well as a reflection of fine-scale spatial variation in ant density.

Mon- 2

Genetic Signature of Post-glacial Recolonization in Longnose Dace (*Rhinichthys cataractae*) from Vermont and New York Champlain Valley Populations

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Because of the Northeast's glacial history, populations of fishes in many localities are a product of recolonization from various refugia. In Lake Champlain rivers, early stream and river colonizers would have been able to move far up into the watersheds because glacial Lake Vermont waters, contained behind the melting glacier to the north, were several hundred feet higher than current levels. Once this ice dam broke and the Champlain Sea temporarily replaced the freshwater environment, Champlain rivers would have been isolated from new colonists until the land rebounded and cut off saline water from entry. With the return of freshwater, colonization again became possible for freshwater fishes, but these fishes would not have been able to colonize as high in the drainages as the prior wave of immigrating fish had due to abrupt elevation change along the "fall line". Additionally, because the flow of water changed from southward to northward, different refugia would be represented at this point. This is a preliminary study of mtDNA sequence data for populations of *Rhinichthys cataractae* (Longnose Dace) in 3 rivers: the Poutney River and the Mettowee River (Champlain drainage) and the Battenkill River (Hudson drainage). We look at population structure and divergence among the two drainages and three rivers as an indication of colonization history for these rivers.

Mon- 11

Assessing the Effect of Landscape Pattern and Arrangement on Native Bee Abundance in Maine's Blueberry Fields

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Non-native Honeybees historically have been used to pollinate many crops throughout the United States; however, recent declines have brought to light the need for a more sustainable pollination plan. Wild bees are an available resource that can play an important role in crop pollination as well as pollination of non-cultivated plants. We are investigating the landscape factors that influence native bee richness and abundance, with a focus on the native bees that pollinate Maine's blueberry fields. By coupling a spatial model that predicts pollinator abundance based on nesting habitat and available alternative floral resources, with generated neutral landscape models, we are examining the relationships between native bee abundance and landscape pattern and arrangement. We are using field-collected data on bee abundance to validate the model's assumptions, and we are conducting a sensitivity analysis to determine how uncertainty in parameter choice influences model output. Our research is one component of an interdisciplinary multi-state, multi-institution project that will explore the biology, sociology, and economics of native bee conservation in the Northeast.

Sun- 4

Assessing Water Quality in the Charles River Watershed, MA and Utilizing Citizen Science to Establish a Biomonitoring Legacy

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During fall 2012, in collaboration with the Charles River Watershed Association (CRWA), a water-quality initiative was established at 10 stations in the Charles River watershed. Physical habitat data, benthic macroinvertebrate samples, and direct physical-chemical measurements were taken at each station following US Environmental Protection Agency (EPA) Rapid Bio-assessment protocols. Habitat physical properties, including the riparian zone, were additionally assessed using the Basin Area Stream Survey (BASS) protocols. The surveyed sites represent a range in terms of the extent to which they have been anthropogenically impacted, and are all in urban or suburban areas. Here we present the fall 2012 habitat, macroinvertebrate, and physical-chemical results, and include inter-site comparisons of water quality. During the summer of 2013, benthic macroinvertebrate monitoring will be added to an existing long-term monitoring program, involving participation from citizen scientists, in collaboration with the CRWA. Based on the findings of the 2012 study, multiple sites will be chosen for a legacy of water quality monitoring by citizen scientists utilizing the macroinvertebrate Stream Biotic Index (SBI). We outline the proposed citizen science project including the practical, logistical, technological, and social considerations necessary for successful implementation.

Sun- 21

Composition of Stream Fish Communities in Seneca Lake Tributaries

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The Seneca Lake (New York) watershed is large (≈194,250 ha) and is composed of primarily agricultural (39%) and forested (41%) land-use activities, with lesser amounts of idle (12%) and developed land (8%). Sensitive fish species are influenced by degraded water and habitat quality associated with certain land uses. Although many water-quality surveys have been performed in the Seneca Lake watershed in the past, a survey of biological stream communities was conducted to learn more about the patterns of species distribution and impacts of environmental stressors within each watershed. Stream surveys were carried out at sites in 14 major subwatersheds (western shore = 6, eastern shore = 7, southern inlet = 1) in June 2011 and 2012. Fish were captured using double-pass backpack electrofishing (Smith-Root LR-20B) in a 75-m stream reach isolated with blocknets. Fish species richness and abundance were recorded. Fish species richness varied across stream sites (mean = 5.4), with highest fish species richness found in Wilson Creek (9) and lowest in Plum Creek (2). Fish abundance followed different trends, with highest abundance in Glen Eldridge (635) and lowest in Wilson Creek (84). The typical fish assemblage of these streams included *Rhinichthys atratulus* (Blacknose Dace), *Semotilus atromaculatus* (Creek Chub,) *Campostoma anomalum* (Central Stoneroller), and *Catostomus commersoni* (White Sucker). The most common species of fish, Blacknose Bace, varied in abundance (mean = 198), composing between 22–100% of the community sample. The only game fish species were found in Catherine's Creek (*Oncorhynchus mykiss* [Rainbow Trout] and *Micropterus salmonoides* [Largemouth Bass]), Kendaia Creek (Rainbow Trout) and Hector Falls (*Salmo trutta* [Brown Trout]). Interestingly, fish communities were not always predictable indicators of stream health; however, they don't always respond to environmental stressors in the same way benthic macroinvertebrate communities do. Fish communities may also be driven by local geology such as barriers to colonization from the lake due to large changes in elevation (primarily waterfalls). This study was instrumental in gaining an understanding of the stream fish community composition in subwatersheds that have a variety of potential water-quality impacts.

Sun- 22

Movements and Recovery Rates of Mallards during Fall and Winter in East-Central New York

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Although *Anas platyrhynchos* (Mallard) is the most well-studied duck in North America, relatively little data exists in the northeastern United States particularly for populations followed during successive fall and winter seasons. Having a banding season just prior to the fall migration and just before the spring migration allows for more recapture opportunities. The objective of this project was to band a population of local Mallards and track their recoveries (direct and indirect) to gain insights into movement patterns of local populations of birds banded during successive fall and winter seasons in Schoharie County, NY. Birds were captured during September at three sites and February at one site using funnel traps baited with corn. The mean distance between the fall banding sites was 2.9 miles, and each of the sites were on average 5.9 miles away from the winter banding site. All birds were aged and sexed using a combination of plumage and cloacal characteristics, banded with a standard USGS aluminum leg band, and released. Morphometric data (wing cord, culmen, tarsal length, body mass, etc.) was collected on birds prior to release when ambient temperatures were above 20 ° F. We banded 25 birds from 13 September through 28 September 2012 for the fall season, and 48 birds from 5 February through 28 February 2013 for the winter season. The direct recovery rate of fall-banded mallards was 12% (n = 3) and the maximum distance from banding location was 8.4 miles. The indirect recovery rate was 8% (n = 2), they were both HY males, suggesting a relatively sedentary segment of the population of locally produced ducks. The overall recovery rate of fall-banded birds was 20% (n = 5). This study reveals the need for long-term studies to further evaluate the contribution of locally produced birds to nearby wintering populations.

The Restoration of the Gilt Darter, *Percina evides*, to the Lotic-Benthic Community of New York's Allegheny River

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The Gilt Darter (*Percina evides*) was extirpated from New York reaches of the Allegheny River over seventy-five years ago due to water-quality degradation and loss of habitat. In recent decades, New York's Allegheny watershed has undergone significant improvements and now meets the parameters set forth by Skyfield and Grossman (2008) as indicators of suitable habitat for Gilt Darters. However, natural restoration of Gilt Darters in the New York's Allegheny watershed is prevented because the Kinzua Dam and the extensive Allegheny Reservoir behind it blocks the upstream movements of northern Allegheny River, PA populations. In 2008, through the combined efforts of the State University of New York at Cobleskill, Conservation Fisheries, Inc., New York State Department of Environmental Conservation, Pennsylvania Fish and Boat Commission, and US Fish and Wildlife Service, a project was initiated to restore New York's extirpated Gilt Darter population using hatchery reared and wild caught fish. In order to meet this goal, a disease-free source of Gilt Darters was sought in the nearby portions of the Allegheny watershed in Pennsylvania to serve as brood-stock for developing hatchery propagation and to use as a source of wild fish for transfer. Gilt Darters captured from the Allegheny River population at East Brady, PA passed the fish health inspection (US Fish and Wildlife Service) and were numerous enough to support this project. Fish from this source population were used to develop spawning protocols at Conservation Fisheries, Inc., and grow-out techniques at SUNY Cobleskill resulting in the production of eight hundred fifty 35-mm gilt darters for stocking in November 2012. Fall electric trawling at East Brady, PA, resulted in the capture of 400 yearling (50-mm) fish which were also utilized in the November 2012 stocking. Hatchery reared and wild fish were marked with visual implant elastomer to assess survival and spawning success. While extirpated Gilt Darter populations were restored to the Pigeon River, TN by stocking wild fish (Coombs 2003), the propagation techniques refined in this project may be more applicable to Gilt Darter restoration in Illinois, Iowa and Ohio, where this species has also become extirpated.

Mon- 14

Inbreeding Depression and Pollination Limitation in *Sarracenia purpurea* L. ssp. *purpurea*

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The founder events associated with long-distance dispersal events (LDD) may have substantial effects on genetic diversity and lead to reduced offspring fitness via inbreeding in small, isolated populations. However, a study of *Sarracenia purpurea* L. spp. *purpurea* (Purple Pitcher Plant) introduced to Switzerland found evidence of outcross depression, rather than inbreeding. This finding suggests that this widespread but habitat-limited bog plant may be the ideal candidate to provide further insight to the tension between LDD, inbreeding, and successful range expansion. To examine this relationship, I am in the process of conducting a multi-site *S. purpurea* experiment utilizing open-pollinated controls and a series of 3 pollination treatments: self-pollination, non-self but within-population pollination, and beyond-population pollination. An ongoing preliminary study at only one site has shown significant reductions in seed production ($P = 0.017$) but increases in seed mass ($P = 0.015$) for outcrossed plants ($n = 24$, $n = 60$ in process). Reduced production suggests outbreeding depression and the possibility of genetic incompatibility or of an alternate fitness strategy, while increased seed mass suggests inbreeding depression. These conflicting results highlight the need for a more robust, multi-site study on breeding effects in *S. purpurea*.

Sun- 1

Vegetation Effects on Turtle Populations in Protected and Agricultural Ponds in Southeastern Massachusetts

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Southeastern Massachusetts is well known for its cranberry farming operations. This type of farming uses nearby ponds as sources of water for flooding and irrigation. This study tested how terrestrial and aquatic vegetation differ between agricultural ponds and those in a protected forest, and how these habitat characteristics affect populations of basking turtles. Turtles were trapped using hoop nets in 2 cranberry bog ponds, as well as in 4 ponds in Myles Standish State Park, Plymouth, MA. Terrestrial vegetation was cover typed using aerial photographs. Aquatic vegetation density in each pond was estimated by counting intercepts of plants along 5-m transects. Turtle abundance, on average, was greater in the forest habitat. *Sternotherus odoratus* (Common Musk Turtle), however, was found only in cranberry bog ponds. Aquatic vegetation density was marginally greater in the forest habitat. Terrestrial vegetation was more diverse and comprised more early-successional species around the cranberry bog ponds. Additional sampling will help to establish to what degree these vegetational differences are influencing long-term dynamics of turtle populations.

Mon- 10

Glades in Northern Forests

Brett Engstrom (Marshfield, VT; bengstrom@fairpoint.net) and Jerry Jenkins (Wildlife Conservation Society Adirondack Program; jcjenkins@hughes.net)

Glades are permanent or semipermanent openings, usually associated with bedrock outcrops and seepage, and often with drought and fire. Some are simple, low-diversity communities dominated by bryophytes and lichens. Others are species rich and have many specialized vascular plants. We illustrate and map the occurrence of three types of high-diversity glades, show some data on species densities, and argue that, besides being pretty as all get out, they are among the highest diversity upland communities, particularly for herbs and graminoids, in the Northern Forest Region.

Mon- 19

Characterizing Environmental Gradients that Support Eastern Hemlock Dominant Stands Using GIS

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New England forests are currently experiencing a rapid decline in the foundation tree species *Tsuga canadensis* (Eastern Hemlock) due to the presence of the invasive *Adelges tsuga* (Hemlock Woolly Adelgid, HWA). HWA is projected to arrive in mid-coast Maine by 2020. Pre-emptive and salvage logging are among the management techniques being used to prevent or slow infestation by HWA. Removal of hemlock has a profound impact on ecosystem function with associated socioeconomic implications. The Hemlock Ecosystem Management Study (HEMS) is a multi-year initiative that is exploring how disturbance related to HWA influences ecosystem function and socioeconomic parameters. Predicting hemlock distribution in Maine is a component of this larger research effort. Mapping hemlocks in Maine will be crucial to identifying stakeholders geographically by anticipating where HWA infestations will occur. Eastern Hemlock is distributed along definable environmental gradients. We can use these environmental gradients to develop a terrain model that will improve predictions. In this study, I used field data from HEMS, Penobscot Experimental Forest (PEF), Massabesic Experimental Forest (MEF), and Maine Forest Service (MFS), as well as the Soil Survey Geographic (SSURGO) Dataset, USGS (United States Geological Survey) 10-m resolution Digital Elevation Models (DEMs), and ArcGIS (V10) software from ESRI to characterize the environmental gradients along which Eastern Hemlock is found in Maine.

Sun- 16

The Inhibitory Effect of Flower Fragrances on Microbes in Flowers

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Volatile organic compounds (VOCs) released from flowers as fragrance are known to attract pollinators to reproductive structures. Less is known about the defensive properties of these volatiles. Terpenoids are important components of the floral blend, found in a wide diversity of plant taxa and emitted by both vegetative and floral parts. At high concentrations, these compounds are known to inhibit microbial growth. Could they be functionally important for protecting flowers from microbes at the low concentrations found in flowers? Recent studies have shown that just like fragrance, nectar may also play multiple roles, rewarding pollinators but also inhibiting microbial growth. Could VOCs dissolved in the nectar be aiding in this inhibitory effect? To test the inhibitory effects of floral fragrance at physiologically relevant concentrations, we cultured bacteria, including plant pathogens and close relatives of plant pathogens such as *Pseudomonas putida*, *Pseudomonas fluorescens*, and *Providencia alcalifaciens*. Fragrance saturated sterile disks were placed on top of the bacterial species plated on agar, and bacterial growth was monitored over multiple days to study the growth. We found some compounds inhibited growth (linalool), while others may have had a positive effect on growth (limonene) for some of the species tested. Reduction of fragrance is a common side effect of plant breeding. Understanding the role of fragrance in the defense of the flower from microbes is therefore an important avenue of study.

Sun- 7

Climate Response of Black Oaks (*Quercus velutina*) at Two Sites In Eastern United States

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The increasing variability of climate today and the long-term trend in temperature and moisture availability demands that we understand the effects of climate on tree growth. To investigate the connection between tree-ring width, a proxy for tree growth, and climate, we present *Quercus velutina* (Black Oak) chronologies from two temperate forest sites in Mt. Pleasant, VA and Otter Creek, PA. By understanding the sensitivity of Black Oak to climate at these two sites, we can better understand the contribution of climate to its future growth trajectories in these regions. To quantify this sensitivity, we compared tree-ring indices to gridded instrumental temperature and precipitation from 1901–2003. Results showed a negative response of the Otter Creek Black Oak trees to temperature, a positive response to precipitation during summer months, and a positive correlation to the previous summer's precipitation. Together, this response represents the classic drought stress found in many species in the eastern United States. This population, however, did not respond to either variable during the winter months. The Mt. Pleasant Black Oak responded to precipitation and temperature during the summer months in a similar fashion and, like the Otter Creek Oaks, showed little response to climate during the winter months. These results suggest that Black Oak in the Mid-Atlantic region do not respond to changes in climate during their dormant winter months and show a strong sensitivity to summer drought. Therefore, moderate temperatures and increases in precipitation during summer months will stimulate growth of Black Oak in the Mid-Atlantic region. However, if summer temperatures warm beyond certain thresholds, the positive response to precipitation could be overwhelmed by heat stress, which might lead to a decline of this species in this region.

Mon- 21

Gene Flow and Population Sustainability of a Native Bee Species in Otsego County, NY

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Genetic diversity plays a very important role in maintaining the overall health of a population. The lower the genetic diversity of a population, the lower its fitness. If genetic diversity is high, the population is better able to adapt to a changing environment. Inbreeding and genetic drift are the two major causes of low genetic diversity. Native bees of the US are vital to the existence of many of the plants that we have. Without these bees, the plants would be unable to pollinate and reproduce (Batra 1992). This is why it is so important to determine the population sustainability of the bees. This study examines the genetic diversity of Carpenter Bees, *Xylocopa virginica*, in Otsego County, NY, to determine whether gene flow, the exchange of genetic information between populations is occurring. Using microsatellites, overall genetic diversity of the bees will be observed. Overall genetic variation of the Carpenter Bees in Otsego County will be examined using an AMOVA (ARLEQUIN). Allelic richness and HWE will be tested using the microsatellite data. Mapping out patterns in diversity will allow us to determine whether measures should be taken to facilitate gene flow in these populations, rather than the current practice of eliminating all colonies of Carpenter Bees found. The data will also allow us to determine how at-risk these populations are to extirpation, localized extinction. It is possible that the impacts of European Honeybee will have left a signature in the genetic data.

Sun- 5

Hibernation Ecology of *Lithobates sylvaticus* in Maine's Montane Landscape

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Overwintering is a critical period for north temperate and boreal amphibians as snowpack, and therefore hibernation, can persist for five or more months. This is especially true for species such as *Lithobates sylvaticus* (Wood Frog), because hibernation is immediately followed by a short, explosive breeding season. Hibernaculum selection likely affects individual fitness; freeze-thaw events alter energy-reserve consumption, prolonged snowpack reduces risks associated with premature hibernaculum exit, and males hibernating closer to breeding sites will have earlier access to females. Amphibians in alpine or boreal ecosystems may benefit from less severe winters and warmer climates, although a reduction in insulative snowpack while temperatures remain below freezing could increase winter mortality. Extensive laboratory research has focused on physiological adaptations and processes associated with the overwintering period; however, few studies have examined the strategies amphibians use to survive hibernation in regions with severe winters. Our research examines interactions between snowpack, temperature, and habitat features as they affect the hibernation ecology of *Lithobates sylvaticus* in Maine's Quebec/New England Boundary Mountain Ecoregion, which boasts one of the coldest climates in New England. In particular, our study (1) assesses hibernaculum selection, (2) compares temperature and humidity profiles across strata and locations, and (3) describes the spatial connectivity of these hibernacula with breeding sites and summer refugia.

Sun- 20

Teaching, Research, and Collaboration: A Public-Private Partnership Model at Robert V. Riddell State Park

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In 2010, Hartwick College faculty together with staff from the New York Natural Heritage Program (NYNHP) and the New York State Office of Parks, Recreation, and Historic Preservation (OPRHP) initiated a long-term collaborative teaching and research partnership at the recently established Robert V. Riddell State Park (RVRSP) near Oneonta, NY. The major goals for the alliance include: 1) research support for long-term RVRSP planning, biological monitoring, and conservation of the Park's biodiversity; 2) field training that engages classes, student researchers, and interns in ecological study,;and 3) environmental education and outreach to the regional community. Current research has involved students, faculty, and agency staff in 1) long-term inventories of trees in three permanent forest plots (of different forest types) that were first surveyed by faculty at Hartwick College in the 1990s; 2) watershed monitoring efforts at established permanent sampling points along the major tributaries at RVRSP at which aquatic macroinvertebrates and basic water chemistry is measured; 3) classification of the major community types in the Park; and 4) surveys and monitoring for rare species and ecological communities as well as invasive species. Through this collaborative effort, we are training the next generation of field biologists in survey methodology, data collection, and analysis, generating research capacity that can address questions that could not be studied independently, and expanding our knowledge of human impacts on natural systems. Ultimately, we hope this initiative offers a collaborative model for researchers, educators, and state agency staff that will better inform stakeholders and enable managers to set priorities for the preservation of public lands and forest ecosystems throughout the state.

Mon- 27

Land Management Effects on Earthworm Populations in Southeastern Massachusetts

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Earthworms are important decomposers that help to recycle nutrients in soil and decaying leaf matter. Because earthworms disperse slowly, the distribution of earthworm species in North America may primarily be determined by human activity, both directly by introducing worms into managed landscapes and indirectly by altering habitat structure and resource availability. This preliminary study focuses on how these factors affect abundance and diversity of earthworms. We hypothesized that the intensity of management at a site will affect the ratio of epigeic (leaf litter-dwelling) to endogeic (soil-dwelling) species. The study took place at 4 sites in Plymouth County, MA. At each site, two methods were used to sample earthworm populations. First, one man-hour was spent searching for species that reside under debris or in leaf litter. Second, earthworms were extracted from soil in 3 plots by using mustard vermifuge. There was a lower abundance of epigeic species in highly managed sites, probably due to a lack of leaf litter to provide food and shelter. The lower number of epigeic species at managed sites suggests that more intensively managed sites support less diverse earthworm assemblages.

Sun- 15

Late-season Patrolling Behavior by Female *Photuris lucicrescens* (Coleoptera: Lampyridae)

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The behavior of *Photuris lucicrescens* Barber has been of interest to firefly enthusiasts since the species was first described. In the very first sentence of the species description, Barber mentioned that "… much remains to be learned of its behavior." Flash patterns of *Photuris* are believed to be species-specific and largely act as reproductive isolating mechanisms. Yet Barber noted several different flash patterns emitted by *P. lucicrescens*. Barber and subsequent observers have described the coloration of the various signals as yellow, green, blue-green, and green-white. In addition, the species sometimes emits a brilliant flash and sometimes emits a weak and dull flash. No other *Photuris* has such a range of behavior, flash color, and signal pattern. That variation has perplexed firefly enthusiasts and caused much consternation as variable behavior creates ambiguity in a genus where species identification is largely dependent on the identification of flash pattern and behavior (because of morphological similarity among species). Here, I report the occurrence of late-season movements and associated flash patterns of female *P. lucicrescens*. The long-distance movement of female *P. lucicrescens* appears to be non-random in the sense that females have been observed moving in small groups. I hypothesize that females may be patrolling forests in an effort to seek other late-season fireflies on which they may prey. The identification of species within the genus *Photuris* will be simplified if we can gain a better understanding of the proximate and ultimate causes of variable behavior patterns.

Sun- 6

The Effect of Dredge Spoil Deposition on *Celastrus orbiculatus* Invasion

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Understanding invasive species expansion in the face of ecological change is one of the most important and difficult challenges in understanding invasive species distribution. Many invasive species take advantage of anthropogenic disturbances, therefore altering ecosystem dynamics and the structure of the native plant communities over generations. Due to its extraordinary ability to adapt, *Celastrus orbiculatus* (Oriental Bittersweet) coexists with changes in the canopy while lowering the richness, diversity, and total abundance of native species, thus encouraging invasion. We studied the distribution patterns of *C. orbiculatus* on a dredge spoil island along the Hudson River in Schodack, NY. We surveyed *C. orbiculatus* age, density, and stem diameter along with soil pH throughout various parts of the island. There was a positive correlation between stem diameter and age ($r = 0.765$). There was also a positive, but weak correlation between stem diameter and density ($r = 0.289$). Contour mapping of species distribution showed patches of *C. orbiculatus* scattered throughout the island. Samples of soil pH also showed patches of areas throughout the island with low pH. These results indicate that more mature *C. orbiculatus* plants have a larger stem diameter and occur within dense populations. Patches of high densities and low soil pH are indicative of hotspot areas promoting *C. orbiculatus* expansion.

Sun- 13

The Effect of Neighboring Exotic Plants on the Consumption of *Asclepias syriaca* (Common Milkweed) by the Monarch Butterfly

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In North America, Monarch Butterfly (*Danaus plexippus*) populations are threatened by anthropogenic global change, and in particular, biological invasion. Exotic plant species may negatively influence summer breeding Monarchs because their larvae are obligate herbivores of native plants in the milkweed family, primarily *Asclepias,* which thrive in habitats that also have high exotic plant diversity. Exotic plant species commonly co-occur with native plant species, yet the effect that native-exotic plant associations have on native plant-herbivore interactions is not well understood. The co-occurrence of native and exotic plants may increase (associational susceptibility) or decrease (associational resistance) the susceptibility of a native plant to herbivory. To explore the effect of neighboring exotic plants on the herbivory of native milkweed by Monarch larvae, I manipulated the identity, density, and diversity of two common exotic plants (*Leucanthemum vulgare, Trifolium pratense*) and examined their effect on the oviposition and consumption of a focal native plant, Common Milkweed (*Asclepias syriaca*) by Monarch Butterfly larvae in a field experiment. Monarch larvae density on Milkweed was 90% lower in plots with *L. vulgare*, suggesting *L. vulgare* provided associational resistance for Milkweed. Independent of neighbor identity, neighbor density did not influence Milkweed herbivory or Monarch density when one exotic species was present. However, when both *T. pratense* and *L. vulgare* were present, Monarch larvae density was significantly lower at high neighbor densities, but not at low densities. Understanding how exotic species can influence interactions between Monarch and native milkweed species can help to better manage and conserve Monarch populations during a period of accelerating exotic species introduction. This research highlights the importance of accounting for the indirect effect that exotic species can have on native species interactions.

Mon- 5

Matching the Pattern of Pollinator and Herbivore Visitation to the Floral Traits of *Cucurbita pepo* var. *texana*, the Texas gourd

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Many fruits and vegetables require pollination by insects to reproduce. While generalist pollinators such as hired colonies of honeybees can be important for crop production, for squash plants such as Zucchini and Pumpkin it is the specialist pollinator Squash Bees, *Peponapis pruinosa*, that can be critical. The blooms of the plant last for a few hours, making pollinator attraction of prime importance for this monoecious species. These plants also have specialist herbivores to contend with including beetles such as the Cucumber Beetle, *Acalymma vitattum*. *Cucurbita pepo* var. *texana*, the Texas gourd, is a wild plant species, and a close relative of many important squash crops that grow in Massachusetts. Squash Bees forage early in the morning, beginning before Honeybees are active. This timing is of great importance, especially since the Texas gourd can bloom as early as 5 am on a warm summer morning. The diurnal pattern of insect abundance, pollen removal, and fertilization were compared with floral traits such as fragrance and nectar in the field. Observations of insect visitors were recorded every hour. At hourly intervals, nectar, fragrance, and available pollen were measured. Female flowers were left open to pollinators and then bagged hourly. At the end of the season, the bagged fruits were collected; fruit weight and seed weight and number were analyzed. Given the documented declines in native bees and the recent colony collapse disorder in Honeybees, it is more important than ever to understand the dynamics of pollination in crops plants, particularly those such as squash which have such short-lived flowers.

Sun- 2

Bryophyte Reproduction and Dispersal in a Mixed Hardwood Forest

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Bryophytes are an integral component of forest ecosystems, forming extensive mats on logs, stumps, and rocks. They are important for soil formation, provide much needed moisture and shelter for invertebrates and small vertebrates, and serve as a seedbed for understory vegetation. The effect of different reproductive/dispersal strategies, however, on the distribution, diversity, abundance, and colonization rate of different species has not been well studied. In order to investigate the dispersal to, and colonization of logs in northern hardwood/coniferous forests, a long-term study is being established at three properties maintained by the SUNY-Oneonta Biological Field Station (BFS). The objective of this study was to select appropriate sites and collect baseline data for the long-term study. Additionally, the bryophyte diversity data collected serve as the first of their kind for the properties on which sites were established. Three sites at each of three locations (nine sites total) were selected, based on an initial survey of bryophyte diversity and forest composition. This will provide three replicates of each of three sites with similar community structure. The location of each site was marked using GPS coordinates. At each location, circular belt transects were established around a central point in ½-m increments to a total distance of 10 m from the central point. Each ½-m transect was surveyed for presence of moss and liverwort patches. When a patch was located, a sample was collected for later identification, and the following information was recorded: substrate type, transect number, compass bearing from central point, presence/absence of sporophytes, site name, date, and time. Here we present data from the first three sites sampled. A total of 695 specimens, representing 39 species (8 liverworts and 31 mosses), were encountered and identified. The three most abundant species encountered, *Brachythecium rutabulum*, *Hypnum imponens*, and *Hypnum pallescens*, showed high sporophyte production with 45%, 36%, and 35% of samples encountered containing sporophytes, respectively. This finding is an indication of greater dispersal ability and colonization rate of spore-producing species compared to those which rely more on asexual means of reproduction and dispersal.

Mon- 20

Invasive Plant Atlas of New England and EDDMapS: Citizens and the Science of Invasive Species Detection

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Invasive species databases are an important way that both citizens and professionals can contribute to invasive species knowledge growth. The Invasive Plant Atlas of New England (IPANE) has formed a partnership with the multistate Early Detection and Distribution Mapping System (EDDMapS) to provide a multi-faceted database project designed to provide comprehensive distributional information about non-native invasive plants in New England. Goals include both education and research leading to a better understanding of the dynamics of plant invasion in New England as well as the early detection of new invasions. Volunteers may contribute in a variety of ways including collecting research data or uploading their own invasive plant sightings via the easy to use EDDMapS website (www.eddmaps.org) or a smart phone app.

Mon- 7

Spatial Ecology of Slavemaking Ants and their Hosts: A GIS Analysis

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Slavemaking ants act as social parasites, raiding the colonies of other ant species to capture their brood, which are raised in the slavemaker colony and become its workforce. Within the 8-acre Spencer J. Roemer Arboretum located on the south part of the SUNY Geneseo campus, there are fourteen slavemaking ant colonies (*Formica subintegra* and *Formica pergandei*) and over 600 colonies of their host species, *Formica glacialis*. Characteristics of the colonies' distributions were examined in ArcGIS by comparing different vegetation compositions mapped within the Arboretum to colony site selection and density. Characteristics of sites selected by slavemakers who moved colony location were assessed to see if preferences remain the same over time. Raids by slavemakers have been monitored over three seasons (summer 2009–2011). Circular distribution analyses were conducted in order to assess if the slavemakers expressed directionality biases when raiding host colonies. These analyses were conducted separately for each raiding season. Directional distributions were used to calculate the mean centroid of raids for each slavemaker colony; the resulting polygons were used to determine if different slavemaker colonies maintain distinct non-overlapping raiding territories. Directional biases expressed by individual slavemaker colonies were analyzed over time to see if they exploit the same or different habitat from season to season. Interpretations from this research will aid in further building our understanding of the spatial dynamics of interactions between slavemaking ants and their hosts.

Mon- 3

The Northeast Climate Science Center: Improving the Way Climate Science Informs Resource Management

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The Department of Interior Northeast Climate Science Center (NE CSC) is part of a federal network of eight Climate Science Centers created to provide scientific information, tools, and techniques that managers and other parties interested in land, water, wildlife and cultural resources can use to anticipate, monitor, and adapt to climate change. Recognizing the critical threats, unique climate challenges, and expansive and diverse nature of the northeast region, the University of Massachusetts Amherst, College of Menominee Nation, Columbia University, Marine Biological Laboratory, University of Minnesota, University of Missouri Columbia, and University of Wisconsin-Madison have formed a consortium to host the NE CSC, providing the USGS unparalleled expertise, resources, and established professional collaborations in climate science and natural and cultural resources management for successfully meeting the regional needs for climate impact science assessment, education, and stakeholder outreach throughout the northeast region. Thus, the NE CSC conducts research, both through its general funds and its annual competitive award process, that responds to the needs of natural resource management partners that exist, in part or whole, within the NE CSC bounds, including the North Atlantic, Upper Midwest and Great Lakes, and Appalachian Landscape Conservation Cooperatives (LCCs). For example, researchers are developing techniques to monitor tree-range dynamics as affected by natural disturbances which can enable adaptation of projected climate impacts; conducting a Sustainable Landscapes project to assess the capability of current and potential future landscapes in the Northeast to provide integral ecosystems and suitable habitat for a suite of representative species and provide guidance for strategic habitat conservation; studying the effects of changes in the frequency and magnitude of drought on Brook Trout habitats, spatial distribution, and population persistence; and conducting assessments of northeastern regional climate projections and high-resolution downscaling.

Mon- 23

Occupancy and Detection Models for Coyotes (*Canis latrans*) in New York City Parks

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We developed models of *Canis latrans* (Coyote) occupancy and detection rate in New York City and Westchester Parks. Reconyx camera traps were set up in 12 New York City and 14 Westchester parks for approximately 6 weeks each in 2010 and 2011, with deployments lasting from 25–54 trap nights and camera density ≤1.0 km^2 per camera. We developed occupancy models for Coyote detection rate in the sites surveyed for 2010 and 2011 using two landscape covariates and on the predictions from a previously developed model of Coyote-human interaction (HCI) and used Akaike's Information Criterion corrected for small sample sizes (AIC_c) to determine the most accurate model. The HCI model was based on the mean distances from parks to the nearest forest patch, grassland patch, and pooled medium- and high-development patch. Our two landscape covariates were distance to railroads (dRR), and the total forested and grassland area in each park (FG-Area). We tested 8 models—the 7 combinations of the three covariates and an intercept-only model with no covariates—to see which best predicted the observed occupancy patterns using maximum likelihood. We modeled occupancy (ψ) and detection (p) using the method developed by MacKenzie et al. (2006) with parks as individual sites and consecutive trap nights as repeat surveys. Maximum likelihood estimates of ψ and p from the top model was used as our final conclusions regarding Coyote occupancy patterns. The model that proved to be the most accurate was ψ(HCIz + dRR), p(.). The zonal HCI score for each park (HCIz) was a strong indicator of Coyote occupancy. The model also showed that Coyotes select parks that are near railroads, indicating that Coyotes may disperse through the urban landscape by traveling along train tracks.

Sun- 11

Effect of Biochar on Lettuce (*Lactuca sativa*) and Basil (*Ocimum basilicum*) Germination

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Biochar is a “thermally modified biomass” that is destined for addition to soil. It can be made from many organic raw materials or feedstock, such as woodchips. The properties of biochar are believed to enhance agricultural performance. Another significant ability of biochar is to persist in the soil indefinitely by not being susceptible to biological decay, which could be a benefit for carbon sequestration. The objective of this study is to test the effect of biochar on seed germination. Biochar was made from woodchips and pyrolysed at 5500 °C. Soil samples were taken from Green Mountain College campus farm in Poultney, VT. *Lactuca sativa* (Lettuce) and *Ocimum basilicum* (Basil) will be used for testing the influence of biochar. Replicate soil samples (n = 10) were amended with 0%, 1%, 3%, 5%, or 9% of biochar by weight. The experiment was conducted in the lab at room temperature. The initial results for the biochar impact on germination of these plants in 3% and 5% biochar have found a significant increase in germination rate, seedling growth, and number of leaf per plot. The authors conjecture two possibilities to explain this performance under biochar treatment: firstly, application of biochar can increase soil water retention directly due to its porous surface area and indirectly increases the soil organic carbon (C) for soil microbes to enhance their catabolism in soil; secondly, while an appropriate amount of biochar can stimulate plant growth at low concentration, some chemicals in the biochar may inhibit seed germination at high concentration.

Sun- 29

Ant Biodiversity Changes Associated with Land Management and Environmental Factors

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The sheer biomass of ants combined with their role as ecosystem engineers make them particularly important to biological systems. Ants are highly responsive to human-induced changes in the ecosystem. With a significant disturbance, the ant species diversity of an area may be altered, which could affect ecosystem function. Land management techniques and corresponding changes in environmental factors in hemlock-dominated stands were examined to determine effects on ant species diversity. Logged and unlogged plots at 4 different sites in Waldo County, ME, were surveyed for photosynthetically active radiation (PAR), fine woody debris, soil moisture, leaf-litter depth, and number of ant genera and species. PAR measurement and fine woody debris were both significantly different between logged and unlogged sites, being significantly higher at the logged sites. Moisture differed significantly between sites but not between logged and unlogged plots. Leaf-litter depth did not differ significantly between sites or logged and unlogged sites. The number of ant species and genera were not significantly different among logged and unlogged plots; however, they were significantly different among sites. The data suggests a shift in species diversity between logged and unlogged sites. This may be due to ant species responding to the changes in microclimate caused by logging.

Mon- 1

Predicting Suitable Habitat for Eelgrass (Zostera marina) Restoration based on Watershed Land-Use

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We present a model for predicting available area for Eelgrass (*Zostera marina*) restoration in estuaries based on changes in land-use in the watershed. The resulting change in nitrogen loading is calculated by the model, and its effect on turbidity is quantified and expressed in terms of available light intensity across the local depth profile. The heart of the model consists of the Nitrogen Loading Model and the Estuary Loading Model (from Boston University Marine Biology Laboratory) dynamically coupled, and converted into a quantifiable effect on the light attenuation coefficient, in conjunction with pre-existing physiochemical data. Herein, the model is applied to the Neponset River Estuary, using bathymetric data and long-term water-quality monitoring data from the Massachusetts Water Resources Authority to suggest suitable areas of Eelgrass restoration based on proposed land-use changes. The poster utilizes embedded tablet computers to allow viewers to interactively input potential land-use changes and see the effect on suitable area for Eelgrass restoration dynamically output in graphical format.

Sun- 23

The Mite Community of Owls

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Parasitic mites of owls include those which feed on blood, feather oils, feather tissue, skin, and tissue fluid. Host relationships range from monoxenous to polyxenous, and mite geographic distribution ranges from endemic to cosmopolitan. Of 43 species of North American owls, mites are known from 18 species, but records from the Holarctic species are mainly from the Palearctic region. The mite fauna of *Asio otus* (Long-eared Owl) is the most well-known, 16 species, but only 2 species are known from North American Long-eared Owls. The North American mite fauna of *Bubo virginianus* (Great Horned Owl) is the best known, 11 species, followed by that of *Athene cunicularia* (Burrowing Owl) with 9 species, *Strix varia* (Barred Owl) with 5 species, and *Megascops asio* (Eastern Screech-Owl) with 4 species. Three or fewer mite species are known from other owls in North America. Data on occurrence on different regions of the host's body, mite populations on healthy and diseased owls, and pathology are largely lacking.

Mon- 16

Development and Intrafamilial Cross-Testing of Microsatellite Primers for Acroneuria Carolinensis (Banks) (Plecoptera: Perlidae)

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Numerous questions of an ecological and/or life-history nature can benefit from population genetic analyses. Doing so, however, requires the development of polymorphic molecular markers, such as microsatellites. This is especially true for non-model species, such as *Acroneuria carolinensis* (Banks), a Perlid stonefly. Using next-generation sequence technology, we developed polymorphic microsatellite primers for *A. carolinensis* and cross-tested them on the congeneric *Acroneuria lycorias* (Newman) and confamilial *Agnetina capitata* (Pictet) and *Agnetina flavescens* (Walsh). These markers will be used to further examine state-wide and fine-scale population structures throughout New York, as well as facilitating the work of other research groups.

Sun- 10

Fontinalis sullivantii: A Potential Bioindicator in the Waccamaw River, SC?

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The Waccamaw River flows completely in the Coastal Plain of South Carolina and typifies the olgliotrophic conditions associated with blackwater rivers. Development and land conversion near this river lead to increases of certain nutrients (e.g., phosphorus and nitrogen) and degrade water quality, increase plant productivity, and cause stressful ecological conditions for aquatic organisms. *Fontinalis sullivantii* could be a potential bioindicator for increased nutrient levels in the Waccamaw River. This aquatic bryophyte may also be acting as a nutrient dam thus reducing nitrogen levels. To assess the potential of *F. sullivantii* as a bioindicator, biomass was measured in the Waccamaw River at seven sites using a nested sampling method. This method measured the biomass of *F. sullivantii* on trees, cypress knees, and subsurface substrates in the Waccamaw River. The biomass was then related to the following water-quality variables: calculated dissolved salts, calculated sodium absorption ratio, calcium, carbonate, chloride, copper, bicarbonate, boron, electrical conductivity, iron, nitrate nitrogen, magnesium, manganese, phosphorous, potassium, sodium, and zinc. *Fontinalis sullivantii* was found at all seven sites. *Fontinalis sullivantii* was found on trees in 30 out of 36 plots, on knees in 24 out of 36 subplots, and on subsurface substrates in 21 out of 144 quadrats. The presence of *F. sullivantii* at all of the sites and in the majority of the plots, subplots, and quadrants makes it a common aquatic bryophyte species in the river. Subsurface sampling yielded the most biomass which was expected since *F. sullivantii* is an aquatic bryophyte. Biomass was highest at the transect mid-point ;total dissolved salts were also highest the transect mid-point. *Fontinalis sullivantii* biomass may be a useful indicator or water quality in this black water river.

Mon- 13

Grazing-Induced Stress in *Rosa multiflora*

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Rosa multiflora (Multiflora Rose) is an invasive shrub which dominates grasslands, roadsides, and forest edges throughout the country. We have been studying the efficacy of using livestock to suppress the spread of *R. multiflora* since 2011. We have observed that the plants appear to exhibit stress as evidenced by defoliation, leaf clustering, and discoloration. In this study, we address 3 non-mutually exclusive questions: (1) Is the stress evident in *R. multiflora* the result of grazing? (2) Is the apparent stress symptomatic of rose rosette disease? (3) Do sheep spread the disease among the plants? A mixed flock of sheep was rotated through a series of nine 0.1-ha enclosures in 2011 and six 0.25-ha enclosures in 2012 at 3-d intervals (full rotation circuit = 18–27 d). An ungrazed reference area was located adjacent to each enclosure. Stress was assessed in several ways: (1) reduced plant vitality, as indicated by greater overall defoliation, in grazed relative to ungrazed plants; (2) the reduced leaf area and chlorophyll (chl) content—symptoms of rose rosette disease—in plants in grazed relative to ungrazed areas; (3) significantly lower average normalized difference vegetative index (NDVI) in plants in grazed areas relative to ungrazed areas. Finally, stem samples were collected and examined for the presence of the eriophyid mite *Phyllocoptes fructiphilus,* the rose rosette disease vector. Grazing resulted in significant defoliation, leaf-area reduction, and loss of chl in grazed relative to ungrazed areas. Mean NDVI was lower in grazed than ungrazed areas. The difference between mite infestation in grazed and ungrazed areas was not significant. Nor was there evidence that mites were transported in the wool of the sheep. It would appear that grazing created symptoms of stress that were similar to those of rose rosette disease. Ultimately, many *R. multiflora* plants died.

Sun- 12

Facilitating Pollination: The Relationship of Co-flowering Species on Fruit set in the Pink Lady's-slipper (Orchidaceae)

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Insect-mediated pollination is a vital part of ecosystem function and services. Pollination maintains genetic diversity within populations and helps ensure species survival. Due to anthropogenic activity, plant-pollinator relationships are threatened. Angiosperms that are pollinator limited are particularly vulnerable. Some of these vulnerable species are also rare and are targets for conservation. To be successful, conservation plans need to consider inter-dependent relationships between rare plant species and their pollinators. The purpose of this study is to determine whether a relationship exists between heterospecific co-flowering plant species and fruit set in a pollinator-limited, deceptive orchid, *Cypripedium acaule* (Pink Lady's-slipper). To assess these relationships, data was collected in July 2012 from fifteen *C. acaule* populations. A tree, shrub, and ground cover inventory was conducted at each plot for natural community classification. Generalized linear models (GLM) and generalized linear mixed models (GLMM) were used to examine the relationship between *C. acaule* fruit set and density and proximity of heterospecific co-flowering species, conspecific density, and conspecific proximity across and within populations, respectively. Contingency tables were used to analyze associations between *C. acaule* fruit set and heterospecific co-flowering species, conspecific clustering (based on nearest neighbor statistics), and natural communities. The results indicate that dense, clustered populations of *C. acaule* among relatively high densities of heterospecific co-flowering plants, particularly *Trientalis borealis,* experience higher reproductive success. According to the findings of this study, in situ conservation management plans to improve the reproductive success of *C. acaule* should focus on promoting dense, clustered populations of *C. acaule* and high densities of heterospecific co-flowering species in and around *C. acaule* populations.

Sun- 3

The Spatial Distribution of *Ixodes scapularis* and *Borrelia burgdorferi* at SUNY Oswego's Rice Creek Field Station

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Lyme disease in North America is primarily transmitted by *Ixodes scapularis* (Blacklegged Tick), which acquires the bacteria *Borrelia burgdorferi* (Lyme Disease Bacterium) during a blood meal. Although not a usual host, humans can become an accidental blood meal and acquire *Borrelia* and thus Lyme disease. *Ixodes* are highly concentrated in the northeastern and north central United States. In New York, the majority of *Ixodes* are found in the southern part of the state, but this species is becoming more common in central New York. *Ixodes* are mostly found in forested areas with shrubby vegetation. The Rice Creek Field Station (RCFS) at SUNY Oswego has a variety of habitats where *Ixodes* has been encountered. Ticks surveys were conducted from May–October 2012 at 13 locations in meadows, hardwood forests, edges (between meadows and forests), and walking trails. Surveys were conducted along transects using drag sampling of a 1-m^2 white corduroy cloth. The cloth was dragged across the ground and examined every 20 m along each transect. A total of 213 ticks were collected. Ticks were found only in the forested (n = 210) and trail (n = 3) habitats. Ticks were most often found in August–October. Following collection of ticks, we used polymerase chain reaction (PCR) of homogenized *Ixodes scapularis* to determine the presence of ticks infected with *Borrelia* within each habitat at RCFS. Of the 213 ticks collected, 65 have been tested for the presence of *Borrelia*. To date, one tick has tested positive for *Borrelia*. We will complete testing on all ticks collected. With this knowledge of tick and *Borrelia* abundance, we can contribute to baseline management and public outreach at RCFS by creating an ecological risk map for faculty, staff, students, and members of the public that use the RCFS grounds.

Sun- 9

Nitrogen and Phosphorus Resorption Efficiencies Vary with Stand Age and Soil Nutrient Availability in a Northern Hardwood Forest

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Trees mobilize and reabsorb nutrients from leaves prior to senescence, which is an important mechanism of nutrient conservation. Traditionally, terrestrial systems have been thought to be primarily nitrogen limited, but recently observation and theory have indicated co-limitation by multiple elements. In 2009 and 2010, we sampled leaves in August and leaf litter in October at the Bartlett Experimental Forest in northern New Hampshire. Species sampled included *Fagus grandifolia* (American Beech), *Betula papyrifera* (White Birch), *Acer rubrum* (Red Maple), and *Prunus pensylvanica* (Pin Cherry). We studied three stands in each of three age classes: 21–26, 33–36, and >100 years. Phosphorus resorption efficiencies tended to be higher in older stands than younger stands. We analyzed the ratio of N:P resorption, which controls for variation in mass loss during senescence. Phosphorus resorption relative to nitrogen was significantly greater in older stands for White Birch ($P = 0.004$), Red Maple ($P = 0.01$), and American Beech ($P = 0.06$). We compared soil N and P concentrations obtained from soil pits in twenty-four 50- x 50-m plots to the N and P resorption efficiencies measured in those plots. Surprisingly, P resorption was better predicted by soil N than soil P for many (but not all) species. This result may be explained under a scenario of co-limitation in that the amount of P conservation required depends on the amount of N available.

Mon- 18

Blood Mercury Levels and the Stopover Refueling Performance of a Long-distance Migratory Songbird in New York

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I examined the relationship between total mercury (THg) and plasma triglyceride (TRIG; an indicator of body mass change) levels in the blood of Northern Waterthrushes (*Parkesia noveboracensis*) during stopovers in New York, NY to investigate the influence of mercury on the refueling performance of migrating birds. THg levels averaged 0.42 ppm and ranged 0.09–2.08 ppm. Model selection indicated that THg was not important for explaining variation in TRIG relative to capture time, body mass, and year. Summed model weights also indicated that THg had low relative importance. Capture time appeared alone in the global best model and had the greatest relative importance. Subsets of birds in the 25th and 75th percentiles of THg level did not have different levels of TRIG. THg in most birds was higher than mean blood levels reported for several other long-distance migrants from the same geographic region, but below the lowest blood level recently determined to cause adverse effects (reduced reproductive success) in a songbird species (0.7 ppm). Blood THg levels in this study did not seem to affect foraging efficiency or other attributes of Northern Waterthrushes enough to reduce their stopover refueling rate. Research is needed to identify mercury effect levels for neurological, physiological, and behavioral changes that would impair the migration performance of passerine birds.

Sun- 27

Demographics of Basking Turtles in Forested and Agricultural Landscapes in Southeastern Massachusetts

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Cranberry production is a common agricultural practice in southeastern Massachusetts. In this type of farming, low soil fertility and frequent pest outbreaks often necessitate widespread use of synthetic fertilizers and pesticides. Accumulation of these chemicals may have a negative impact on populations of aquatic wildlife, such as freshwater turtles. This preliminary study compared demographic characteristics of freshwater turtle populations between ponds in a state forest and those used for the irrigation of cranberry bogs. We hypothesized that higher road density and vehicle traffic near cranberry bogs would increase mortality risk for nesting females and dispersing juveniles, leading to populations more dominated by adult males than those in the state forest. Turtles were trapped using hoop nets, identified to species and sex, individually marked, and released. Nitrogen and phosphorous concentrations were determined for each pond and compared among habitats. The Eastern Painted Turtle (*Chrysemys picta*) was the most abundant species captured. Demographic characteristics of this species differed between habitat types. Turtles were marginally more abundant in forest ponds than in agricultural ponds, and sex ratios were less strongly male-biased. Additional long-term sampling will be conducted to evaluate effects of agricultural use of ponds on population dynamics and morphometry.

Mon- 12

Assessing the Potential Impact of Emerald Ash Borer on the New York City Watershed

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The New York City Watershed is located in the Hudson River Valley and supplies drinking water to more than 9 million consumers. The Watershed has an ecologically significant component of *Fraxinus* spp. (ash trees) in its 100,000 acres of forests, riparian areas, and reservoir edges. In winter 2010–2011, an established population of *Agrilus planipennis* (Emerald Ash Borer) was detected on the Watershed in the Ashokan Basin during a multi-agency delimitation survey to determine the extent of a nearby Emerald Ash Borer infestation. The decline and mortality of ash from Emerald Ash Borer on the Watershed poses a potential threat to water quality and aesthetics. The New York City Department of Environmental Protection (NYC-DEP) and the US Forest Service - Northeastern Area State and Private Forestry are working together to monitor the Emerald Ash Borer infestation and slow the advance of ash mortality on the Watershed. In addition, we are assessing the potential impact by estimating Emerald Ash Borer populations using ash inventory data. This work will aid NYC-DEP resource managers in prioritizing and assessing impacts of management activities on Emerald Ash Borer population potential on the New York City Watershed's forested lands.

Mon- 6

Climate and Species Phenology Changes at Mohonk Lake, NY

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Mohonk is a unique area in the northern Shawangunk Mountains of New York State where weather records have been taken daily since 1896. The National Weather Service's Cooperative Weather Station at Mohonk Lake has changed very little in 117 years. The weather box has never changed location, the original brass rain gauge continues its service, and the surrounding area has seen very little change 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 exemplary to investigate true changes to the local climate. The longevity of these data sets reveals how temperature, precipitation, and even the timing of the seasons have changed over the years. In addition to the weather record, species phenology observations, started by the late Daniel Smiley, have also been recorded at Mohonk since 1925. A phenology study area was established with the weather station as the center, extending a maximum of a two-mile radius, keeping a consistent elevation range for observations on this mountain top. Coupling the weather data with dates of first bloom, spring arrival dates of migratory birds, and the emergence of amphibians and insects illustrates how some species are reacting to the change in climate. Statistical analysis of eighteen wildflowers and flowering shrubs, thirty-two species of birds, two species of hibernating mammals, five species of amphibians, and six species of insects were explored for possible trends in change of phenology. The earliest spring ephemeral wildflowers, earliest arriving birds, and earliest emerging amphibians have experienced the most drastic change in phenology. In addition, several avian species have recently become year-round residents.

Mon- 22

Assays for Aggression and Activity in a Host Species of the Slavemaking Ants *Formica subintegra* and *F. pergandei*

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The slavemaking ant species *Formica subintegra* and *Formica pergandei* are social parasites that invade the nests of host ant species in order to steal host brood and incorporate them into the workforce of the slavemaker nest. The behavioral responses of Individual host colonies may vary in ways that could influence the success of such raids and the survivability of the victim colony. Assays were developed to rate behavioral traits such as the aggression and activity level of individual colonies of the host species *Formica glacialis* under the influence of this parasitic pressure. Assays included quantifying foraging activity using baits, scoring reactions to encounters with slavemakers vs. conspecific ants, and monitoring responses to nest disturbance. Lower rates of foraging activity were documented in colonies that were recently raided than in unraided colonies. The assays themselves were evaluated for consistency and refined with the intention of maximizing efficiency and accuracy while maintaining the integrity of the field setting. The results of these preliminary assays contribute to our understanding of the dynamics of host-parasite interactions; such assays can potentially illuminate both the causes and consequences of colony-level variation in host species behavior.

Mon- 4

Songbird Associations with Native versus Non-native Plants During Migratory Stopovers

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As migratory songbirds travel from their breeding to non-breeding grounds every fall and spring, they seek stopover sites where they can rest and refuel before continuing their journey. In recent years, however, many of these stopover habitats have become lost to land development and urbanization. Habitat fragmentation has been shown to make the land more susceptible to invasion by exotic plants, although the effects of this on stopover site quality are still unknown. Our study was designed to look at birds' foraging tendencies during their stopover and identify relationships between the plants available and those being used by the birds. We hypothesized that birds would exhibit more foraging behaviors associated with native plants, as they have been evolving side by side in the area for many years. To identify associations between migratory songbirds and plants, we observed foraging migrants during spring and fall migration at the Mianus River Gorge Preserve, Bedford, NY and the Bronx Zoo, Bronx, NY. The two sites are located in suburban and urban areas, respectively, and both serve as stopover sites for Neotropical migrants. We identified all plant species in our study plots and determined that plants native to New York were more prevalent than non-native plants at both sites. Our foraging observations indicated that migrant songbirds fed on vegetation relative to its availability at both sites during the spring and at the Bedford site during the fall. At the Bronx site during the fall season, however, we observed more foraging birds associated with non-native plants than native plants despite the greater availability of native species. We suspect this is due to the tendency of non-native plants to produce fleshy fruits earlier in the season than native plants, particularly in urban areas, thus providing food resources for energy-seeking songbirds.

Sun- 24

Changes in the Phenology of Spring Bird Migration in Cincinnati Ohio between 1955 and 1992

Carol Trosset (Bennington College, Bennington, VT; caroltrosset@gmail.com)

From 1955 to 1992, Ruth P. Trosset (1923–2003) documented the presence of all bird species observed on a 1.5-acre wooded residential property in Cincinnati, OH, weekly and sometimes daily. Her data are analyzed in this presentation. Thirty migratory species were documented in most or all years. Of these, fourteen altered their pattern of seasonal presence, most during the 1970s. Shifts in first arrival dates among twenty species that continued to arrive in the spring are analyzed with respect to local temperature and precipitation records, and with respect to a variety of species traits such as migration distance and feeding behavior. Spring departure dates of the mostly winter resident *Junco hyemalis* (Dark-Eyed Junco) got later over time and are analyzed with respect to climate variables.

Sun- 25

A Preliminary Study of Culverts as Corridors for Crayfish Movement

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Man-made thoroughfares, such as roads and railroads, can inhibit the movement of aquatic organisms, limiting gene flow and promoting local extinction. Culverts facilitate the movement of water beneath roads and may allow stream-dwelling organisms such as *Cambarus bartoni*i (Common Crayfish) to move freely between bodies of water. This study evaluated how effectively crayfish utilized culverts in their movements. Traps were placed around four culverts along a stream and pond system in Bridgewater, MA. Captured crayfish were marked and released to monitor their movements within the stream system. Thirty-two individuals were captured between October and November 2012. The sex ratio was significantly biased in favor of females, and juveniles represented more than 53% of the captured individuals. No individuals were recaptured, preventing inferences about the degree to which crayfish use culverts to cross roads or railways. Additional trapping will help to provide a better understanding of crayfish movements and the degree to which road crossings act as barriers.

Mon- 15

Earthworms as Ecosystem Engineers: Effects on Soil Properties and Implications for Ectomycorrhizal Fungi

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In forested regions of North America with no native earthworms, invasive earthworms from Eurasia have a large impact on the below- and aboveground environment. These invasions potentially alter carbon and nutrient cycling, decrease native plant germination and diversity, and facilitate nonnative plant invasion. Although ectomycorrhizal fungi are essential symbionts of many important North American trees, the effect of earthworm invasions on ectomycorrhizal fungal ecology is unknown. We predict that the homogenization of soil horizons by earthworm invasions will result in more uniform soil nutrient availability, thereby decreasing the number of niches available to ectomycorrhizal fungi. In 2012, we sampled four partially invaded sites in New York (Heiberg Memorial Forest, Mianus River Gorge Preserve, Mohonk Preserve) and New Hampshire (White Mountains National Forest) to measure the impact of earthworm invasion on soil properties and ectomycorrhizal diversity. At 10 plots per site (5 invaded, 5 uninvaded), we extracted earthworms and took soil cores. Cores were separated by horizon for soil property (C, N, P, Ca, Mg, K, pH, moisture) and ectomycorrhizal root-tip analyses. Earthworm-invaded organic soil had significantly lower Ca, Mg, C, and C:N than uninvaded soil. Invaded mineral soil had significantly higher Ca and Mg, and significantly lower C than uninvaded soil. In addition, invaded-soil cores had a higher similarity index across all soil variables, suggesting that earthworms are homogenizing the soil profile. A decrease in available niches could result in a subsequent decrease in biodiversity and functional diversity, for both the belowground fungal community and their associated plant partners. Ectomycorrhizal richness was highly variable between plots, making it difficult to measure the effects of earthworm invasion. Our results suggest that while earthworms drastically modify the soil environment, they may not affect overall ectomycorrhizal richness. Future research will elucidate whether certain ectomycorrhizal species are more or less sensitive to earthworm invasions.

Sun- 14

Differences in Bill Surface Area of the Saltmarsh Sparrow throughout its Global Range

Jennifer Wiacek (Unity College, Unity, ME; Jwiacek09@unity.edu)

Sparrows living in salt marshes face unique environmental stressors including high temperatures, low fresh water availability, and tidal inundation. It is thought that salt marsh sparrows have larger bills that are highly adapted to dissipate heat and conserve water. *Ammodramus caudacutus* (Saltmash Sparrow) is endemic to tidal marshes in the northeastern United States and its population is considered vulnerable due to the decrease of salt marsh habitat and hybridization with *Ammodramus nelsoni* (Nelson's Sparrow). Little is known about what factors influence the Saltmarsh Sparrow bill size. It is hypothesized that sex, temperature, and species hybridization would influence bills to be larger in males and southern subpopulations. Results indicate that state and species most influence bill size. It was found that individuals breeding further north have a larger bill size, and that Nelson's Sparrows have smaller bill surface areas than Saltmarsh Sparrows. Hybridization with Nelson's Sparrow and the fasting-endurance hypothesis explanation of Bergmann's rule are discussed as possible explanations.

Sun- 28

Determining the Effects of Eurasian Watermilfoil Hand Harvesting on Biocontrol Populations

Klara Widrig (Burnt Hills-Ballston Lake Science Research, Ballston Spa, NY; klarawidrig@gmail.com)

Myriophyllum spicatum (Eurasian Watermilfoil) is an invasive weed that represents an enormous threat to aquatic ecosystems. Native or naturalized biocontrol agents that have been shown to negatively impact Eurasian Watermilfoil include *Euhrychiopsis lecontei* (Milfoil Weevil) and *Acentria ephemerella* (Acentria Moth). As the two species rarely co-dominate in the wild, it is important that lake managers know which species is dominant before implementing a biocontrol program. Both biocontrol agents were found in the Chateaugay Lakes system in a population study conducted in the summer of 2011, with Acentria Moths dominating over Milfoil Weevils. Previous studies have indicated that Milfoil Weevil populations are negatively impacted by milfoil hand harvesting, a common control method that is used in the Chateaugay Lakes. It is therefore recommended that areas where biocontrol is to be promoted are not harvested, but it may be necessary in some cases to harvest small areas to allow boater access. A study was conducted in the summer of 2012 to determine if small-scale hand harvesting would have any effect on biocontrol populations in the immediate vicinity. A drop in the number of adult Milfoil Weevils was observed in the surrounding area immediately after harvesting small plots of milfoil, which was followed by a drop in the number of larvae one week later.

Mon- 9

Photomorphogenic Effects of UV-B Radiation and α-Tocopherol Treatment on *Arabidopsis thaliana* Deficient in CUT1 Gene

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UV-B radiation may cause morphological, physiological, and genetic damage to living organisms, and prolonged exposure to UV-B radiation results in photooxidative damage to DNA and proteins. Sessile organisms, such as plants, are unable to escape relentless UV-B exposure. However, plants can protect themselves from UV-B by the production of antioxidants. Plants also respond to UV-B irradiance by inhibiting hypocotyl elongation, reducing leaf surface area, and altering composition of epicuticular waxes. In this study, *Arabidopsis thaliana* will be subjected to varying degrees of UV-B radiation and treated with an antioxidant, α-tocopherol. Harmful reactive oxygen species, formed by UV-B radiation, may be stabilized by the α-tocopherol scavenger. The hypothesis is: *A. thaliana* deficient in making epicuticular wax (*CUT1* gene) which renders the plant more vulnerable to UV-B radiation, will recover more efficiently when treated with an external application of α-tocopherol. In the experiment, six frames will be covered in 1–3 layers of 0.08-mm cellulose acetate film and contain both wild type and *CUT1* deficient *A. thaliana*. Frames will either receive daily applications of α-tocopherol (in addition to water) or only water. UV-B fluorescent light (280–315 nm) and photosynthetically active radiation (PAR, 400–700 nm) sources will be suspended above frames in parallel. Measurements will be taken to determine chlorophyll content, stem height, leaf surface area, and total biomass. *Arabidopsis thaliana* with suppressed *CUT1* gene may be more susceptible to photo-oxidative damage which will result in an alteration of morphology or perhaps premature senescence. The external application of α-tocopherol on plants may promote repair mechanisms in the presence of UV-B radiation.

Mon- 25

Techniques to Suppress Invasive Oriental Bittersweet (*Celastrus orbiculatus*) on Presque Isle State Park, Erie, Pennsylvania

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Celastrus orbiculatus (Oriental bittersweet) is a deciduous, woody vine native to Southeast Asia. Currently this invasive is considered a major threat to native forests in the eastern United States. Some characteristics associated with its' competitive ability include shade tolerance, ability to colonize a wide range of suitable environmental conditions, and prolific seed production, viability, and germination. These factors contribute to difficulties related to the suppression and containment of this species. In order to preserve the native plant communities at Presque Isle State Park in Erie, PA, a total of 5 treatments, each having 4 replicates was established to test various procedures to suppress this invasive species and restore native plant communities. Two control treatments tested involved either making cuts of all stems at chest height and ground level (window cut) or no action at all. Additional treatments consisted of a basal stump herbicide application of a 100% solution of either triclopyr or glyphosate to every cut stem immediately after window cuts were made. The last treatment method consisted of making a window cut followed by a foliar herbicide application 5 weeks post cut with a backpack sprayer containing a solution of 5% glyphosate and 2.5% triclopyr. Data analyses have led to determining the most effective method to suppress *C. orbiculatus* is by making a window cut of all stems followed by a foliar herbicide application 5 weeks post cut. Plots with this treatment had significantly fewer regrowth stems, and these stems had a trend towards shorter length when compared to other treatments. This knowledge has the potential to assist not only Presque Isle State Park but many other locations inflicted with the presence of this invasive species.

Mon- 8

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