

2018 Northeast Natural History Conference Poster Abstracts

Listed in alphabetical order by first-listed author/presenter. Code at the bottom of each abstract indicates when in the conference schedule the presentation will be given: Day -Poster # (thus, for example, Sun-21 indicates the presentation will be poster #21 in the morning and afternoon Sunday poster sessions).

Variation in Bat Wing Morphology Correlates to Folding Patterns and Degree of Flexion

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Abstract - The wings of all 1400+ species of bats (Order: Chiroptera) are composed of the same subdivisions seen in the manus, or hand, of their mammalian counterparts: carpals, metacarpals, and phalanges. However, a bat's wing (manus) is functionally unique due to the fact that its structure permits powered flight. Although all bats share the functional ability to fly and the morphological arrangement to allow this mode of transportation to occur, it has been previously noted that the direction of flexion along the manual digits is varied across the Order. I examined the morphological pattern of wing folding was examined across 18 of the 19 extant bat families and, in a subset of 12 species, investigated the osteology of the wing's third digit with the goal of identifying aspects of joint morphology involved in the observed variable folding actions. This study has identified 4, distinct wing-folding patterns in extant bat families. Variation among these patterns is defined by the range and direction of flexion along the proximal and distal joints. These patterns observed in the digits include: proximal and distal joint flexion is anterior in digits III-V, 2 distinct patterns of dorsiflexion along the proximal joint and anterior flexion of the distal joint, and anterior flexion of distal joint with no movement at the proximal joint. Although the degree of flexion along the metacarpophalangeal joint is extremely varied among these folding patterns, the structural unit formed by this articulation maintains similar morphology of a condyloid joint throughout all of the taxa studied, despite having extreme differences in epiphyses bone markings. Since this was the first study that set out to describe bat wing digits, these markings were named and a morphological function was assigned based on degree and direction of flexion. The shape and prominence of structures that make up the digit joints appear to be directly associated with how compactly the wing folds into the body. Further knowledge about the morphology of bat digits could have a significant impact on our understanding of how the mammalian wing functions.

Sat- 72

Characterization of Microplastics using Fourier Transform Infrared Spectroscopy (FT-IR)

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Abstract - Microplastics are small particles of plastic <5 mm in size (longest dimension) and are characterized by color, type (e.g., fragment, pellet, fiber, foam, film), and density. These synthetic particulate can adsorb contaminants and increase in concentration within organisms. The increased frequency of published studies on the harmful impacts of microplastics on survival and reproduction in aquatic organisms has led to development of methods to polymerically categorize these particulate. Fourier transform infrared (FT-IR) is a spectroscopy technique widely used to analyze these particles at a chemical level. FT-IR utilizes spectral absorption bands to confirm the identity of a pure compound, as well as impurities. The goal of this study was to assess the polymer composition of microplastics ingested by aquatic organisms located in Lake Champlain. We dissected organisms obtained from tournaments and used a wet peroxide oxidation method to eliminate biodegradable/organic particles, prior to being characterized by type and size. Prior to FT-IR spectroscopy, all particulate samples were dried by convection ovens at 50 °C. Preliminary results suggest fibers were the most prominent particle type in organisms ($n = 589$). These fibers were primarily comprised of polyester (PET), cellulose, and rayon. Fragments were the second most prominent particle type ($n = 180$) and were commonly polyester (PET), rayon, vinyl, and polypropylene. Pellets ($n = 14$) were primarily vinylidene chloride, polyethylene chlorinated with 36% chlorine, vinyl, and cellulose nitrate. Films ($n = 14$) were primarily rayon, poly [methylmethacrylate], and poly [1,4 cyclohexanedimethylene terephthalate]. The least common polymer type found was foams ($n = 11$) resulting in polyethylene, chlorosulfonated, polyethylene chlorinated with 36% chlorine, and azlon (casein). Overall concerns are warranted as polyester [PET] is more abundant, non-reactive, and resistant to many chemical and biological reactions and thus persists in the environment and has the potential to be mistaken for food by aquatic organisms. The major concern with microplastic trophic transfer is their potential to adsorb heavy metals and leach bisphenol-A and phthalate within organisms. It is essential that we gain a better understanding of microplastic polymer type, as persistence and sorptive properties can influence organismal impacts long-term.

Sun- 24

Assessing Biodiversity with Trail Cameras in the Hampshire Woods

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Abstract - The goal of this project is to use long-term trail-camera data to better understand the biodiversity of animals in the Hampshire College campus woods, and track populations over time. As a part of a new, ongoing biodiversity project at Hampshire College, trail cameras have been distributed at various locations within the Hampshire College woods. Trail-camera data, as well as data collected through tracking and observing in the field, provides a survey of species residing in this area as well as samples of their behaviors. Data is shared in the online database iNaturalist under the Hampshire Biodiversity project, which is open to all community members. Members are encouraged to contribute, as the goals of this project are to both assess the variety of species on Hampshire College campus, and to engage the campus community in exploring their environment. So far, we have observed at least 15 mammalian species on campus, ranging from the most common, *Sciurus carolinensis* (Eastern Gray Squirrel), to the most aloof, *Lynx rufus* (Bobcat).

Sun- 49

Post-Dispersal Seed Predation in the Roemer Arboretum

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Abstract - In forests of the northeastern US, *Lonicera maackii* (Amur Honeysuckle) is an invasive species that forms dense thickets in the understory. In addition to competing with native plants for space, Amur Honeysuckle exhibits extended leaf phenology. Extended leaf phenology allows leaves to be retained for a longer period of time and outcompete native understory plants for light and fix carbon in the spring and in the autumn while native plants do not have leaves. It also may provide cover for seed consumers that would be vulnerable under absence of canopy cover. We studied how the extended leaf phenology of Amur Honeysuckle influences its own seed predation as well as that of 2 native species, *Vitis labrusca* (Wild Grape) and *Parthenocissus quinquefolia* (Virginia Creeper). In the fall of 2016 and 2017, we placed seeds of all 3 species in patches of Amur Honeysuckle and patches of Wild Grape. In 2016, the experiment was performed in the late fall after the abscission of the native species' leaves but while Amur Honeysuckle leaves still remained. In contrast, in 2017 we timed the experiment to occur as the canopy cover of all species disappeared. We found in both years that Wild Grape had the highest proportion of seeds that survived to the end of the experiment ($P < 0.0001$) and Amur Honeysuckle had the lowest survival rate ($P < 0.0001$). We found that a greater proportion of seeds was depredated in native Wild Grape patches compared to in Amur Honeysuckle patches ($P = 0.0002$) in the fall of 2016 (native canopy absent), whereas in the fall of 2017, patch type did not have an effect on seed predation (both canopies initially present; $P = 0.267$). These results suggests that Amur Honeysuckle's extended leaf phenology reduces rather than increases seed predation, perhaps because extended leaf phenology creates cooler microclimates, discouraging the activity of small-bodied seed predators. We propose that extended leaf phenology of invasive species may intensify seed predation of co-occurring native plants, especially those that are patchily distributed.

Sat- 64

Flower Size Provides Information about Nectar Production in *Lyonia ligustrina* (Maleberry)

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Abstract - Variation across flowers and/or plants in the production of floral rewards such as nectar and pollen is found in many plant species. Within some species, floral cues such as flower size and scent provide information to pollinators about which flowers or plants offer the greatest rewards. This study examined whether flower size provides information about rewards in an ericaceous shrub native to Maine, *Lyonia ligustrina* (Maleberry). Greater flower diameter in Maleberry was positively correlated with nectar production, providing information both on how much nectar different plants offered in relation to each other and on the relative amounts of nectar offered by different flowers within the same plant. Flower diameter and pollen production were not significantly related to each other. Future work will explore fitness consequences to Maleberry of revealing information about reward production to flower visitors.

Sun- 16

Decline in Growth and Productivity of Sugar Maples in the Northeastern Adirondacks

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Abstract - Recent surveys on *Acer Saccharum* (Sugar Maple) populations in the northeastern United States and in eastern Canada have revealed declines in productivity and negative trends in growth patterns. Sugar Maple is of great ecological significance, as it provides refuge and resources for many species of ungulates, small mammals, insects, and birds. Sugar Maple is also an important economic resource throughout northeastern North America as a highly sought-after timber species and for its sap that is used for maple syrup production. Sugar Maple decline has historically been monitored based on the outward appearance of trees, and while this may be a good indicator, it does not reflect if the decline is related to actual growth. The objective of this study is to determine if the decline is evident in the growth trends of Sugar Maples. We will use annual growth trends as an indicator of the Sugar Maple decline as they show the amount of growth produced after each growing season. A minimum of 10 populations will be assessed, with ~20 individuals (>25 cm DBH) being cored at each site. We will analyze trees in each population for outward symptoms of decline (i. e., crown dieback) to correlate with observed growth trends and assess site conditions (soil quality, moisture, canopy openness, etc.) to determine their influence on growth and productivity. Increment cores will be mounted, sanded and then measured and analyzed using standard dendrochronological techniques to determine overall growth trends and relationships between growth, climatic, and other abiotic factors. This study will include plots throughout the Champlain Valley and the High Peaks region within the Adirondack Mountains, and will extend as far north as Chazy, NY. Understanding Sugar Maple decline will provide us with a better understanding of the trends that are occurring among this species at the population level, along with insight into compositional and structural changes that may occur with decreasing Sugar Maple health and abundance.

Sun- 39

Where and When do Turtles Cross the Road: The Case of the New York State Threatened Blanding's Turtle

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Abstract - We used ArcMap 10 software to analyze 189 occurrences on roads by *Emydoidea blandingii* (Blanding's Turtle) detected over the period 1997 to 2017 in Northern New York to help explain the spatial and temporal patterns of road crossing in relation to landscape characteristics. We will contrast presence data with randomly generated points on roadways to determine whether movement is random or not. Actual crossing points will be assayed based on sex and reproductive condition to see if movement patterns differ among demographic classes. We expect that road-crossing locations are not random and that differences in where and when a turtle crosses the road exist among groups within a population. This analysis could potentially influence road-mortality mitigation strategies, which target existing areas of greatest concern, by potentially identifying previously unknown areas that could be characterized as a potential turtle crossing hotspot.

Sat- 1

Studying Mercury Bioaccumulation in Avian Species at the Albany Pine Bush Preserve

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Abstract - Mercury pollution is a concerning phenomenon due to the detrimental effects it can have on natural ecosystems. There have been various studies conducted on the bioaccumulation of mercury in avian species demonstrating reduced reproductive success and changes in standard behavior and endocrine function as a result of the incorporation of mercury into living tissue. In addition to providing an indication of mercury pollution in the region, studying mercury bioaccumulation in birds can provide more knowledge on factors that lead to increased absorption of mercury in organisms. We studied mercury concentration in avian blood and feathers in order to gain a better understanding of the degree of the mercury contamination and bioaccumulation process at the Albany Pine Bush Preserve, an inland pine barren in upstate New York. Blood and feather samples were collected from songbird species at the Albany Pine Bush over the course of 4 years (2013– 2016). The samples were chemically analyzed for their mercury concentrations. We tested several specific hypotheses using separate ANOVAs including whether mercury concentrations varied by year, species, habitat location, diet, or whether the species is a year-round versus breeding-season resident. Blood-mercury levels in every sample were below the Biodiversity Research Institute's lowest risk threshold (<0.7 ppm Hg), and they did not vary by year. Although all blood-mercury concentrations were classified as being below low risk, it was found that some species, such as *Melospiza georgiana* (Swamp Sparrow) and *Dumetella carolinensis* (Grey Catbird), had significantly higher concentrations than others ($P < 0.0001$). Habitat type additionally had a significant effect on mercury concentrations, with wetland birds having 2x higher concentrations than birds that lived in more upland habitats. Our analysis suggests that mercury is not a significant pollutant at Albany Pine Bush and that the preserve is a healthy ecosystem in terms of mercury pollution. The variance in effects of our proposed hypotheses demonstrate that factors such as habitat influence mercury exposure in birds. The study site thus presents favorable mercury values and illustrates a model of positive management that can serve as a comparison for sites with high risk of mercury exposure.

Sat- 44

White-tailed Deer Endozoochory: A Year of Pellet Germination and Analysis

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Abstract - *Odocoileus virginianus* (White-tailed Deer) are the most abundant large herbivore in eastern North America. Capable of consuming both herbaceous and woody plant material, deer populations can significantly change community composition across landscapes. Their role as seed dispersers of native and invasive plants after ingestion (or endozoochory) was the focus of our study. We collected fecal pellet piles from 3 sites across Monroe county, NY, throughout 2016 and 2017. Each pellet pile was divided into thirds and either stored in a freezer or placed outside to germinate in sun or shade plots. The stored samples were processed in a soil dispersion mixer and rinsed through a sieve to extract seeds for identification. Both native and invasive species germinated in our samples or were extracted from pellets and provided insight into species capable of surviving the ruminant gut and temporal feeding behaviors of deer.

Sat- 65

Can You Hear Me Now? Changes to Winter Bird Vocalizations in Response to Anthropogenic Noise

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Abstract - Birds vocalize for many reasons, including communication of potential threats, and alerting others to new food sources. These vocalizations are a reliable source of information that birds depend on in the harsh winter months. We focused on winter vocalizations, which are dominated by simple calls, not songs, because not many researchers focus on bird behavior outside of breeding season. We predict effects of anthropogenic noise on call vocalizations will result in changes similar to those seen in bird songs. This investigation of winter vocalizations focused on *Poecile atricapillus* (Black-capped Chickadee) and *Spinus tritis* (American Goldfinch). We conducted this study at 7 sites: a recording at each of 2 Roemer Arboretum sites, 1 recording at the Genessee Valley Conservancy (GVC) Island Preserve, 1 recording at the GVC Research Reserve, and a total of 4 recordings at 3 different private properties with different exposures to anthropogenic noise. We set up a bird feeder for a week before recordings were performed at each site. Recordings were made at hour-long intervals for each site during the morning (6–10 am) and the afternoon (12–5 pm). During the recordings, we noted bird behavior and which species visited the feeders. We analyzed each recording using Cornell Ornithology Lab's Raven Pro software to measure maximum frequency and minimum frequency at which the birds recorded called. We also analyzed the length of calls and the length of time between notes in each call, all features of song that change with anthropogenic noise. Preliminary results suggest both species alter the highest frequency in their calls in response to anthropogenic noise. We will report on differences between species, sites, and the relationship of other vocalization characteristics to anthropogenic noise.

Sat- 45

Trophic Transfer of Microplastics in *Phalacrocorax auritus* (Double-Crested Cormorant) and Fish in Lake Champlain

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Abstract - The goal of this research was to determine whether microplastics (MP) result in trophic transfer within invertebrates, fish, and *Phalacrocorax auritus* (Double-crested Cormorant) resident to Lake Champlain. We did so by quantifying and characterizing (e. g., fragment, fiber, film, foam, pellet) plastic particulate. We performed wet peroxide oxidation digests on digestive tracts of 665 lake organisms, specifically invertebrates (as detailed in a colleague's poster presentation), Double-crested Cormorants, and 15 species of fish: *Salvelinus namaycush* (Lake Trout), *Micropetrus salmoides* (Largemouth Bass), *Esox lucius* (Northern Pike), *Amia calva* (Bowfin), *Micropterus dolomieu* (Smallmouth Bass), *Salmo salar* (Atlantic Salmon), *Ameiurus nebulosus* (Brown Bullhead Catfish), *Perca flavescens* (Yellow Perch), *Archosargus probatocephalus* (Sheepshead), *Morone americana* (White Perch), *Lepomis macrochirus* (Bluegill sunfish), *Osmerus mordax* (Rainbow Smelt), *Cottus cognatus* (Slimy Sculpin), *Ambloplites rupestris* (Rock Bass), and *Alosa pseudoharengus* (Alewife). Our research indicated that fibers were the most common (80.1%) type of particulate found in all organisms, followed by fragments (9.64%), films (6.36%), foam (3.01%), and pellets (<1%). The fish species Bowfin contained the greatest average number of plastic particulate (mean = 29.67), followed by Lake Trout (mean = 22), and Northern Pike (mean = 18.42). Among digested fish, stomachs contained the greatest mean number of MPs (mean = 5.84), followed by the esophagus (mean = 5.48) and intestines (mean = 4.76). These findings illustrate trophic transfer in addition to direct consumption of MP's in Lake Champlain organisms, as invertebrates, fish, and Double-crested Cormorants contained on average 0.615, 6.49, and 22.93 microplastic particles, respectively. Results from this research serve to inform residents of the Lake Champlain watershed, anglers, non-profit lake organizations, as well as public health and government officials of the risks microplastics pose to aquatic biota and ultimately humans.

Sun- 67

Habitat Preferences and Species Distribution Models for Bats in the Delaware Water Gap National Recreation Area

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Abstract - Following the arrival of the fungal disease white-nose syndrome (WNS) in North America in 2006, massive mortality of hibernating bats has made the conservation of these species a critical concern. Improvements in technology for acoustic monitoring and automated call classification have led to new survey methods to assess bat population status and distribution. One new survey technique, mobile acoustic transects, can assess bat activity over large areas and is now widely used for surveying bats. We have been making car-based mobile transects in the Delaware Water Gap National Recreation Area (DEWA) in Pennsylvania and New Jersey since 2012. Echolocation calls recorded along these mobile transects are identified to species using the SonoBat 3 autotransmitter and then mapped along the transect route using GIS and the program TransectPro. Our past work has used this transect data to assess post-WNS activity levels and the distributions of bat species in DEWA. The present study uses transect data to assess bat habitat preferences and develop species distribution models. We used vegetation data layers in GIS to compare the vegetation types where different species were recorded along our transects. We then produced a MaxEnt model in R to develop species distribution models for bats within DEWA. We found significant habitat preferences for *Eptesicus fuscus* (Big Brown Bat), *Lasiurus borealis* (Eastern Red Bat), *Lasiurus cinereus* (Hoary Bat), and *Lasionycteris noctivagans* (Silver-haired Bat). Low detection rates precluded the development of distribution models for *Perimyotis subflavus* (Tri-colored Bat) and for species in the genus *Myotis*. Future transects that pass through a greater variety of habitat types should increase the applicability of these models.

Sat- 71

The Northern Waterthrush: Analyzing the Distribution and Abundance of a Secretive Songbird in Pennsylvania

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Abstract - *Parkesia noveboracensis* (Northern Waterthrush) showed a drastic decline between the first and second Pennsylvania Breeding Bird Atlas (PBBA) efforts. This is one of the largest declines of any Pennsylvania breeding species in the ~20 years between the 2 atlas periods. This decline is especially concerning because, while all of the blocks were surveyed in the first atlas, the effort was more extensive in the second atlas. During the second PBBA, data suggested a slight northward range contraction and perhaps a more noticeable increase in elevation of occupied blocks, both trends implicating climate change as an influence on the population. This study further refines the distribution shown in the latest atlas effort and investigates potential factors that may be responsible for detected changes in distribution. In the spring of 2017, extensive wetland surveys were conducted in Northampton, Monroe, and Pike counties in Pennsylvania for singing males. At each of the 12 occupied sites found, 2 point counts were conducted to characterize the avian community in Northern Waterthrush habitat. Measurements on vegetation structure/composition and hydrology were also collected. These data characterizing occupied Northern Waterthrush habitat will be compared to currently unoccupied sites where individuals were detected either during the 2nd PBBA or sites with suitable habitat where no individuals were detected during our own targeted wetland surveys. In the process of conducting this study, natural history data/observations will also be collected including data on reproductive behavior, which is lacking in Pennsylvania.

Sat- 48

Assessing Effectiveness and Community Response to Different *Alliaria petiolata* Eradication Methods

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Abstract - The eradication of the invasive biennial forb *Alliaria petiolata* (Garlic Mustard) and the restoration of invaded forest habitats present important linked challenges to land managers in North America. Root and leaf-litter exudates from Garlic Mustard contain allelopathic secondary compounds that may interfere with root colonization by mutualistic mycorrhizal fungi for a number of native tree and understory species, thereby impacting growth and recruitment. Removing Garlic Mustard by hand and by glyphosate herbicide application have both been used as eradication strategies in the Northeast. There are advantages and disadvantages to both eradication methods, such that both methods require many years of applications to deplete the Garlic Mustard seed bank. In order to inform effective management practices, there is a need to better understand both Garlic Mustard population and native plant community responses to these techniques within multi-year and multi-site eradication. In this study, we established experimental Garlic Mustard eradication plots with pulled and sprayed treatments, to compare with invaded and uninvaded control treatments, in 4 temperate forests in the Northeast. We conducted baseline and annual vegetation surveys each spring for 4 consecutive years and applied annual eradication treatments following the annual surveys. Our results represent the plant community during and after 3 consecutive years of eradication treatments. We found no reduction in Garlic Mustard seedling abundance following 3 years of treatments, regardless of eradication method. Adult Garlic Mustard abundance in pulled plots ($n = 12$) was significantly lower than invaded reference plots ($P < 0.05$). Plant diversity indices including species richness and Shannon diversity were lower in uninvaded plots ($n = 12$) than in the other 3 treatments ($P < 0.05$). Results indicate that manual removal is more effective than herbicide application for reducing adult Garlic Mustard plants, thereby reducing or preventing new contributions to the seed bank. Furthermore, annual removal of Garlic Mustard must be continued until the seed bank is exhausted. In terms of community response and recovery, the results indicate that managers should not use increased diversity as a baseline for restoration at these sites. Additionally, disturbance and micro-site variation should be considered as potential drivers of community diversity and composition at these sites.

Sun- 2

Pastures and Hayfields: An Assessment of Soil and Plant Health at Essex Farm

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Abstract - Agricultural land management shapes the plant community and soil fertility of pasture ecosystems. Our goal was to assess the impact of agricultural land management practices on plant communities and soil properties in fields at >445-ha (>1100-acre) Essex Farm, Essex, NY, which produces dairy, vegetables, meat, and grains without using synthetic fertilizers. We compared current plant community diversity and composition of 4 fields with different histories of mowing and rotational grazing and evaluated soil nutrient changes over time from field nutrient analyses conducted on samples from 14 grazed pastures and 7 mowed fields in 2010 and 2015. We hypothesized that pasture fields would have healthier soil and plant communities than the grass hay fields due to the beneficial impacts of rotational grazing. Stratified random sampling found higher levels of plant species richness and evenness in rotationally grazed fields, and a healthier balance of grass, legumes, and forbs than in the grass-dominated mowed fields. Overall, considering all fields, the Essex Farm pasture fields had healthier soil nutrient levels than the grass hay fields, with significantly higher levels of organic matter, cation exchange capacity, and calcium levels than mowed hayfields. Fields under both types of land management had soil nutrient levels in the average to above average category for each nutrient, most likely due to benefits of rotational grazing and the application of fertilizer on mowed hayfields. These results suggest that rotational grazing has benefits over mowed fields to both the soil and plant community health, making it a beneficial practice for farmers.

Sat- 29

Biological Soil Crusts in the Northeast: They're not just for Deserts Any More

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Abstract - Biological soil crusts are diverse communities of lichens, mosses, cyanobacteria, and algae that bind together surface-soil particles. Though these ecologically important communities are best-known and most-studied in arid and semi-arid climates such as the desert southwestern United States, crusts can be found in a range of environmentally stressful conditions in which vascular plant cover is limited. We detail for the first time the prevalence of crusts in inland sand barrens of the northeast. The plant canopy in these ecosystems is typically kept open by a combination of deep, sandy soils that create xeric conditions, low productivity, and frequent fires. We found a diverse assemblage of lichens, mosses, and algae forming crust communities at 11 different barrens in New York, Massachusetts, New Hampshire, and Maine. Many of these sites are already protected and managed for their unique plant and animal assemblages, but in few cases were the crust communities a recognized component of their biodiversity let alone considered in management decisions. The crusts at these sites were similar in composition and function to the dryland crusts, but also differ in ways that are not well understood. We encourage ecologists and managers already working in mesic temperate barrens to acknowledge and appreciate the diverse and vital biocrusts underfoot, and to make an effort to integrate biocrust ecology into a more holistic view of, and research agenda for, these systems.

Sat- 30

Nonbreeding Habitat Use of the Common Loon (*Gavia immer*) in Newport, RI

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Abstract - Over the course of 5 years, we conducted a study observing the distribution and habitat use of the Common Loon (*Gavia immer*) along Newport Neck, RI. We observed Common Loons in winter along the eastern shore of Newport Rhode Island's Cliff Walk where its irregular shoreline provides sheltered inlets and coves for foraging. We divided the 5.6-km Cliff Walk into 6 sections for this study, with sections 1 and 3 having the most protected coves; sections 2 and 6 included small, slightly protected coves; and sections 4 and 5 were adjacent to the most open ocean. Surveys were conducted during the winter months (Nov–Apr) of 2006–2007, 2010–2011, 2014–2015, 2015–2016, and 2017–2018. We made field observations using 8 x 40 binoculars and a 15–40x spotting scope, observing birds within 500 m of the coast line. We surveyed 256 Common throughout all years of study. Because we found no effect of month or year on abundance, data were combined across all years. Results suggest that Common Loons arrive by late October, and spring migration begins towards the end of March. Results also show that the average number of Common Loons observed per survey section was not significantly different than expected by chance ($P = 0.65$), indicating that this species uses the entire Newport Neck for foraging. Additionally, Common Loons were most often observed foraging alone, suggesting that they roost in flocks in deeper water and separate and divide into exclusive foraging zones along the coast line in relatively shallow water.

Sat- 47

SPARCnet Year 1: Preliminary Results of a Long-term Mark–Recapture Study on *Plethodon cinereus* (Eastern Red-Backed Salamander) in Bridgewater, MA

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Abstract - The Salamander Population Adaptation Research Collaboration Network (SPARCnet) is a collaborative network of researchers throughout northeastern North America who work to discover the effects of climate change and land use on populations of *Plethodon cinereus* (Eastern Red-Backed Salamander). Bridgewater State University (BSU) became a collaborator of this project in the fall of 2016. This poster presents our first year of capture–mark–recapture data from 6 plots on BSU’s campus. In 2017, we sampled each plot 12 times (6 times in the spring and 6 times in the fall). We marked all captured salamanders with visual implant elastomer (VIE) and collected biotic data including, snout–vent-length, total length, sex, reproductive status, and color morph. We also recorded abiotic data, such as soil and air temperature, during each visit. Over the course of our field work, we marked 301 individual salamanders and observed over 500 individuals including recaptures. Capture rates are higher in the fall ($n = 305$ captures) compared to spring ($n = 203$ captures); capture rates also varied between the 6 plots (min–max = 17–197; mean = 84.7; standard deviation = 68). Once the data was compiled, we performed various analyses including estimated population size, spatial distribution of salamanders within plots, and seasonal abundance. The results of these analyses are going to be shared with the rest of the collaborators to draw regional conclusions about *P. cinereus*. In the future, this project will be exploring climate-change effects on the salamander population via comparison of snow-removal treatments with control plots, along with other studies aimed at testing environmental factors such as soil composition and light exposure.

Sat- 4

Assessing Impact of Dam Removal on *Anguilla rostrata* (American Eel) in the Mill River, Taunton, MA

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Abstract - *Anguilla rostrata* (American Eel) is a catadromous fish that has been listed as endangered on the ICUN red list (Jacoby et al. 2014), though not currently listed as endangered by the US Fish and Wildlife Service (ECOS 2017). Stream barriers have negatively impacted populations of *Anguilla rostrata* throughout New England (Limburg and Waldman 2009). The objectives of this study are to compare changes in density of elvers and yellow eels (2 of the life stages of American Eels) above and below the Reed and Barton Dam before and after its removal in January 2018 on the Mill River in Taunton, MA, and to determine if PIT (Passive Internal Transponder) tagged yellow eels move upstream after the dam is removed to evaluate stream restoration efforts. Eels under 200 millimeters were considered elvers and only yellow eels above 250 mm were PIT tagged. We PIT-tagged a total of 111 American eels during the fall sampling period out of 732 eels captured by backpack electrofishing. All eels were tagged at 2 sites downstream of the dam at Taunton State Hospital or 2 sites upstream of the dam at Whittenton Mills. Sixty seven eels were PIT-tagged at the Taunton State Hospital site on the Mill River as part of a long-term study of the movement of yellow phase eels past stream barriers and 44 at Whittenton Mills. Out of 111 eels tagged, 19 recapture events occurred for the 2 locations. Average density of elvers and yellow eels in riffle habitat was higher downstream of the dam during Fall 2017 sampling at the Taunton State Hospital site, averaging 73 per 100 m² versus 50 per 100 m² above the dam at Whittendon Mills. Densities were lowest (24 per 100 m²) in the deeper channel habitat near the riffle habitat. Average total length decreased noticeably for surveys in October at both Whittenton Mills and Taunton State Hospital and may be linked to downstream Fall migration of larger yellow phase.

Sat- 12

The Regeneration of a Rare Forest Type, Pitch Pine Duneland, in Coastal Maine

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Abstract- *Pinus rigida* (Pitch Pine) reaches the Northern extent of its range in south-coastal Maine. While all 4 Pitch Pine community types found here are considered rare, only the Pitch Pine dune woodland is ranked S1, or critically imperiled, due to its scarcity in the state. These woodlands are important ecologically as they help to stabilize dunes and create unique habitat that supports diverse wildlife. In 1998, one of the few extant stands of Pitch Pine dunes in Maine was surveyed at Bates-Morse Mountain Conservation Area in Phippsburg. Current research aims to elucidate the successional stage and overall health of the stand by comparing past and present age distribution, density, and species composition. Additionally, dendrochronology was used to measure the age and growth rate of these long-lived trees. Pitch Pine is dependent on disturbance to create the conditions optimal for its colonization and persistence in an area. Fire-suppression efforts, often related to extensive beach development in the area, have thus threatened the ability of Pitch Pine to regenerate and maintain its ecological niche. By reconstructing changes in stand dynamics and growth rates incurred over the past 20 years, it will become possible to predict whether the stand will endure without the intervention of human or natural disturbance.

Sun- 43

Impacts of the Invasive Round Goby on Benthic and Pelagic Prey in Lakes

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Abstract - *Neogobius melanostomus* (Round Goby), an invasive species in the Great Lakes, has begun to invade new territories in the Finger Lakes of New York. It is known to forage primarily on Dreissenid mussels and *Salvelinus namaycush* (Lake Trout) eggs, but their impact on other lake invertebrates is unknown. Observations of declining snail populations and abundant pelagic invasive mysids (*Hemimysis anomala* [Bloody Red Shrimp]) led us to conduct tank-feeding studies to assess consumption patterns and rates. We hypothesized that Round Goby can change the benthic invertebrate community composition in invaded lakes. Round Goby not only consumed snails but preferred some families (*Physidae*) over others. Bloody Red Shrimp were consumed at a low but variable rate, and more in summer than fall. Smaller goby consumed more in June, but all gobies consumed few Bloody Red Shrimp in September, indicating that season-dependent foraging occurs in the water column in addition to benthic prey. In conclusion, these studies indicate that Round Goby will forage on a variety of invertebrates depending on life stage, environmental conditions, and phase of invasion in new waters

Sat- 13

Pollinator Abundance and Distributions in Marginal Urban Habitats Including Green Roofs

Brian Dagley (University at Albany, SUNY, Albany, NY; bdagley@albany.edu)

Abstract - Novel urban environments such as green roofs have been recognized for their conservation potential for insect pollinators, but their biodiversity needs further confirmation and comparison. I surveyed bees and wasps using insect nets and pitfall traps in several locations selected as urbanized target sites and reference areas for comparisons. I compared samples from the University at Albany, SUNY campus (meadow, garden, and pond) to records from the nearby Albany Pine Bush Preserve. Two green roofs were sampled, intensively at the Doane Stuart School (Rensselaer County), and partially at the New York City High Line for supporting data. For all sites, I classified surrounding land cover within a 2-km radius. Sampled diversity in Upstate NY was similar to comparable studies in the Northeast, with a pooled collection of 48 bee and 35 wasp taxa, and presence well distributed between sites. The university and school green roof surveys found 33–30% of state bee genera and 5–8% of species. Between these locations, 27% and 42% of bee and 40% and 29% of wasp genera and species, respectively, were shared. Sixty-nine percent of park bee species were present at the university or school, and 52% of university species were present at the preserve. Surrounding greenspace and forest was higher for the preserve and school roof than the university and High Line, which may partially explain the higher bee diversity of the former and occurrence of the most families (5 and 6, respectively, out of a total of 6 known from NY State). Like the preserve, the meadow's high pollinator diversity compared to that of the school roof may be attributed in part to its connection to unaltered forest. The garden's low plant diversity of 2 may explain why it had the lowest bee diversity despite the highest abundance. In line with previous studies, variation in site characteristics as well as surrounding landscapes were correlated with differences in pollinator diversity. However, it is interesting that a wide-ranging subset of pollinators can occur in such different circumstances, and characterizing them may aid in setting expectations for ecological restoration in urban areas.

Sun- 10

Correlations in Autumn Leaf Color Change and Cardinal Direction

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Abstract - I tracked autumn leaf coloration through repeat photography of Maine mountains in September to November 2017. Preliminary results suggest that the cardinal direction of slopes correlates with timing of leaf color change. These correlations may relate to the abilities of anthocyanins to protect against temperature and UV light damage. One way to measure color change is to compare the point at which mean red intensity surpasses mean green intensity: east and south slopes reached this point before north slopes, while west slopes exhibited greater red intensity over course of the entire study. Preliminary analysis also suggest that dawn temperatures had a significant effect on the ratio of red to green, with higher ratios associated with colder temperatures. Together, these results encourage future research in autumn leaf color change to explore the protective role of anthocyanins.

Sat- 36

Spatial Prioritization of Invasive Species Management and Survey Efforts

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Abstract - As a major threat to biodiversity, invasive species are a constant challenge for natural resource managers, and there is a growing need for tools to help prioritize limited conservation funds. Integrating data sources and creating map models that highlight both conservation value and invasion risk can help guide management decisions. We developed a synthesis map layer for New York to help conservation partners decide where to focus their efforts when surveying and managing for invasive species. The model indicates areas predicted to have high-value natural areas prone to new invasive species populations and dispersals by incorporating component models of ecological significance, priority protected areas, and anthropogenic stressors. Stakeholder workgroups helped shape the output and provided valuable use-case examples. The maps are incorporated into the NYS Invasive Species Database through the iMapInvasives interface.

Sun- 5

Assessing the Validity of an Invasive Species Prioritization Model

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Abstract - Invasive species are one of the world's leading threats to biological diversity. The introduction and spread of non-native invasive species causes tremendous ecological and economic harm on a local, regional, and international scale. As such, there has been an increase in interest in assessing the distribution of invasive species, researching their effects on native species and ecosystems, and determining the most cost-effective conservation actions to minimize their ecological and economic impacts. Given that land managers typically have limited funds, it is important to be able to prioritize management efforts (both in terms of time and money). But where should research and conservation efforts be directed? In 2016, the regional Capital-Mohawk PRISM Conservation Committee created a spatial model to help land managers prioritize their efforts so that they can focus their limited resources on high quality areas that are likely to be invaded by invasive species, but no field validation of the accuracy of the model was done. In 2017, we sampled vegetation in 20 m x 50 m forest plots at 16 forest tracts in and around the capital region of New York State. We calculated measurements of floristic quality, species richness, and the proportion of native to non-native plants to assess that site's ecological significance and risk of invasive spread. In general, the model predictions were supported by the field data, with a few exceptions (e.g., Schodack Island State Park and dredged soils). Sites with low ecological significance were more variable in percent non-native species and indicators of site quality (mean C, Floristic Quality Index (FQI)). Sites with high ecological significance had less variability in percent non-native species and indicators of site quality, indicating that they may be more resilient to invasion by non-native species. Results indicate support for the model.

Sun- 6

Reproductive Benefits of Natal Philopatry in *Dolichonyx oryzivorus* (Bobolink) and *Passerculus sandwichensis* (Savannah Sparrow)

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Abstract - There are 3 primary benefits of natal philopatry in grassland birds: (1) prior knowledge about the resources in an area, (2) local adaptations, and (3) outbreeding avoidance. Breeding experience plays a crucial role in reproductive success, and experienced females often have an advantage over inexperienced females. However, the benefits of natal philopatry may increase reproductive success of first-time breeders. We examined the effect of natal philopatry on reproductive success in female *Dolichonyx oryzivorus* (Bobolink) and *Passerculus sandwichensis* (Savannah Sparrow) who returned to breed within 8 km of their natal field in the Champlain Valley of Vermont. Between 2002 and 2016, we banded 2132 Bobolinks and 1916 Savannah Sparrows as chicks. In 2003–17, we found, recaptured (to identify), and monitored the nests of 36 female Savannah Sparrows and 63 female Bobolinks. We first assessed reproductive success of birds who returned to their natal field, regardless of age, against those who were born elsewhere to see if high natal philopatry conferred an advantage. Second, we compared reproductive success of birds who returned to their natal field for their first breeding season against all newly banded birds (presumed to be in their first breeding year) who were born elsewhere. Third, we assessed reproductive success of females who returned to their natal field for their first year of breeding against females who returned for their second or more year of breeding but were born elsewhere. Finally, we assessed adults who were born on a nearby study field, but had previously bred on the study field against others who had bred previously on the study field but were born elsewhere (e.g., on fields > 3 km away).

Sat- 49

Common Loon Vocalization Activity on Undeveloped Adirondack Lakes: Lake Size Matters

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Abstract - Vocalization is a means of transmitting a message from one individual to another individual of the same or different species. Species can change their call strategy to adapt to local conditions. Yet increasing urbanization (and anthrophony, or human-derived sound) has influenced the soundscape of many northeastern lakes and affected animal behavior and biophony. The acoustic adaptation hypothesis (AAH) states that more vocalizations will occur in more densely vegetated/packed areas. *Gavia immer* (Common Loon) is an iconic species known for a variety of low frequency vocalizations such as the wail, the tremolo, the yodel, and the hoot. We hypothesized post-nesting Loon call activity would decrease with increasing lake size and show a diurnal pattern. We placed sound recorders at 4 undeveloped Adirondack lakes (area = 0.46–2.17 km²) for 6 nights. Total vocalizations were negatively related to lake size ($R^2 = 0.94$). The greatest average calls per hour were on the smallest lake, Arbutus (7.91), nearly twice that of the lowest call rate, which was on the largest lake, Catlin (4.32). Wails and hoots were more frequently used on the 2 smaller lakes. Loons on smaller lakes called more frequently in early morning (5:00–7:00), while calls on the larger lakes were distributed throughout the night with a drop in activity at 2:00–3:00. Our result concurs with the AAH, given smaller lakes have more densely packed shoreline vegetation and a larger perimeter-to-area ratio. Loons may optimize long-range communication with certain call types on larger lakes. Our study supports the idea that Loon vocalizations, and by extension, soundscapes, may be influenced by geography. However, mechanisms behind Loon vocalization activity remain complex and relate to breeding status, age, predation risk, time of the year, and other factors. As one of the most charismatic species in the Northeast, an understanding of Loon behavior is useful for wildlife conservation. Loon vocalization activity and lake-use patterns suggests attention to shoreline development is needed with regard to land-use policy.

Sun- 57

Consequences of Divorce on Reproductive Success of Grassland Songbirds Breeding in Vermont Hayfields and Pastures

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Abstract - *Dolichonyx oryzivorus* (Bobolink) and *Passerculus sandwichensis* (Savannah Sparrow) are grassland songbirds that breed in hayfields and pastures in New England. These birds have complicated mating systems, as they are both socially and genetically polygynous. Furthermore, both species have relatively high annual apparent survival, which creates the opportunity to respond to previous years' reproductive success. We studied the frequency, cost, and benefit of divorce, defined as the choosing of a different social male by a female to nest with, on reproductive success. We explored divorce both within and between breeding seasons. In 2002–2017, we monitored 930 Savannah Sparrow and 505 Bobolink nests where both the associated social male and female were identified. Divorce yielded no cost or benefit in terms of reproductive success in either species. However, surprisingly, Bobolinks who divorced between years had higher reproductive success the previous year than mates that did not divorce, suggesting that divorce was not an adaptive strategy for Bobolinks.

Sat- 50

Geographic Variation in the Fecundity of the Invasive Asian Shore Crab in Southern New England

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Abstract - *Hemigrapsus sanguineus* (Asian Shore Crab) is a common and widespread invasive species on the coast of New England, and has caused large declines in the abundance of its prey and competitors on rocky shores of this area. It has had success not only because it aggressively out-competes resident crabs for food and shelter, but also because it reproduces more rapidly, producing more and larger broods each year than resident species. It is unclear, however, how fecundity of Asian Shore Crab varies geographically or with changes in abundance of putative prey species. In this study, we examined fecundity of Asian Shore Crab (i.e., number of eggs per ovigerous female) at 8 rocky intertidal sites in Massachusetts and Rhode Island. Although Asian Shore Crab is generally more abundant at sites south of Cape Cod than at those north of Cape Cod, preliminary results suggest no significant association between latitude and fecundity. In contrast, fecundity was strongly positively correlated with abundance and mean body size of a preferred prey species, *Mytilus edulis* (Blue Mussel), suggesting that energetic consequences of prey availability may drive reproductive success of Asian Shore Crab.

Sat- 52

Urban Woodland Gardening as a Mechanism for Sustainable Landscaping and Recommendations for the Bates College Campus

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Abstract- Insights from the relatively new field of urban ecology can guide efforts to conserve wildlife within urban environments. In this presentation, I review the literature on different factors that contribute to the conservation of wildlife species, like birds and insects, in urban environments. A large portion of this literature emphasizes the quality and quantity of vegetation presence as the predominating factor for conserving biodiversity in urban landscapes. Although exotic vegetation can provide benefits to wildlife in urban settings, I argue for the superior conservation value of native plants in New England gardens. Urbanization has significantly reduced the presence of native tree and herb species in the region throughout the 20th and 21st century. Spaces like the Bates College campus could play a role in regenerating New England's native plant life within urban surroundings, with implications for creating habitat for native wildlife. Replacing exotic ornamentals with native plants would substantially raise the conservation value of the Bates College campus. Native plant gardens on campus could also generate a greater community awareness of naturalistic landscaping as a mode of best practice in urban environments.

Sun- 8

Water-Holding Capacity in Sphagnum: Micro CT Scanning Reveals Differences in Pore Structure

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Abstract - Species in the wetland plant genus *Sphagnum* engineer ecosystems by altering nutrient and water cycling and storage. *Sphagnum* plants hold water both internally and externally, with up to 80% held within capillary spaces among leaves and branches. Water retention and movement depend on hydraulic properties, which can be modeled within capillary spaces. These properties can help explain the water-holding capacity in *Sphagnum* and how these differ across species. To better understand external water holding among *Sphagnum* species, we used micro CT scanning to characterize the structure of pore water spaces within leaves and branches. We collected 3 species of *Sphagnum* in the field: *S. subsecundum*, *S. palustre*, and *S. angustifolium*. These differ greatly in terms of cellular characteristics and represent distinct ecological groups in *Sphagnum*. Three mature branches from each type of *Sphagnum* were stained in $\text{Pb}(\text{NO}_3)_2$, imaged using a micro CT scanner, and reconstructed to generate 3D model for comparison. Scans were unable to fully resolve cellular detail, but could reconstruct leaf morphology. We used a shrinkwrap technique to simulate the external water-holding spaces within branches at different radii of curvature, which correspond to water held at particular water potentials (-0.21 MPa). The ratios of water volume to leaf volume were calculated and were compared using ANOVA. For *S. subsecundum*, the mean ratio was 1.44 ($n = 3$) and this was significantly lower ($P = 0.02$) than for *S. angustifolium* (2.22). Understanding the mechanism that leads to differences in water holding capacity is helpful to understand the functional role of *Sphagnum* in ecosystems.

Sat- 58

Leafminers of North America

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Abstract - Leafminers are insects whose larvae live and feed between the epidermal layers of leaves for part or all of their development. In North America, they include about 40 species of Hymenoptera (sawflies), over 200 species of Coleoptera (beetles), well over 600 species of Diptera (flies), and well over 1200 species of Lepidoptera (moths). Most are specific to one or a few related plant genera, and each produces a characteristic pattern (mine) in the leaves of its hostplant. Many species are more readily identified by their leaf mines than by examination of adults, but until now there has been no guide to the identification of North American leaf mines. Since 2011, I have conducted a thorough literature review and traveled throughout the US to photograph, collect, and rear leafminers. I have now constructed dichotomous keys to the known mines on every plant genus in North America, which I am self-publishing as an e-book in monthly installments. The result is not only an identification guide, but a guide to discovering new natural history information and new species. Byproducts of this project have included published descriptions of 7 new leafminer species, with dozens more in press, in review, or in preparation. Twelve (and counting) additional publications have documented new host and distribution data for known species. Given how much is left to learn about these insects, my hope is that others across the continent will use this guide to focus collection and rearing efforts on adding to scientific knowledge.

Sat- 20

Evaluating Bioremediation Potential for Plastic Pollution with Wax Worms, *Galleria mellonella*

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Abstract - Researchers have been seeking methods to address plastic pollution problems. These approaches include diverse potential solutions such as oceanic harvesters, washing machine bags that limit fiber emissions, and bioremediators. In 2015, researchers determined that 100 caterpillar larvae of *Galleria mellonella* (Greater Wax Moth), also called Wax Worms, were capable of consuming 92 mg of polyethylene in a 12-h period. In order to assess Wax Worms's potential as bioremediators, we ran pilot trials using 5 worms under low and high light conditions and exposed them to different forms of plastic such as PVC (tubing), PET (water bottle), polypropylene (bottle cap), ethylene/vinyl acetate (inner liner bottle cap), and hydroxypropyl methyl cellulose (overhead projector sheet), as well as no plastic (control worms). Additional trials (including additional plastic types) are in progress with adjustments in conditions and worm abundance based on pilot study findings. FT-IR (Fourier Transform Infrared Spectroscopy) was used to verify both plastic and fecal polymer composition. Both worms and plastics were photodocumented before and during the experiment to assess signs of foraging (e.g., channeling, chewing) morphological changes in plastics. Fecal material was found to be nylon and azlon (casein) suggesting worms are processing plastic. Consumption of plastic varied across polymers, specifically more polypropylene, PET, and hydroxypropyl methyl cellulose was consumed compared to other types. Channeling was noted on several plastic pieces. Our lab experiment will serve as a baseline for future testing of the bioremediation potential of Wax Worms at addressing small-scale plastic pollution.

Sun- 25

Bat Occupancy in Two Habitat Types in Private Conservation Lands of Southeastern Massachusetts

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Abstract - Bats (Order: Chiroptera) are among the most diverse mammalian lineages in North America, and they occupy a wide variety of habitats. Different types of habitats—open spaces, forest edges, and forest interior—substantially vary in resource distribution and spatial structure (clutter), and therefore foraging strategies as well as echolocation signatures of bats can vary substantially among different habitats. In order to explore this hypothesis, we deployed 2 automated SM3BAT Bioacoustics Recorders (Wildlife Acoustics, Inc.) in a forest-edge habitat and a cluttered habitat located in Mass Audubon's Moose Hill Wildlife Sanctuary, in Sharon, MA. Forest edge habitat is a low-shrub dominant open area surrounded by a deciduous forest edge while the cluttered habitat is a mixed hardwood-coniferous forest containing 2 vernal pools. Analysis of the bioacoustics data through Kaleidoscope Pro software confirmed the presence of 6 bat species during the 2017 active season. Our preliminary analysis showed relative high nightly passes of *Myotis lucifugus* (Little Brown Bat) altered from the forest edge habitat in early spring to the closed habitat in mid- to late summer. Our preliminary conclusions concerning *M. lucifugus* are that this could be related to either changes in foliage density as the season progressed or food availability. Further investigation and data is required. We plan on continuing our research and data collection through the 2018 season.

Sat- 68

DNA Barcodes of Roots Collected from an Urban Forest to Determine Biodiversity

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Abstract - We took soil core samples from the center and edge of the Thain Family Forest at the New York Botanical Garden, Bronx, NY, to identify plant species from their roots. As it is an urban forest where non-native species have been introduced, with differences between the edge and the center. One objective was to analyze soil core samples for root content as an easy technique for measuring plant diversity. The second was to determine whether the biodiversity of the forest increased or decreased from the center of the forest to the edge. We extracted and sequenced the roots in the soil samples. We used DNA barcoding to identify the species of the roots collected. Of the 28 species that were successfully identified in the edge and center of the forest, 10 were shared. We compared the results of both locations to an existing reference library of the forest. The most common species found in both areas was *Pinus strobus* (Eastern White Pine). The species *Betula lenta* (Sweet Birch) and *Alnus glutinosa* (European Alder) were identified in the center, but not in the edge. While *Populus deltoides* (Eastern Cottonwood) and *Fagus grandifolia* (American Beech) were only found at the edge.

Sat- 63

Baseline Data for Study of Powerline Rights of Way Management in Delaware County, NY

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Abstract - Powerline Rights of Way (ROW) are the land areas beneath the powerlines that are usually managed by the power company. Rights of Way are important habitats for birds, insects, and small mammals. The most common management practice in ROWs is Integrated Vegetation Management (IVM), typically involving the use of herbicides. This form of maintenance keeps the ROWs safe for electricity transmission and minimizes management visitation. The Delaware County Electric Cooperative maintains some ROWs on land whose owners do not want herbicides used. This study was designed to gather baseline data for later assessment of alternative management strategies (IVM, basal oil application on woody stumps, and clipping of woody plants by the land-owner) for their maintenance of safety and biodiversity. At 3 ROW sites in Delaware County, 3 spans (areas within the ROW between adjacent powerline support structures) were sampled for plant community composition and danger-tree size using a systematic sampling technique. The plant species present at 10 cm intervals was documented along three 10 m transects (5 m apart) perpendicular to the powerline in each span, for a total of 300 sample points per span. The height and diameter of potential danger trees within 2 m of the transects were documented. Dominant species across sites were goldenrods and asters. Woody plants that could become danger trees were present in 5 of the 9 spans. Plant diversity and species composition varied widely among spans within each site. For data analysis following treatments, relative changes from these baseline data will be necessary as opposed to absolute changes.

Sun- 9

Parameterization of a Spatially Explicit Forest Model SORTIE for Addison County, VT

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Abstract - Forest-dynamics modeling is a powerful tool to understand and anticipate changes in forest composition and structure by providing a framework through which fine-scale measurements of spatial and temporal trends can be extrapolated to understand large-scale processes. SORTIE is a spatially explicit individual-tree-based model that incorporates 4 separate submodels that describe interactions of light, growth, mortality, and recruitment to ultimately determine local stand structure and composition. We developed this general model for a New England transitional *Quercus* (oak)-northern hardwood forest, but have successfully applied it across many forest types. We have partially parameterized the SORTIE model for Vermont forests in Addison County. We collected data for parameterization from trees within Middlebury's Battell Research Forest and college-owned lands surrounding Middlebury's Bread Loaf campus near Ripton, VT, between 2016 and 2018. The light submodel was parameterized from crown geometry using nonlinear maximum likelihood inference and from canopy openness using photo analysis to calculate gap light index (GLI). We parameterized the recruitment submodel using maximum likelihood inference from known locations of seedlings and adult trees. We obtained data for the growth submodel through radial ring growth in relation to tree diameter acquired through the collection of increment cores, as well as measurement of seedling rings from individuals under varying degrees of canopy cover. Future work will focus on parameterizing the mortality submodel and validating the model. Following validation, the model will be used to predict response of the region's forests to disturbance.

Sun- 44

Enhancing *Polistes* Social Wasp Populations in Farm Fields for Caterpillar Biocontrol

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Abstract - We are exploring methods of enhancing populations of predatory *Polistes fuscatus* and *Polistes dominula* paper wasps in farm fields and gardens, as *Polistes* wasps can aid in controlling caterpillar pests on *Brassica* (mustards) and *Lycopersicon esculentum* (Tomatoes). In April 2016, we installed wooden wasp nest boxes either directly into fields where crops would be planted or immediately adjacent to the fields. Responding to very low (2 of 45 nest boxes) natural colonization of nest boxes by wasps, we transplanted 17 nests into the boxes, and observed nest phenology and the wasps' prey hunting behavior over the course of the summer. In April 2017, we installed a mixture of weathered—placed out in the field the previous season—and newly constructed nest boxes at our 2016 field sites as well as at several new field sites. We recorded natural establishment of nests (no nests were transplanted in 2017) and nest phenology. During the 2017 season, wasps preferentially initiated nests in boxes located at field sites that in 2016 had housed boxes with transplanted nests ($P = 0.029$). At all sites, wasps preferred to nest in weathered nest boxes ($P < 0.001$) and produced higher maximum numbers of capped brood cells with pupae ($P = 0.046$) in weathered boxes. Although labor-intensive and not for the faint-hearted, transplanting nests may hasten the establishment at a site of a population of wasps that will, in subsequent years, colonize nest boxes on their own. Weathered nest boxes were more attractive to foundresses than newly constructed boxes, and were more productive.

Sun- 34

Modeling Growth Rates and Competitive Effects in Northern Hardwood Permanent Forest Plots

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Abstract - Understanding forest growth is important because forests provide key ecosystem services for their inhabitants, timber production, carbon storage, and recreational use. Permanent forest plots are research plots that allow for long-term monitoring of biological and chemical processes. The purpose of permanent plots is to answer questions related to tree biomass accumulation, carbon storage, and disturbance patterns. Permanent plot data can also be used to model growth over time and predict community and species level response to long-term problems such as climate change. The purpose of this study is to determine the effects of competition on growth and dispersion patterns of individuals in northern hardwood forests. Five permanent forest plots were established and measured in Rugar Woods, Plattsburgh, NY, in 2013 and have been remeasured in 2017. Plots contained 22 tree species, with *Ostrya virginiana* (Hophornbeam) and *Acer rubrum* (Red Maple) being the most common species (20% and 16%, respectively). Data collected from 2013 and 2017 will be used to determine growth rates by comparing the differences in diameter at breast height (DBH) of each individual present in all 5 permanent forest plots over this time frame. Growth models will include species-specific parameters as well as competition parameters derived from spatial data (e.g., distance to nearest neighbor, number of competitors within a given radius, etc.) that has been collected for each tree. This will allow us to assess how different species affect each other's growth when growing in relatively close vicinity. It is hypothesized that individuals with greater distances between each other will experience more rapid growth rates than individuals growing more closely together. However, species-specific shade tolerance, nutrient requirements, and reproductive mechanism (i.e., vegetative versus outcrossing) may influence dispersion patterns. Understanding forest growth dynamics is essential for predicting species- and community-level response to climate change and will assist land managers with management of forest ecosystems.

Sun- 45

Ecological Restoration of an Urban Riparian Migratory Bird Stopover Site

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Abstract - Critical to the successful fall migration of songbirds are habitats with dense cover and food, especially lipid-rich berries. Stopover habitats along the eastern US flyway are lost annually to urban development. This study is based on 6 years of autumn bird banding in a conserved riparian corridor (Sweet Flag) in the densely populated southern portion of Aquidneck Island, RI. Over the past 6 fall migrations, we have captured 1588 birds, of 63 species, varying from a maximum of 467 in 2012 to a minimum of 131 in 2017, with capture success largely based on weather and total net hours available. The 5 most common species that were captured were *Dumetella carolinensis* (Gray Catbird), *Melospiza melodia* (Song Sparrow), *Poecile atricapillus* (Black-capped Chickadee), *Geothlypis trichas* (Common Yellowthroat), and *Melospiza georgiana* (Swamp Sparrow), all short-distance migrants or winter residents. The goal of the ecological restoration is focused on increasing the use of the site by long-distance migrants. The 5 most common long-distance migrants during 2012–2017 were *Parkesia noveboracensis* (Northern Waterthrush), *Setophaga striata* (Blackpoll Warbler), *Setophaga americana* (Northern Parula), *Seiurus aurocapillus* (Ovenbird), and *Vireo olivaceus* (Red-eyed Vireo). In order to improve the quality of the Sweet Flag migratory stopover habitat, there are multiple fall high-lipid content, berry-producing shrub species we propose to establish and maintain on the site in 2018: *Viburnum dentatum* (Arrowwood), *V. lentago* (Nannyberry), *Rhus copallinum* (Winged Sumac), and *Rosa palustris* (Swamp Rose). If these shrubs provide an adequate fuel source and dense protective cover for migratory songbirds, we predict several changes in future fall migrations: increase in long-distance migrants, increase in total captures, increase in mass gain during stopover, and an increase in the ratio of adult to hatch-year birds. If the ecological restoration of this urban riparian habitat proves to be successful, it may be a good model for other watershed-buffer conservation easements in the Northeast.

Sat- 46

Environmental Effect on Enzymatic Activities of Boreal and Temperate Forest Soils

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Abstract - The aim of this study is to understand (1) which variables of the habitat regulates soil enzymatic activities and (2) their stoichiometry in boreal and temperate forests of North-East America. Beta-1-4- glucosidase, beta-1-4-N-acteylglucoaminidase, and phosphatase are related to carbon, nitrogen, and phosphorus cycles, respectively, and to the decomposition of organic matter into soils. We measured enzymatic activities on 260 soil samples using a standard spectrofluorometry method and obtained habitat variables (Water draining, Deposits, Age and Bioclimatic domain) using ecoforest maps. In an ANOVA model, bioclimatic domain was always the most significant habitat variable affecting enzymes activity. Southern and northern *Abies balsamiae* (Balsam Fir)–*Betula alleghaniensis* (Yellow Birch) forest were highly different even though they are in the same bioclimatic domain. As in other studies, we found a regulation between the 3 enzymes with a stoichiometry ratio of approximately 1:1:1. The south of the Balsam Fir–Yellow Birch and the *Acer* (maple)-Yellow Birch forests are where the recycling of nutrient is the fastest and the north of the Balsam Fir–Yellow Birch and the Balsam Fir–*Betula papyrifera* (White Birch) forests are the slowest. The next steps in this project are to determine if there is a relationship between soil microorganisms and ecological functions (BEF) and to better understand the importance of the soil potential hydrogen and potential redox in this relationship with path analysis and models.

Sat- 33

Biological Soil Crusts Inhibit Seedling Germination in an Inland Sand Plain

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Abstract - Biological soil crusts (BSCs) are soil aggregations of diverse biotic organisms like cyanobacteria and algae that are often topped off with a layer of lichen and/or moss. These crusts are best-known in arid to semi-arid regions where they can play a key ecological role, whether by physical or biological means. BSCs can stabilize the soil against wind and water erosion, be important nitrogen fixers, and promote or inhibit the growth of vascular plants. The literature has been heavily biased towards studying crusts in arid and semi-arid regions, despite the fact that they are present even in the temperate Northeast. This experiment sought to investigate the constituents of these northeastern crusts and their impact on seedling germination. Crust and bare soil samples were excised from the Albany Pine Bush Preserve (NY) using petri dishes. Twenty seeds of *Lespedeza capitata* (Round-headed Bush Clover) and *Lupinus perennis* (Sundial Lupine) were scattered onto each dish and then placed under white light. There were 10 replicates of each soil treatment (crust and bare sand). We recorded germination at emergence of the radicle and subsequently plucked the sprout to avoid intra-species interaction. Bush Clover and Lupine had a significantly greater amount of seeds germinate on bare soil than crusted dishes, 3 and 5 times more, respectively ($P < 0.0001$). Thus, we conclude that BSCs inhibit plant germination at the Albany Pine Bush and therefore can influence the spatial patterning of the plant community. Heterogeneity is likely increased in these systems due to the presence of BSCs, as the literature shows that often different species are able to germinate and establish with different rates of success. Finally, we emphasize that crusts are an under-appreciated component of northeastern barren habitats that play a larger ecological role in our region than has been recognized.

Sat- 31

Phylogenetic Relationships of Leeches and their Relatives

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Abstract - Leeches are one of the most recognized parasites locally and further afield, as they are commonly encountered in ponds, have powerful anticoagulants that result in bloody wounds, and are often depicted in popular media (e.g., films). The relatives of leeches are far less known, despite being fascinating in and of themselves. One group of leech relatives, the crayfish worms (Branchiobdellida) are common ectosymbionts of crayfish. Species of Branchiobdellida swing between mutualistic and parasitic states depending on the densities of their populations. The other closest relative to leeches are a group of worms (Acanthobdellida) that parasitize salmonid fish in far northern latitudes. While it has been clear for years that leeches, crayfish worms, and acanthobdellidans are one another's closest relatives, the exact relationships between the groups have been difficult to determine. Here, we present the largest phylogenetic reconstruction of these groups. Our results strongly indicate that leeches are most closely related to the acanthobdellidans, suggesting a single origin of bloodfeeding. Additionally, we produce a revised classification of several members of these groups.

Sun- 32

Historical Trends of Benthic Invertebrate Biodiversity Spanning 182 Years in a Southern New England Estuary

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Abstract - Marine benthic invertebrates support numerous ecosystem functions and services including shellfish production, energy flow to fishes, and biogeochemical cycles. The decline of marine biodiversity worldwide has raised concerns about effects on ecosystems. To examine biodiversity trends of Narragansett Bay over time, a list was compiled of all benthic invertebrate species collected from the bay since 1834. The list covers 104 studies spanning 182 years and currently holds 1214 unique taxa from 21 phyla, the majority of all animal phyla on Earth. A permuted estimator of number of species suggested there are about 300 more yet to be discovered. Widely varying sampling gear and sieve mesh sizes precluded use of abundance data. Instead, we used multidimensional scaling and taxonomic distinctness with presence-absence data to examine biodiversity trends. The changes in community composition and decline of benthic biodiversity ($P < 0.01$) since 1855 are what would be expected of a community that gradually deteriorated in the face of increasing anthropogenic stressors. Taxonomic distinctness had negative correlations ($P < 0.05$) with human population in the watershed, total nitrogen inputs, and inputs of metals. This loss of benthic biodiversity has implications for ecosystem functions and services. As some of the stressors waned in the last 2 or 3 decades, following passage of environmental legislation in the 1970s, biodiversity appeared to show a partial recovery. An inventory of species, documentation of how it has changed over time, and understanding what caused those changes are important for assessing whether remediation programs are achieving improved water quality and ecosystem health.

Sun- 65

Micro-morphology of the Styler Umbrella of *Sarracenia purpurea* (Northern Pitcher Plant)

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Abstract - The genus *Sarracenia* (North American pitcher plants) is well-known for its carnivorous pitcher-like leaves, yet its distinctive flowers have received little attention in botanical research. *Sarracenia* species have a flower that bears a unique umbrella-shaped style, which consists of the distal regions of 5 fused carpels, each bearing a stigma at the tip. At anthesis, petals of the pendulous flower hang between the 5 lobes of the style, while numerous anthers are located near the central umbrella stalk. Pollinators, carrying pollen from other *Sarracenia* flowers, contact the stigma in between the adjacent petals before they can move to the inner surface of the styler umbrella to reach the pollen at the center. In this study, we hypothesized that the umbrella-shaped style plays an important role during flower-pollinator interaction and collected micro-morphological data of the flowers and leaves of *Sarracenia purpurea* (Northern Pitcher Plant) using scanning electron microscopy. Our data showed that the inner (abaxial) surface of the styler umbrella shares similar epidermal cells (convex cells with reticular cuticular striation) with the petal, which may provide visual cues for pollinators. In addition, the inner surface of the styler umbrella presents the same type of trichomes (unicellular with striped cuticular striation) as those of the inner surface of the lid of pitcher-like leaves, which may provide tactile cues for pollinators. We also found secretory glands on the inner surface of the styler umbrella, which is absent from the petal and the lid of pitcher-like leaves and may provide olfactory cues for pollinators. Another kind of secretory tissues was also found near the stigma. Thus, our micro-morphological data indicates that the unique umbrella-shaped style of Northern Pitcher Plant may provide visual, tactile, and olfactory cues for pollinators to encourage cross pollination.

Sun- 11

Pre-Dispersal Seed Predation in the Roemer Arboretum

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Abstract - Many invasive plant species have a detrimental impact on native species through their superior ability to compete for resources, such as fruiting for longer periods of time and drawing away frugivorous seed dispersers from native plants. Likewise, invasive plant species may increase consumer pressure on native species, creating apparent competition. Pre-dispersal seed predation by insects can have strong effects on plant population dynamics. Before seeds are dispersed by birds or other dispersal agents such as wind, the seeds inside are still at risk of predation by adult and larval insects. Adult insects lay eggs inside individual fruits, and when the eggs hatch, the seeds inside serve as a food source for the developing larvae. This larval activity renders seeds incapable of germination, which may translate to reduced population growth. During the growing season of 2017, we quantified the relationship between the presence of larvae in fruit and fruiting phenology in both native and invasive plant species in the Roemer Arboretum in Geneseo, NY. We found that the duration of fruiting phenology has a stronger correlation to the presence of larvae for native plant species ($r^2 = 0.695$) than for invasive plant species ($r^2 = 0.342$). Fruit crop sizes are larger for invasive species, and this larger volume of fruit production suggests that predator satiation could generate the lack of correlation in the invasive species. Together, a longer period of fruiting and relatively low pre-dispersal seed predation may contribute to the advantages that invasive plant species have over native species. Our presentation will also examine predation rates during periods of overlap in fruit production between native and invasive species.

Sat- 62

Impact of Intraspecific Density on *Alliaria petiolata* (Garlic Mustard) Sinigrin Concentration

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Abstract - *Alliaria petiolata* (Garlic Mustard) is a biennial herb that produce classes of constituent secondary metabolites called glucosinolates, which aid in its competitiveness as an invasive species. Garlic Mustard can grow at high densities and form dense monocultures that may affect the species abundance relative to other species through variation in secondary chemical concentration. The hydrolyzed product of glucosinolate, sinigrin, is a predominant by-product in Garlic Mustard and plays a role in negative multi trophic effects decreasing forest species diversity. However, the relationship between intraspecific Garlic Mustard density and glucosinolate expression remains poorly understood. Here, we measured sinigrin leaf concentration across Garlic Mustard field populations in 2 regions and in light and density factorial greenhouse experiments to evaluate the relationships between sinigrin concentration, growth, density, and light. In the field, we observed a significant tradeoff between sinigrin concentration and growth in the form of second-year stem height and root mass. The effect of density (the number of second-year stems) on sinigrin concentration in the field differed by region, with significance observed in only 1 region. In the greenhouse density experiment, sinigrin concentration differed significantly by density category, with concentration being higher in the high rosette densities. With the addition of a shade treatment in the density and light factorial experiment, sinigrin concentration remained similar over time between the high and low densities, and sun and shade treatments. Results suggests that the paradigm of growth vs defense and the observed trade-offs between these 2 traits for most plants do not fully apply to Garlic Mustard populations since interactions with external factors such as density and light effects the individual plants ability to grow and hydrolyze sinigrin. Findings suggest that sinigrin leaf concentration alterations may be driven by competition through intraspecific plant density but also forest characteristics.

Sun- 1

Spatial Patterns of Lichen and Moss Abundance in the Dynamic Fir-Wave Forest on Whiteface Mountain

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Abstract - Self-perpetuating cycles of death and regrowth of *Abies balsamea* (Balsam Fir), known as fir-waves, characterize the subalpine forest of Whiteface Mountain. Microclimatic site factors including light and humidity change along the gradient of the fir wave, influencing the understory growth. This study describes the pattern of lichen and moss distribution in relation to a broader pattern of fir tree death and regrowth. We hypothesized that in the areas with more light, there would be a higher abundance of lichen and moss growth. We measured epiphytic and terrestrial lichen and moss abundance, as well as tree diameter along 5 transects through bands of fir waves. Using canopy photographs, we analyzed the pattern of understory light availability along one transect. Although tree diameter increased linearly across the wave, light availability displayed a unimodal pattern with a maximum in the middle of the wave. Lichen abundance was also greatest in the middle of the wave, while moss abundance had the inverse relationship being most abundant on either end. These results highlight the complexity of this dynamic ecosystem. Understanding the spatial patterns of ecosystem change in a clear cyclical pattern like that of the fir-wave forest can potentially be applicable to dynamic ecological systems worldwide.

Sat- 35

Invasive Swallowwort (*Cyananchem spp.*) and Small-Mammal Interactions Determining Tick Abundance

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Abstract - Past studies have linked invasive shrubs such as *Berberis thunbergii* (Japanese Barberry) and *Lonicera maackii* (Amur Honeysuckle) to changes in tick abundance. *Cyananchem spp.* (swallowwort), however, is a vine that is primarily found closer to the ground. By studying swallowwort, I sought to determine how the different growth form affects relative humidity in areas where swallowwort is both present and absent. Presumably, the swallowwort creates a dense shaded area, which will help to retain moisture and provide optimal habitat for *Ixodes scapularis* (Blacklegged Tick) who are sensitive to changes in humidity. My project looked at swallowwort invasions in the greater Rochester area to determine if tick abundance increased between areas with and without Swallowwort at the same sites. Microclimate stations at each plot were used to record temperature and relative humidity data to determine suitability for tick habitat. In addition to tick sampling, I conducted small-mammal trapping at the sites. Small mammals, especially *Peromyscus leucopus* (White-footed Mouse), serve as hosts for ticks, primarily in the larval and nymphal stage. By trapping small mammals, I can determine both the abundance of potential tick hosts and the tick burden of infected mammals that I trap. I hope to use this tick data to draw larger conclusions about how vegetation and small mammal interactions affect tick-borne diseases, such as Lyme disease, at the local scale.

Sat- 17

Enterococci Contamination of Marine Tidal Water Surrounding Aquidneck Island, Rhode Island

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Abstract - Contamination of *Enterococci* sp. in marine tidal zones can be directly linked to human infection. From 2008 to 2017, we sampled 9 coastal locations weekly, year-round, in Newport, RI. In this study, our goals were to continue water sampling from various sites throughout the Aquidneck Island and its local watershed, analyze the samples for levels of *Enterococci*, and detect possible sources from which contamination originates. When detected in recreational water, *Enterococci* are indicative of other pathogenic bacteria or human and animal fecal contamination, i.e., *Enterococci* is a reliable fecal-indicating bacteria (FIB) in marine waters. Samples were analyzed using IDEXX Enterolert testing at the Rhode Island Department of Health. This method of analysis yielded a most probable number of Enterococci CFU's (colony forming units) per 100 ml. Over the past 9 years, coastal waters were contaminated (>60 CFU) for 23% of all samples, with greater contamination in outflow sites and in the warmer months. In 2011, the town of Middletown and city of Newport installed a UV filtration plant at the outfall of Easton's pond into Easton's Beach, the city's most popular recreational beach. In 2012, a new off-shore storm-water diffuser was implemented off the Esplanade site in Easton's bay, the second most significant storm-water discharge into the beach area. Since the installation of these storm-water management practices, *Enterococci* CFUs greatly decreased at the Esplanade outfall testing site. We predicted that total precipitation the week prior to coastal sampling would have a significant impact on *Enterococci* levels; however, since 2011, that has not been the case. The new infrastructure and filtration seem to be mitigating most of the storm-water run off contamination and improve overall tidal water quality in Easton's bay; however, the nonpoint sources of continued contamination surrounding Aquidneck Island remains unknown.

Sat- 55

Sediment Transport and Salinity of the Hoosic River

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Abstract - The construction of large dams along rivers has disturbed the flow of sediments downstream, impacting wetland ecosystems and causing deltas to decline. As people depend on sand and salt to remove ice from roads in the winter, a consequence can be higher salinity in rivers, which can affect aquatic organisms as well as animals and humans that depend on the water for hydration. High salinity levels in water have the potential to be unsafe for people on low sodium diets to drink. Our objective is to evaluate the effects of applying salt to roads near the Hoosic River. We anticipate documenting spikes in salinity following spring wet weather events. Measurements of salinity will be taken with YSI 566 probes. Another component is to measure suspended sediment levels in the river to assess if dams upstream affect sediment transport downstream. We began suspended sediment monitoring during the fall of 2017; the continuation of suspended sediment monitoring will provide measurements in the presence of high flows from snow melting. We determine suspended sediments by collecting water samples in dry and wet conditions. After collection, water is filtered out of samples, then dried in an oven at ~105 °C for 48 hours. This study will help gauge if ice-removal practices on roads in North Adams and towns upstream impact microorganisms and wildlife that depend on the Hoosic River. Additionally, our assessments will help determine if dams upstream are significantly impacting sediment transports.

Sun- 28

Patterns in Native Bee Diversity: Effects of Floral Resources and Habitat

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Abstract - Over the past several years, native-bee diversity surveys have been conducted in the Arboretum on the SUNY Geneseo campus in western New York. The primary objective of this project was to assess the diversity of bees found across several unique sites within the Arboretum as well as investigate biases in methodology and floral resource use by the bees themselves. Over the course of the survey, we have collected 24 genera and 64 species. The highest diversity was found in the sites that had the greatest floral resource diversity. Focal observations revealed that, generally, native bees preferred to visit native plants whereas the non-native *Apis mellifera* (European Honeybee), preferred non-native plants such as *Centaurea nigra* (Black Knapweed). There were also some biases detected in the collection methodology, as pan traps are ineffective at capturing larger-bodied bees. However, this bias can be countered with the addition of blue vane traps to the sampling regime. This study provides data that suggest how to improve pollinator habitat as well as how to improve bee-diversity monitoring methodology.

Sat- 25

Genetic Variation of the Gene Cytosolic Phosphoglucose Isomerase (*pgiC*) within the *Matteucia struthiopteris* Populations Dispersed over the Northern Hemisphere

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Abstract - In this study, we sought to understand more about genetic diversity in *Matteucia struthiopteris* (Fiddlehead Fern) over its range in northeastern North America, with reference to a wider sample from throughout its circumboreal range. Locations of the Fiddlehead Fern for this research include several New England states, Canada, Alaska, China, Japan, and Sweden. Focused research will be conducted on samples from the Midwestern and southeastern limits of the species in the United States. For our genetic analysis, we are using the gene encoding Cytosolic Phosphoglucose Isomerase (PgiC), an enzyme that is essential for glycolysis, a cellular respiration pathway seen in almost all living species. This gene can be used to assess genetic variation between populations of species because the introns evolve rapidly, and it has 2 long introns especially valuable for population-level analysis. To date, our work has yielded primer pairs to successfully capture introns 8 through 15 for PgiC, allowing for sequence analysis of population-level variation in Fiddlehead Fern. Sequencing of our population-level sample is underway. Our goal will be to gain a better understanding of the genetic diversity of the Fiddlehead Fern in a geographic context across its North American range as well as expand our knowledge on the PgiC gene for ferns. Knowledge of population structure in the Fiddlehead Fern will provide the basis for advising the non-timber forest products industry on best harvesting practices for the species as a spring vegetable.

Sun- 55

The Movement of Male *Odocoileus virginianus* (White-tailed Deer) within a Metapopulation in Response to the Behavioral Habits of Other Organisms in Cohasset, MA

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Abstract - By modifying habitat configuration and the relative abundance of edge habitats, habitat fragmentation strongly affects multiple population attributes, including population size, reproductive success, and behavior. These relationships are especially true for large mammals that have extensive home ranges, such as *Odocoileus virginianus* (White-tailed Deer). White-tailed Deer are known to move to different fragments, but to what extent is not known. The objective of this study was to document the abundance and movements of male White-tailed Deer between forest fragments in response to environmental stimuli. Data was collected through trail cameras in 3 different forest fragments that were in close proximity to each other. Results suggested that male deer avoid most interactions with other deer in the summer months (non-breeding season). Large males tended not to disperse frequently and were recaptured multiple times, whereas smaller males were rarely captured twice. In autumn–winter months, there were significantly more interactions between male deer and female deer. The largest habitat fragment supported the largest population of deer, but populations persisted throughout the study even in the smallest fragments. Data collected from this project will be useful in the following years to track the change of White-tailed Deer movement, due to major construction and deforestation happening in the town of Cohasset.

Sat- 66

How is Climate Change Affecting Species Range Limits? A Tale of Two Trees: *Pinus banksiana* and *Pinus rigida*

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Abstract - Looking at species range margins helps us gain an understanding of how species will deal with changing environmental conditions. At their range margins, species may not be in ideal, or optimized, conditions for survival, growth, and/or reproduction. Furthermore, different factors may influence species distributions depending on the orientation of the range margin (i.e., southern versus northern). In northern New York, *Pinus banksiana* (Jack Pine) and *Pinus rigida* (Pitch Pine) both reach their range limit, but at opposing edges of their distributions—their southern and northern limits, respectively. Our study site is located at the Altona Flatrock, part of the Miner Institute Forest in Clinton County, NY. This area is ecologically unique in that it is one of the few locations where Pitch Pine and Jack Pine trees coexist, making it ideal for a study of how changing environmental conditions may be differentially affecting these 2 species at their opposing latitudinal margins. Specifically, we will assess how changing conditions are affecting annual growth in the 2 species. Increment cores will be taken from 20 Jack Pine trees and 20 Pitch Pine trees at the study site. We will mount and sand the cores and measure and crossdate the annual rings using standard dendrochronological techniques. We will then analyze annual growth trends to identify differences and changes in growth over time, within and between species. We hypothesize that with warming climate, environmental conditions may be becoming too warm for Jack Pine because it is adapted to a colder climate, with its range extending into central and northern portions of Canada. Pitch Pine on the other hand, will potentially thrive with warming temperatures. Decreases or increases in growth over the past several decades may provide insight into the longer-term response of these species to climate change, where over the coming decades to centuries we may see concurrent northward range contraction and expansion of Jack Pine and Pitch Pine, respectively. This study will help to increase our knowledge of how tree species are responding to ongoing climate change, and inform management decisions in regard to species vulnerability and forest biodiversity along range edges.

Sun- 41

Effect of Garlic Mustard Management on Exotic Earthworms and Native Plant Diversity

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Abstract - The invasive plant *Alliaria petiolata* (Garlic Mustard) can disturb aboveground diversity of native forest ecosystems in Massachusetts. Exotic earthworms have been hypothesized to promote Garlic Mustard invasion, but the mechanism of coinvasion is not understood, nor are the impacts of both species on native biodiversity. We conducted an eradication study at 2 sites in Massachusetts to test the responses of exotic earthworms and native plant communities to Garlic Mustard removal. This work was conducted at the Harvard Forest (central MA) and McLennan Reservation (western MA), where we established replicate plots without Garlic Mustard (control), reference plots with Garlic Mustard, and plots where Garlic Mustard was eradicated by hand 1 year earlier. We measured native plant diversity and earthworm biomass in the field from each treatment. Post-hoc analyses indicated earthworm biomass was highest in the invaded treatment and declined to uninvaded levels in the Garlic Mustard eradication treatments (Tukey's test: $P < 0.05$). Results from a regression analysis also demonstrated a marginally significant interaction effect between eradication treatment and earthworm biomass on native plant diversity ($P < 0.01$). Our findings suggest that Garlic Mustard populations may be facilitating earthworm invasion, contrary to previous studies suggesting the opposite relationship. Moreover, sites eradicated of Garlic Mustard had lower earthworm biomass than invaded sites, which posits this method as a possible dual management strategy to control earthworm and Garlic Mustard invasions. We also show that native plant diversity is negatively correlated with earthworm biomass in invaded plots but positively so in eradication treatments, further supporting previous research that Garlic Mustard eradication as a tool can preserve aboveground diversity at least for some sites.

Sun- 3

The Effects of Pale Swallowwort (*Cynanchum rossicum*) on Native Forest Moth Communities

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Abstract - *Cynanchum rossicum* (Pale Swallowwort) is an invasive vine that is rapidly invading northeastern forested ecosystems. Due to its broad tolerance of abiotic conditions, competitive advantage, and release from predation, it is perceived as a threat to native plant communities of invaded areas. Our study sought to determine whether or not invasion by Pale Swallowwort had a pronounced impact on moth (Lepidoptera) communities. We surveyed paired plots that had similar canopy species and used light traps to sample moths from them. We also analyzed differences between *Quercus* (oak) plots and *Pinus* (pine) plots. We collected a total of 2039 moths from 19 families and used factorial ANOVAs (Minitab 17) to assess differences in mean abundance, richness, and Shannon–Weiner diversity (H'). We found no significant differences in mean abundance, richness, and Shannon–Weiner diversity (H') among treatments or canopy types. We did a Kruskal-wallis test (Minitab 17) to assess differences in mean number of families per sample which resulted in no significant differences. Lastly, we used factorial ANOVAs (Minitab 17) to assess differences in abundance of 4 taxa: *Halysidota tessellaris* (Banded Tussock Moth), *Idia aemula* (Common Idia), *Malacosoma americana* (Eastern Forest Tent Caterpillar Moth), and *Noctua pronuba* (Large Yellow Underwing). We found no significant differences in abundance of these taxa among treatments and canopy types. These results suggest that the scale and latency period of an invasion are important factors to note when trying to quantitatively assess their impacts on higher trophic levels.

Sat- 18

Heterogeneity Within and Among Streams in Leaf-Decomposition Rates: Is Japanese Knotweed the New American Chestnut?

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Abstract - Autumn leaves provide an important food resource to in-stream food webs. To the extent that the leaves from different plant species have diverging concentrations of important nutrients, such as nitrogen and phosphorus, and that the streams utilizing these leaves also differ in nutrient concentrations, and therefore nutrient limitation, the rate of in-stream decomposition may differ considerably among particular streams and among the leaves available within a stream. This study compares the foliar decomposition rates of 5 riparian plant species—*Castanea dentata* (American Chestnut), *Populus deltoides* (Eastern Cottonwood), *Prunus serotina* (Black Cherry), *Acer rubrum* (Red Maple), and the exotic *Fallopia japonica* (Japanese Knotweed)—in 6 streams with diverging chemistries within the Saratoga Lake watershed, located in the foothills of the Adirondack Mountains. Decomposition rates varied 7-fold among these 30 species-by-site combinations (daily decay coefficients varied from 0.006 to 0.042 in October 2017). Based on comparisons of among-stream coefficients of variation for species-specific decomposition coefficients, Black Cherry was the most consistent among the 5 riparian plant species while Eastern Cottonwood and Japanese Knotweed were the most inconsistent. Based on average rank orders within streams (treating streams as replicates), Red Maple was the fastest decomposing species, Japanese Knotweed the slowest, and American Chestnut's rank was indistinguishable from the other 4 native species but its leaves decomposed significantly faster than Japanese Knotweed's. One interpretation is that mass-loss dynamics within streams may be influenced more by the introduction of Japanese Knotweed than by the loss of American Chestnut.

Sat- 9

Interactions between Beech Blight Aphids, Sooty Mold Fungus, and Forest Invertebrates

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Abstract - *Grylloprociphilus imbricator* (Beech Blight Aphid) is a type of sap-sucking aphid that forms large colonies on *Fagus grandifolia* (American Beech) branches. As they extract phloem from the tree, these insects excrete a sugar-rich waste called honeydew. Underneath aphid aggregations, honeydew accumulates in the forest understory. In the Genesee Valley Conservancy/SUNY Geneseo Research Reserve, a variety of forest invertebrates such as wasps, millipedes, and slugs were observed around honeydew accumulations. At 25 different aphid-hosting trees, forest invertebrates were quantified in areas with and without honeydew accumulations. This survey revealed a significant association of wasps with honeydew accumulations. Additionally, the honeydew acts as a substrate for sooty mold fungus, which grows on leaves, sticks, branches, and rocks coated with honeydew. *Scorias spongiosa* is a specialist fungus known to associate with the honeydew accumulations of Beech Blight Aphids. We conducted genetic work in order to investigate whether the species composition of these sooty mold growths was solely *Scorias spongiosa* or a variety of fungal species as some preliminary data suggest. The goal of this study is to provide insight into the many species interactions that revolve around Beech Blight Aphids, as their impact is not well-documented or understood.

Sat- 21

Differences in Seasonal Occurrence and Activity of Bat Species within Private Conservation Land in Massachusetts

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Abstract - There are 9 Vespertilionid species of bat documented within Massachusetts; 5 of these have been state-listed as Endangered. The long-term assessment of bat activity and presence may offer valuable population data on the affect environmental and human-driven pressures (wind turbines, human disturbance and diseases including White Nose Syndrome) have on our regional bat populations. This study investigated bat species composition and occurrence within 2 habitat types (forest edge and forest interior) in Mass Audubon's Moose Hill Wildlife Sanctuary in Sharon, MA. We made passive ultrasonic recordings using the automated bioacoustic recorder SM3BAT (Wildlife Acoustic,s Inc.) during active-season months in 2017. We then ran recordings through Kaleidoscope Pro Analysis Software and manually identified species. Throughout the active season, *Eptesicus fuscus* (Big Brown Bat) was consistently present at both deployment sites. The months of May and June showed a greater presence per recorded night of 2 migrating species, *Lasiurus cinereus* (Hoary Bat) and *Lasionycteris noctivagans* (Silver-haired Bat), within the forest interior when compared to mid- or late summer months. Finally, *Perimyotis subflavus* (Tricolored Bat) echolocation pulses were recorded only in May for the forest edge site but during early, mid-, and late summer in the forest interior. We plan on correlating these preliminary results with classified foraging and migratory strategies of Massachusetts bat species to help determine a baseline for species occurrence and activity levels. This first season of data will aid in a long-term study of bat populations within this protected area.

Sat- 69

Is Something Shady Going On? Animal Vocalization During the Great American Eclipse

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Abstract - Audio recordings were taken on the days before, during, and after the 21 August 2017 solar eclipse to gain information about wildlife vocalization during eclipses. Recorders were placed at 3 locations in Western New York, in a region that received 0.7 to 0.8 of the eclipse's total magnitude. On 22 August, the day following the eclipse, a storm front moved into this area. In our analysis, we are comparing the temperature, solar intensity, and levels of biophony on the day of the eclipse to surrounding dates, including the day of this storm. We predict that solar intensity and temperature during the eclipse will be similar to the conditions at the time of the storm's approach, and will result in similar levels of biophony. Levels of biophony are calculated using the Bioacoustic Index developed by Boelman et al., and we are additionally identifying the taxa present in our audio recordings. These findings add to the presently small body of knowledge regarding animal responses to solar eclipses, particularly in areas outside the path of totality.

Sat- 7

Impact of Vegetation History on Forest Development in a Heterogeneous Secondary Successional Forest

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Abstract - The Spencer J. Roemer Arboretum is an 8-ha natural area on the SUNY Geneseo campus that was used as pasture until around 1960. In a vegetation survey of the Arboretum in 1999, the plant communities were mapped and categorized as tree-dominated, shrub-dominated, or open sites. In summer 2015, to assess the differences among areas in different stages of forest development, six 20 m x 20 m permanent plots were established in the Arboretum, 3 on tree-dominated sites and 3 on shrub-dominated or open sites. In each plot, the species, DBH, and crown class were recorded for all stems >2.5 cm DBH. We revisited the plots in the summer of 2017 to collect repeat measurements on all marked individuals. We used these data to assess the survival and growth rates on plots from 2015–2017, current species composition, diversity within each crown class, and size distribution of stems within each species and crown class. The findings can inform how the different histories of the plots have resulted in current differences in forest development.

Sat- 39

Vernal Pool Policies and Protections in the Northeast: Gaps and Opportunities

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Abstract - Vernal pools are small, seasonally flooded wetlands that reach their maximum size in spring and lack connections to permanent surface waters. These pools harbor a unique suite of species including aquatic invertebrates and pool-breeding amphibians. Vernal pools are subject to degradation and destruction, and declines in their associated biological communities have become a concern in recent decades. Despite these concerns, many vernal pools are not afforded federal-level protections as a result of 2 prominent US Supreme Court decisions handed down over the past 2 decades, and the importance of regional, state, or local regulations as alternative approaches to conserving vernal pools is becoming more evident. This study was implemented to better understand expert perceptions about technically feasible solutions for protecting vernal pools in the region and what might facilitate or constrain those solutions. We interviewed vernal pool experts in the northeastern US regarding approaches to vernal pool protection and analyzed their perceptions through the lens of Kingdon's multiple streams policy development framework. The framework recognizes 3 processes associated with policy development: problem identification, policy solution development, and the impacts of politics. We found participants most often discussed feasibility of policy formulation and implementation, particularly with regard to protecting vernal pools of high value while also remaining within the bounds of what public opinion supports.

Sun- 20

The Dynamics of Cohabitation: Using Camera Traps to Estimate Important Wildlife Occupancy Covariates in an Urban Matrix

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Abstract - Vassar College is a 405-ha (1000-acre) campus nestled within an urban matrix. It has a varied landscape; comprised of multiple ponds, streams, forest patches, and a 213.5-ha (527.5-acre) farm and ecological preserve. The campus provides ample habitat for many mammalian species within the heavily developed area. Using 21 motion-activated cameras distributed equally in 20-ha (50-acre) grid cells, we analyzed the effect that anthropogenic land-use factors (main campus vs ecological preserve, distance to nearest structure, patch size, naturalized area) as well as natural factors (habitat type, distance to water) have on occupancy of 4 key mammal species: *Vulpes vulpes* (Red Fox), *Canis latrans* (Eastern Coyote), *Lynx rufus* (Bobcat), and *Procyon lotor* (Raccoon). We also analyzed the effect that human impact has on daily activity patterns for each species. Of the 4 target species, we detected all but Bobcats across both landscape types (preserve and campus). Bobcats have only been detected at the preserve. All species except Raccoons were active throughout the day, regardless of landscape type, suggesting that human activity on the Vassar campus does not alter animal activity. Using percent naturalized area as a metric for disturbance (higher naturalized = lower disturbance), we found that Red Fox and Raccoon showed little aversion to the most disturbed areas. Coyotes also utilized the locations that were most disturbed, but avoided areas that were particularly fragmented (camera sites in small patch sizes), suggesting habitat connectivity is more important than amount of disturbance. These preliminary results highlight the importance of larger tracts of naturalized areas even when bounded by development.

Sat- 67

Patterns of Predation on Crayfish in the Upper Susquehanna River Catchment: Does Stream Size Matter?

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Abstract - Patterns of predation risk can have strong effects on prey distribution patterns, which, for prey species that are strong interactors in a community, can produce indirect effects on other parts of a community. Crayfish are important consumers and agents of disturbance in North American stream communities, so factors influencing crayfish distribution and abundance, such as predation, should also have significant indirect effects on community structure. In streams, predation risk is often a function of prey size and water depth, in part because gape-limited predatory fish are more abundant in deep areas, whereas terrestrial-based predators (birds and mammals) that can consume larger prey are more restricted to shallow areas. A previous study of predation on crayfish in a small NY stream (Charlotte Creek) demonstrated that size- and depth-specific predation on non-native *Orconectes rusticus* (Rusty Crayfish) followed typical patterns, with small crayfish at higher risk of predation in deep water and the opposite for larger crayfish. Here, I expand the scope of the earlier study by conducting a similar experiment in a larger stream (upper Susquehanna River), which is deeper, wider, has more and larger predatory fish, and a greater diversity of habitat (reach) types, any of which could influence patterns of predation. Results to date suggest that size- and depth-specific patterns of predation on crayfish in the 2 stream types are similar, but bottom topography (steepness of streambed slope) may modify these patterns in the Susquehanna River. Because predation can influence distribution and behavior, identifying how patterns of risk vary spatially for this invasive species contributes to a full understanding of its impact on invaded stream communities.

Sat- 11

Relationship Between Female Body Size, Egg Size, and Stage of Development in the Asian Shore Crab

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Abstract - *Hemigrapsus sanguineus* (Asian Shore Crab) is an invasive species that was introduced to the coast of the northeastern United States in the 1980s and is now the dominant brachyuran on most rocky shores throughout New England. It is a strong competitor for food and shelter and has higher reproductive potential than resident crab species, and consequently has caused major declines in their populations. Nevertheless, few studies have examined the reproductive biology of this species beyond demonstrating its high fecundity relative to its competitors. The objective of this preliminary study was to compare the sizes of eggs during different stages of development and to investigate how these patterns vary geographically and with body size of ovigerous females. As expected, we observed a strong positive correlation between body size and fecundity. As has been observed for some other crustaceans, egg diameter was significantly greater for eggs in late stages of development than for those that were early in development. This pattern appeared consistent geographically, but sample size was limited at some sites. Additional data will be necessary to confirm these patterns conclusively.

Sat- 54

Effect of Habitat Type on Wasp Abundance and Diversity on the SUNY Geneseo Campus

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Abstract - An ongoing study on bee diversity conducted on the SUNY Geneseo campus used a standard sampling method involving small bowls painted with different fluorescent colors and filled with soapy water to capture bees; this type of trap often attracts other flying insects including wasps. We took advantage of these incidental captures to investigate the effects of habitat type on wasp abundance and diversity. Samples were collected from the College Green, an area of open lawn surrounded by manicured flower beds; 2 different sites in the Arboretum near native plantings surrounded by secondary successional forest; and a no-mow zone, a roadside unmowed field. The wasps were pinned or pointed, depending on size, and sorted based on lowest taxonomic level reached. The wasps were catalogued by collection date, location, bowl color, and identity. Yellow bowls collected significantly more wasps than blue bowls or white bowls at all sites. The site Arboretum 2 had the highest diversity, while the College Green had the lowest. Parasitoid wasps were rare at the College Green site, perhaps because grounds management may limit the availability of host species. The presence of human-made structures that offer nesting substrates could explain a high relative abundance of vespids found at the College Green site, while ichneumonids were the most abundant taxon at all other less-managed sites on the edge of campus.

Sat- 23

The Effect of Deer Browsing on Native and Non-native Vegetation in Northeastern Forests

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Abstract - The population of *Odocoileus virginianus* (White-tailed Deer) has increased dramatically in northeastern North America due to the effect of human activities on landscape patterns and wildlife values during the 20th century. Deer have greatly altered the forest composition, structure, and wildlife habitat in northeastern North America. The intensity of deer browsing has impeded the growth and altered nutrients of key plant species, which may disrupt the plant community through top-down or bottom-up trophic cascades. Studies of deer browsing effect have shown that invasive species success was facilitated by deer both through dispersal and competitive release from native species. Possible explanations might include the resilience of invasive plants to herbivory, the differential palatability of invasive and native tree species, and the foraging behavior of deer. Deer browsing may prevent the regeneration of native species, making them susceptible while giving exotic plants opportunities to increase their niche breadth. To determine the effect of deer on invasive species success in hardwood forests of northern New York, we have established deer exclosures and paired control plots in 2 different forest conditions: a recent clearcut (harvested ~10 years ago) and a more mature forest (last harvested ~40 years ago). This study will be conducted to help us understand the effect of deer browsing on the diversity and growth of native and non-native. Focusing on the correlation of invasive species and deer, we hypothesize that the control habitats in the clearcut area with deer foraging will have a higher amount of invasive species than the partitioned exclosure habitats in the mature forest over the time studied. To test our hypothesis, we will tally all plant species, both invasive and native to the species level within each plot. We will also measure growth increment for select target species. Data will be analyzed using ANOVA tests to determine if there is any significant difference between exclosure and control plots, and between forest management type. Land managers will receive information of the forest conditions throughout the study and propose solutions for pest control along with deer population management.

Sun- 52

Bee Communities in Native and Restored Pine Barrens Habitats in the Albany Pine Bush Preserve

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Abstract - The Albany Pine Bush Preserve, APBP, maintains a globally unique inland pine barrens ecosystem, which houses many rare and endangered species that rely on pine barrens habitat. However, the non-native *Robinai psuedoacacia* (Black Locust) invaded many pine barren sites, leading to loss of biodiversity. The APBP commission staff have restored several of the invaded sites by removing Black Locust trees, replanting native vegetation, and introducing prescribed-fire treatments. The restored areas have yet to match the original pine barrens habitat in plant species composition, but have a similar grassy, open habitat. The effects of restoration on local bee populations is unclear. The bee communities are extremely important to monitor as they are declining worldwide at an alarming rate. Bee decline is due to a variety of reasons including: habitat loss, pesticide use, and climate change. To analyze the bee communities in restored and native sites, 4 survey plots of each were established. We utilized pan trapping and sweep netting methods 6 times between mid-June and late September resulting in 958 individuals, which are being identified and prepared for quantitative community analysis. Bee communities in the 2 habitat types will be analyzed by comparing species abundances and diversity indices. In addition, community composition will be evaluated using non-metric multidimensional scaling to summarize species distributions among sites. We have already analyzed the differences in the number of bees collected at each site, and there was not a significant difference between the number of bees collected at restored sites versus native sites ($P = 0.62$). However, finding distinct bee community compositions between different site types has been a common result in other studies. We hypothesize that we will find similar differences in community composition between native and restored sites due to greater number and abundance of specialist bees in the native habitats.³⁹

Sat- 43

Gladiator Salamanders as Biological Indicators of Environmental Quality in Central Adirondack Forests

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Abstract - Given their sensitivity to changes in habitat and strong territoriality, salamanders are considered indicator species for environmental quality and forest ecosystem changes. We studied the relationship of 4 terrestrial woodland salamanders—*Desmognathus fuscus* (Northern Dusky Salamander), *D. ochrophaeus* (Allegheny Mountain Dusky Salamander), *Eurycea bislineata* (Two-lined Salamander), *Notophthalmus viridescens* (Eastern Newt), and *Plethodon cinereus* (Eastern Redback Salamander)—to climate conditions precipitation and temperature in the central Adirondacks. We sampled 1232 salamanders under artificial cover objects over 17 years. Northern Dusky/Allegheny Mountain Dusky and Eastern Redback Salamanders had the highest abundance with 493 and 632 individuals, respectively. We measured a single annual snout-vent length (SVL) and vent-tail length (VTL) value per individual per year and averaged by species. The analysis we compared correlated annual mean salamander body size, snout-vent length (SVL) and vent-tail length (VTL,) with precipitation and temperature of the same year climate conditions of one year to salamander body size, snout-vent length (SVL) and vent-tail length (VTL), of the same year. Only our 2 species of dusky salamanders had a significant relationship between snout-vent length SVL and precipitation ($P = 0.006$), with salamander size increasing in wetter conditions relating to larger salamanders. To account for natural a likely delay time in effects of changes in environment precipitation and temperature, to obvious physical changes in the salamander morphology and conditions, we reanalyzed the study analyzing the data with a 1-year lag. Climate data taken in one year was reanalyzed with physical data from the following year. Taking into consideration our previous results, we predicted to see expected similar trends with climate and species, but there was no relationship between individual body size and precipitation or temperature. However, dusky salamander and Two-lined Salamander abundance showed a significant negative relationship with precipitation ($P = 0.05$ and $P = 0.03$, respectively); in wetter years, fewer salamanders were recorded. This may suggest that while climate impacts salamander behavior and fitness, other factors such as habitat disturbance, predation, or competition may more directly relate to change in salamander body size and distribution over time, outside of the climate variables themselves. For example, further study into precipitation and leaf-litter coverage depth and quality, important for salamander foraging, may indicate changes in invertebrate consumption and metabolic rate, leading to changes in body size. Since dusky salamanders and Two-lined Salamanders appear to be more moisture-sensitive, they may be important species to study as strong indicators of environmental changes in the Northeast.

Sun- 62

Spatial Patterns Associated with Soil Chemistry in the High Peaks Region of the Adirondack Mountains, NY

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Abstract - The Adirondack Mountains are both susceptible and sensitive to ecosystem changes caused by atmospheric deposition because of their proximity to the industrial sector of the Midwest, prevailing wind patterns, the orographic effect, and acidic bedrock. This study investigates the impact of topography and geographical location on the soil chemistry of the High Peaks Region. I hypothesized that placement farther west, western slopes, and higher elevations would have greater exposure to atmospheric deposition. Therefore, I predicted that soils from high elevations on western slopes in the western High Peaks would have lower pH, lower organic matter content, and higher carbon (C) and nitrogen (N) content than other locations, but a lower C:N ratio. I collected soil and litter samples from 31 sites on elevational transects across 7 mountains in the western, central, and eastern High Peaks and analyzed them for pH as well as C and N content and isotopic composition using gas chromatography-mass spectrometry. Preliminary results indicate some variation of C and N content with geographical location, aspect, and elevation.

Sat- 32

Bees and Blueberries: Signaling Rewards and Reproductive Success in the Maine Lowbush Blueberry, *Vaccinium angustifolium*

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Abstract - The quantity of floral rewards, such as nectar and pollen, that plants offer to pollinators often varies within species and even within individual plants. In some species, cues like flower size, changing color, and scent provide information to pollinators about reward quantity. Limited evidence suggests that plants that provide better information about their floral rewards may have higher reproductive success. We investigated whether flower size in *Vaccinium angustifolium*, (Lowbush Blueberry) provides information about floral rewards, and whether flower size and reward production are associated with pollination success and fruit set in blueberries. We measured flower diameter and length, nectar production, and pollen production in flowers from which pollinators had been excluded. To gain insights into these floral traits' influence on pollination and reproductive success, we recorded fruit set and, in developed fruits, numbers of fertilized and unfertilized ovules from other flowers on the same plants. To determine the contribution of pollinators to the patterns we saw, we compared the results from hand-pollinated and naturally pollinated flowers. This work adds to the small amount currently known about the functional significance of flower size variation and contributes to understanding of pollination in an important crop species.

Sun- 60

A Comparison of Alpine Plant Frequency and Abundance on Mount Marcy over a Century

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Abstract - Alpine plants in the Adirondack Mountains are highly susceptible to not only the effects caused by global environmental changes but also trampling by unaware hikers. My objective was to compare present-day plant communities of Mount Marcy (elevation = 1628 m [5344 ft]), the highest point in New York, and at a bog surrounding Lake Tear of the Clouds (1309 m [4293 ft]), located on the southwest slope of Mount Marcy, with qualitative observations published in the journal *Ecology* in 1920 by Charles C. Adams et al. I hypothesized that the plant community composition of these high alpine landscapes would be noticeably different (e.g., that lower elevation and disturbance adapted species would be found at higher elevations). Sampling in late October 2017 at similar locations as Adams et al., I found 14 out of the 26 species reported in the 1920 study on the summit and 9 out of 24 at the bog. Interestingly, I found 2 alpine species, *Coptis trifolia* (Threelobed Goldthread) and *Houstonia caerulea*, (Little Bluet), at the summit and 2 lower understory species, *Polytrichum piliferum* (Haircap Moss) and *Cornus Canadensis* (Creeping Dogwood), at the bog, none of which were reported in 1920. It is important to recognize the limitations of my study including its late fall timing and time constraints due to the long hike to both sites. Nevertheless, my study illustrates the value of using early ecological literature to understand how global environmental change and disturbance may influence alpine communities of the Adirondacks and other northeastern mountains.

Sat- 60

Comparison of Cnidae Size and Animal Size for the Sea Anemone *Diadumene lineata*

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Abstract - Sea anemones belong to the phylum Cnidaria. All members of this phylum contain organelles called cnidae (nematocysts and spirocysts), which are used for predation and defense. A scaling effect was observed for cnidae in anemones of the genus *Anthopleura*, in which spirocyst length, but not width, correlated with size (wet weight) of the sea anemone. The purpose of our research was to determine if this same scaling effect is observed in *Diadumene lineata* (Organe-striped Green Sea Anemone). Spirocysts and 2 types of nematocysts (basitrichs and macrobasic p-mastigophores) were photographed and measured using ImageJ. These measurements were plotted against the average basal diameter of each anemone. No scaling effect was observed for spirocysts, basitrichs, or macrobasic p-mastigophores.

Sun- 63

Vermont Natural Heritage Inventory: Accomplishments and Activities

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Abstract - The Vermont Natural Heritage Inventory (VNHI) of the Department's Wildlife Diversity Program promotes the conservation of native plants and animals and their habitats. VNHI uses NatureServe methodology to document native plants and animals and natural communities. We maintain a spatial database of rare species and natural community observations that are used in conservation and regulatory planning and in scientific inquiry. Natural community types are described in the book *Wetland, Woodland, Wildland: A Guide to the Natural Communities of Vermont*. An updated edition is planned for the end of 2018. VNHI has completed wall-to-wall natural community mapping for two-thirds of our State-owned lands, which is used to guide long range management plans. VNHI has also conducted several statewide natural community inventories to identify the most significant examples of different natural community types, including bogs, fens, floodplain forests, hardwood and softwood swamps, and oakpine forests. Some of the major VNHI /partner zoological inventories include: a statewide butterfly atlas, a statewide Odonate survey focusing on large rivers and peatlands, an updated bird atlas, a statewide bumblebee atlas, statewide vernal pool atlas, and a small mammal atlas. In cooperation with Scientific Advisory Groups, we have completed rarity ranking for all vertebrate animals and selected groups of invertebrates. We have an active botany inventory for rare and uncommon plants and partner with the New England Wild Flower Society on the Plant Conservation Volunteer program that monitors high priority species in the state. We have completed rarity ranking for the rare and uncommon vascular plants and all non-vascular plants in the state.

Sun- 66

Extended Leaf Phenology of the Invasive Amur Honeysuckle

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Abstract - Phenology describes the timing of cyclical biological events in plants and animals. Several invasive shrubs exhibit "extended leaf phenology" (ELP) in forest understories by leafing out earlier in the spring and retaining their leaves later in the fall than native species. ELP provides a competitive advantage to the invasive plant by "shading out" nearby species that demonstrate later phenology. The phenological events of the invasive *Lonicera maackii* (Amur Honeysuckle) and the native *Cornus racemosa* (Gray Dogwood) in the Spencer J. Roemer Arboretum on the SUNY Geneseo campus were monitored by trained observers and undergraduate ecology students using the mobile application "Nature's Notebook". Nature's Notebook is a citizen-science platform that allows the general public to contribute to national online databases, offering documentation of phenological patterns amidst growing concern about the changing climate. Both fall and spring phenophases were monitored, including breaking buds, increasing leaf size, fruits, colored leaves, and leaf drop. Initial analysis supports evidence for ELP in the Amur Honeysuckle. In the spring of 2017, all monitored Amur Honeysuckle plants presented breaking buds at least 1 week earlier than the Gray Dogwood plants. In the fall of 2017, most of the Amur Honeysuckle plants retained a majority of their leaves up to 2 weeks after all of the Gray Dogwood plants had lost 50% of their leaves or more. We also compared the timing of each phenophase to temperature and canopy openness measures, and preliminary data suggest that increased canopy cover influences the fall phenology of the Gray Dogwood more strongly than the Amur Honeysuckle.

Sun- 4

Discovery of Species Boundaries to Aid Conifer Conservation.

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Abstract - Conservation plans for conifers under threat of extinction are improved by having detailed knowledge of species boundaries. The boundaries can be detected by searching for a unique pattern of alleles among populations—unique (private) patterns indicate that there is no interbreeding and thus evidence that the populations are different species. In order to detect species boundaries, a significant number of sequenced loci are required. Double digest restriction site-associated DNA sequencing (ddRAD) is suitable for this process because it is able to simultaneously sequence many loci without knowledge of the genome structure or its gene complement. In conifers, the megagametophyte develops from a single meiotic product; the megagametophyte is haploid, meaning that each megagametophyte cell has a single copy of the genomic DNA, and therefore any variation observed within a megagametophyte can be attributed to duplicated loci rather than allelic variation. Analysis of many megagametophytes from a single mother tree facilitates the construction of a gene-to-centromere genetic map in order to confirm that variation detected is the result of duplicated loci. The gene-to-centromere map measures the distance between the locus and its centromere in units of segregation frequency of the alleles in the sample. Since, second division segregation can be discovered by observing polymorphisms within a sample of megagametophytes from the same mother tree. Thus, knowing the number of species and the genetic diversity in populations focuses efforts to protect those species that are in danger of extinction.

Sat- 40

A Survey of Microplastics in Invertebrates in the Lake Champlain Basin

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Abstract - The goal of this research was to determine whether microplastics (MP) were ingested by aquatic macroinvertebrates resident to Lake Champlain. We did so by quantifying and characterizing (e.g., fragment, fiber, film, foam, pellet) microplastic particulate. In more-recent samples, we have dried and weighed invertebrates to better assess uptake. We performed preliminary wet peroxide oxidation digests on aquatic invertebrates ($n = 301$). We collected invertebrate specimens across 2 classes (Insecta, Malacostraca) and 7 orders including Coleoptera, Ephemeroptera, Hemiptera, Odonata, Trichoptera, Mysida, and Amphipoda. These representative organisms are an important part of the lake food web, serving as preferred food for higher vertebrates including fish and waterfowl. Aquatic macroinvertebrates in our sample possess unique feeding methods, such as filter feeding, scraping, piercing, shredding, scavenging, collecting/gathering, and predation. Our research indicated that fibers were the most common microplastic type uptaken by invertebrates. Preliminary results suggest that, Hydropsyche, a filter-feeding insect digested, the greatest mean number of MP's ($n = 3$). Lake Champlain macroinvertebrates contained on average 0.36 microplastic particles. There are limited reports of microplastics uptaken in aquatic invertebrates, and this research provides baseline information for a guild that will be involved in trophic transfer. Results from this research serve to inform residents of the Lake Champlain watershed, anglers, non-profit lake organizations, as well as public health and government officials of the risks microplastics pose to aquatic biota and ultimately humans.

Sun- 22

Bumble Bee (*Bombus*) Distribution and Diversity in Vermont, USA: A Century of Change

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Abstract - *Bombus* spp. (bumble bees) play key roles as pollinators in temperate ecosystems. Some North American species have declined due to factors that include habitat loss, parasites, pesticides, and climate change. In many regions, conservation is hampered by lack of quantitative data on historical abundance and distribution, making status assessments difficult. From 2012 to 2014, with help from 53 citizen scientists, we conducted surveys to determine the status of bumble bees throughout Vermont. For historical comparison, we determined species identifications and databased bumble bee specimen data from 24 public and private collections. Our dataset contained 12,319 valid records, which we separated into historic (1915–1999; $n = 1669$) and modern (2000–2014; $n = 10,650$) periods, with our survey contributing 91% of modern data. Of 17 species, 4 were extirpated and 4 showed significant declines. Rarefaction indicated that both modern and historic datasets slightly underestimated true species richness, diversity, and abundance, but confirmed a strong decline for all 3 parameters. Declining species broadly accorded with those reported elsewhere in eastern North America, and included those in subgenera *Bombus* and *Psithyrus*, as well as *Bombus fervidus* and *B. pensylvanicus*. Four species in the subgenus *Pyrobombus* (*B. bimaculatus*, *B. impatiens*, *B. ternarius*, and *B. vagans*) increased strongly in relative abundance in the modern period. Landscape factors such as road density, elevation, and land use strongly predicted distribution of some species. Species diversity was correlated positively with grasslands, and negatively with deciduous and mixed forest cover, while abundance was correlated positively with evergreen forest cover, yet negatively with deciduous forest.

Sun- 59

A Comparison of Insect Assemblages at the Ground and Canopy of *Acer saccharum* and *Prunus serotina* in New York

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Abstract - While canopy insect assemblages have been studied in tropical forests and temperate forests of the Pacific Northwest, they remain less studied in northeastern deciduous forests. Temperate insect assemblages are believed to be less stratified than those in the tropics due to the seasonality of canopy and understory resources. One phenomenon that would control resource availability in temperate canopies is the blooming of tree species such as *Prunus serotina* (Black Cherry) and *Acer saccharum* (Sugar Maple). Similarly, the blooming of certain spring ephemerals would provide increased resources in the forest understory. These food resources would contribute to changes in the diversity and abundance of canopy and understory insect assemblages. To test this hypothesis, we set hanging pan traps in the canopy and understory of these 2 tree species for 2 months. We sorted the trapped insects to order and further sorted the Hymenoptera and Coleoptera into family and morphospecies. Overall, we collected 27,334 insects including ~4000 Coleoptera and ~800 Hymenoptera. Insects were found to be ~2–3 times more abundant in the canopy than the ground level during Sugar Maple bloom and throughout May, while ground insects became more abundant following Black Cherry bloom in June. Results from the analysis of Coleoptera and Hymenoptera will be discussed.

Sun- 37

Use of Point-and-Shoot Photography to Compare Regional Differences in Coyote (*Canis latrans*) Skull Size

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Abstract - Increasing interest in digital resources for zoological study have resulted in the creation of several online collections of specimens with varying degrees of complexity and sophistication. We illustrate how an inexpensively created archive of digital photographs can be used to test hypotheses of general interest to evolutionary biologists. Using conventional and digital measurements from *Canis latrans* (Coyote) crania, we show that northeastern Coyote skulls are larger than skulls from all other areas in our collection. Furthermore, we reject Bergmann's rule by demonstrating that Coyote skulls from Texas are larger than skulls from Alaska and Washington. Measurements taken from calibrated digital photographs support conclusions drawn using conventional hands-on measurements from the same specimens. All images used were made using simple point-and-shoot photography. Because these resources have been placed on a wiki platform under a Creative Commons licensing, they are available for use in any manner, and the digital archive can be expanded by others. Using Bland-Altman plots, we demonstrate an approach to image quality control that can be employed to identify and replace images that could lead to erroneous measurements. We describe how digital archives shared in this manner could aggregate data from several small collections and isolated specimens, making these otherwise obscure specimens available to the broader scientific community and the general public.

Sun- 50

NEPARC Vernal Pool Working Group: Small, Wet, and Vital

Stacy McNulty (Adirondack Ecological Center, SUNY College of Environmental Science and Forestry, Newcomb, NY; smcnulty@esf.edu) and **Mary Beth Kolozsvary** (Siena College, Environmental Studies and Sciences, Loudonville, NY; mkolozsvary@siena.edu)

Abstract - The Northeast Partners in Amphibian and Reptile Conservation (NEPARC) vernal pool working group was initiated nearly a decade ago to address the growing concern in the region for amphibians and other species that rely on vernal pools for successful breeding. Vernal pools are small, intermittent wetlands that are geographically isolated from permanent water bodies. These pools are difficult to locate and identify, thus they are especially vulnerable to filling, draining, and other alteration. Furthermore, federal wetland protections leave most vernal pools unprotected, further exacerbating the potential for amphibian habitat loss. To date, working group members spurred several initiatives to advance vernal pool conservation across the region. For example, vernal pool mapping and conservation efforts were compiled and are available online, and members have served as experts in contributing to a recent study evaluating approaches to protecting vernal pools at the state-level. Potential projects on the horizon include drafting an updated vernal pool bibliography and making it available in a sharable reference format. Broadly, NEPARC facilitates a wide variety of efforts that support vernal pool conservation, including basic and applied research and monitoring, conservation and appreciation of vernal pool ecosystems and species, disinfecting protocols for prevention of disease transmission between vernal pools, and bibliographies of the environmental impacts of road salt. The vernal pool working group meets at the NEPARC annual conference to discuss progress and initiate coordination of efforts to improve our knowledge of vernal pools and to advance their conservation in the region. The upcoming NEPARC meeting will be held July 31-August 2, 2018 in Amherst, MA. Opportunities to be active in the group will be explored.

Sun- 21

MassMoths: An Ongoing Compilation of Past, Present, and Future Records of the Moths of Massachusetts

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Abstract - Despite a rich history of moth collectors and inventories in Massachusetts since the late 1800s, and in spite of the passage of the Massachusetts Endangered Species Act that currently includes 37 moth species, no comprehensive list of the moths of Massachusetts exists. The authors have established a template for the collection of current and historical data that will be used to produce such a list annotated with details such as dates, localities, distribution maps, and habitats. This list will be made available through a dedicated website and will be updated as data contributions are received. Our first product will be a County list. Through our data mining and contributions for current collectors, photographers, and researchers, the list of Massachusetts moths currently stands at over 2600 species and increases in number at almost a weekly basis thanks to contributions by volunteers.

Sun- 36

Effects of Asian Shore Crab Abundance on Biodiversity of Intertidal Zones in Southern New England

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Abstract - *Hemigrapsus sanguineus* (Asian Shore Crab) is a common and widespread invasive species that inhabits the coast of New England. Asian Shore Crab populations have dramatically increased since the species was first introduced to the eastern United States in the late 1980s, with resultant declines in abundances of resident crab species such as *Carcinus maenas* (Green Crab), as well as putative prey species such as *Mytilus edulis* (Blue Mussel). Most studies of the impacts of the Asian Shore Crab, however, focus on a restricted geographic range or short time period, limiting the generality of the results. In 2014, we began monitoring abundance of the Asian Shore Crab and biodiversity of intertidal invertebrates at 4 rocky intertidal sites in Massachusetts and Rhode Island. Patterns of population dynamics differed geographically, in that mean abundance of Asian Shore Crab has increased over time at some sites but decreased at others. Despite the reputation of the Asian Shore Crab for reducing abundance of competitors and prey, neither species richness nor Shannon diversity of intertidal invertebrates were clearly associated with abundance of Asian Shore Crab. Continued monitoring will be necessary to evaluate long-term impacts of the Asian Shore Crab on intertidal communities.

Sat- 53

Collecting Moths (Lepidoptera) Leads to New Discoveries, Conservation, and Preservation of Moths

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Abstract - My work for the Ohio Department of Natural Resources, The Nature Conservancy, the US Fish and Wildlife Service, the Wisconsin Department of Natural Resources, the Ohio Biological Survey, Carlsbad Caverns National Park, White Sands National Monument, Guadalupe Mountains National Park, and others from 1973 through 2017 allowed me to collect moths in pristine specialized habitats such as native tallgrass prairies, wetlands, snow-white gypsum dunes, and protected northern Chihuahuan Desert. Moths were systematically collected in USDA type kill-traps at discrete locations in many preserved areas in Ohio, Indiana, Iowa, Texas, and New Mexico. Each specimen was recorded in an Access relational database. I identified the moths using normal techniques of preparation, dissection, and DNA barcoding. The accumulated data over these 43 years permitted me to compare species of moths from specialized habitats to species of moths from highly disturbed habitats. Based on my findings and descriptions of new species that are specialists of the habitats, The Nature Conservancy and the Ohio Department of Natural Resources revised management plans, purchased land, and otherwise utilized the data from the moth inventories to assist with habitat management and public relations. Beginning in 2016, White Sands National Monument hosted 3 National Moth Week celebrations at the Monument for the general public, and Seville National Wildlife Refuge hosted 2 festivals of moths. Support from the agencies and the public is positive. The research continues.

Sat- 19

Calendaring the Fluctuation of Nectar Resources for Pollinators

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Abstract - Pollinators provide crucial ecosystem services such as crop pollination and pest control. Global declines in pollinator populations have been observed with habitat loss and fragmentation acting as primary drivers. The Environmental Monitoring and Management Alliance (EMMA) is a partnership of researchers and land managers in the Hudson Valley dedicated to regionally coordinated ecological monitoring that informs sustainable management practices and natural resource conservation. In partnership with Vassar College, we piloted a method to determine the availability of nectar resources for pollinators at the Vassar Farm and Ecological Preserve (VFEP). We created an inventory of flowering plants between June 2017 and the end of the growing season, and conducted a literature search to determine which pollinators visit the flowers found. We found that the VFEP has flowers available throughout the sampling period to service native bees, moths, and butterflies, and that there were no significant temporal gaps between the flowering times of dominant populations. Future directions include building an understanding of spring and early summer nectar sources, conducting pollinator surveys to corroborate our findings, developing management plans for pollinator habitats based on our results, and evaluating the feasibility of expanding the project to other ecological preserves in the EMMA network.

Sat- 27

A Survey of Microplastics in Wastewater Treatment Plant Effluent in the Lake Champlain Basin

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Abstract - Microplastic-pollution researchers are beginning to quantify, characterize, and collaborate on finding solutions to this emerging pollution problem. Recent studies have documented consumer-care products and laundering of synthetic garments as major sources of microplastics. Most current wastewater treatment plant (WWTP) technologies are unable to capture and remove particulate <5 mm in size; thus, over time, trophic transfer poses a threat to aquatic organisms. In 2015, we began surveying and have currently processed WWTP post-treatment effluent samples from the city of Plattsburgh, NY ($n = 59$), and in 2016 added 3 other treatment plants in the Lake Champlain watershed: St Albans, VT ($n = 46$), Ticonderoga, NY ($n = 29$), and Burlington, VT ($n = 14$). Twenty-four hour post-treatment effluent samples were collected and digested using wet peroxide oxidation methods. We characterized all samples based on microplastic type (e.g., fragment, fiber, pellet, film, foam), size, and color. The most common microplastic type varied by WWTP and was dominated by fragments in Burlington (39%) and Plattsburgh (44%), fibers in Ticonderoga (39%) and foam (42%) in St. Albans. Estimated output of microplastic particles per day were: Plattsburgh ($n = 14,105$), St. Albans ($n = 30,268$), Burlington ($n = 14,228$), and Ticonderoga ($n = 7841$). Differences likely reflect plant characteristics, and the difference in particle abundances may be due to varied infrastructure updates. For example Plattsburgh and Burlington serve a similar sized population and have a similar capacity, whereas St. Albans and Ticonderoga serve similar population sizes; but St. Albans has tertiary treatment and Ticonderoga is in the process of upgrading clarifiers. Microplastic pollution may not appear to be significant, but when plant flow rate and abundance of treatment plants discharging into Lake Champlain is accounted for, the microplastic issue compounds. These particulates have potential to adsorb harmful chemicals residing in the water and pose risk to aquatic organisms and human health. By documenting wastewater treatment plants as a source of microplastics, we can share these findings with plant operators, lake stewards, and government officials, and work towards solutions both up and downstream.

Sun- 23

Investigating Novel Mycorrhizal Mutualisms of Endemic *Rhododendron catawbiense* with Soil Fungi North of its Range

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Abstract - Anthropogenic climate change is predicted to imperil many species as the climatic conditions their ranges currently occupy rapidly shift poleward in coming decades. Models forecasting these changes focus almost exclusively on change in abiotic factors, although it is expected that biotic interactions will also greatly complicate species' responses. For example, competitive or predatory interactions could slow species' migration ability, while the presence or absence of required mutualists in new regions could be decisive in determining colonization success. In this study, we investigated the performance of a narrow endemic Appalachian plant, *Rhododendron catawbiense* (Catawba Rosebay), to explore how seed germination and establishment might be influenced by the presence or absence of native soil microbial communities, including specialized ericoid mycorrhizae thought to be crucial to success of many plants in the Ericaceae. Through greenhouse mesocosm experiments, we compared germination rates of Catawba Rosebay when sown on soil inoculated with ericoid mycorrhizal communities from a predicted area of northern range shift in Central Massachusetts, alongside control forest soil without Ericoid fungi, and compared with the performance of a more widespread New England native plant, *Rhododendron maximum* (Great Laurel). We found that Catawba Rosebay had significantly higher germination rates than Great Laurel in soil inoculated with ericoid mycorrhizae from Great Laurel sites ($P < 0.01$), as well as significantly higher rates within the mycorrhizal treatment than in the control ($P < 0.01$). In contrast, native Great Laurel only showed marginally significant differences in germination rate between inoculated mesocosms vs. non-inoculated controls ($P < 0.10$). An expanded study is currently being conducted to determine if this pattern is the result of potential "cheating" by Catawba Rosebay in a novel mutualism with northern mycorrhizae, underlying species fitness variation between the 2 rhododendrons, or a difference in mutualist specialization vs. generalization between the 2 species and their native fungal communities. In addition to the previous controls and treatment, this ongoing study includes the addition of a second, sterile control and a new treatment of ericoid fungal communities from within the native range of Catawba Rosebay.

Sun- 13

Finding the Sharpest Needles in the Haystack: Predicting Vernal Pool Hotspots in High-quality Upland Areas in New York State

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Abstract - Vernal pools present a unique conservation challenge to land managers. Due to their small size and isolated nature, they are not regulated at the federal level; where states have stepped in to regulate these unique systems, pools are generally protected as critical habitat for those amphibians that use them for breeding. Because these amphibians use both terrestrial and aquatic habitats throughout their life cycles, high-quality habitat must be characterized by the quality of both the pools themselves and that of the surrounding uplands. Finding vernal pools and assessing in-pool habitat quality are time- and personnel-intensive efforts; in order to effectively manage limited agency resources, maximizing the probability that searches will find higher-quality pools is critical. To this end, we attempted to predict potential vernal pool hotspots using known pool locations throughout New York State and parts of Vermont and Massachusetts. We also created a statewide index of upland habitat quality that combined anthropogenic impacts, forest cover, and other factors. The potential pool hotspots were combined with the upland quality index to identify priority areas for intensive aerial image and on-the-ground searches to find and survey vernal pools embedded in high-quality upland habitats. By identifying pools in high-quality uplands, we can increase the likelihood of finding and protecting the highest priority vernal pools for sustaining amphibian populations of interest.

Sun- 18

An Index of Time of Day that Accounts for Shifts in Sunrise and Sunset for Use in Wildlife Studies

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Abstract - Wildlife ecologists are often interested in determining the activity patterns of animals across the 24-hour day, and studies that collect animal observations along with some measure of when in the day each observation is made can address such questions. However, using clock time as a metric for when an animal is active or observed is problematic. Presumably animals respond to solar events such as sunrise and sunset, but human clocks are not continuously calibrated to the changes in these solar events across the year. In short term studies, clock time may suffice, but seasonal or longer studies must account for the change in sunrise, sunset, and day/night length or several problems will be introduced to the analysis, e.g., the activity of crepuscular animals will not be as clear and/or nocturnal or diurnal events will be mischaracterized. Other researchers have identified this problem and recommended that measures such as minutes-since-sunrise be used instead of clock time; however, “minutes-since” measures will only be calibrated to the one solar event chosen as the zero point (e.g., sunrise) and not the opposite one (sunset) because seasonal shifts in one are not exactly symmetrical with the other. I developed a relatively simple method using Program R to change clock times to a 0–2 index, where scores of 0–1 equate to a proportional measure between sunrise and sunset and scores 1–2 equates to an analogous “rescaled” proportion between sunset to sunrise. This index score is thereby independent of day/night length and calibrated to both sunrise and sunset of the specific days of the year the animal events were observed. These scores are easily converted to radians and sent to activity pattern analyses such as found in the ‘Overlap’ package or sorted into diel period “bins” (e.g., dawn, day, dusk, night). Future developments will include “in-code” calculation of daily sunset and sunrise times for any geographic location rather than importing calendars of such times from external data.

Sat- 8

Estimating Deer Populations in Champlain Valley Forests

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Abstract - Overpopulation of *Odocoileus virginianus* (White-tailed Deer) may have a large effect on forests, with high deer densities in a given area suppressing tree seedlings and saplings, shrubs, and herbaceous plants. Knowing population size of deer in a given area is key in estimating (and predicting) potential damage to forest health and regeneration. If a land owner or manager knows the population density in their area, they will be better equipped to take action preventing forest from damage. The objectives of this project are to estimate regional deer population size in a northern hardwood forest in the Champlain Valley. Additionally, we will be comparing several different deer population-estimation methods. This project is part of a larger ongoing project looking at the potential impacts on forest health and composition due to deer browse. Our study site will be in a hardwood forest located at the Miner Institute in Clinton County, West Chaz, NY. This forest is comprised of 2 silvicultural treatments, specifically a recent clear cut (≤ 15 years since harvest) and an uncut (≥ 40 years since harvest) stand. Within each forest type, we have established four 10 x 10 m plots. Two plots are deer exclosures that are fenced off by an 8.5-foot-tall fence, and 2 are control plots that are untouched areas that deer may freely enter. We will place game cameras in the 4 control plots to allow monitoring of deer abundance and activity in the area, and will collect data from the cameras each 1.5 weeks (1011 days). In order to estimate population density with camera data, we will develop models including date, temperature, population size, and behavior variables. Further, transects will be established through the 2 forest types with sample plots evenly spaced along them. We will collect scat, browse, and bedding data in these plots 2 times during the course of the study, once in early March and again in late April. This study will help inform natural resource management decisions and implementation regarding regional deer densities and their impacts on forest ecosystems.

Sun- 53

The Sky is Falling: Beech Bark Disease, Changes in Forest Structure, and Impacts on Biodiversity

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Abstract - Late-successional forests possess unique biological assemblages due to the structural features they possess, such as large trees, multi-layered canopies, and roost and den sites. The northern hardwood forest type provides diverse and complex microhabitats for vascular plants, birds, bats, and other species. However, most northern hardwood forests have been compromised by the spread of the invasive scale/fungal complex beech bark disease (BBD) that targets *Fagus grandifolia* (American Beech). Infected trees produce prolific root sprouts that form dense understories of shade-tolerant saplings at the expense of other desirable herbs, shrubs, and tree seedlings. The dramatic changes caused by this disease are of concern for long-term resilience, biodiversity, habitat quality, and forest productivity. This study represents the first phase of an inventory and analysis of a mature, second-growth *Acer saccharum* (Sugar Maple)–*Betula alleghaniensis* (Yellow Birch)–American Beech forest infected with BBD, located at Huntington Wildlife Forest in the Adirondacks. We are conducting an operational-scale experiment that integrates the need to test commercially viable mechanical control of American Beech sprouts with the responses of plant and wildlife communities. This study represents the baseline data for a multi-year, operational-scale forest management experiment of removing all shrubby and infected mature beech. We surveyed 122 vegetation-plot clusters in treatment and control blocks in 2016 and 2017 for live-tree canopy, understory, and coarse woody material and sampled microclimate, moss and lichen communities, and habitat features of 70 large reserve trees. The basal area of our stand pre-treatment is ~ 150 sq ft. per acre, with 37% of our stand consisting of American Beech. We are monitoring pre- and post-harvest vascular plant, epiphyte, bat, small-mammal, and bird responses, paying special attention to avian spatial patterns of use and forest composition. Given the millions of hectares of affected forests throughout the Northeast, we hope to shed light on effective management of BBD-infected forests for native flora and fauna communities.

Sun- 38

Seasonal Presence and Habitat Association of a Cryptobenthic Fish, the Seaboard Goby, at its Northern Range Limit

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Abstract - Little is known of the local distribution and abundance of *Gobiosoma ginsburgi* (Seaboard Goby), at the northern extent of its range. Although this species is known to range northward to the Wareham River and Woods Hole, MA, records are sparse at its northern extent. The Seaboard Goby is frequently associated with bottom structure, such as shells and debris. Previous investigations have noted the possible role of the species' cryptic nature in rendering standard collecting gear (e.g., bottom trawls) inefficient, which may in turn account for the scarcity of occurrence records even in frequently sampled habitats. As part of a habitat assessment project, we conducted systematic intertidal and subtidal fish and invertebrate surveys bimonthly in Pleasant Bay (Massachusetts) from June 2015 through June 2016, supplemented by opportunistic sampling in summer 2016 and 2017. Sampling techniques included beach seining as well as dredge and trawl sampling from a small research vessel. During systematic surveys, Seaboard Goby occurred in dredge samples throughout the year, but were only captured by bottom trawl in November 2015. Seaboard Gobies were captured by dredge at 6 of 15 subtidal stations sampled, and by trawl at 3 of those. Stations where gobies were captured featured structure including shells, macroalgae, tunicates, and assorted debris. Fish were often found within empty bivalve shells or other shelters. These results indicated the value of using multiple sampling gears to accurately document seasonal occurrence of cryptobenthic species. This study established a new range extent and year-round presence for Seaboard Goby along the northeast coast. Given that Seaboard Gobies are unlikely to be captured by traditional sampling methods, the species may extend even further north.

Sun- 31

Driver-dependent Hysteresis in an Enriched Aquatic Ecosystem

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Abstract - The utility of early warning signals to detect impending ecosystem regime shifts depends on whether such ecosystems display nonlinear dynamics. Hysteresis, a phenomenon in which the response of a system depends on the system's state or history, is a hallmark of nonlinearity. Long-term enrichment and recovery studies of aquatic ecosystems show hysteresis in response to enrichment; however, such studies lack replication and manipulation of driver variables such as enrichment-loading concentration. We conducted a test for driver-response hysteresis in replicated enriched aquatic ecosystems. We induced a regime shift in water-filled leaves of *Sarracenia purpurea* (Purple Pitcher Plant) via the addition of organic matter (bovine serum albumin) at 3 loading concentrations (low, medium, and high) and monitored both organic matter and dissolved oxygen concentrations during enrichment and subsequent recovery phases. Hysteresis was present at low concentrations of organic matter loading; however, the hysteresis loop was reversed at high loading and absent at intermediate loading concentrations. Our results suggest that (1) the Purple Pitcher Plant microecosystem displays nonlinear driver-response dynamics and is therefore a suitable system for identifying early warning signals, and (2) hysteresis in the Purple Pitcher Plant microecosystem is dependent on the magnitude of the driver variable. Such driver-dependence has important implications for the management of ecosystems following a regime shift.

Sun- 15

Densities of Invasive and Native Bivalves in a Massachusetts Stream

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Abstract - *Corbicula fluminea* (Asian Clam), native to freshwaters of Asia and Africa, was introduced into North America and currently occupies 44 States. This invasive clam was first documented in New England (Connecticut) by early 1990 and is now documented from 28 waterbodies of Massachusetts since first reported in 2001. Considered one of the most invasive animal species in freshwater ecosystems, Asian Clam invasions offer high potential of negative ecological and economic impacts. In October 2016 and 2017, we sampled the density of the exotic Asian Clam and the native *Elliptio complanata* (Eastern Elliptio) mussel at two locations along the Nemasket River (Middleboro, MA). Overall, we found Asian Clam density (mean: 32 clams m⁻², min-max: 0–111 m⁻²) to be significantly greater than Eastern Elliptio (mean: 3 mussels m⁻², min-max: 0–12 m⁻²). Asian Clam density was consistently significantly greater than that of Eastern Elliptio across both sampling years as well as across the 2 sampling sites. Neither Asian Clam nor Eastern Elliptio densities differed significantly between sampling locations. Between the 2 sampling years, there is a marginally significant effect of the year on Asian Clam density and marginally insignificant effect on Eastern Elliptio density. This baseline dataset is important for long-term monitoring efforts in the Nemasket River, an ecologically important migratory herring fish and *Anguilla rostrata* (American Eel) route.

Sat- 14

Ornamental Gardens as Sites for Conserving Plant Species: Insights from Bloodroot (*Sanguinaria canadensis*)

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Abstract - Ornamental gardens can be important sites for the conservation of plants species, especially those that might be under threat of overharvest in the wild, for e.g., medicinal plants. *Sanguinaria canadensis* (Bloodroot) is a medicinal plant collected by traditional Iroquois medicine practitioners. It is also a plant gaining importance in the large-scale pharmaceutical industry. It is frequently planted as an ornamental species in many gardens in northern New York. We measured biotic variables such as ramet density, rhizome biomass, and leaf area of 12 Bloodroot populations found in ornamental gardens, and compared these variables to 15 populations found in wooded areas of St. Lawrence county. We also examined abiotic variables (soil characteristics and canopy cover) at each of these populations. Our study indicated that there is a significant ($P < 0.05$) difference in biotic variables between ornamental gardens and wooded sites. Populations located in ornamental gardens had greater ramet density and rhizome biomass. Biotic variables varied significantly ($P < 0.05$) in response to local abiotic characteristics (soil moisture, potassium, magnesium, and nitrates) at population sites. The study provides information that can be applied to using ornamental gardens as a site for the conservation of medicinal plant species.

Sun- 7

Water Quality Blueprint for Floodplains and Wetlands in the Lake Champlain Basin of Vermont

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Abstract - The Water Quality Blueprint is a web-based tool developed by The Nature Conservancy for the Champlain Basin of Vermont. The Blueprint allows conservation practitioners to focus on areas that provide the most benefit to water quality and conservation goals. The geographic analysis area is focused on the most inclusive spatial representation of river corridors as well as wetlands throughout the basin. The Blueprint highlights areas for protection and restoration of wetlands and floodplain forests. The primary audiences for the Blueprint are local watershed organizations, town conservation commissions, government agencies, and land trusts.

Sun- 27

Student-Driven Research Links Sensory, Physiology, and Behavior in Brook Stickleback

Simon Pearish (Norwich University, Northfield, VT; spearish@norwich.edu)

Abstract - Students in an upper-level biology course formed specialized research questions centered around the underlying mechanisms that might generate differences in behavior in *Culaea inconstans* (Brook Stickleback). Research teams developed expertise in 4 distinct specializations, including social behavior, risk-taking behavior, physiological performance, and mechanosensory traits. Then, through collaborations with other teams, students formed cross-disciplinary research questions and conducted hypothesis-driven experiments. Significant findings included a link between risk-taking behavior and physical exhaustion as well as evidence that the lateral line system has an impact on social interactions.

Sun- 30

Are Trees Migrating? Elevational Shifts of *Betula papyrifera* and *Acer saccharum* in the Adirondack Mountains

Rachel Penders (SUNY Plattsburgh, Plattsburgh, NY; rpend001@plattsburgh.edu) and Mark Lesser (SUNY Plattsburgh, Plattsburgh, NY; mless004@plattsburgh.edu)

Abstract- Elevational shifts of tree species' ranges in montane habitats is a response to global climate change. This is important as it highlights species' tolerances to changes in abiotic and biotic factors. Initial evidence of range shifts may be evident in distribution patterns of juvenile compared to mature trees. While mature trees would show the past range extent, it is possible new growth of saplings and seedlings would be found in elevational ranges just adjacent to the mature stands. Warming upslope temperatures may result in juvenile distributions higher than mature trees. Conversely, altered land-use at lower elevations may result in downslope shifts of juveniles compared to mature tree distributions. To address this question, we plan on focusing on the range limits of 2 species: *Betula papyrifera* (Paper Birch) and *Acer saccharum* (Sugar Maple) in the Adirondack Mountains. Field-data collection and analysis will be carried out in the spring/summer of 2018. We chose these species for their locality in the Adirondacks as well as their known limited tolerances of warmer temperatures and open canopy. Within the High Peaks region of the Adirondacks, we will select 10 mountains which encompass a minimum of 500 m in elevation change, which will ensure that upper limits of both adult and juvenile birch and maple are captured in the study. At each mountain, 100-m transects will be located perpendicular to the slope every 50 m along the elevational gradient. We will use point quarter method every 15 m along each transect to assess species composition. We hypothesize that, upslope shifts may be observed if climatic factors are dictating species distributions, whereas downslope shifts may be observed if other factors (i.e., changes in land-use) are determining distributions. Further, competition with other species may influence distribution shifts. This study will provide a better understanding of large-scale patterns of upslope (or downslope) species migration. This potential for migration is important to the natural elevational ranges of all montane forests communities, as each tree grows in a range most suitable for its species. A shift in these ranges may alter the surrounding habitats, animal populations, and forest community structure.

Sun- 40

Influence of Surface Agricultural Runoff on Nutrient Concentrations in the Little Chazy River

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Abstract- Surface runoff from agricultural activities can increase nutrient deposition into downstream aquatic ecosystems, thereby increasing the likelihood of eutrophication and the associated negative consequences for human health. We monitored nutrient export in the Little Chazy River, a tributary of Lake Champlain that flows through agricultural areas and the Town of Chazy, NY, during the autumn period of manure application. We collected hourly flow measurements for 4 locations along the river using data loggers, USGS data, and periodic measurements with a current meter. Water samples were collected twice during base-flow conditions and twice following a small rainfall event. We analyzed water samples for total suspended solids, total nitrogen, nitrate, total phosphorus, and soluble reactive phosphorus. We detected significant differences in nutrient concentrations among sampling locations, likely due to variation in local topography and adjacent runoff sources. However, we failed to detect significant changes in nutrient export following the small rainfall event. Autumn 2017 was a particularly dry season, and a relative lack of rainfall likely contributed to our failure to detect changes in nutrient export following manure application to adjoining agricultural fields. We plan to continue monitoring these sites to capture a greater number of agricultural fertilization and rainfall events. This study provides a useful baseline for understanding nutrient transformations along the Little Chazy River and to compare future export measurements to low-flow conditions.

Sat- 10

Fall vs. Spring Predation on Eastern Red-Backed Salamander

Emma Perry (Bridgewater State University, Bridgewater, MA; e3perry@bridgew.edu) and M. Caitlin Fisher-Reid (Bridgewater State University, Bridgewater, MA; mfisherreid@bridgew.edu)

Abstract - Current understanding of predation on salamanders is limited. Most studies suggest that salamanders are eaten mainly by birds and snakes, but there are still unanswered questions. One of these unknowns is whether primarily visual predators, such as *Meleagris gallopavo* (Wild Turkey) preferentially prey on *Plethodon cinereus* (Eastern Red-Backed Salamander), and if so, if they have a preference for 1 of the 2 primary color morphs (striped and unstriped). Since salamanders are typically most active at the surface in fall and spring, we are also interested in whether predation intensity varies seasonally to match typical salamander abundance. Clay models are a common method of measuring predation intensity by visual predators in herpetology, and we apply this method to explore type of predator and seasonal intensity of predation. We made impressionable, non-toxic clay models of the 2 color morphs of *P. cinereus* to determine types and patterns of predation based on number and shape of bite marks left in the clay. We deployed each of the models for 2 weeks during fall 2017 and spring 2018. Models were checked daily for signs of predation and photographed, removed, and replaced when predation had been detected. This poster summarizes the results of our study after 2 seasons (fall and spring). We have found a variety of marks, including those left by rodents, slugs, birds, and some unidentifiable predators. Thus far, there is no significant difference in predator attacks on striped vs. unstriped models. Of the identifiable marks, we believe the slugs are “accidental”, i.e., slugs are unlikely to be seeking out and eating real salamanders, but rather just encounter the clay models, taste them, and continue to eat them, perhaps detecting calcium in the clay. We are planning to continue this study by collecting 2 more weeks of data in summer 2018, so that we can better understand seasonal predation on *P. cinereus*.

Sat- 5

Methods in Simulating Nutrient Stoichiometry, Structure, and Function within *Sarracenia purpurea*

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Abstract - Alterations to nitrogen and phosphorous levels have led to numerous problems in aquatic ecosystems, specifically eutrophication. Due to large size of most aquatic systems, it is difficult to model the fate of nutrients, specifically in regard to stoichiometry at varying scales. *Sarracenia purpurea* (Northern Pitcher Plant) can be used as a model system for an aquatic ecosystem due to the carnivorous pitcher containing a fully functioning ecosystem. Through experimental manipulations, this system can allow us to test modeling efforts. Prior to experiment implementation in any system, it is advised to conduct preliminary studies simulating the full range of variation in measured variables and predicted parameters. We present here our work using Random Walk algorithms in Program R to simulate and graphically represent the full range of stoichiometries, structures, and functions within *Sarracenia purpurea* pitchers.

Sun- 12

Quantifying the Value and Quality of Created Wetlands in Otsego County, New York

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Abstract - Wetlands provide numerous ecosystem services including, but not limited to flood control, sediment and nutrient retention, groundwater replenishment, water purification, recreation, and climate-change mitigation. Despite these benefits, wetlands have rapidly disappeared from the landscape and are often degraded by anthropogenic expansion. The goal of this study is to better understand the ecosystem dynamics of created wetlands to determine their functionality in mitigating loss of ecosystem services through adverse impacts to natural wetlands. Ultimately, the utility of created wetlands is dependent upon the quality of those systems, which can be defined based on a floristic quality index (FQI) used in a floristic quality assessment (FQA). However, this approach has not traditionally accounted for rare or commonly unobserved species, which may be important for determining the quality of a wetland. Quality and value of 35 wetlands created as conservation easements by the National Resources Conservation Services (NRCS) in Otsego County, NY, will be evaluated in this study based on FQI determined through floral community surveys of each wetland. We will use occupancy models to estimate the number of species present at multiple plots in each wetland to account for imperfect observation. This approach will allow us to correct estimates of FQI for rare or commonly unobserved species, thus improving the application of FQA for site selection. The FQA results from this work will be used to assist the NRCS in selecting high-quality sites for creating easement wetlands in the future.

Sun- 17

The Effects of Clorox Green Works® on *Brassica rapa* Plant Growth and Health

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Abstract - The purpose of this experiment was to explore the possible detrimental effects of a single exposure to a biodegradable cleaner on plant health, in this case *Brassica rapa* subsp. *oleifera* (Field Mustard). Effects on plant height, survival rate, and flower production were recorded. The percent concentrations of Clorox Green Works® used were 0% (control), 5%, 10%, and 20%, and only 1 ml of solution was applied to each group exactly a week after germination. The hypothesis was not supported by statistical analysis, but the experiment still revealed that in the 20% concentration, survival rates went down to 34%, as compared to a 100% survival rate in the control group. Also, a threshold seems to have been reached at 5% concentration, since all subjects survived that treatment. A second modified trial of the experiment is currently being conducted to account for possible extraneous variables.

Sun- 14

Phenotypic Plasticity of Pitch Pine (*Pinus rigida*) Across Environmental Gradients

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Abstract - *Pinus rigida* (Pitch Pine) grows over a wide range extending from Ontario to Appalachia, and in various habitats. Usually found on sandy, less-fertile soils, Pitch Pine can also grow in a wide array of habitats and moisture conditions. While cases of phenotypic plasticity have been studied within Pitch Pine, it remains unknown how this tree thrives in disparate environments, many of which are understood to be highly stressful for plants. In the summer of 2017, we selected study sites representing 5 different habitats with a range of water availability, including: rocky ridge, swamp, plateau, mixed woodland, and sand dune. At all sites, we measured Pitch Pine needle length, specific leaf area, and stomatal density, in addition to photosynthetic traits such as light response and water-use efficiency. Across the varied environmental constraints presented by each site, differences were observed in needle length, water-use efficiency, and maximum photosynthetic rates. Further measures of needle plasticity such as stomatal density and specific leaf area remained constant between sites. Our research suggests that Pitch Pine exhibits some extent of phenotypic plasticity, enabling it to grow across a wide range of growing habitats.

Sun- 42

The Effects of an Open Compost Site on Mammal and Bird Species Compared to a Field Location in Colchester, VT

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Abstract - Camera trap surveys draw inferences on the richness, composition, and structure of mammal communities. The Saint Michael's College campus-wide compost facility appears to be an attractor for birds and, based on footprint density, may also be a focal point for mammal activity. Data were gathered from 8 trail cameras to study the effects of the open compost site on mammal and bird species compared to 9 cameras set in control locations in nearby fields and woods. Relative abundance of each photographed species, evenness of the community, and species richness were calculated from each camera. Small foraging mammal species including *Sciurus carolinensis* (Grey Squirrel), and bird species such as *Corvus brachyrhynchos* (American Crow) and *Sturnus vulgaris* (Starling) were larger components of the community at the compost site than at control locations. Control sites tended to be dominated by larger mammals including *Canis latrans* (Coyote) and *Odocoileus virginianus* (White-tailed Deer). *Meleagris gallopavo* (Wild Turkey) were more frequently observed at control sites than near the compost. These data confirm that the open compost site influences the distribution of fauna on campus.

Sun- 51

Exposing Biodiversity Data in Library and Archive Collections

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Abstract - The Biodiversity Heritage Library (BHL) has >54 million pages of natural history literature from the 15th to 21st centuries and is available to all, from the student seeking information on insects in the garden, to scientists investigating endangered species, to those interested in protected area management, disease control, and more. Natural history literature and archives contain information that is critical to studying life on Earth. This material includes species descriptions, distribution records, historic climate records, history of scientific discovery, scientific observations, and illustrations. More than 110,000 natural history illustrations are available through Flickr, and these have been used in the worlds of art and design. In some cases, publications and archives may be the only remaining record for an extinct species. This poster describes the collections, services, and tools that can benefit naturalists or anyone interested in biodiversity. BHL provides optical character recognition (OCR) for the content. Of key importance is the extraction of scientific names from the OCR text using advanced algorithms and the Global Names Architecture. BHL is a global collaborative digital library with a mission to improve research methodology by making biodiversity literature openly available. The institutional collaborations of libraries and archives apply digital technologies to unlock their collections for scientific and wider public use. By applying common standards, collection development policies, contribution to a single repository that allows content to be curated, and innovative tools and services that ease data and text mining, the result is an open science resource that advances scientific progress through linking, use, and reuse. Examples include delivering literature to the Encyclopedia of Life (eol.org) and the Global Biodiversity Information Facility (gbif.org) as well as participation in crowdsourcing projects such as Zooniverse (Zooniverse.org). BHL depends on user engagement, as evidenced by effective direct interactions and use of social media tools for collecting, managing, and responding to user feedback which can range from requests for digitization of a particular item, metadata corrections, field notes transcriptions, and research questions. BHL links to related initiatives providing extensive exposure to scientists, citizen scientists, and the interested public anywhere in the world.

Sat- 61

Bird and Tree Censuses of the Clare J. Hoyt Foundation Property in Walden, NY

Douglas A. Robinson Jr. (Mount Saint Mary College, Newburgh, NY; douglas.robinson@msmc.edu) and **Deja Carter** (Mount Saint Mary College, Newburgh, NY; dcar4396@my.msmc.edu)

Abstract - Ecological surveys give an overview of what a particular area contains during the time of the survey and can lead to discoveries of new habits, species, and/or endangered animals. In May and June 2017, bird and tree surveys were used to evaluate the species present on the Clare J. Hoyt Foundation in Walden, NY. The 26-ha (65-acre) property was once a dairy farm, but it was left to “return to nature” and repopulate with species typically found within temperate deciduous forests. We completed 4 surveys of birds found on the property and collected basic information on the tree composition around the census points. We determined there were 38 species of birds utilizing the property during the censuses and 8 different tree species found around our census points. Our data indicate there is a relatively clear distinction between areas of relatively old and relatively young forest. While the species found on the site are representative of upland and lowland temperate forest, future research will focus on how use (e.g., breeding, wintering, etc.) of the sites differs on the property.

Sun- 56

The Environmental Pesticide Imidacloprid Decreases Neurotransmission Associated Enzymes in the Honeybee (*Apis mellifera*)

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Abstract - Imidacloprid is a neonicotinoid and systemic pesticide that is widely used in the United States for controlling a wide variety of pest insects. Inadvertently, the same spraying regimes expose environmentally and agriculturally beneficial *Apis mellifera* (Honeybee) as well. Imidacloprid has been previously described as causing confusion and memory issues in Honeybees. However, the molecular cause of this disorientation is not understood. Therefore, we evaluated the acetylcholinesterase and acetylcholine receptors in honeybees. We exposed Honeybees to a sugar solution containing 0 ug/L, 0.2 ug/L, 20 ug/L, or 2000 ug/L imidacloprid for 5 days in glass jars. We extracted RNA, synthesized cDNA, and performed quantitative PCR (QPCR) on acetylcholine pathway genes. Acetylcholinesterase-1 (Ache-1) was down-regulated to 25% of the control at 20ug/L imidacloprid. The decreased gene expression of Ache-1 suggests decreased production of enzyme to break down acetylcholine. Due to the excess of acetylcholine in the synapse at the nerve, the Honeybee could be compensating by reducing the amount of acetylcholine receptors. Acetylcholine receptor subunits $\alpha 3$, $\alpha 4$, and $\alpha 2$ were all down-regulated to 520% of the control bees at similar concentrations. In summary, imidacloprid is altering neurotransmission in Honeybees by changing the action of acetylcholine.

Sat- 28

Associations between Forest Type, Diversity, and Soundscape Parameters in Letchworth State Park

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Abstract- The field of soundscape ecology hypothesizes that different habitats will have unique community acoustic qualities composed of all the sounds that are of biological, geological or anthropological origin. If this is true, the biophony of different habitats should reflect their biodiversity. The purpose of our study is to investigate soundscapes in three different habitat locations in New York's Letchworth State Park, each with distinct vegetation communities. We hypothesize that the most vegetatively diverse stand will have the most avian diversity and the highest overall presence of biophony, and that biophony will reflect seasonal changes in the habitats as well. Within each site, transects were used to determine plant species diversity and composition, canopy cover, and ground cover. Site 3 was the most diverse according to a rank abundance curve, it also had lower diameter at breast height, and point to plant measurements than the other 2 sites. Forty-eight hour recordings were done in each habitat during the summer and fall of 2017. We are using the recordings to assess the biodiversity of vocalizing organisms in each habitat, and to test the hypothesis that soundscape indices such as the Acoustic Complexity Index and the Bioacoustic Index accurately reflect the biodiversity of these habitats.

Sat- 41

Documenting the Presence of Eastern Small-footed Bats in the Delaware Water Gap National Recreation Area

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Abstract - *Myotis leibii* (Eastern Small-footed Bat) has traditionally been considered one of the rarest bat species in northeastern North America and it is recognized as a species of concern across much of its range. However, there is still much that is not known about the population status and summer roosting ecology of this species. This lack of information may stem from the Eastern Small-footed Bat's habitat preference of rocky outcrops and talus slopes, which are scattered and difficult to survey, as well as survey methods that may be ineffective for this species. We used 3 techniques to survey for Eastern Small-footed Bats in the Delaware Water Gap National Recreation Area in eastern Pennsylvania and western New Jersey: active acoustic monitoring, stationary acoustic monitoring, and visual searches for roosts. We selected 5 sites of suitable habitat in the Delaware Water Gap National Recreation Area and surveyed over the summer and fall of 2017. We then used occupancy modeling to compare detection probabilities for the 3 techniques. Eastern Small-footed Bats were detected at 3 of the 5 sites. Active acoustic monitoring was the most effective technique at documenting this species (detection probability of 0.25), followed by stationary acoustic monitoring (0.18), and finally visual roost searches (0.08). In a similar study in Virginia, visual roost searches were most effective at detecting this species, whereas acoustic monitoring was least effective. This difference between studies may be due to the type of detectors used for acoustic monitoring and also the learning curve associated with visual roost search surveys.

Sat- 70

Determining the Importance of Vernal Pools Across Geophysical and Urbanization Gradients to Inform Regulation, Conservation, and Management

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Abstract - Vernal pools (also known as “geographically isolated pools” and “ephemeral pools”) are small, non-permanent bodies of water that are typically found in forests and provide critical breeding habitat for many amphibian and invertebrate species. Some species are vernal pool obligates whose population viability depends on the preservation of functioning and connected vernal pool and upland systems. Long-term shifts in precipitation and seasonal temperature further threaten these ephemeral communities. Yet these key wetlands often fall through the regulatory cracks and become degraded or eliminated. In New York State, for example, wetlands smaller than 5 ha (12.4 acres) are protected by law only if designated as a wetland of “unusual local importance” (ULI), per the state’s freshwater wetland regulations. Among other criteria, ULI can be designated for wetlands supporting “an animal species in abundance or diversity unusual for the state or for the major region of the state in which it is found”. However, the New York State Department of Environmental Conservation and local partners lack a comprehensive and defensible way to identify vernal pools having unusual regional or statewide abundance or diversity. In this project we are compiling available data on vernal pool quality in rural and urban locations in the major regions of New York and conducting field sampling to fill data gaps. To date, we have amassed biodiversity data from over 700 pools, with counts of *Rana sylvatica* (Wood Frog) and *Ambystoma maculata* (Spotted Salamander) egg masses being the most commonly collected piece of biodiversity data at 245 pools across the state. In 2018 and 2019, we will count egg masses at an additional 200 pools, and habitat data at a subset of pools, yielding a combined data set of amphibian productivity along development gradients in all regions of New York. The result, combined with landscape metrics available from GIS analyses, will be a powerful instrument for defining the distribution and habitat relationships of amphibian productivity in vernal pools across the state in a variety of landscape settings. These data will help the New York establish science-based thresholds for potential ULI designation.

Sun- 19

Restoring Northeast Understory Species: A Case Study of the Primary Literature

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Abstract - Restoration research of forests often focuses on re-establishment of dominant tree species more than ground-layer herbaceous cover. The ground layer contributes significantly to the biodiversity of the forest, but it hasn’t received significant attention in forest-restoration literature. This project reviews current northeastern hardwood forest understory restoration research, and in particular, the methods of establishing 2 species of interest, *Sanguinaria canadensis* (Bloodroot) and *Allium tricoccum* (Wild Leek). Although these are not considered endangered, they are ecosystem engineers in ground-layer understory communities and temperate forests. There are ground-layer–research studies being done in woodland and savanna ecosystems where herbaceous species are dominant components of the environment. Herb species that are relatively slow to disperse, such as Bloodroot, which is dispersed by ants, have a harder time taking hold in closed forests that are distant from established populations. We will build a restoration garden and nursery space and report a pilot test of methods for establishment of Bloodroot and Wild Leeks. Restoration using native species appropriate to all strata of the forest may increase the resilience of our ecosystems to environmental change such as rising temperature or species invasions. Success is measured by how species restoration has contributed to alpha and beta diversity of forest restorations. Historical records of past land use are also of significance as a natural experiment; for example, the impacts of logging in Vermont cleared the majority of trees in the Champlain Valley by 1840, also removing valuable herb species. Land-use records can show which areas of our landscape are far from seed sources, and therefore least likely to experience natural re-establishment. Such sites furthest from parent plants could benefit most from ground-layer restoration.

Sat- 34

Remote Sensing of Cliff-side Vegetation Using GigaPan Technology

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Abstract - Understanding what controls the distribution of vegetation is a primary ecological question, but tough-to-access areas, such as the steep cliffs found in the gorges of the Finger Lakes region of New York, have been difficult for plant ecologists to survey. We used a remote-sensing technology, GigaPan photographs, to sample the gorge walls of Fillmore Glen State Park, in Moravia, NY. A GigaPan is a portable, tripod-mounted robotic instrument that houses a DSLR camera, and allows for the camera to take hundreds of individual photos at high resolution in the visible wavelength range, which are then combined into a zoomable panoramic image. In October 2017, we chose 2 cliff walls, and took GigaPan images from the base of the cliff to about 4.5 m high. The photos were sampled in Illustrator using a 30-cm grid superimposed over the image. The vegetation that was present at each node was sampled. We found that there were similar species found on each cliff face, with the most abundant species being mosses, *Marchantia* sp., and *Polypodium* ferns. There were no significant differences in species composition between either cliff face or the tops of the cliff and the bottoms. However, we will resample these sites in the Summer 2018 to determine if there is any spatial or temporal variation of the vegetation at these sites. Using GigaPan technology is a safe and easy method to sample these sites that have been historically difficult to access and will allow us to have a baseline to assess changes in the cliff-side vegetation in the future.

Sat- 59

Wintering Bufflehead (*Bucephala albeola*) Habitat Use Along Newport Neck, Rhode Island

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Abstract - The Bufflehead (*Bucephala albeola*) is a common diving duck that forages on the coastal waters of Narragansett Bay and surrounding Rhode Island Sound during the winter. This sexual dimorphic species can be found foraging in shallow, sheltered inlets and coves for mollusks and crustaceans. Our goal was to determine the habitat preferences of Buffleheads in this region. Sea ducks and their associates (geese, loons, grebes, gulls, cormorants, etc) were surveyed in 6 nearly equal distant sections of the 5-km Cliff Walk along the edge of the Atlantic Ocean during the winters (Nov–Mar) of 2006–2007, 2010–2011, 2014–2015, 2015–2016, and 2017–2018. Surveys were conducted on foot with 8 x 40 binoculars and 15–40x spotting scope to count numbers of birds within 500 m of the coast line. Surveys were conducted at low tide (\pm 3 hr) and under relatively calm conditions. We counted 996 Buffleheads in all years of study. Effort varied in each section (10–31 surveys per section), therefore we weighted relative abundance of Bufflehead by number of surveys per section. There was no significant effect of year or month on abundance in each section of the Cliff Walk, therefore data were combined across years and months in each section. Buffleheads were significantly ($P < 0.0001$) more abundant per survey in coves (mean = 15.5–19.0 birds per survey) than sites more open to the ocean (mean = 2.4–5.9 birds per survey). While Buffleheads are commonly observed along the open ocean coastline of Newport Neck, RI, they are preferentially choosing the most sheltered coves when foraging.

Sat- 51

Monitoring Pool-Breeding Amphibians in a Massachusetts State Forest from 2014 to 2017: Results and Surprises

Patricia Serrentino (Serrentino Environmental Services, Greenfield, MA; pserrentino19@gmail.com) and Alexander J. Haro (Serrentino Environmental Services, Greenfield, MA; aharo@usgs.gov)

Abstract - We monitored 9 vernal pools in Dubuque State Forest, located in Franklin County, MA, between 2014 and 2017 to determine the abundance and distribution of breeding *Lithobates sylvaticus* (Wood Frog), *Ambystoma maculatum* (Spotted Salamander), and the state-listed *Ambystoma jeffersonianum* (Jefferson Salamander). Potential and actual threats to pool-breeding amphibians were identified. Productivity of pools varied between species and years, and was not consistent for either year or species. Pools that were larger and deeper usually produced the highest number of egg masses for the 3 amphibian species. The effects of local weather conditions on breeding effort was substantial during periods of lower-than-normal precipitation. Egg-mass surveys and informal searches of new vernal pools in Dubuque State Forest resulted in the discovery of numerous breeding sites for Jefferson Salamanders. The long-term maintenance of healthy vernal pool communities in this State Forest will require monitoring the potential and actual impacts of recreational and silvicultural activities, illegal off-road-vehicle use, climate change, and other factors on these communities.

Sun- 61

Long-term Studies of Ferns at the Holt Research Forest, Arrowsic, Maine

Joanne M. Sharpe (Sharplex Services, Edgecomb, Maine; joannesharpe@juno.com)

Abstract - Fern observations began in 2000 at the Holt Research Forest in Arrowsic Maine (www.holtforest.org) and are still ongoing in 2018. Over 700 individuals of *Dryopteris intermedia* (Evergreen Wood Fern) and *Dryopteris marginalis* (Marginal Wood Fern) in selected research plots were flagged initially and monitored annually near the end of the growing season in the early fall. For each observation, I measured plant height and counted and classified as sterile or fertile (spore-bearing) all leaves. Spore production rates in terms of number of fertile leaves produced was consistently higher for reproductively mature individuals of *D. marginalis* than for *D. intermedia*. Leaf counts and plant height measurements have declined in the most recent 3–4 years of the study. Plant mortality was also higher in more recent years, with losses greater in the plot that had tree cover removed as part of a forest management experiment begun in 1987–1988. Patterns of temporal change and abundance for ferns can be assessed in combination with comparable data for other organisms in this research forest where monitoring has been underway since 1983.

Sun- 54

Can an Invasive Species Burn Soil Carbon? Black Locust Invasion and Soil Carbon in the Albany Pine Bush

Jacqueline Sharry (Union College, Schenectady, NY; sharryj@union.edu) and Jeffrey Corbin (Union College, Schenectady, NY; corbinj@union.edu)

Abstract - Invasive plant species can have dramatic and pervasive impacts on ecosystems, from species interactions, to resource availability, to biodiversity. One such invasive plant, the nitrogen-fixing tree *Robinia pseudoacacia* (Black Locust), has had significant effects on the soil chemistry in the globally rare inland pine barren ecosystem of the Albany Pine Bush. We have documented a loss of soil carbon following invasion by Black Locust, one that persists long after locusts are removed. We hypothesize that the nitrogen added through fixation by the Black Locust increases the carbon flux from soil to the atmosphere. Because decomposition rates are dependent on leaf-litter quality and carbon:nitrogen ratio, addition of the nitrogen-rich locust leaves may accelerate the release of CO₂. To test this, we added exotic locust or native scrub oak leaf litter to barren soil or locust soil in a factorial design and conducted a 16-week lab incubation. The carbon flux of the soil was monitored every 1–2 weeks using a LiCor 6400 portable photosynthesis analyzer. The invasion simulation treatment had a higher soil flux than the native simulation and treatments designed to control for the amount of carbon added and the original amount of carbon in the soil. These results indicate that adding nitrogen to the soil by nitrogen fixation accelerated the rate of decomposition and the release of CO₂ from the soil. Future measurements will determine whether there is less stored soil carbon in the soil. If more CO₂ is released to the atmosphere and stored soil carbon is lost because of species invasion, this may indicate another mechanism of carbon emissions and may provide more incentive for management of nitrogen-fixing invasive species.

Sat- 16

Using Dendrogeomorphology to Reconstruct Flooding History in the Champlain Valley

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Abstract - Understanding the flood history of a water body is imperative in land planning. Using data from tree core samples, it is possible to reconstruct flood histories. This information can be used by land planners in order to make informed decisions regarding development and land-use surrounding flood-prone areas. In ring-porous tree species (species that differentially exhibit large vessel elements in the early wood of an annual growth ring), flooding may exhibit itself in several ways, depending on the timing and magnitude of the event. First, enlarged vessels may be seen in the latewood zone of a growth ring where much smaller ones would be expected, if flooding occurs during the summer months. Second, early growing-season flooding may exhibit itself in the earlywood of the growth ring in the form of constricted or smaller-than-expected vessel elements. These are collectively known as flood rings. In the Northeast, ring porous species include *Fraxinus* sp. (ash) and *Quercus* sp. (oak), which are abundant in the Champlain Valley region. Tree core samples from ash and oak trees can be obtained from floodplains and analyzed to determine the flood history of the adjacent water body by identifying flood rings. Tree rings can be dated with annual resolution providing an accurate temporal record of flooding. Further, by coring trees along transects running perpendicular to the shoreline, we can quantify flood extent, providing a spatial context to the flood history. If a tree core provides evidence of multiple floods, it is possible to predict future storms based on the recurrence interval. Using GIS, we will locate floodplains and proceed to core ash and oak trees from those sites. Objectives of the project include assessing the extent of the flood-prone areas and determining if there is a recurrence interval of flooding. Due to the implications of flooding on land planning and development, it is important to have an understanding of the magnitude and recurrence of storms.

Sun- 47

Substituting the Natural Honey for the Artificial High-fructose Corn Syrup will Alter Sugar Metabolism in Honeybees

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Abstract - The decline in *Apis mellifera* (Honeybee) health may be caused by multiple interacting environmental stressors. Among these may be the effects of feeding bees high-fructose corn syrup (HFCS), which may lead to inconsistencies in metabolizing glucose and fructose properly. This lack of proper nutrition could contribute to the spiraling decline in bee health. Genes have been identified in the metabolism of carbohydrate that is involved in glycolysis and gluconeogenesis. We fed Honeybees from 9 separate beehives honey, HFCS, corn syrup, and sucrose. We extracted mRNA, prepared cDNA using reverse transcription enzyme solution, and performed Quantitative PCR (qPCR) with SYBR green to detect any changes in gene expression. Genes only in the glycolysis pathway were down-regulated including glucokinase (GK1), phosphofructokinase (PFK), pyruvate kinase (PK2), triose phosphate isomerase (TRS1), and lactate dehydrogenases (LDHA) when compared to honey. There were no changes in the gene expression within the gluconeogenesis pathway. This down-regulation in glycolysis genes implies there are different pathways in sugar metabolism that could be up-regulated to supply ample energy. Other enzymes such as glycerol kinase, ketohexokinase, fructose-bisphosphatealdolase, and alcohol dehydrogenase are currently the focus of our search for an alternative sugar breakdown pathway in Honeybees.

Sat- 24

The Effect of Pollination Treatment on Thistle Dispersal

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Abstract - Invasive species are one of the major threats to biodiversity, which makes understanding how they spread across the landscape of great importance. In this study, we focused on the invasive thistle *Carduus nutans* and asked how pollination (outcross- or self-pollinated by hand vs. open-pollinated control) influences its dispersal. First, we tested the effect of pollination treatment on terminal velocity of its wind-dispersed seeds. Terminal velocity is the highest velocity that a seed can achieve in still air; seeds that fall quickly do not travel as far on the landscape as seeds that fall slowly. We found that pollination treatment had a significant effect on terminal velocity ($P < 0.0001$), with slowest terminal velocity for self-pollinated seeds. Surprisingly, seed mass did not contribute to this difference in terminal velocity ($P = 0.1616$). Other factors, such as the size of the plume of these seeds, may instead contribute to differences in terminal velocity. We predict that self-pollinated seeds would travel farther because of slower terminal velocities, and we would not expect these seeds to have any competitive disadvantage in establishment with respect to outcrossed seeds because seed masses were found to be similar across treatments. Our presentation will also include the results of a dispersal model to estimate dispersal rates for different pollination treatments for *C. nutans*. Our findings suggest that some conditions of the invasion process, such as small initial population sizes, can disproportionately promote an invasion.

Sat- 16.5

Developing a Vegetation-based Deer-browse Index for the Northeastern United States

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Abstract - Over more than 30 years, numerous studies have quantified the impacts of *Odocoileus virginianus* (White-tailed Deer) browse on the vegetation in natural areas throughout the northern United States. In particular, many studies have emphasized species in forested habitats and the influence of deer browse on the regeneration of woody species. Many of these studies have summarized data on specific utilization and selective preferences for individual species, guilds, or functional groups. Others have confirmed community-level trajectories of biotic homogenization. Other measures such as the coefficient of conservatism and Floristic Quality Assessment have been developed to provide site-based metrics of plant composition relative to a variety of habitat quality and anthropogenic disturbances. To date, no synthetic species-based index has been developed utilizing the wealth of data available regarding the influence of deer browse on species composition and abundance on site-specific vegetation composition. I propose an index that quantifies browse using coefficients of preference, resilience, and structural amplitude applied to vegetation composition and abundance. I will discuss the status and application of this index and give examples of its use drawing from sites around New York State.

Sun- 46

The Effect of Group Size and Assessment Behavior on Pathogen Transmission in *Tetramorium caespitum* (Pavement Ant)

Erin Stanley (Salve Regina University, Newport, RI; erin.stanley@salve.edu), Anna Wilson Wuestefeld (Salve Regina University, Newport, RI; a.wilsonwuestefeld@salve.edu), and Heather Jylen Axen (Salve Regina University, Newport, RI; Heather.Axen@salve.edu)

Abstract - Sociality is associated with various benefits, but also costs, such as increased disease transmission among group-members. In the obligatorily social ants, behaviors such as assessment of infection in self or others, or self-and allo-grooming may limit pathogen spread. We investigated the effect of group size and efficacy of assessment behavior on transmission of the common soil-dwelling entomopathogenic fungal pathogen *Metharhizium anisopliae* in *Tetramorium caespitum* (Pavement Ant), a non-native ant common in New England. Colony fragments differing in worker number ($n = 1, 3, 5, 15$) were established in triplicate. Twenty-four hours after establishment, we exposed a single worker originating from the same colony, either to a solution of *M. anisopliae* conidia (1×10^7 conidia/mL, in distilled water with 0.05% Triton X) or a solution of only distilled water with 0.05% Triton (negative control), and introduced that individual to the fragment. The frequency and duration of antennation, self, and allo-grooming were observed for 5-minute periods at 0, 5, 10, 15, 30, 45, 60, and 90 minutes post-introduction. Survivorship was recorded for 7 days, and all dead ants were surfaced sterilized and cultured to determine if death was due to *M. anisopliae*.

Sun- 35

Single Planting Creates Expanding Naturalized Population of *Quercus palustris* Far From its Native Range Limit

Judy Stone (Colby College, Waterville ME; jstone@colby.edu) and Juvenal Lopez (Washington University, St. Louis, MO; juvenal@wustl.edu)

Abstract - Ornamental plant species are frequently planted well outside of their native ranges and, in some cases, escape from cultivation to develop naturalized populations. In this study, we characterized a naturalized population of Pin Oak *Quercus palustris* (Pin Oak) that has recently arisen in the woodlands of Colby College in central Maine, 275 km from its native range limit. The population stemmed from trees in 2 small horticultural plantings: one from 1950 and one from the mid-1980s. We compared growth rates of individual Pin Oak trees to those of *Quercus rubra* (Red Oak), the most closely related native species and likely competitor. We also carried out genetic testing to determine how many parents gave rise to the naturalized population. Growth rates of Pin Oak saplings were only marginally greater than those of Red Oak saplings. Genetic analysis showed that at least 75% of sampled progeny descended from the 6 trees of the original 1950 population, with at least one-third of the progeny descending from 2 individual trees. Our results demonstrate that a small number of founders can be sufficient to establish a naturalized population beyond the native range limit. It is too soon to tell whether naturalized populations of Pin Oak in Maine will behave invasively, as might be expected with a trans-oceanic introduction, or will behave more similarly to populations at a naturally expanding range limit.

Sat- 38

Effects of Riparian Plant Invasions on Stream Macroinvertebrate Communities

Weston Strubert (East Stroudsburg University, East Stroudsburg, PA; wstrubert@live.esu.edu) and Emily Rollinson (East Stroudsburg University, East Stroudsburg, PA; erollinson@esu.edu)

Abstract - Leaf litter from riparian plants is an important source of nutrients for stream macroinvertebrates. Riparian zones are highly susceptible to plant invasions, and changes in the species composition of riparian habitats may lead to substantial changes in the quality of leaf-litter inputs to streams. We conducted a field experiment examining decomposition rates and macroinvertebrate colonization of leaf-litter packs in 2 streams in northeastern Pennsylvania: Brodhead Creek and Appenzell Creek. Leaf-litter packs representing native plant communities contained leaves from *Rhododendron maximum* (Rosebay Rhododendron) and *Acer rubrum* (Red Maple), while invasive litter packs consisted of *Acer platanoides* (Norway Maple) and *Fallopia japonica* (Japanese Knotweed) leaves. We anchored mesh bags, each containing a total of 10 grams of leaf litter from the constituent species, in the streams in November 2017. Litter bags remained in the stream for 1 month, to allow macroinvertebrates to colonize the leaf packs and begin decomposing the leaves. After 1 month, we collected leaf bags and from the streams. Approximately twice as much decomposition occurred in the invasive leaf pack (86% loss of invasives' leaf litter; 47% loss of natives' leaf litter), although abundance of macroinvertebrates did not differ between the 2 leaf packs. The relatively low rate of decomposition in the native leaf pack was likely due to the inclusion of Rosebay Rhododendron, which has relatively low-quality leaf litter. Although a native species, the expansion of Rosebay Rhododendron thickets in riparian zones may therefore be of concern for the health of stream macroinvertebrate communities.

Sat- 15

Holocene Ecology and Climate in the Northern Adirondack Mountains

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Abstract - Peat bogs are one of the most important carbon sinks on the planet, and serve as an important record of the past. The paleoclimate and paleoecology of the Adirondack Mountains are poorly studied, especially in peat bog systems. Furthermore, there are no published studies that use stable isotope natural abundance to study paleoclimate in the Adirondack region. We took a continuous core to a depth of 7.1 m at a peat bog near Paul Smiths in the Northern Adirondacks. The bog is ~7000 years old. We sampled the core in 10-cm increments, and analyzed these samples for pollen fossils and stable isotopes of carbon, nitrogen, and oxygen. Initial pollen analysis shows a high abundance of *Pinus* (pine) and *Picea* (spruce), consistent with the environment this bog is situated in, though I have not analyzed all of the samples yet. The data from the isotope samples is not yet available. We expect to observe the mid-Holocene Hemlock decline in the pollen record, as well as shifts in species abundance based on local patterns of disturbance. Correlations of $\delta^{13}\text{C}$ and $\delta^{15}\text{N}$ with depth and topography (hummock or hollow) will show successional history and climate. Additionally, $\delta^{13}\text{C}$ and $\delta^{15}\text{N}$ increase with microbial processing of organic material; however, $\delta^{13}\text{C}$ also tends to increase in wetter conditions when microbial processing can be stifled by a rise in water level. Colder periods tend to show low $\delta^{18}\text{O}$, while warmer periods have high $\delta^{18}\text{O}$. This data will fill the gap in isotope data from the Adirondack region, and will provide a record of climate and succession in this area for the last 7000 years.

Sat- 57

Overwintering Dark-eyed Juncos (*Junco hyemalis hyemalis*) and their Plumage Microbiota

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Abstract - We initiated this study in order to describe the microbiota found in the ventral plumage of overwintering *Junco hyemalis* (Dark-eyed Junco). Between December 2017 and February 2018, we used walk-in Potter traps baited with bird seed to capture Juncos on the campus of the Massachusetts College of Liberal Arts in North Adams, MA. We captured 46 individual Dark-eyed Juncos, all of the *hyemalis* subspecies. Using differences in plumages we were able to confidently determine the sex of 20 males and 11 females. Wings of males were ~5 mm longer than those of females ($P < 0.05$), and male tarsus were slightly larger than those of females (~0.7 mm; $P < 0.05$). Males contain slightly more white (~5%) in their tail feathers compared to females. A subset of the 46 Dark-eyed Juncos were sampled for microbiota. On days that we sampled plumage for microbiota, we sterilized any surface that would touch the bird with ethanol (e.g., Potter traps, our gloved hands, and forceps). We plucked 4–6 feathers from the bird's ventral surface. Those feathers were used to extract, isolate, and sequence DNA from the entire microbial community found on those feathers. After plucking feathers, we rubbed the bird's ventor on Agar plates with 4 different growth media known to support bacterial growth. Plates were incubated at 37 °C or room temperature; subsequently cultures were isolated. In this presentation, we will report on the findings of this survey of microbiota in the plumages of overwintering Dark-eyed Juncos.

Sun- 58

American Chestnut Repopulation as a Management Strategy for Vine-Dominated Forest Gaps

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Abstract - Invasive vines such as *Celastrus orbiculatus* (Oriental Bittersweet) and *Ampelopsis brevipedunculata* (Porcelainberry) tend to dominate forest light gaps, shifting the forest's successional trajectory or delaying succession for decades. Vines are becoming more prolific in temperate forests due to forest fragmentation, higher atmospheric CO₂ levels, and milder winters caused by climate change. Forest canopy gaps are increasing in abundance with the arrival of the *Agrilus planipennis* (Emerald Ash Borer), an invasive beetle that kills *Fraxinus* spp. (ash). This study examines the potential for mitigating vine gap expansion through shade management by planting *Castanea dentata* (American Chestnut). On the Vassar College Ecological Preserve, we cleared six 10 m x10 m vine-dominated gaps and planted American Chestnut in 3 plots, paired with 3 unplanted control plots. In anticipation of the Emerald Ash Borer, we identified 6 "pre-gap" plots that contained *Fraxinus americana* (White Ash), and planted American Chestnut in 3 of these plots, paired with 3 unplanted control plots. We will compare the successional trajectories of the planted and unplanted plots to assess the effectiveness of this management strategy. This study has potential for use in forest management across the Northeast.

Sat- 37

Effects of Woody Shrub and Tree Density on Species Richness and Habitat Preference

Alyssa L. Valentyn (Saint Michael's College, Colchester, VT; avalentyn@mail.smcvt.edu) and **Declan McCabe** (Saint Michael's College, Colchester, VT; dmccabe@smcvt.edu) **Abstract** - Human modification of landscapes alters the structure of plant communities, thus modifying mammal habitats and mobility pathways. The Saint Michael's Natural Area in Colchester, VT, contains wetlands which have previously been used for agriculture but which may soon undergo restoration. This research establishes a baseline understanding of the distribution of mammal species across habitat types based on size and time of day. We surveyed the area surrounding a cornfield using Browning Strikeforce trail cameras ($n = 14$), deployed for a total of 1253 trap nights during May, June, and July 2017. We collected camera SD cards monthly and cataloged each photo by species, date, time, and size of animal sighting. Camera sites were determined by forest density and considered wooded ($n = 7$ sites) or open ($n = 7$ sites) based on tree density. We verified site categories and determined site density using shrub and tree diameters at breast height (DBH) and an estimation of canopy cover. We found a greater number of species in wooded sites than in open sites. Notably, wooded sites were

Abstract - Human modification of landscapes alters the structure of plant communities, thus modifying mammal habitats and mobility pathways. The Saint Michael's Natural Area in Colchester, VT, contains wetlands which have previously been used for agriculture but which may soon undergo restoration. This research establishes a baseline understanding of the distribution of mammal species across habitat types based on size and time of day. We surveyed the area surrounding a cornfield using Browning Strikeforce trail cameras ($n = 14$), deployed for a total of 1253 trap nights during May, June, and July 2017. We collected camera SD cards monthly and cataloged each photo by species, date, time, and size of animal sighting. Camera sites were determined by forest density and considered wooded ($n = 7$ sites) or open ($n = 7$ sites) based on tree density. We verified site categories and determined site density using shrub and tree diameters at breast height (DBH) and an estimation of canopy cover. We found a greater number of species in wooded sites than in open sites. Notably, wooded sites were generally frequented by small and medium-sized animals, whereas open sites were generally preferred by larger animals. Species richness was mildly influenced by tree density. These findings suggest that habitat restoration to a more wooded state may favor small-mammal populations.

Sun- 48

The Paleoecology of Great Duck Island

Gemma L. Venuti (College of the Atlantic, Bar Harbor, ME; gvenuti@coa.edu)

Abstract - My analyses of a 2-m sediment core from Great Duck Island (GDI), an 89-ha (220-acre) Maine Island, provides insight into paleoecological events over thousands of years. Analyses include radionuclide measurements, isotopic dating, geochemical testing, loss on ignition, pollen and fungi identification, sediment size, and charcoal sampling. Analyses are ongoing, but preliminary results reveal a localized zone of charcoal at a depth of 30 cm, suggesting a large fire. Charcoal fragments are being studied for species of tree burned and origin of fire. This project will reconstruct the general natural historical story of GDI with emphasis on nesting seabirds, humans, spruce forest, storms, and atmosphere.

Sat- 56

Habitat Use of the Wood Turtle (*Glyptemys insculpta*) in a Disturbed Field Site

Alexandra Vlk (SUNY Oneonta, Oneonta, NY; vlkalexandra@gmail.com) and **Elizabeth Bastiaans** (SUNY Oneonta, Oneonta, NY; elizabeth.bastiaans@oneonta.edu)

Abstract - This project targets *Glyptemys insculpta* (Wood Turtle), which is currently under review for listing under the Endangered Species Act. The species is listed as Endangered by the IUCN, has a classification of G3 (vulnerable) in the NatureServe comprehensive species database, and is considered a species of Special Concern by the New York State Department of Environmental Conservation. Wood Turtles face decline due to anthropogenic disturbances, including pollution, habitat destruction, and illegal exploitation. Predation and road mortality are also substantial threats to the persistence of this species, especially as Wood Turtle habitat is often infiltrated by residential and recreational developments. To further Wood Turtle conservation, this project seeks to provide vital information regarding this species' habitat use in an environment with high anthropogenic impact. To accomplish this project, I captured and radio-tracked turtles in 2017 in a disturbed field site located in Fortin Park, Otsego County, NY. It is the largest park in the Town of Oneonta, used for hiking, soccer, softball, picnics, and angling. Areas of suitable Wood Turtle habitat are substantially impacted by litter, and vegetation in the park is periodically mowed, reducing vegetation cover and directly threatening turtle survival. When a Wood Turtle was located, the habitat type they were in was classified as field, forest, floodplain, bank, or water. The Wood Turtles' habitat use was analyzed using mixed effects logistic regression. In 2018 field season, the presence or absence of invasive species will be added to the habitat classification to see if this affects their home-range size and/or habitat use. Information from this study will be used to identify, protect, and manage important habitat of the Wood Turtle in a disturbed setting.

Sat- 2

The History of Northeastern Land Conservation Through the Wildlife and Sport Fish Restoration Programs of the US Fish and Wildlife Service

Kyle Welsh (US Fish and Wildlife Service, Hadley, MA; kyle_welsh@fws.gov) and **Jessica Kane** (US Fish and Wildlife Service, Hadley, MA; jessica_kane@fws.gov)

Abstract - The US Fish and Wildlife Service's Division of Wildlife and Sport Fish Restoration (WSFR) administers 11 grant programs in the northeast that provide funding primarily to state agencies for conservation activities. Conservation activities are variable and can include habitat management, research, land and water protection, biodiversity conservation, and increased public access to conserved land. Nine of these 11 grant programs have funded land-acquisition projects. These grant programs include the Wildlife Restoration (Pittman-Robertson), Sport Fish Restoration (Dingell-Johnson), Great Lakes Restoration Initiative (GLRI), Endangered Species Act Recovery Land Acquisition (RLAG), National Coastal Wetlands Conservation (NCWCG), Highlands Conservation Act, Landowner Incentive Program, and State and Tribal Wildlife Grants (SWG; TWG). We summarized and analyzed all land acquisition projects funded by WSFR to date to improve understanding of the region-wide impacts achieved. From 1912 to present, WSFR has funded approximately 2876 individual acquisitions totaling ~751,826 acres from Virginia to Maine, including 119 that are currently in progress. Most acquisitions have taken place through the Wildlife Restoration grant program and have been used by state agencies to create and expand new and existing wildlife management areas. Others focus on protecting and restoring wetlands and aquatic ecosystems (NCWCG & GLRI), and biodiversity conservation (RLAG, SWG, and TWG). Together, these conserved lands and waters help support our natural heritage and are vital to protecting our regional diversity of wildlife, fish, and plants, as well as some of the most beautiful and iconic places in the Northeast.

Sun- 29

Importance of Amphibians: A Synthesis of Their Environmental Functions, Benefits to Humans, and Need for Conservation

Josh West (Bridgewater State University, Bridgewater, MA; J2west@student.bridgew.edu) and **Thilina Surasinghe** (Bridgewater State University, Bridgewater, MA; tsurasinghe@bridgew.edu)

Abstract - Amphibians are among the most threatened species in the world and have been the subject of a substantial number of studies that have underscored their ecological and anthropocentric importance. Yet a synthesis of those aspects is long overdue. In this study, we conducted a comprehensive literature review to investigate the importance of amphibians in every dimension, ranging from medical applications such as tissue regeneration, pharmaceutically useful compounds, direct socio-economic benefits, and overall ecosystem values. Amphibians have astounding tissue regenerative abilities, such as the ability to regrow entire limbs as adults, and perfectly heal cardiac, brain, spinal, and retina tissue. Study of these processes could allow the medical industry to restore sight and mobility, and to remedy neurological defects, along with countless other medical discoveries that are currently under investigation. Revolutionary novel findings have emerged, including amphibian polypeptides that release insulin, and raise and lower blood pressure, showing the full scope of their pharmaceutical value is just beginning to be explored. The ecological importance of amphibians includes the cycling of essential nutrients such as P, C, and N between aquatic and terrestrial environments that occurs as a result of their migration from water to land as they mature, which improves the overall health and resilience of the ecosystem. In many northern forests and vernal pools, amphibians account for greater biomass than birds, mammals, and reptiles combined. They are a central part of many food webs, as both predators and prey, and being poikilotherms, they turn a greater portion of calories into biomass compared to homeotherms. Amphibians provide many predators with a stable food and nutrient source. Due to their constant feeding patterns, amphibians are excellent regulators of biomass in lower trophic levels, contributing to ecosystem stability, as well as good biological control agents against pests such as mosquitos, biting flies, and crop-damaging arthropods. Their thin skin and superficial vasculature result in extreme sensitivity to environmental pollutants thereby making them excellent indicator species as well. This review can help further the appreciation of the conservation importance of these unique animals and highlight their potential in general environmental functions as well as in the biomedical industry.

Sat- 3

Identification of Bacterial Endosymbionts of the Sea Anemone *Diadumene lineata*

Brittney White (Massachusetts College of Liberal Arts, North Adams, MA; ba5267@mcla.edu) and **Ann Billetz** (Massachusetts College of Liberal Arts, North Adams, MA; a.billetz@mcla.edu)

Abstract -This research focuses on uncovering the identity and potential relationship between the bacteria that reside within the sea anemone *Diadumene lineata* (Organe-striped Green Sea Anemone). Currently, there is little known about this organism. Our research group is examining the morphology and behavior of *Diadumene lineata*, while I am focusing solely on the relationship between the anemone and its endosymbiont bacteria. The anemones were collected from a marina in Mystic, CT. I homogenized the anemones and plated the homogenate onto marine agar for cultivation of endosymbiont bacteria. Pure cultures were obtained and characterized as to colony morphology, cellular morphology and arrangement, and gram reaction. The bacteria will be identified by 16S rDNA analysis. These data will provide insight into the bacteria associated with *Diadumene lineata* and their potential protective role within the anemone.

Sun- 64

Assessing the Conservation Status of New York's Native Pollinators, 2018–2021

Erin L. White (NY Natural Heritage Program of SUNY ESF, Albany, NY; elwhit02@esf.edu), **Matthew D. Schlesinger** (NY Natural Heritage Program of SUNY ESF, Albany, NY; mdschles@esf.edu), and **Jeffrey D. Corser** (NY Natural Heritage Program of SUNY ESF, Albany, NY; jdcorser@esf.edu)

Abstract - The aim of the Empire State Native Pollinator Survey is to determine the conservation status of a wide array of New York's native insect pollinators in nonagricultural habitats. Many pollinators are important ecosystem components that have been largely overlooked in conservation efforts thus far. We are incorporating both museum records and new field-collected distributional data from focal taxa within the 4 main pollinating insect orders that are native to the northeastern US (bees, flies, beetles, and butterflies/moths). Combined with existing knowledge, these data will enable us to determine the conservation status (S-rank) for a suite of at-risk native pollinators. Last year, with the help of our Advisory Committee, we developed and piloted a sampling design and survey methodology and are now ramping up for a full field season in 2018. Our primary field method is an extensive survey involving transects of bee bowls coupled with timed searches in meadows, wetlands, forests, and roadsides in randomized locations in protected lands around the state, stratified by ecoregion. The same protocol deployed in high-quality examples of pine barrens, dunes, peatlands, alpine meadows, and late-successional forests will ensure adequate coverage of these target habitats expected to yield rare species or high diversity. We will also target known at-risk species in separate surveys. We will involve professional biologists, students, and citizen scientists in data collection, and we are asking for interested people to make insect observations and/or do scientific surveys all across New York. This will be a great opportunity for volunteers to spend time outdoors expanding their knowledge of pollinating insects while contributing to a worthwhile cause. We will hold workshops the next few summers around New York to train participants in basic pollinator biology and survey methodology. The results of this 4-year effort will provide a basis for updates to the state's Wildlife Action Plan, suggest species for state listings, and inform efforts to improve pollinator habitat on managed lands.

Sat- 26

Evaluating Nitrogen Heterogeneity in the Albany Pine Bush

Samantha Williams (Union College, Schenectady, NY; williams@union.edu) and **Dr. Jeffrey Corbin** (Union College, Schenectady, NY; corbinj@union.edu)

Abstract - Ecological theory predicts that heterogeneous environments should support more species. In such habitats, species are able to partition resources such as space, sunlight, water, and nutrients in ways that can prevent niche overlap and competition. This study at the Albany Pine Bush assessed soil nitrogen heterogeneity by analyzing the soil nitrogen content at close and far (1 m away) distances from nitrogen-fixing wild *Lupinus* (lupine) plants. In addition, we analyzed foliar $\delta^{15}\text{N}$ in *Schizachyrium scoparium* (Little Bluestem) leaves at the same close and far distances from *Lupinus*. We used these 2 measures to quantify the degree of heterogeneity and the spatial impact of a native nitrogen-fixer on its surrounding vegetation. We performed these analyses in a native-dominated pine barren and also a site that had been previously invaded by another nitrogen-fixing species, *Robinia pseudoacacia* (Black Locust), and subsequently restored. Paired *t*-tests of soil percent nitrogen in close versus far distances from *Lupinus* showed they were not significantly different from one another in either the barren or the restored sites. $\delta^{15}\text{N}$ values were significantly higher close to *Lupinus* than far, but only in the restored site. There was no difference in the means of $\delta^{15}\text{N}$ values for Little Bluestem tissue near and far from *Lupinus*. Both sites were homogenous in nitrogen and $\delta^{15}\text{N}$ values, contrary to the pattern that we had hypothesized. Like other barren ecosystems, the Albany Pine Bush is an overall nutrient-poor environment made up of sandy soils, and this may explain why we did not observe soil heterogeneity. In such nutrient-poor habitats, nitrogen limitation may be strong enough to prevent the creation of "islands of fertility" near nitrogen-fixing species. Additionally, it is possible that the nitrogen that is put into the system by nitrogen-fixing species gets exported deep into the soils and thus was not quantified in our study.³⁸

Sat- 42

Bioremediation of Crude Oil Using the Fungus *Pleurotus ostreatus*

Anthony Young (Massachusetts College of Liberal Arts, North Adams, MA; ay4554@mcla.edu) and Carolyn Dehner (Massachusetts College of Liberal Arts, North Adams, MA; Carolyn.Dehner@mcla.edu)

Abstract - Bioremediation is the use of biological organisms and their functions to clean up environmental pollution. This experiment was designed to test whether the white rot fungus *Pleurotus ostreatus* (Oyster Mushroom) can be used in the remediation of raw petroleum contamination. Several samples of clean straw were contaminated with crude petroleum and inoculated with the fungus, along with no-oil and no-fungus controls. Using liquid extraction and evaporation methods, the mass of oil left in each sample was compared to that of the controls. The average percent of petroleum added that was consumed by the fungus was 89.1%. These results show that this species of fungus can be a powerful tool in the fight to restore ecosystems affected by petroleum spills and safeguard the habitability of our planet against the effects of such pollution.

Sun- 26

Comparative Odonate Biodiversity in Two Northern Berkshire Ponds

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Abstract - Surveys of Odonate populations in 2 northern Berkshire ponds with comparable aquatic macrophyte floras are similar in Odonate abundance but differ in species composition and species richness. Bridges Pond, in Williamstown, MA, occurs in a suburban setting, and has an Odonate fauna dominated by the Anisopteran family Libellulidae (skimmers). Mausert's Pond, in Clarksburg, MA, is surrounded by a forested matrix and light human development, and has an Odonate fauna dominated by the Anisopteran family Aeshnidae (darners). Both water bodies support lower abundances of Zygoptera (damselflies), although there were differences between the 2 sampled faunas, with Lestidae (spreadwings) dominant at Mausert's Pond and Coenagrionidae (pond damsels) dominant at Bridge's Pond. The authors investigated correlations between Odonate faunas and water quality, water body size, and substrate composition.

Sun- 33

Genetic Comparison of Slavemaking Ant Colonies to Complement Assays of Aggression Between Nests

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Abstract - The secondary successional forest that comprises Spencer J. Roemer Arboretum at SUNY Geneseo is home to *Formica subintegra*, a species of slavemaking ant that steals the young of the local *Formica glacialis* species to work and forage for their colonies. Over time, *F. subintegra* colonies have repeatedly relocated throughout the 8-ha arboretum to maximize accessibility to *F. glacialis* young, and have been observed to split, rejoin, or even raid each other. However, it is currently unclear whether these raids are actually raids, or if one nest voluntarily joins another, giving the appearance of a raid. It is also unknown if individuals are more inclined to be aggressive toward genetically distant conspecifics. This study tests for the presence of aggressive behavior between individuals from nests at a variety of geographic distances using behavioral trials. DNA was extracted from each individual and amplified using PCR, then analyzed using a variety of microsatellite markers. The degree of relatedness between colonies can be estimated using the microsatellite genotype data. These results begin to answer whether or not there is a link between genetic similarity and *F. subintegra* nest movements, contributing to our understanding of this understudied species.

Sat- 22