2022 Northeast Natural History Conference
Oral 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-Session-Room-Presentation # (thus, for example, Sun-AM2-B-4 indicates the presentation will be the 4th presentation in Room B in the Sunday Morning II concurrent session time slot).

Changes in Nest-Site Selection in a Maine Herring Gull Colony: The View from Great Duck

John Anderson (College of the Atlantic, Bar Harbor, ME)

Abstract - Great Duck Island (44°8′31″N 68°14′44.″W) is a 90-ha (220-acre) island located in eastern Maine. The island has provided nesting sites for *Larus argentatus* (Herring Gull) since at least the late 19th century, and is at present one of this species' few nesting colonies in the eastern seaboard of the United States to be increasing in the 21st century. Starting in 1999, we mapped the location of every gull nest at the south end of the island using differentially corrected GPS, accurate to 0.5 m. During the period 1999–2021, the number of nests in our study area increased from 107 to over 801, while numbers in the rest of the island declined from 811 to 339. Increases were most noticeable along the island's rocky berm between the high-tide line and the permanently vegetated area, though we also saw marked increases in nesting in open meadows. Many sites were re-occupied multiple years in a row, though there was also noticeable variance, particularly in meadow areas. During the period of the study, the presence of *Haliaeetus leucocephalus* (Bald Eagle) has increased, with eagles hunting over the colony on an hourly basis in July. We hypothesize that predation pressure from the eagles is responsible for the movement of gulls from the north end of the island, which has a very limited human presence, to the south end, where researchers may deter the eagles somewhat by their everyday activities. Recently we are also seeing increased predation on gull eggs and chicks by *Corvus brachyrhynchos* (Common Crow). The combination of disturbance and predation by these 2 predators may explain a portion of the overall decline in gulls in the northwestern Atlantic basin.

Sat-PM2-B-1

Land-use History Legacies on Myrmecochorous Plants and Epigeic Ant Assemblages in New York State Forests

Mariano G. Arias (SUNY ESF, Syracuse, NY), Gregory McGee (SUNY ESF, Syracuse, NY), and Martin Dovciak (SUNY ESF, Syracuse, NY)

Abstract - Forested landscapes are increasingly composed of patches of differing land-use histories that include past stand-replacing disturbances such as logging, fire, or past agricultural use. These disturbances affect community composition, biodiversity, and they can disrupt trophic interactions among mutualistic species guilds that differ in ecological requirements and mobility. However, few studies address the joint effects of past disturbance on spatial distributions of mutualist species guilds across spatial scales. We studied how past land-use history affected regional community patterns of both ant-dispersed plants (myrmecochores) and their ant mutualists across a broad environmental gradient in New York State (spanning 2 ecoregions, 250 km distance, and elevations from 276 to 616 m above sea level). We found that changes in species composition of myrmecochores and ants along the full environmental gradient were positively related to each other in residual stands that did not experience stand-replacing disturbance within the last 80 years. In contrast, species compositions of myrmecochores and ants varied independently of each other across this gradient in secondary stands (established after a stand-replacing disturbance ~60–80 years prior to this study), suggesting that past disturbance decoupled species compositions of the 2 guilds. Interestingly, the effects of historical land-use were too weak to observe them within each individual ecoregion. Since weak land-use history effects on biodiversity (species composition) that may be hard to observe at local or regional scales can scale up to become visible at broader scales, it is important to consider these emergent broad-scale effects of local land-use decisions in biodiversity conservation.

Sat-AM2-C-2

Using Models to Identify Diamondback Terrapin Road Mortality Hotspots

John M. Arnett (Department of Biological and Environmental Sciences, Western Connecticut State University, Danbury, CT), Christopher Schrull (Department of Biological and Environmental Sciences, Western Connecticut State University, Danbury, Connecticut), and Tyler Mahard (Connecticut Department of Energy and Environmental Protection, Connecticut)

Abstract - *Malaclemys terrapin* (Diamondback Terrapin) utilizes a habitat niche of brackish coastal waters along the eastern coast of the United States. Northeastern coast is one of the most developed parts of US, but there is little knowledge of how this development is affecting the Diamondback Terrapin. Through trying to better understand these affects, we used multiple models to identify 72 potential road-mortality hotspots for the Diamondback Terrapin in Connecticut. These models utilized geospatial data and probability of occurrence to predict areas with estimated high frequency of Diamondback Terrapins migrating from the water to suitable nesting habitat. We then examined the potential hotspots through ground-truthing and evaluated the hotspots based on the accessibility for terrapins to migrate from the water and availability of suitable nesting habitat. From ground-truthing, we were able to disregard 28 of the 72 potential hotspots due to low/no occurrence of Diamondback Terrapins and low availability of nesting habitat . The data have then been utilized by agencies such as Western Connecticut State University and the Maritime Norwalk Aquarium as a basis for projects related to Diamondback Terrapin road mortality and the effects on the population. The status of Diamondback Terrapins is unknown within states such as Connecticut that have minimal data to represent the state population. It can be deemed crucial that models such as these that can be used to predict potential hotspots for terrapin road mortality be applied to conservation efforts, before the severity of the population decline has become too severe.

Sat-AM1-A-2

Community Perceptions of River Restoration on the Megunticook River

Hallie Arno (College of the Atlantic, Bar Harbor, ME)

Abstract - Rivers are critical components of many landscapes. River flow, fish passage, and the renewal of riparian regions are all affected by dams and other structures. Dam removals are an ideal case study of human–environmental interactions. Particularly in New England, dam removals can be contentious, as dams are often viewed as a critical part of town identity. The effects of dams on rivers are often far-reaching, affecting parts of the watershed miles away. Studying these conflicts has provided insights into the values behind conservation within the broader community. The Megunticook River in Camden, ME, has 7 dams along the river's 5.6-km (3.5-mi) stretch. These dams create a barrier to fish passage, alter water speed and temperature, and increase flood risk. The Camden Select Board is investigating options to restore the river, including dam removal. This proposal prompted controversy including the formation of a group dedicated to saving the most iconic of these dams. I created a survey and conducted interviews with community members within the Megunticook watershed to better understand community perceptions of dam removal and of the Megunticook River. I investigated the role of the Megunticook River and its dams in community history, aesthetics, and identity. This research revealed themes such as the conflict between preserving history and conserving biodiversity, the importance of local ecology in collective identity, the responsibility of conserving habitat in a changing climate, and the importance of stakeholder engagement in management decisions. The information gathered in the study can be used to inform future restoration projects by examining the values underpinning attitudes around ecological restoration.

Sat-PM1-C-4

Developing Species Distribution Models for Conservation of *Glyptemys insculpta* (Wood Turtle) in Atlantic Canada

Thomas H.A. Baker (Dalhousie University, Halifax, NS), Karen Beazley (Dalhousie University, Halifax, NS), Lisa Doucette (Wildlife Division, NS Department of Natural Resources and Renewables, Kentville, NS), and Alana Westwood (Dalhousie University, Halifax, NS)

Abstract - Species distribution modelling (SDM) has become increasingly common in conservation research and management. However, the application of SDM to conservation management within Atlantic Canada remains relatively new and unexplored. *Glyptemys insculpta* (Wood Turtle) is a globally endangered freshwater turtle found throughout Eastern Canada and the United States, with the northern-most boundary of its range including the Atlantic Canadian provinces of Nova Scotia (NS) and New Brunswick (NB). Conservation of this species in Atlantic Canada could be especially important as this region may provide climate refugia in the face of climate change. Despite this, systematic surveying in NS and NB has been historically arbitrary, and geographic distribution knowledge gaps persist. Using Maxent, we have developed SDMs for *G. insculpta* for the 2 provinces with the objective of establishing a systematic survey effort and identification of core habitat. Environmental variables that have emerged as important during the modelling include elevation, proximity to *Alnus* (alder) stands, and proximity to river-sized watercourses. The SDMs predict higher relative probabilities of *G. insculpta* occurrence at lower elevations, closer to alder stands and watercourses, though the most recent round of modelling appears to indicate that the density of watercourses on the landscape may be more important than watercourse proximity. Modelling in the northeastern United States has predicted the highest probabilities of occurrence at 200–300 m above sea level. When compared to the effect of elevation in the NS and NB SDMs, this result suggests *G. insculpta* prefer lower altitudes at the northern limits of their range. The SDMs we developed in 2021 were shared with the NS Department of Natural Resources and Renewables and the NB Department of Natural Resources and Energy Development and used to plan a 2021 field survey season with the goal of confirming *G. insculpta* presence in watercourses with no prior recorded occurrences in the provincial datasets. These surveys resulted in new *G. insculpta* subpopulations being recorded in 2 NS watercourses and 5 NB watercourses. The on-going partnership between this project and the provincial governments will lead to further application of the SDMs to *G. insculpta* conservation in Atlantic Canada.

Sun-PM2-A-1

The Ethology and Phenology of *Lasiopogon currani* (Diptera: Asilidae) in St. Lawrence County, New York

Karina L. Bellavia (St. Lawrence University, Canton, NY), Kayla Edmunds (St. Lawrence University, Canton, NY), Karl McKnight (St. Lawrence University, Canton, NY), and Tristan McKnight (University of Arizona, Tucson, AZ)

Abstract - Robber flies (Order: Diptera, Family: Asilidae) are a widely distributed family of predacious flies. They are considered to be top-level predators crucial to suppressing various insect populations; however, the ecology and behavior of the species *Lasiopogon currani* has received minimal attention. We conducted a study of *L. currani* underneath a disturbed powerlines area in Pierrepont, St. Lawrence County, NY, to determine insect diversity, potential prey, phenological patterns, and behavioral patterns. We found that the insect diversity of the powerlines study site included representatives of 8 orders. We also found that 88% of specimens collected from a malaise trap and 5 pan traps could be considered as potential prey for *L. currani*. Furthermore, we observed a positive correlation between adult *L. currani* abundance and lux intensity, and *L. currani* abundance and the abundance of their potential prey. By calculating the number of prey consumed per day, per fly, we estimated that ~9200 prey are consumed every year by the local *L. currani* population. Additionally, we observed that *L. currani* exhibit multiple behavioral traits that can be categorized as: predation, test flights, positional rotation, mating, preening, avoidance, and aggression. We found that on average, *L. currani* make about 22 short flights of some kind between prey captures. Our observations of *L. currani* are noteworthy because we have learned that *L. currani* consume black flies, mosquitoes, and midges, which can be vectors of diseases and pests to humans.

Sat-AM2-B-2

Monitoring a Spotted Turtle Population Inside an Urban Landscape

John Berkholtz (Zoo New England, Boston, MA), Dr. Byran Windmiller (Zoo New England, Boston, MA), and Mathew Kamm (Zoo New England, Boston, MA)

Abstract - A unique urban population of *Clemmys guttata* (Spotted Turtle) inhabit a nearly 243-ha (600-ac) park in Boston. This is the only known population within the city limits and is surrounded by urban residential neighborhoods. Other populations can be found in bordering busy suburbs. Since 2018, Zoo New England has been studying this population through trap surveys and radio tracking. In 2021, we estimated the population size based on our trap captures. Habitat use and movements have been recorded among the 12 turtles that have been radio tracked. In addition, we endeavored to locate and protect nests. We pulled eggs by the third trimester to be incubated and hatchlings subsequently headstarted. A total of 12 hatchlings are being headstarting, with 4 slated for release and outfitted with radios in the spring of 2022 to determine suvivorship and habitat use. The remaining 8 hatchlings are currently being headstarted at 2 Boston elementary schools for release in 2023. The Spotted Turtles live in the many vernal pools and swamps that also home to several obligate vernal pool species and are certifiable under the Massachusetts Natural Heritage and Endangered Species Program.

Sat-AM1-A-3

Ectomycorrhizal Fungi on Hop Hornbeam Seedlings Growing Near Ectomycorrhizal or Arbuscular Mycorrhizal Trees In Old Fields

Summer Blitz (SUNY ESF, Syracuse NY), Andy Cortese (SUNY ESF, Syracuse NY), Thomas Horton (SUNY ESF, Syracuse NY)

Abstract - We investigated whether there were differences in ectomycorrhizal colonization on *Ostrya virginiana* (Hophornbeam) seedlings collected from patches of ectomycorrhizal (EM) trees versus patches of arbuscular mycorrhizal (AM) trees within AM-dominated forests. The seedlings were collected from plots located in secondary *Acer* spp. (maple)-dominated stands a Heiberg Forest and Tuller Hill State Forest in Cortland County, NY. For each seedling, we counted the total number of EM root tips to calculate percent colonization and identified unique EM morphotypes to calculate EM fungal richness. We found no differences in percent colonization or EM fungal richness between AM and EM patches, although more unique morphotypes were found in EM patches. The EM fungi producing the different morphotypes are currently being identified by sequence analysis of the fungal nrITS region. To our knowledge, this is the first study that has studied the mycorrhizal associations of Hophornbeam, a widespread tree species in the eastern deciduous forest. The information obtained through our study will increase our understanding of the mycorrhizal ecology in of Hophornbeam during seedling establishment.

Sun-PM2-C-2

Incorporating Conservation Dogs in Multilayered Invasive Species Management

Arden Blumenthal (New York–New Jersey Trail Conference, Conservation Dogs Program, Mahwah, NJ)

Abstract - The New York–New Jersey Trail Conference (NYNJTC) Conservation Dogs Program is the only detection-dog program based in the Northeast that's committed to protecting the ecological integrity of native habitats through invasive-species detection and native-species monitoring. It was established in 2018 to augment the existing invasive-species management efforts of the organization's Ecological Stewardship Department. Originally a nonprofit dedicated to supporting parks by building and maintaining trails in the greater New York City metropolitan area, the NYNJTC has now positioned itself as a leader in invasive-species management in the Lower Hudson Valley and Northern New Jersey natural areas. The organization combats invasive species on multiple fronts by coordinating the Lower Hudson Partnership for Regional Invasive Species Management to develop regional priorities and strategies, employing a seasonal Americorps crew along with volunteers to conduct removals, and supporting an impressive volunteer surveyor base. The Conservation Dogs Program seamlessly integrates with these players to achieve important conservation goals. Specifically, the program has been an essential asset in early detection of new and sparse invasive species. During its first 2 years, the dogs learned to detect 6 invasive species, including 4 species of plant, a fungus, and an insect, all early detection targets in the Lower Hudson Valley region. By expanding search boundaries and discovering new infestations, the team has enhanced the effectiveness of removal efforts and informed management decisions. In this presentation, I will explain how a Conservation Dogs Program can integrate with existing partnerships and management efforts, including volunteers, to improve invasive species early detection and native species monitoring across multiple taxa.

Sun-PM2-B-3

The Natural Recolonization of Long Island, NY, by River Otters

Mike Bottini (Seatuck Environmental Association, Islip, NY)

Abstract - *Lontra canadensis* (North American River Otter) once inhabited rivers, lakes, and estuaries throughout North America. Several factors (unregulated trapping, water pollution, and habitat loss) caused a dramatic decline in otter populations in many areas and, by the early 1800s, local extirpation on Long Island, NY. In 1936, a state-wide moratorium was placed on hunting and trapping otters for 9 years. Over the years 1995–2000, a reintroduction project released 279 otters at sites in west-central New York to accelerate their recolonization of their former range in that part of the state. A survey of Long Island's mammals over the years 1960–1963 encountered no otters or otter sign. In 2008, at the start of the next otter survey on Long Island, the status and distribution of otters there was unknown. The 2008 survey effort included contacting Long Island natural resource agencies and conservation groups for potential otter sightings. I mapped these locations, along with several otter roadkills documented since 1999. Within the watersheds of each location, I mapped potential otter latrine sites based on known otter latrine characteristics, and surveyed those sites in the field. Through these efforts, I documented 22 otter latrines in 7 watersheds. During and after the 2008 survey effort, field workshops were held to train natural resource staff and volunteers in otter survey and monitoring techniques, including how to recognize otter sign. Over 100 people attended the workshops. The 2008 survey process was repeated in 2018, resulting in 77 latrines documented in 26 watersheds, an indication that, despite Long Island's fragmented landscape and high potential for otter roadkills, otters are expanding their distribution on the island.

Sun-AM2-C-4

The Invasion and Eradication of *Taraxacum officinale* from Alpine Snowbed Communities on Mt. Washington, NH

Robert S. Capers (University of Connecticutt, Storrs, CT), Nancy G. Slack (Biology Department, The Sage Colleges, Schenectedy, NY), and Daniel D. Sperduto (New Hampshire Natural Herittage Bureau, Campton, NH)

Abstract - Non-native, *Taraxacum officinale* (Common Dandelion) was discovered invading alpine snowbed communities near the summit of Mt Washington, NH, in 2014. We report on their distribution and abundance and on the methods and progress of the work in our sites that has continued since then to eradicate them from this important and sensitive alpine community. Thus far, only native alpine plants have replaced the removed dandelions.

Sun-AM1-B-3

Fishes of Northern New York and the Adirondacks

Douglas M. Carlson ((Biology Department, SUNY Potsdam, Potsdam, NY)

Abstract - Knowing about the fishes of Northern New York can help with conservation planning and landscape interpretations, and a solid foundation comes from surveys in the 1880s and 1930s. This presentation augments that information by offering an overview of what was known for the region surrounding and including the Adirondacks. More than half the fish species were native to the lowland region, and many of those species became widespread in the uplands after stocking, which caused extensive changes and losses. The lowland species experienced fewer losses, and some regions were able to retain a high diversity of habitat specialists. There were 26 species still found in only their native range of lowlands of this region, including *Notropis rubellus* (Rosyface Shiner) and *Moxostoma anisurum* (Silver Redhorse). Uplands had 4 species exclusive to this ecozone, including *Prosopium cylindraceum* (Round Whitefish) and *Erimyzon oblongus* (Eastern Creek Chubsucker). Broad-scale protection against detrimental land uses in the Adirondacks have benefited a few unique taxa, and the extensive studies of lakes and ponds have documented losses to *Salvelinus fontinalis* (Brook Trout).

Sun-PM2-A-3

Do Alterations of Forest Arthropod Communities by Japanese Barberry (*Berberis thungergii*) Affect the Diet Composition of an Insectivorous Songbird?

Wales A. Carter (Great Hollow Nature Preserve and Ecological Research Center, New Fairfield, CT) and Chad L. Seewagen (Great Hollow Nature Preserve and Ecological Research Center, New Fairfield, CT)

Abstract - Invasive alien species are widely recognized as one of the foremost threats to global biodiversity. By virtue of their position at the base of food webs, invasive plants are predicted to have radiating effects through higher trophic levels, but relatively few studies have tested this prediction by comparing the diets of consumers between invaded and uninvaded areas. We used stable isotope analysis to investigate the influence of the non-native shrub *Berberis thunbergia* (Japanese Barberry ; hereafter "barberry") on the diet of a common insectivorous songbird (*Seiurus aurocapilla* [Ovenbird]) in a New York forest in which barberry was previously linked to altered arthropod community composition. We expected bird diet composition in barberry-invaded forest patches to be altered in accordance with these changes in relative abundance among arthropod taxa. Assimilated Ovenbird diets were primarily made up of predatory invertebrates followed by sucking herbivores, chewing herbivores, and detritivores. Although our best-supported model included a term for barberry density, we found no substantial differences in the assimilated diets of Ovenbirds in forest patches with high and low densities of barberry. Our results indicate the effects of non-native plants on connections between higher trophic levels are context dependent, and comparisons with previous findings suggest that existing community complexity and time since introduction of the non-native plant are key contextual differences that affect the outcome of an invasion. Our results may also indicate a shift in individual foraging effort by Ovenbirds in response to barberry's effects on the arthropod community, but previous research suggests there is no cost of any such compensatory change in behavior to the birds' energetic condition.

Sun-AM2-A-1

The New England Botanical Society, Past and Present

Matt Charpentier (New England Botanical Society, Cambridge, MA)

Abstract - The New England Botanical Society (NEBS) was originally founded in 1896 as the New England Botanical Club, dedicated to promoting the study of the flora of New England. NEBS has fostered botanical research by publishing the peer-reviewed journal *Rhodora*, maintaining the largest collection of specimens from the region (over 260,000 sheets), and granting nearly $20,000 in annual research awards. NEBS has provided a platform for those passionate about botany to connect and learn through monthly meetings and field trips. In this talk, I will discuss the history of NEBS, including the contributions of its members, its predominantly volunteer-run inner workings, and efforts to expand and enhance NEBS' support of the regional botanical community.

Sat-PM2-C-1

Chitt Chat: An Overview of the Chittenango Ovate Amber Snail ex situ Population and Population Augmentation Project

Emlyn Clark (SUNY ESF, Syracuse, NY)

Abstract - *Novissucina chittenangoensis* (Chittenango Ovate Amber Snail [COAS]) is one of the most endangered animal species in New York State, with current population estimates at 50 individuals in the wild. Captive breeding efforts have proven successful over several years for this highly endemic snail, with a captive population housed at SUNY ESF comprising 500 individuals. Specific diet, management, and breeding protocols have been produced to rear COAS. I will discuss these developments along with future research plans and possible translocation efforts.

Sun-AM1-C-1

Using a Collaborative Research Network to Explore Foraging Sapsucker Tree Use Across Landscapes

Sandra L. Cooke (Greensboro College, Greensboro, NC) and **Danielle Garneau** (SUNY Plattsburgh, Plattsburgh, NY)

Abstract - Research networks are valuable for exploring ecological questions at broad spatial scales and for engaging undergraduate students in hands-on scientific inquiry. This project uses a coordinated, network approach to investigate the characteristics of trees used by foraging *Sphyrapicus* spp. (sapsuckers), a genus of woodpeckers that primarily feeds on tree sap. Their feeding leaves behind rows or grids of small, round holes called sap wells, which can facilitate food resource access for other species. Project participants observed trees in their locality and recorded sap-well data (e.g., abundance, location on the tree), tree data (e.g., species, diameter, bark type), and site attributes (e.g., NEON ecoregion, urbanization index). Since the project was launched in January 2021, we have had participation from 7 institutions, including 2 that have used the iNaturalist app as an archiving database. Preliminary data analysis from these 2 institutions indicate that the cardinal direction of sap wells was non-random, which may be caused by sapsuckers avoiding wind exposed tree faces or preferring sun-exposed tree faces when feeding. Additionally, analysis of 181 tree observations from Greensboro, NC, found that sap-well occurrence did not significantly differ between native and non-native tree species, but among trees that had sap wells (n=111), abundance was significantly higher on non-native species compared to native species. A more comprehensive analysis of data from all participating institutions will enable us to examine these trends at a broader scale. Furthermore, this research-network approach will be used to address macroecological questions, including the effects of urbanization on sap-well occurrence and abundance, and the correlations between sap-well abundance and the distributions of sap-well-using species, such as *Selasphorus rufus* (Rufous Hummingbird).

Sat-AM2-A-3

Mapping Potential Targets for Restoration of New York's Pine Barren and Sandplain Ecosystems

Jeffrey D. Corbin (Union College, Schenectady, NY) and Emma L. Flatland (Union College, Schenectady, NY)

Abstract - Identifying potential sites for restoration action can be difficult where succession, land-use changes, or altered disturbance regimes have made suitable sites cryptic on the landscape. In such cases, ecosystem modeling can aid in identifying areas that might be overlooked. We used ecosystem modeling based on soil geomorphology to examine whether opportunities exist to restore globally rare pine barren and sandplain ecosystems in New York State. These ecosystems are limited to edaphically dry soil with deep layers of sand and gravel, and where disturbances are frequent enough that succession to forest does not occur. We quantified soil percent sand and soil depth of 156 known remnant pine barren and sandplain ecosystems to calculate threshold soil characteristics that support these unique ecosystems. We then mapped all soils that were at least as sandy and deep as the threshold values we calculated. The total area of our map of potential soil conditions was >9500 km^2, made up of forested (57%), urban (26%), agricultural (13%), and open (4%) land cover. Nearly 7000 km^2—almost 20 times the area of known, high quality remnant ecosystems—was forested, agricultural, or open land and therefore had the greatest restoration potential. Existing examples of pine barren and sandplain ecosystems were mostly embedded within much larger matrices of forest, agriculture, and urban land cover that shared the distinctive soil conditions. Soil geomorphology and other ecosystem characteristics can aid in the identification of appropriate locations for restoration, thereby reducing the chance that appropriate locations are overlooked.

Sat-PM1-C-2

Integrating the Museum Voucher Specimen into Academic Curricula: A Case Study with Freshwater Mollusks

Jay Cordeiro (Bridgewater State University Biological Sciences Department, Bridgewater, MA)

Abstract - College-level curricula in natural sciences underutilize collected specimens as tools for educating students. Courses may involve observation and collection in the field but emphasize survey methodology and data analysis; making little use of collected specimens beyond identification. I encourage the collection of permanent voucher specimens in academia so students can recognize their value in a time of unprecedented environmental degradation and biodiversity loss. Vouchers provide historical documentation of a species in place and time—a biodiversity baseline to track geographic and temporal changes in species and communities. Examples of their utility include: discovering new species and modifying phylogenies, documenting changes in biodiversity, genetic study (e.g. frozen tissue collections), tracking infectious disease, determining invasive species impacts, monitoring change in marine resources, monitoring climate change, and influencing legislative actions. I teach a 9-week field course on freshwater mollusks at Bridgewater State University. The course includes 2–3 field collecting trips and assembly of a regional specimen collection, emphasizing the value of preservation, good record-keeping, accuracy, and precision. Where does this information go? What do students take away? How can we eliminate a wasteful disregard for disposable specimens? Each class donates its collections to the Harvard Museum of Comparative Zoology (MCZ), thereby increasing its collection holdings and scope. Collections document regional distribution, habitat information, and population viability. Massachusetts has 11 species of state or federally protected freshwater mollusks, and students typically find at least 2 of them. Collection information is shared with the MA Natural Heritage and Endangered Species Program for use in wildlife conservation. Information is made available beyond the classroom to scientists, educators, students, and the global community of scholars, wildlife managers, naturalists, artists, historians, and indigenous peoples. What's more, each student's name is included on labels as collector and identifier, preserving their legacy in the museum's collections in perpetuity. MCZ accessions are databased online (MCZBase), and student response has been very positive. Incorporating voucher specimens into academic curricula is easy and straightforward, and I will highlight how best to do this including collections field trips, specimen donation, visiting local museum exhibits, and utilization of museum loan material.

Sun-AM1-C-4

Mass Audubon's Spadefoot Toad, *Scaphiopus holbrookii*, Conservation Project: A 10-Year Summary of Habitat Restoration, Captive Breeding, and Translocation

Jay Cordeiro (Mass Audubon Cape Cod, , Barnstable, MA) and Ian Ives (Mass Audubon Cape Cod, Barnstable, MA)

Abstract - *Scaphiopus holbrookii* (Eastern Spadefoot Toad) is a fossorial anuran typically found in sandy soil habitats interspersed with temporary ponds. The species gets its name from distinctive protruding cartilage "spades" on its hind feet utilized for digging below ground where it spends much of the winter, emerging in spring to breed only in temporary waterbodies. In Massachusetts, the northeast corner of its range, the species was historically widespread but has declined due to habitat loss and degradation and is listed by the state as threatened. In 2011, Mass Audubon's Long Pasture Wildlife Sanctuary began an ambitious undertaking to captive headstart and translocate Eastern Spadefoot Toad metamorphs into newly restored wetlands at the Ashumet Holly Wildlife Sanctuary in Falmouth. We summarize results following the landmark 10th year of this study, which has resulted in a diverse, healthy established population that saw its first evidence of successful breeding in 2021. Captive headstarting, primarily in school classrooms, has resulted in propagation and release of nearly 40,000 toadlets. Ongoing monitoring and management have included pitfall trapping, digital audio recording, wetland surveys for reproductive evidence, and visual-encounter transect and trail surveys, to inform population demographics. Several years of pitfall trapping and upland surveys have demonstrated toads are surviving through multiple years with diverse sizes and age classes present. Extensive upland surveys across much of the 18-ha (45-ac) property revealed burrow uses, foraging activity, and dispersal up to ~400 m from release sites, with most toads remaining with 100 m. Following lower capture returns in earlier years, we increased survey effort in 2021 (n = 177 nights) resulting in a peak catch per unit effort (CPUE) of 4.1 toads/night (over 75% of marked adult toads >5 g were captured more than once). After 10 years without evidence of breeding, the first calling males were observed in 2021, and we noted eggs laid and hatched in 1 wetland restored at Ashumet Holly in 2012. Now that this milestone has been achieved, monitoring and management efforts going forward will be aimed at supporting and promoting reproductive effort and outcome at Ashumet, as well as maintaining appropriate long-term breeding habitat to accommodate a viable and self-sustaining population.

Sat-PM2-A-3

Islands in the Shade: Scattered Ectomycorrhizal Trees Influence Soil Inoculum Potential and Heterospecific Seedling Response in a Secondary Forest

Andrew M. Cortese (SUNY ESF, Syracuse, NY) and Thomas R. Horton (SUNY ESF, Syracuse, NY)

Abstract - The eastern deciduous forest exists as a mosaic of arbuscular (AM) and ectomycorrhizal (EM) trees, but anthropogenic effects, such as agricultural land use, have altered forest composition by increasing the abundance of AM trees like *Acer* spp. (maple). We investigated whether soils near scattered EM *Betula lenta* (Black Birch) support a greater abundance and diversity of EM fungi compatible with *Pinus strobus* (Eastern White Pine) and *Tsuga canadensis* (Eastern Hemlock) seedlings in an AM-dominated secondary maple forest, and whether their growth and foliar nutrition was responsive to fungal propagules associated with scattered overstory birch trees. We also examined how inoculation with soil from an adjacent EM-dominated old-growth forest influenced mycorrhizal colonization, growth, and nutrition of pine and hemlock seedlings compared to secondary forest soil alone. We found that scattered birch trees support communities of EM fungi mostly lacking from the surrounding maple forest but supported a lower overall EM fungal diversity than old-growth forest soil. Hemlock seedlings grown in soil collected near birch trees exhibited increased growth and decreased foliar nitrogen compared to soil from near maple trees, while hemlock and pine seedlings both exhibited increased growth from inoculation with old-growth forest soil. Our results suggest there is a lack of EM fungal propagules in secondary AM-dominated forests and highlight the importance of scattered EM trees for supporting EM fungi critical to nutrient acquisition and growth of establishing pine and hemlock seedlings.

Sun-PM2-C-3

Parallel Evolution of Urban–Rural Clines in Melanism in Eastern Gray Squirrels

Bradley J. Cosentino (Hobart and William Smith Colleges, Geneva, NY) and James P. Gibbs (SUNY-ESF, Syracuse, NY)

Abstract - Urbanization is the dominant trend of global land-use change. The replicated nature of environmental change associated with urbanization should drive parallel evolution, yet insight into the repeatability of evolutionary processes in urban areas has been limited by a lack of multi-city studies. Here we leverage community science data on coat color in > 60,000 *Sciurus carolinensis* (Eastern Gray Squirrel) across 43 North American cities to test for parallel clines in melanism, a genetically based trait associated with thermoregulation and crypsis. We show the prevalence of melanism was positively associated with urbanization as measured by impervious cover. Urban–rural clines in melanism were strongest in the largest cities with extensive forest cover and weakest or absent in cities with warmer winter temperatures, where thermal selection likely limits the prevalence of melanism. Our results suggest that novel traits can evolve in a highly repeatable manner among urban areas, modified by factors intrinsic to individual cities, including their size, land cover, and climate.

Sat-PM1-B-3

Invasive Species Tiers: Data-driven Approach to Creating Early Detection Lists

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

Abstract - Natural resource managers are often challenged by an overwhelmingly long list of invasive species to prioritize for management and surveys. Often, managers determine priorities through subjective experience and not regional data, contributing to a lack of objectivity, consistency, and transparency. Using the invasion curve as a guiding principle, the New York Natural Heritage Program developed a data-driven process to guide expert input in creating regionally specific invasive species lists based on management priorities. The invasive species tiers framework uses a standardized set of definitions, data from locational databases (such as iMapInvasives and iNaturalist) and impact assessments, and expert elicitation to categorize high-impact invasive species present in and surrounding the target regions. The analysis process was evaluated and improved by feedback from the structured network of invasive species managers in New York State. Results of the invasive species tiers process for 8 management regions and at the state-scale were made publicly available, and demonstrated variation in invasive species diversity across the management landscape. The approach developed here can be replicated in and scaled to other regions with comparable data, and it can provide a common management language to better coordinate invasive species management efforts.

Sun-AM2-B-1

How to Study Bees without Killing Them

Nicholas N. Dorian (Tufts University, Medford, MA) and Elizabeth Crone (Tufts University, Medford, MA)

Abstract - In North America, there are nearly 4000 species of wild (i.e., non-commercialized) bees. Over the past 20 years, in response to concerns over declining wild bee populations, ecologists have generated enormous volumes of data on where and when adult bees occur. These data help us understand how bee communities vary across space and time, and, in some cases, provide evidence for declines in abundance of target taxa, but they never teach us about the processes underpinning these changes. We believe the emphasis on pattern-oriented research in wild bees reflects 2 perceptions: (1) that population-level studies are too narrow in scope to provide rigorous inference, and (2) that wild bees can only be identified via lethal sampling. In this talk, we combat these perceptions. If population-level studies are couched in general ecological theory, then findings from a single species can be generalized to many. And when we overcome the conceptual barrier that studying bee populations is too narrow, it will be straightforward to overcome many of the technical barriers to doing field work with wild bees. Contrary to widespread opinion, at least 72 bee species in eastern North America can be identified "on the wing" using field marks like morphology, phenology, and habitat use. More generally, we emphasize the need to link data-rich pattern-oriented approaches in ecology with an understanding of the basic natural history throughout the life cycle and mechanisms that generate those patterns.

Sat-AM1-B-1

A Preliminary Examination into the Primary Causes of Sea Turtle Mortality in the New York Bight

Kimberly Durham (AMSEAS, Hampton Bays, NY, and WCSU, Danbury, CT), Theodora Pinou (WCSU, Danbury, CT), and Robert A. DiGiovanni Jr. (AMSEAS, Hampton Bays, NY)

Abstract - Post-mortem examination of sea turtles for determination of a cause of death were conducted by Atlantic Marine Conservation Society (AMSEAS) in New York State during 2017–2021. A total of 421 mortality investigations were conducted on stranded sea turtle species found along shorelines or floating in marine or estuarine waters of the coastal counties in New York. Four species of sea turtles were documented as stranded in New York. These include the threatened *Caretta caretta* (Loggerhead Sea Turtle) and *Chelonia mydas* (Atlantic Green Sea Turtle) and the endangered *Lepidochelys kempii* (Kemp's Ridley Sea Turtle), and *Dermochelys coriacea* (Leatherback Sea Turtle). Mortalities were characterized into natural mortality events (cold stunning, disease) and mortalities caused by anthropogenic trauma (vessel collision, fishing gear entanglement, and peracute underwater entrapment [by-catch]). Preliminary data suggests anthropogenic trauma in the form of watercraft-related mortality is an increasing threat to sea turtle species in New York. Management efforts should therefore be focused on reducing these threats of serious injury and mortality via public awareness campaigns to vessel operators on sea turtle presence and the precautions which may decrease turtle–vessel interactions.

Sat-AM1-A-1

Structural Complexity, Resilience, and Mitigation Capacity of Wild Forests in the Northeastern United States

Edward Faison (Highstead Foundation, Redding, CT), Jonathan Thompson (Harvard Forest, Harvard University, Petersham, MA), Danelle Laflower (Harvard Forest, Harvard University, Petersham, MA), and David Foster (Harvard Forest, Harvard University, Petersham, MA)

Abstract - Managing forests for climate adaptation and mitigation has become a major priority among government and private agencies in the northeastern United States. Adaptation involves managing forests for structural, species, and functional diversity in order to increase resistance or resilience to intensifying disturbances (i.e., native and non-native insect outbreaks, fire, drought, and windstorms), while mitigation refers to increasing carbon storage in forests in order to reduce carbon dioxide in the atmosphere. Yet, surprisingly little is known about the adaptation and mitigation values of wild (aka "natural") forests protected from timber harvesting, relative to forests that are open to management. We examined whether northeastern wildlands have developed differences in adaptation and mitigation capacity (i.e., forest structural complexity, species richness and carbon storage and sequestration) relative to surrounding forests that are open to management. We compared USDA Forest Service FIA plots across public and private wildlands to surrounding non-wildland forests using a causal inference design that matched wild to non-wild forests across multiple environmental covariates. We used an index of forest structural complexity derived from 11 forest attributes and found structural complexity to be higher in wildland forests than in matched non-wild forests ($P = 0.0004$). Tree species richness (i.e., species density) did not differ between wildland (5.2 species/plot; SE = 0.13) and non-wildland (5.4 species/plot; SE = 0.14) forests. Aboveground carbon storage in wildlands was 19% higher than in non-wildlands overall ($P < 0.0001$) and 122% higher than in recently harvested areas ($P < 0.0001$). Carbon sequestration rate (basal area increment) did not differ between wildlands and non-wildlands overall, but was 55% higher in wildlands than in recently harvested forests ($P = 0.01$). Our results suggest that northeastern wildlands forests have developed complex and resilient structures with relatively high mitigation capacity.

Sat-AM1-C-1

Northern Hardwood Seepage Forests of Vermont: Conservation Implications of an Elusive Wetland Type

Dan Farrell (VT Fish and Wildlife Department, Montpelier, VT)

Abstract - Northern Hardwood Seepage Forest (NHSF) is a newly classified, under-surveyed, diverse wetland natural community type in Vermont that contributes to freshwater climate resilience and benefits fish and wildlife. Similar communities occur in New Hampshire and Maine. It was introduced to the public in the second edition of *Wetland, Woodland, Wildland: A Guide to the Natural Communities of Vermont* (Thompson, Sorenson and Zaino, 2019). Difficult to find using remote-sensing data, they are regularly mapped as upland natural community types, though some datasets provide clues. Although predominantly wetlands, occurrences of this groundwater-fed community type which are currently documented by the Vermont Fish and Wildlife Department (VTFWD) are rarely included on national and Vermont wetland maps. Spring thaw occurs earlier than in surrounding areas and provides much needed vegetation to *Ursus americanus* (Black Bear) and other wildlife. During the heat of the summer, the cool water supplied to streams by NHSFs can create refugia for aquatic species like *Salvelinus fontinalis* (Brook Trout). As headwater wetlands, they also increase the flood resilience of rivers downstream. Temporal and micro-topographically related spatial variability of depth to water table produces dynamic and heterogeneous sites with variable canopy cover, conditions that beget high species diversity, especially where there is high soil pH and nutrient availability. Increased awareness and documentation of this important natural community type will foster further understanding. Building on fieldwork by the VTFWD and other ecologists, we will discuss identification, vegetation, natural processes, and implications for conservation, climate resilience, and wildlife.

Sat-AM2-C-4

MAREN: Leveraging EREN to Improve Milkweed Restoration

M. Caitlin Fisher-Reid (Bridgewater State University, Bridgewater, MA), **Heather Marella** (Bridgewater State University, Bridgewater, MA), Julia Whalen (Bridgewater State University, Bridgewater, MA), Kaitlin Cook (Bridgewater State University, Bridgewater, MA), Annie Vasapollo (Bridgewater State University, Bridgewater, MA), William Riendeau (Bridgewater State University, Bridgewater, MA), Darlene Andrade-Fonseca (Bridgewater State University, Bridgewater, MA), Katie Sylvia (Bridgewater State University, Bridgewater, MA), Emily K. Mohl (St. Olaf College, Northfield, MN), Andrew C. McCall (Denison University, Granville, OH), Madelyn Wood (St. Olaf College, Northfield, MN), Lauren Sherman (St. Olaf College, Northfield, MN), Mari Reid (St. Olaf College, Northfield, MN), Patricia A. Saunders (Ashland University, Ashland, OH), Sara E. Scanga (Utica University, Utica, NY), Clara Danielson (St. Olaf College, Northfield, MN), Danielle E. Garneau (SUNY Plattsburgh, Plattsburgh, NY), Kaitlin Stack Whitney (Rochester Institute of Technology, Rochester, NY), Kendra Cipollini (Wilmington College, Wilmington, OH), Jennifer Nesbitt Styrsky (University of Lynchburg, Lynchburg, VA), John D. Styrsky

Abstract - *Asclepias syriaca* (Common Milkweed) is a popular target for ecological restoration because *Asclepias* species are the sole host plant for the charismatic *Danaus plexippus* (Monarch Butterfly). As both Monarch and Milkweed populations have declined in recent years in the United States, there has been a widespread push for community scientists to plant Milkweeds in their local environment both to support migrating monarchs and help restore meadow habitat. However, the large geographic range and subsequent breadth of climates Milkweeds inhabit raises the specter of locally adapted seeds. Local adaptation of Milkweed may reduce the success of restoration projects sourced with non-local seeds, compared to those sourced with local seeds or at least seeds from a similar climate. MAREN, the Milkweed Adaptation and Research Education Network, was founded in part to characterize and quantify the local adaptation of Common Milkweed across its geographic range. MAREN participants collected seeds from their local populations and planted them in common gardens with at seeds from at least 3 other MAREN localities and measured plant traits over 3 years. Additional growth-chamber experiments with participant seeds have explored germination rates under different climates and different cold-stratification regimes. In this presentation, we will summarize some of the preliminary findings on local adaptation of Common Milkweed by MAREN participants, as well as highlight how we have brought MAREN protocols and data collection into our teaching and scholarship with undergraduate students at Bridgewater State University. Importantly, locally sourced seeds do seem to be important for successful restoration, and other factors, like seed size or cold stratification regime, play a role in successful germination and establishment of Milkweed. MAREN invites educators and their students to participate in ongoing data collection about geographic variation in Milkweed plants and their interactions with consumers, with the goal of answering questions relevant to ecological restoration.

Sat-AM2-A-1

Increased Resistance to White-Nose Syndrome is Associated With Elevated Skin Temperatures During Torpor

Craig L. Frank (Fordham University, Bronx, NY), Venessa Cardino (Fordham University, Bronx, NY), and Carl Herzog (NY DEC, Albany, NY)

Abstract - The factors that limit the degree of body temperature (T_b) reduction that occurs during mammalian hibernation are poorly understood. We hypothesize that one of the factors that limits the degree of T_b reduction during hibernation is the pathogen species present during this period. We examined the long-term effects of White-nose Syndrome (WNS) on torpor in 2 bat species to test this hypothesis. WNS is caused by an extensive cutaneous infection with *Pseudogymnoascus destructans* (*Pd*) during hibernation, and this fungus was introduced to North America from Europe, first appearing in New York during the winter of 2006–2007. This fungus grows well at 4–12 ºC, displays heat stress at temperatures above 12 ºC, and stops growing at 19.0 ºC. The population of *Myotis leibii* (Eastern Small-footed Bat) declined by only 12% with the appearance of *Pd*, indicating that this bat is highly resistant to WNS. In contrast, populations of *Myotis lucifugus* (Little Brown Bat) decreased by 95% with the first appearance of *Pd*. The over-winter survival rate of Little Brown Bats at a New York hibernation site increased from just 12% during the winter of 2008–2009 to 50% during by the winters of 2013–2014/2014–2015. We thus predicted that both the high initial resistance of Eastern Small-footed Bat to *Pd*, and subsequent increased resistance of Little Brown Bat to *Pd* in New York are both associated with an increased skin temperature (T_{skin}) during torpor. We conducted a 2-winter field study on these 2 bat species at a New York hibernation site to test our prediction. The mean torpor-bout duration of Eastern Small-footed Bats was 25.4 ± 3.0 d, with a mean minimum T_{skin} during torpor of 16.1 ± 1.0 ºC. The mean minimum T_{skin} maintained by Little Brown Bats hibernating in the same site was 7.0 ± 0.5 ºC during 2008–2009, and by the winters of 2015–2016/2018–2019, it had increased to 9.7 ± 0.9 ºC. Our findings thus indicate that both the high resistance of Eastern Small-footed Bats, as well as the recently increased resistance of Little Brown Bats, to *Pd* are both associated with an elevated T_{skin} during torpor.

Sun-AM1-B-2

Range-wide Population Structure and Migration Patterns of Eastern Gray Squirrels (*Sciurus carolinensis*) across Eastern North America

Nicole Fusco (Yale University, New Haven, CT)

Abstract - *Sciurus carolinensis* (Eastern Gray Squirrel) is one of the most common and conspicuous species present within rural forests and within human-dominated landscapes across the Eastern United States. While much is known about its ecology, not much is known about genetic and recent phylogeographic structure for this species across its native range. In this study, I performed reduced representation sequencing on 403 individual Gray Squirrels (both black and gray morphs) to explore spatial genetic structure, genetic diversity, and migration patterns across the landscape. Using ~44K SNPs, we found some areas with distinct population clusters within individual cities (e.g., in Ohio; Kingston, [NY or ON?]; Geneva, NY; and Syracuse, NY), but also large areas of widespread gene flow, specifically across the megacities along the northeastern coastline and through areas of Ontario, Canada. Results also indicate moderate levels of genetic diversity housed within each sampled location and low levels of inbreeding. On the landscape scale, there was significant isolation by distance and high levels of migration across urban areas and forested land, with lower than expected migration across agricultural landscapes. On the city-scale, we found different genetic groupings within and outside of the cities like Syracuse, NY. We also found structure across samples collected in the NYC metropolitan area, with squirrels from New Jersey, Long Island, and mainland New York all separating out as separate genetic clusters. Human-induced landscape change may be altering recent evolutionary patterns for Eastern Gray Squirrels, but they maintain connected and genetically diverse populations throughout their native range and can continue to provide vital ecosystem services within both rural forests and within cities.

Sat-PM1-B-4

White-tailed Deer Harvest Success and its Impact on Forest Understory Vegetation: Evaluating Management Program Efficacy in Southeastern New York

Ralph H. Green III (Pace University, Pleasantville, NY) and Danielle Begley-Miller (Teatown Lake Reservation, Ossining, NY, and Pace University, Pleasantville, NY)

Abstract - In southeastern New York, *Odocoileus virginianus* (White-tailed Deer) populations have increased over the last 50 years due to a lack of natural predation, increase in food resources from land-use changes, and restrictive hunting regulations. Unmanaged deer populations have severe negative impacts on understory plant communities, a key contributor to forest regeneration and biodiversity, affecting other plant and animal species. Numerous strategies are employed by land managers throughout the Hudson Valley region of New York to manage deer via lethal means. This study aims to better understand the effectiveness of different White-tailed Deer-removal programs (i.e., culling, archery, and firearms seasons) compared to no management in improving forest understory conditions across 7 nature preserves in the Hudson Valley. To assess each site, we used an analysis of covariance to correlate long-term (4+ year) understory vegetation characteristics (species diversity, seedling density, and seedling height) with changes in deer density estimates and treatment (firearm, archery, culling, archery + culling, no management). Data were from pre-existing permanent forest-monitoring plots at 5 sites with ongoing deer management and 2 with no management. We also used an analysis of variance to compare harvest rates across sites and program types to determine harvest efficiency (hours per successful harvest). Deer-density estimates decreased or stabilized across all management program types in the first 4 years of management ($F(4,18) = 2.3$, $P = 0.098$, $R^2 = .22$), and harvest efficiency (number of deer harvested per hour effort) decreased at all sites with time ($F(3,23) = 8.974$, $P < 0.001$, $R^2 = .46$). Culling (5.32 deer/per hour) was the most efficient harvest strategy compared to archery (0.22 deer/per hour), archery + culling (0.2 deer/per hour), and firearms (0.02 deer/per hour) programs. While management programs did reduce deer densities, those changes did not correlate consistently with seedling density ($F(1,9) = 0.265$, $P = 0.62$, $R^2 = .10$) and seedling height ($F(1,6) = 0.039$, $P = 0.85$, $R^2 = .06$), but did positively correlate with understory diversity ($F(1,46) = 8.31$, $P = 0.01$, $R^2 = .51$). Vegetation responses appear site-specific and driven by additional site limitations beyond deer density, but data analysis was limited by inconsistent data-collection strategies across sites. Regional coordination among land managers is recommended to establish consistent protocols to assess and monitor the impacts of deer density on forested ecosystems at beyond local spatial scales.

Sun-AM2-C-3

Below-ground Biodiversity in a System Transitioning to Native Meadows

Carmen Greenwood (SUNY Cobleskill, Cobleskill, NY), Emily Krsnak (SUNY Cobleskill, Cobleskill, NY), and Lisa Starikov (SUNY Cobleskill, Cobleskill, NY)

Abstract - Soil-dwelling organisms constitute one of the most diverse terrestrial ecosystems. Below-ground organisms provide ecosystem services such as nutrient cycling and decomposition of organic matter, and aid in carbon sequestration. Microarthropods, specifically oribatid mites, are sensitive to changes in soil quality, and are often used as soil-health indicators. Our study examined microarthropod abundance, diversity, proportion of oribatid mites, and community composition of soil-dwelling microarthropods within 4 native meadows recently transitioned from intensive agricultural production. It generally takes a number of years for soil health to improve as a system transitions from intensive agricultural production to a less-disturbed application. We collected data from 4 different regimes: native wildflower mix (23 spp. of native flowers and 1 sp. native grass), native grass mix (80 % native grass spp., small proportion of native flowers), fallow, and hay fields (triticale and pea mix) located at the Hudson Valley Farm Hub (HVFB) in Hurley NY, during June, July, and August of 2020 and 2021. We measured soil moisture and organic matter content with each sampling event. In 2020, we collected a total of 2182 organisms representing 46 different taxa; 20 of these taxa were mites, and 9 of those were oribatid mites. The hay planting regime yielded the highest abundance (50.17 ± 6.01, 51.33 ± 8.97, 34.50 ± 10.15) and % organic matter (3.87 ± 0.32, 3.60 ± 0.26, 3.26 ± 0.15) for all 3 dates, respectively. Taxa richness levels were highest in the hay planting regime in June (12.67 ± 1.15) and August (9.83 ± 1.96) and in the native wildflower mix in July (13.33 ± 1.45). Shannon's diversity was also highest in the hay regime in June (2.14 ± 0.14) and August (1.9 1± 0.17) and in the native wildflower mix in July (2.31 ± 0.08). Soil Moisture content was highest in native grasses in July (21.0 ± 3.68) and fallow planting regimes in June (14.37 ± 0.53) and August (32.4 ± 1.08). We are currently analyzing the data from 2021. This study is part of a larger study comparing the biodiversity of multiple communities within these native meadows to evaluate possible above-ground—below-ground linkages in biodiversity, and to develop regional guidance for growers wanting to increase biodiversity on their farming systems.

Sat-PM1-A-3

Ectomycorrhizal Fungal Diversity and Abundance Across Transgenic Versus Traditionally Bred American Chestnuts

Molly Heit (SUNY ESF, Syracuse, NY), Andrew Cortese (SUNY ESF, Syracuse, NY), Tom Horton (SUNY ESF, Syracuse, NY), and Bill Powell (SUNY ESF, Syracuse, NY)

Abstract - Once a dominant species in Northeastern forests across North America, *Castanea dentata* (American Chestnut) was decimated by a fungal stem blight in the early 1900s. Restoration efforts since that time have included hybrid and backcross breeding with naturally blight-tolerant species, and more recent advances in genetic engineering biotechnologies have allowed for the generation of blight-tolerant transgenic chestnut lines, including the Darling-58 tree expressing the oxalate oxidase gene. Confirmation that the transgene does not pose a risk of non-target environmental effects to the soil or root community of the tree in both open field and natural settings is a large-scale mission currently being addressed at sites across the northeastern US through a USDA Biotechnology Risk Assessment Grant (BRAG). The present study uses morphological as well as molecular techniques to compare the ectomycorrhizal (ECM) fungal colonization on roots of 2-year-old transgenic, conventionally bred American–Chinese chestnut hybrid, and non-transgenic seedlings across both orchard and shelterwood settings. All surveyed root fragments ($n = 67$) contained at least 1 mycorrhizal morphotype, and percent colonization rates varied from 16.7% to 95.8%. However, morphological analysis of root fragments has revealed no significant differences in species richness (number of morphotypes per seedling) or percent colonization as a function of tree genetic background nor as a function of site. However, species richness was significantly greater in trees grown in a shelterwood versus an orchard setting (two-tailed *t*-test: $P = 0.0006$) across all sites. Further analyses will confirm these data and search for additional emergent patterns in colonization extent, abundance and dominance of ecologically significant morphotypes or species, and fungal diversity, via DNA extraction and identification of species using restriction fragment length polymorphism (RFLP) typing of the fungal internal transcribed spacer (ITS) sequence. As *C. dentata* has been absent from the typical northeastern forest overstory throughout the development of these molecular techniques, the typical ECM community assemblage is not well understood; neither is any particular effect of traditional hybrid breeding on ECM colonization or diversity. These factors could provide important insights into the tree's ecological function in present-day common hardwood forest ecosystems, as well as support the body of evidence that the ECM community of transgenic *C. dentata* is not functionally different from that of its nontransgenic relatives.

Sun-PM2-C-1

Panel Discussion: Conservation Detection Dogs

Kristine Hoffmann (St. Lawrence University, Canton, NY), **Arden Blumenthal** (New York–New Jersey Trail Conference, Conservation Dogs Program, Mahwah, NJ), and **Lindsay Ware** (Science Dogs of New England, Ellsworth, ME)

Sun-PM2-B-4

Training Undergraduate Biologists with Wildlife-Detection Dogs

Kristine Hoffmann (St. Lawrence University, Canton, NY), Hannah Duffy (St. Lawrence University, Canton, NY), and Julia Sirois (St. Lawrence University, Canton, NY)

Abstract - Wildlife-detector dogs usually have professional handlers, but with dedication and coursework in canine behavior, scent movement, and ecology, undergraduate students may also be successful handlers. We conducted undergraduate research projects to (1) examine canine ability to differentiate among frog species, (2) survey a population of frogs, and (3) locate turtles. Students completed specific courses before their projects, such as Biology of Dogs and Herpetology. Each student took at least 1 independent study focused on training the dog(s) to search for and alert on a species in collaboration with professional trainers. Students were able to handle the dog(s) and collect data in either the lab or field, providing a synergy of class material, independent work, and experience practicing the scientific method.

Sun-PM2-B-1

A Gleasonian View of Ectomycorrhizal Networks

Thomas R. Horton (SUNY-ESF, Syracuse, NY)

Abstract - Ectomycorrhizal networks are getting a lot of attention these days. New tools we have for understanding their form and function have revealed some amazing features of the forest ecology under our feet. The general message is that forests are highly connected below ground and resources move throughout the mycorrhizal fungal networks. On those points, I am in full agreement. But we now know that fungal communities making up ectomycorrhizal networks are impressively diverse, especially in older, undisturbed stands. They are made of many species with unique life histories. Individuals of most species are relatively small, typically less than 3 m in diameter. Individuals of some species can live for decades, and these can form mycelial networks that span tens of meters below ground. Fungi recognize nonself hyphae and will reject fusions with individuals from their own species, let alone from other species. So, the ectomycorrhizal network of a forest stand is made of many individual hyphal systems of varying sizes forming many discrete bridges between trees. The transfer of resources through complex ectomycorrhizal networks in older, undisturbed stands is likely not as free and easy as is suggested in the popular press.

Sat-AM1-C-4

The Acadia Bug Project: Influence of Citizen Science Collection Techniques on Invertebrate Communities

Allyson K. Jackson (Purchase College, SUNY, Purchase, NY), Lauren A. Smith DiCarlo (Westfield State University, Westfield, MA), Veronica Winter (Purchase College, SUNY, Purchase, NY; Utah State University, Logan, UT), Alex Youre-Moses (Purchase College, SUNY, Purchase, NY), and Matthew Garafalo (Purchase College, SUNY, Purchase, NY)

Abstract - The interplay between freshwater aquatic and the surrounding riparian ecosystem is now well understood and documented. Subsidies flow both ways, with terrestrial productivity subsidizing aquatic communities and aquatic emergent insect flux moving aquatic nutrients into the surrounding terrestrial ecosystem. While monitoring is necessary, sampling baseline invertebrate communities can be time consuming and often poorly funded. Many institutions have implemented BioBlitz or citizen science programs to help engage the public while also collecting data. Despite the evidence of how these citizen science-based programs promote education, engagement, and stewardship of natural resources, they have often been criticized for their lack of scientific rigor. In June and July 2018, we collected aquatic, terrestrial and emerged aquatic insects at 4 sites in Acadia National Park (Maine) using both expert/quantitative sampling techniques and citizen science/qualitative techniques. Our goal was to determine if quantitative and citizen science collection effects differed in (1) biomass collected in aquatic or terrestrial habitats, (2) community structure of aquatic and terrestrial food, and (3) site-specific indicator species. We used non-metric multidimensional scaling (NMS) and found some differences in the invertebrate community collected using each method but also many similarities. We were also able to use the insects collected by citizen scientists for a secondary stable isotope analysis, which highlights how these data can be used for applied scientific outcomes, outside of the obvious education and outreach benefit.

Sat-PM1-C-5

Population Ecology of the Endangered Hemiparasitic Plant Species, *Schwalbea americana*, in the New Jersey Pine Barrens

Jay Kelly (Center for Environmental Studies, Raritan Valley Community College, North Branch, NJ), Bob Cartica (NJDEP Office of Natural Lands Management, Trenton, NJ), Mike Van Clef (Ecological Solutions LLC, Great Meadows, NJ), and Carol Denhof (Longleaf Alliance, Andalusia, AL)

Abstract - We conducted long-term demographic and ecological studies of the endangered hemiparasitic plant, *Schwalbea americana* (American Chaffseed), in the New Jersey Pine Barrens from 1991 to 2020 in order to address important questions about its biology and conservation. We observed spatial clustering during a major population increase in 2001, which corresponded to variation in soil, hydrology, and plant community conditions. Subsequent experiments confirmed the microhabitat preferences of *Schwalbea* for soil and host species (especially *Chrysopsis mariana* [Maryland Golden-aster] and other Asteraceae species), which contributed to the first successful propagation and reintroductions for this species in New Jersey at several historic sites. Dormant season prescribed burning and mowing were shown to yield positive effects on *Schwalbea* growth and flowering, and time lags observed between increased flowering and recruitment appeared to be the result of accumulating seed abundance in the seed bank combined with observer error, which failed to account for late-season germination in prior years due to the timing of annual monitoring. Dormant plants represented an average of 21% of the total population each year, with 20% of above-ground plants entering dormancy annually. Most dormancy events (92%) were 1–3 years in duration (less than 1% being 6–10 years), indicating that mortality cannot be distinguished from dormancy for a minimum of 3 years after disappearance. Annual survivorship was high (88%), with 9% of individuals surviving 18 years on average, but differed significantly by cohort and increased with more frequent management. We observed significant differences in size and flowering by age/stage class. However, size alone was insufficient to identify *Schwalbea* recruits from older plants, due to overlap of their lower size ranges. Long-term declines in survival and recruitment from 2004 to 2020 occurred despite suppression of woody succession by annual hand clipping and intermittent mowing and burning. Increased frequency of mowing or burning appears to be needed to sustain this population in the future.

Sun-AM1-A-2

Plants in a Human-Altered Environment (PHAE) Project: Students Investigating the Local Importance of Woody Plants Through Independent Hypotheses and Collaborative Data

Jason S. Kilgore (Washington and Jefferson College, Washington, PA)

Abstract - Even prior to COVID-19, ecology students lived in a diverse array of learning environments that became even more varied due to the pandemic, forcing many students to engage in remote learning, often far from their instructor and physical campus. Instructors were challenged to get their students to practice the scientific process and learn relevant technologies, field skills, and data science. With support from the National Science Foundation, Ecological Research as Education Network (EREN) faculty and National Ecological Observatory Network (NEON) staff utilized NEON protocols and/or data in the EREN collaborative model to co-develop a set of Flexible Learning Projects for ecology instructors to help their students explore their learning environments, whether students were remote or on-campus. To encourage students to engage with woody plants in their surroundings, Dr. Karen Kuers (University of the South) and I developed the Plants in the Human-Altered Environment (PHAE) project. Initial modules build the foundation for a basic understanding of landscape structure and ecosystem services that leads to the overall research objective for PHAE, specifically quantifying the importance of woody plants as related to human-altered viewshed and impervious surface area. Knowing that they will follow the prescribed PHAE methodology and be able to use data from other plots, students generate independent testable hypotheses, develop a research plan, identify their research site, collect and contribute their data to a shared GoogleSheet that contains data from all other sites and institutions, and then visualize and analyze the combined data in context of their own hypotheses. Whether they are remote, commuter, or in-person, PHAE provides flexibility for ecology students to engage in the scientific process with authentic data to test their own hypotheses while using a standardized methodology that contributes to the overall project. In addition, students gain a suite of ecology skills, such as identifying and locating plots using remote technology; identifying, mapping, and measuring tree diameter and height; and entering, visualizing, and analyzing data. Broadly, students increase awareness of biological limitations of plant growth in urbanizing landscapes and the importance of woody plants in their environment.

Sat-AM2-A-4

Uncertainties in Artificial Intelligence Classifications of Colonial Nesting Seabirds in Plane-based Imagery

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Abstract - Traditional avian survey methods have limitations due to observer errors and visibility bias, while on-site observers can cause disturbance to nesting birds. Recently, remotely sensed imagery has been used to inventory and characterize wildlife populations, including those of colonial nesting seabirds. Planes equipped with digital cameras for high-resolution photography offer solutions to the limitations of traditional surveys while minimizing disturbance created during ground surveys. Additionally, remotely sensed imagery provides a snapshot of populations at moments in time, allowing for retroactive counts and assessments. These advantages can also be prohibitively expensive, in part because of the substantial labor required for manual image interpretation. The development of automated image-processing tools for object detection and classification with artificial intelligence (AI) offers promise as an alternative, though there are few studies that examine how contexts (e.g., landscape metrics) affect the accuracy of automated population estimates. We developed an automated process with AI to detect and identify the species of ~37,000 colonial birds labelled by human observers in plane-based imagery captured over islands in the Gulf of Maine. We manually interpreted plane-based imagery (n = 43 islands, pixel resolution of 2.1 cm/pixel) to document seabirds nesting on Maine's coastal islands. We implemented a You Only Look Once (YOLO) AI algorithm to automate image interpretation across contexts and species, and we trained the algorithm with a subset of manual interpretations. The AI algorithm detected ~25,000 birds with a precision of 0.93, recall of 0.71, and F1-score of 0.81 and identified *Larus argentatus* (Herring Gull) with the greatest accuracy. Though the algorithm effectively identified birds to species when it was able to detect them, it failed to detect ~10,000 birds that were found by manual observers. Future work includes modelling AI certainty and agreement with manual observers as functions of landscape metrics and other relevant parameters. This research will contribute to our understanding of biases and errors in AI interpretation of wildlife imagery and derived population estimates.

Sat-PM2-B-2

The Effect of Human Activity on Wildlife in Protected Lands: A Minimally Invasive Trail Study Conducted Using Motion-activated Cameras

Charlotte Klurfeld (Mianus River Gorge Nature Preserve, Bedford NY), Chris Nagy(Mianus River Gorge Nature Preserve, Bedford NY), and Budd Veverka (Mianus River Gorge Nature Preserve, Bedford NY)

Abstract - With the number of recreational trail users reaching 101 million Americans in 2017 and projected to increase substantially in the next decade, it is of increasing importance to examine the potential impacts of human recreational activity on wildlife. This study monitored wildlife presence and activity patterns both on and off established hiking trails at 3 nature preserves in Westchester County, NY, using camera traps. We deployed cameras directly on, 50 m away, and 200 m away from hiking trails and monitored them for 2 years. We used visit frequency (VF), i.e., the rate of photographs per trap night, as an index of use and relative abundance of wildlife to calculate activity patterns and diversity. We used AIC model selection to distinguish among a set of possible models including seasonality, distance from trail, and whether trails were open to human activity at the time. Our research found that trails affected different species in differing ways. As a group, mammalian predators (*Cans latrans* [Coyote], *Vulpes vulpes* [Red Fox], and *Lynx rufus* [Bobcat]) exhibited a VF value of 0.27 in relation to the on-trail camera as opposed to 0.15 observations/day 50 m from trails and 0.07 observations/day for the trail camera placed 200 m from the trails; however, examination of the daily patterns at on-trail cameras showed that nearly all of this activity was nocturnal and/or when trails were closed. Our results suggests these carnivores select human-made trails as movement corridors but still avoid humans temporally and so were not overly affected by human activity on trails. Conversely, this same grouping of animals exhibited differences in activity pattern depending on distance from the trails, indicating a potential temporal avoidance rather than a spatial avoidance. *Odocoileus virginianus* [White-tailed Deer] were substantially less likely to be photographed near trails than far away regardless of time of day or whether trails were open or not. There were few species (e.g., *Procyon lotor* [Raccoon]) that were not affected by trails in some way. The results of this study provides information on how common mammal species respond to trails and human activity and can help managers balance the positive benefits of expanding a trail versus the negative impacts. However, it is important to note that the species we sampled (medium and large mammals) are a small portion of species potentially impacted by trails.

Sat-PM1-B-1

On-farm Native Wildflower Meadows: A Long-term Experiment

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

Abstract - The creation of native wildflower meadows on farms is being promoted to support insect diversity and to boost the populations of beneficial insects, which provide pollination and pest control in crops. In May 2017, we initiated a long-term native meadow trial at the Hudson Valley Farm Hub in Hurley, NY, to document the development of the vegetation and the flower abundance in different on-farm habitats over the years. The trial also serves as a basis for other researchers to explore the consequences of these habitats for (1) macroinvertebrate communities above and below ground, (2) soil microbial communities, (3) soil health, and (4) adjacent crops. The experimental design consists of 3 sets of three 0.2-ha (0.5-ac) experimental plots. There are 3 treatments: a native wildflower-rich seed mix, a native grass-rich seed mix, and an unseeded old field succession (fallow control). The seeded wildflowers established quickly, covering most of the ground in the second year. Nine of the 22 seeded species made up most of the vegetation from the 2nd year onward. However, the relative abundance of these 9 species continued to change as quick-establishing, short-lived species were replaced by longer-lived perennials. The native grasses were slower to establish, gradually increasing in abundance during the first 5 years. The vegetation cover in the fallow control plots was more variable and slower to establish. Flower abundance in the seeded treatments peaked in year 2 and has steadily declined since. However, the availability of flowers across the season has become more even in the wildflower-rich treatment over the years. The flower abundance in the fallow control remained significantly below that of the seeded meadows during the first 5 years. The impact of these meadows on microbes, macroinvertebrates, and adjacent crops will be discussed in separate presentations during this same session.

Sat-PM1-A-1

Incorporating NEON Data and Eco-Literacy Elements into Flexible Learning Projects

Mary Beth Kolozsvary (Siena College, Department of Environmental Studies and Sciences, Loudonville, NY)

Abstract - The Ecological Research as Education Network (EREN) promotes collaborative ecological research that generates high-quality, publishable data involving faculty and students at primarily undergraduate institutions (PUIs). EREN projects investigate ecological questions using standardized protocols that allow undergraduate students to collect and compare data across multiple sites over broad geographic areas and environmental settings. EREN supports highly productive collaborative research projects that fit within the constraints of scientists with significant teaching responsibilities. EREN projects have a strong record of peer-reviewed publications that approach scientific inquiry through differing vantage points, from focusing on ecological questions to pedagogical elements (e.g., development of instructional materials, assessment). Over the years, EREN has expanded and strengthened in depth and breadth by partnering with other organizations and networks (e.g., National Ecological Observatory Network (NEON), Environmental Data-Driven Inquiry and Exploration [Project EDDIE]) to focus on integrating networked large datasets into undergraduate teaching and research. In 2020, the COVID-19 crisis created an urgent need for online educational experiences that teach field ecology concepts to undergraduates in a flexible, socially distanced context. EREN scientists quickly assembled to develop a proposal for National Science Foundation (NSF) funding to adapt ongoing and new EREN projects into online learning modules to allow data collection in backyards, campuses, and urban areas by students learning remotely. These flexible projects were designed to embed rich learning experiences within authentic ecological research during these disruptive times. These projects were supported by newly developed instructional materials promoted through webinars, list-serves, and Quantitative Undergraduate Biology Education and Synthesis (QUBES)-supported Faculty Mentoring Networks, and involve students in collecting data, working with both student-collected and NEON data, and are designed so that students can address a variety of hypotheses at multiple scales of inquiry. The flexible learning projects were designed to align with the Four-Dimensional Ecology Education (4DEE) framework guidelines. The flexible projects were used widely and received positive feedback from instructors who implemented them. The EREN–NEON collaboration, which ties NEON data (collected at the macroscale) with comparable local data in varied settings, is well positioned to explore innovative ways to advance eco-literacy in undergraduate curriculum.

Sat-AM2-A-2

Northeast Partners in Amphibian and Reptile Conservation (NEPARC): Advancing Conservation Through Collaboration

Mary Beth Kolozsvary (Siena College, Department of Environmental Studies and Sciences, Loudonville, NY)

Abstract - Northeast Partners in Amphibian and Reptile Conservation (NEPARC) is a regional working group of Partners in Amphibian and Reptile Conservation (PARC). Both the regional group (NEPARC) and national group (PARC) were established to address the widespread declines, extinctions, and range reductions of amphibians and reptiles, with a focus on conservation of taxa and habitats in North America. Amphibians and reptiles are affected by a wide variety of human activities, both as incidental effects of habitat alteration and direct effects from overexploitation; these animals are also burdened by humans attitudes—that amphibians and reptiles are either dangerous or of little environmental or economic value. However, these taxa are important parts of our natural and cultural heritage and they serve important roles in ecosystems throughout the world. With many amphibians and reptiles classified as threatened with extinction, conservation to ensure healthy populations of these animals has never been more important. NEPARC facilitates and supports members working together to research and develop protocols for disinfection and decontamination protocols aimed at preventing the spread of diseases, determine areas that should be considered high priority for amphibian and reptile conservation, and conduct coordinated field assessments to develop region-wide conservation plans for target species. This presentation will discuss how NEPARC works to advance amphibian and reptile conservation through science- and partnership-based region-wide efforts.

Sat-PM2-A-1

A Rare Tree, a Rattlin' Tree: Climate and Deposition Effects on Growth of Boreal Tree Species at their Southern Lowland Range Limits

Mark Lesser (SUNY Plattsburgh, Plattsburgh, NY), Steve Langdon (Shingle Shanty Preserve and Research Station, Saranac Lake, NY), Anna Skolnick (SUNY Plattsburgh, Plattsburgh, NY), and Troy Tetreault (Idaho State University, Pocatello, ID)

Abstract - Boreal peatlands at their southern range limits in the Boreal Temperate Ecotone (BTE) of eastern North America provide distinct habitat and ecosystem services compared to surrounding uplands. These peatlands also serve as refugia for disjunct boreal tree species, providing the only suitable habitat for these species at, or near, their lowland southern range-limits. In this study, we examined growth rates in 4 tree species—*Picea mariana* (Black Spruce), *Abies balsamea* (Balsam Fir), *Larix laracina* (Eastern Larch), and *Thuja occidentalis* (Northern White Cedar)—growing at, or near, their lowland southern range-limits in a large (>400 ha) boreal peatland at Shingle Shanty Preserve and Research Station, located in the west-central Adirondacks in upstate New York. The objectives of this study were to (1) quantify annual growth trends in the 4 species, and (2) determine relationships between growth trends, climate, and hydrochemistry. We obtained increment cores from 134 trees in the peatland (71 Black Spruce, 25 Balsam Fir, 21 Larch, and 17 Northern White Cedar). We measured and crossdated annual ring widths and modelled annual growth against current and previous year monthly temperature and precipitation, North Atlantic Oscillation and atmospheric deposition, and pH data from 1980 to 2018. Tree ages varied from 13 to 251 years old, however most trees established in the second half of the 20th century. All 4 species showed a period of high growth in the 1950s. Following that, Black Spruce growth has continuously declined, while the other 3 species have fluctuated, but all showed declines since 2000. Model results showed highly significant relationships between growth and the tested variables (R^2 values from 0.33 to 0.49 and $P < 0.001$ for all models). Models are highly species specific, but all models included some combination of deposition and previous year monthly temperature variables. Models suggest that declines in atmospheric inputs since the 1980s has been detrimental to growth, while spring, fall, and winter temperature increases over the same period have generally had a positive influence. Interestingly, however, the negative response to summer temperatures by Black Spruce and Balsam Fir suggests growing-season temperatures may be becoming too warm for these species.

Sat-PM1-C-1

Using Hudson River School Paintings to Explore Historic Forest Dynamics in Eastern US Forests

Harper M. Loeb (Oregon State University, Corvallis, OR), Dana R. Warren (Oregon State University, Corvallis, OR), Peter Betjemann (Oregon State University, Corvallis, OR), Isabel Munck (U.S. Forest Service, Durham, NH), David Shaw (Oregon State University, Corvallis, OR), William Keeton (University of Vermont, Burlington, VT), and Eleanor Harvey (Smithsonian American Art Gallery, Washington, DC)

Abstract - As we contemplate the future of forest landscapes under changing climate conditions and land-use demands, there is increasing value in studying historic forest conditions and how these earlier landscapes have changed and recovered from past disturbances. Historic American landscape paintings are a potential data source for highly detailed, full-color depictions of pre-industrial forests. They display key details about forest community composition, microhabitat features, and structural complexity from a time well before the advent of color photography. Despite these paintings' rich potential, their scientific applications have been impeded by questions of validity: How truly accurate are the images portrayed in these paintings? How much of an image is an artist's manipulation of a scene to best illustrate an allegory or romanticized view of nature? We present the results of an interdisciplinary study applying the methods from art history and historical ecology to address these questions. From a review of the images and writing of key landscape painters in the mid-1800s, we can find clear support for the veracity of these images, but we also identify important caveats when making ecological interpretations from these images.

Sat-AM2-C-1

Monitoring the Effects of Human Disturbance on American Oystercatcher Nesting Behavior on Beaches in New York City

Kaitlyn M Maffett (Columbia University Department of Ecology, Evolution, and Environmental Biology, New York, NY), Emilio Tobón (New York City Audubon, New York, NY), Kaitlyn Parkins (New York City Audubon, New York, NY), Felicity Arengo (Center for Biodiversity and Conservation, American Museum of Natural History, New York, NY) Susan Elbin (New York City Audubon, New York, NY), and Sara Kross (Columbia University, Department of Ecology, Evolution & Environmental Biology, New York, NY)

Abstract - As the line between the human and wildlife world continues to blur, it is important to understand how increased human–wildlife conflict will affect species. In coastal areas, increasing human development and activity may negatively affect many migratory species of shorebirds, including several threatened species. To understand the impact human presence has on breeding shorebirds, we conducted an observational study to monitor the behavior of incubating *Haempoteus palliates* (American Oystercatcher) on the Rockaway Peninsula in Queens, New York City. We conducted observations at 4 different beaches along the peninsula representing a gradient of human activity to assess how the frequency and type of activities affected the amount of time incubating adult Oystercatchers spent away from the nest. Overall, we found that nests on beaches with more human activity spent slightly more time off the nest compared to beaches with less activity. Specifically, as the number of disturbances within a 10-minute observation period increased, the amount of time spent off the nest increased on the busiest beach ($B = 0.22$, $se = 0.018$, $p < 0.001$). We also found that certain types of anthropogenic disturbances caused Oystercatchers to spend more time away from the nest. For instance, when a person walking with a dog walked by a nest, incubating Oystercatchers flushed and remained off the nest for a longest amount of time (mean = 36.36 seconds, SE = 9.34 seconds). While there is a relationship between time spent away from the nest and human activity, it is still unclear if this time spent away from the nest affected hatching success and overall productivity of the pair. Productivity data from this season show the beaches with the most disturances had the highest hatching success and chick survival rates. Future studies should assess different disturbance factors that may contribute to changes in nest productivity, including possible correlations between human activity and nest predation by natural (e.g., *Procyon lotor* [Raccoon]) and anthropogenic (e.g., pet dogs) sources.

Sat-PM2-B-3

Ecological Observations of the Large Robber Fly *Proctacanthus philadelphicus* (A Bee Killer)

Karl B McKnight (St. Lawrence University, Canton, NY) and Kayla Edmunds (St. Lawrence University, Canton, NY)

Abstract - *Proctacanthus philadelphicus* is one of 5 common North American genera of robber flies that routinely kill bees, wasps, and other large insects. We used a mark–resight technique to observe 2 populations in St. Lawrence County, NY. *Proctacanthus philadelphicus* hunts mostly from a perch on open sand. We observed adult *P. philadelphicus* first in late July, and our last sighting was in late-September. Males were significantly more abundant during the first month, whereas females were more abundant during the second month. We resighted 15 times more males than females. We cannot explain the disappearance of the females. The average interval between marking and last resighting of individual flies was 5 days; however 1 fly was observed 24 days after marking, giving some idea of potential adult lifespan. We also observed mating and oviposition. Dispersal distances observed during consecutive sightings varied from 1 to 436 m. The median dispersal distance depended on the population observed and varied from 21 to 37 m. Prey of *P. philadelphicus* were predominately hymenoptera, including wasps and bees, but some beetles, flies, and hanging flies were also eaten. Prey consumption times varied from 60 to 74 minutes. We also observed partial prey consumption times varying from 5 to 44 minutes. *Proctacanthus philadelphicus* were not easily spooked from their perches, but when disturbed, they would often fly into the forest canopy rather than moving to a nearby patch of open sand. Nighttime perches of *P. philadelphicus* were varied, encompassing herbs, shrubs, and deciduous and coniferous trees, with no apparent preference.

Sat-AM2-B-4

Spring Ephemerals Aren't Just Plants! Population Dynamics of the Robber Fly *Lasiopogon Currani*

Tristan A. McKnight (University of Arizona, Tucson AZ), Kayla Edmunds (St. Lawrence University, Canton, NY), Karina L. Bellavia (St. Lawrence University, Canton, NY), and Karl McKnight (St. Lawrence University, Canton, NY)

Abstract - We assessed population dynamics of the predatory assassin fly *Lasiopogon currani* (Diptera: Asilidae) by conducting near-daily mark–resighting surveys at 2 woodland sites in northern New York State. This spring ephemeral species is one of the first robber flies to emerge each year, with an initial pulse of adults emerging in favorable habitat before the main green-up followed by a gradual decline and turnover over the following month. The growth of summer vegetation likely diminishes habitat suitability for this open-ground–loving predator, and dispersal and death eventually erode away the population's initial boom and continuing recruitment. The mean longevity of marked individuals was 8 days, but we tracked several individuals for over 30 days. The sex ratio of the population flipped from slightly male-dominated to slightly female-dominated as the season progressed. Despite a daytime activity of frequent meters-long movement (short flights seemingly at random to catch prey or avoid predators, and nightly retreats to hidden perches), most marked flies remained close to their original sighting locations throughout the season. The mean dispersal distance was only 49 m, but 1 individual was found 419 m from its original location. Surveys throughout the surrounding habitat matrix suggest this species may follow a classical metapopulation model.

Sat-AM2-B-3

Monitoring Tree Health for the Early Detection of Forest Health Issues

Kelsey McLaughlin (DEC Ecosystem Health Diagnostic Lab, Delmar, NY) and Jessica Cancelliere (DEC Ecosystem Health Diagnostic Lab, Delmar, NY)

Abstract - Early detection of forest pests and pathogens is crucial for effective management. The list of invasives that threatens New York ecosystems can seem daunting, but this presentation will cover general tree-health indicators that you can use to recognize when something is wrong. Reporting unhealthy trees can lead to the discovery of various forest pests and pathogens. Issues such as oak wilt, beech leaf disease, and *Adelges tsugae* (Hemlock Woolly Adelgid) have all been found in new locations in New York by concerned citizen scientists reporting issues they see in the trees around them. The presentation will also briefly discuss early detection tactics used by the NYS DEC for statewide monitoring, such as eDNA, aerial surveys, trapping surveys, and others.

Sun-AM2-B-4

A Comparison of the Understory Vegetation Community in a Remnant Old-growth Hemlock Forest and Adjacent Second-growth Hardwood Forest in Southern NY

Christopher Nagy (Mianus River Gorge, Bedford, NY), Chloe Ng (Wildlife Technician Program, Mianus River Gorge, Bedford, NY), Norman Budd Veverka (Mianus River Gorge, Bedford, NY), Mark Weckel (American Museum of Natural History, New York, NY)

Abstract - The Mianus River Gorge (MRG) Preserve is a 374-ha nature preserve in southern New York that includes an ~186-ha old-growth *Tsuga canadensis* (Eastern Hemlock) forest, with the remainder of the preserve made up primarily of second-growth deciduous forest. As part of an effort to monitor long-term forest change and the efficacy of management activities, MRG has monitored 22 large vegetation plots on its ~405-ha (~1000-ac) preserve in Bedford, NY (Westchester County), since 2004. These 3–5 year periodic surveys collected data on wildflower and woody understory. After the 2019 survey, representing 15 years of monitoring, we assessed the composition and change in the understory of both the old-growth Hemlock stands and the younger hardwood stands. There was significant regeneration of woody stems since 2004, likely due to the intense deer management program implemented by MRG, but this improvement was almost entirely found in the smaller (<90 cm tall) stem classes. Overall, native woody stem density and species richness increased similarly in both forest types. However, there were differences in woody species composition; notably, more invasive species were observed in the second-growth forest. *Fagus grandifolia* (American Beech) and *Betula lenta* (Black Birch) were more prominent in the Hemlock forest's understory. *Quercus* spp. (oak) and *Acer spp*. (maple) regeneration were similar in both forests, and Hemlock regeneration was minimal. Regarding wildflowers, total species richness was much higher in hardwood (22 species) than Hemlock (13.5) forests, though again, there were certain rare species and fewer invasive herbs found in the older forest. Stem counts of a set of indicator species showed declines or no change over time across both forest types, with the exception of *Maianthemum canadense* (Canada Mayflower), which increased dramatically in the Hemlock forest. Going forward, the protocol established in 2004 seems suitable for representative sampling of woody species but likely inadequate to monitor patchy and/or rare wildflowers. With this caveat, it seems that management efforts are facilitating woody regeneration, albeit slowly, but recovery of wildflower diversity is less promising.

Sat-AM1-C-3

An Update on the Ongoing Range Expansion of the Eastern Coyote through New York City and Long Island, NY

Christopher Nagy (Mianus River Gorge, Bedford, NY)

Abstract - Given a number of new developments, an update on the range expansion of eastern *Canis latrans* (Coyote) through New York City (NYC) and Long Island, and the effort to study this event, is of interest to mammologists and wildlife managers in the Northeast. Since 2019, Coyotes have established themselves more firmly in the boroughs of Queens and Manhattan as well as in Nassau and Suffolk counties, though their densities remain low compared to mainland NYS and even the northern areas of NYC itself. Recently, a Coyote was photographed in Staten Island and a lone Coyote has lived in Central Park since 2018. In 2020, a pair of Coyotes raised a litter of pups in a private preserve in Nassau County, marking the first confirmed den in the County. Multiple agencies, private organizations, researchers, and volunteers are collaborating to collect and follow up on sightings, run camera traps, and collect scat and roadkill to monitor the range expansion in as detailed a manner as possible across this large, complex landscape. These groups have also made efforts to study public perceptions and work to improve coexistence between people and their local wildlife.

Sun-AM2-C-1

An Examination of Habitat-Specific Population Trends from Regional Breeding Bird Survey Data

Megan Napoli (Mohonk Preserve, New Paltz, NY)

Abstract - The Mohonk Preserve, located in southeastern New York, has collected breeding bird survey data in different habitat-types, rotating survey effort per habitat yearly. I examined this long-term breeding-bird survey dataset to determine species relative abundance (ra) and diversity changes over time within 3 forested habitat-types: mixed deciduous (survey years 1983–2017), hemlock ravine (1993–2019), and wetland (1995–2016). I have preliminarily analyzed a selection of NYS-listed Species of Greatest Conservation Need : *Helmitheros vermivorum* (Worm-eating Warbler [WEWA]), *Piranga olivacea* (Scarlet Tanager [SCTA]), and *Parkesia motacilla* (Louisiana Waterthrush [LOWA]). Using the Shannon diversity index, the mixed-deciduous habitat had the highest average species diversity, followed by wetland, and then hemlock ravine ($H'/J_{(evenness)}$= 3.3/0.88, 3.2/0.93, 2.7/0.89, respectively). Over time, within mixed-deciduous habitat, SCTA ra increased (trend estimate (%) = 15.1), WEWA decreased (-1.6), and LOWA increased (2.6). Within wetland habitat WEWA ra increased (52.7), SCTA increased (18.1), and LOWA increased (10.8). In hemlock-ravine habitat, SCTA ra increased (18.8) and LOWA decreased (-2.2); no WEWA observations in this habitat. This dataset can help determine potential shifts in habitat preference over time and determine survey allocation effort for both the USGS NYS Breeding Bird Survey (BBS) and NYS Breeding Bird Atlas (NYBBA). With continued digitization of this dataset, further study efforts will include examining additional bird species in each habitat and adding a fourth habitat-type for analysis (Pitch-Pine–oak–heath forest).

Sun-AM2-A-2

Wildlife and Trail Recreation: Understanding, Managing, and Monitoring Recreation Effects in the Northeast

Meredith Naughton (University of Vermont, Field Naturalist Program and Stowe Land Trust, VT), David Barrington (University of Vermont, Burlington VT) and Bob Zaino (VT Fish and Wildlife, Barre, VT)

Abstract - An exhaustive, systematic review of recreation ecology literature revealed that trail recreation has a primarily negative effect on northeastern wildlife. This review clarifies primary factors influencing these negative effects in order to provide scientifically based guidance for land managers fulfilling the dual mandate of protecting wildlife while offering opportunities for recreation. The presentation discusses what steps land managers may take to effectively mitigate negative impacts to wildlife where trail recreation is present.

Sat-PM1-B-2

Importance of Wildflower Patches and Ornamental Gardens for Small-scale Agriculture in Northern NY

Aswini Pai (St. Lawrence University, Canton, NY), Samantha Haab, (St. Lawrence University, Canton, NY), and Raven Larcom (St. Lawrence University, Canton, NY)

Abstract - Wild bee species are ecologically and economically valuable as pollinators that enhance biodiversity in both large-scale commercial agriculture and in small-scale kitchen gardens. With the current threats to native bee populations, there is a pressing need for more scientific research to monitor wild bee communities. Our research focused on the importance of wildflower patches as well as ornamental gardens as resources and attractants to wild bee species that also pollinate kitchen gardens in St. Lawrence County. We hypothesized that the wild bee diversity would be the greatest in areas with greater floristic diversity, at the point in the summer when the most plants had flowered, and that there would be no significant difference among bee species found in cultivated kitchen gardens and those found in nearby wildflower patches and ornamental gardens. We sampled bee species richness and floral resources in kitchen gardens, adjacent wildflower patches, and nearby ornamental gardens using pan trapping during the summer. We trapped 20 genera and at least 100 species of wild bees. We found no significant difference ($P > 0.05$) in the bee species trapped both within and outside of kitchen gardens. However, we found that native wild bee abundance is positively correlated to with flowering plant species richness ($P > 0.05$). Both wildflower patches and ornamental gardens can provide critical supplemental resources for wild bees throughout the summers, thus supporting pollination services for local crops by serving as attractants. However, there is a pattern indicating the importance of floristic diversity both within and outside a kitchen garden for attracting wild bees. This study contributes to the much-needed compilation of scientific baseline information concerning plant–pollinator interactions and monitoring in agroecosystems in St. Lawrence County. The study also has ramifications for the gardening of native species.

Sat-PM1-A-5

Early Detection of Aquatic Invasive Species in New York State

Steven Pearson (New York State Department of Environmental Conservation, Albany, NY)

Abstract - Aquatic invasive species are those non-native species that are introduced to aquatic ecosystems and cause harm to the ecology, economy, or human health. Across the northeastern United States, there are many pathways that can result in species introductions to ecosystems and many of them stem from the commercial and industrial hubs in New York State on the Atlantic and Great Lake coasts. Furthermore, the aquatic highways (canals) that were developed to move goods in the early 20th century continue to act as a conduit for aquatic invasive species movement between regions. I will provide an overview of the larger-scale aquatic invasive species management projects in New York, an introduction to several emerging aquatic invasive species, and information on the methodology and tools being used to survey for these species. Aquatic invasive species in the early stages of an invasion are often reported by community scientists. Remaining curious as to what species you interact with and reporting any invasive species sightings can help managers control an invasive species before they become well established.

Sun-AM2-B-3

Divining the Natural Resilience of Forests from the Memories of Trees

Neil Pederson (Harvard Forest, Harvard University, Petersham, MA), Dario Martin Benito (INIA, Madrid, Spain), Daniel Bishop (Karen Clark & Company, Boston, MA), Tessa Mandra, (Harvard Forest, Harvard University, Petersham, MA), M. Ross Alexander, (Argonne National Laboratory, Lermont, IL), Laura Smith, (University of Tennessee, Knoxville, Knoxville, TN), and David Orwig, (Harvard Forest, Harvard University, Petersham, MA)

Abstract - Global change is threatening the resiliency of forests and, in the worst cases, their mere existence. The impacts on the ecological dynamics of ecosystems around the world under pressure from global change are causing widespread concern. In too many places, this is rightly so. There are times when the future of these systems looks bleak. However, ecologists and geoscientists have amazing tools that allow us to peer into the past and put context around the current changes in our world. In some ways, these views bring balm and comfort. Our group specializes in using tree-ring records, the archived memories of trees, to divine the past history of old forests to as far back as the trees allow. These memories allow us to peer back and examine the formation of canopy gaps decades and centuries ago. We can determine when and how large these gaps where, how surviving trees responded to each of these disturbances, and how tree species composition might have changed over time. These measures highlight the ability of forests to recover following disturbance, i.e., their resilience. We provide 3 examples that reveal aspects of forest resilience: (1) a mortality event from >200 years evidenced from many iconic old-growth forests in the southeastern US, (2) recovery dynamics in old forests at Pisgah State Forest following the 1938 Hurricane, and (3) the response of trees in the diverse landscape of the Palmaghatt Ravine in New York State to severe drought, an exotic insect, and an ice storm over the past 60 years. We will not paint a rosy picture of the turmoil in today's broader environment. The northeastern US is likely still far from the climatic turmoil being experienced in other parts of the world. Yet, the long-term view, especially those of the memories of trees, gives glimpses of the resiliency of trees and forests.

Sat-AM1-C-2

Patterns of Microbial Diversity in an Experimental Wildflower Meadows Trial

Gabriel G. Perron (Bard College, Annandale-On-Hudson, NY)

Abstract - The thin layer of soil under the direct influence of plant roots, i.e., the rhizosphere, is considered a hot spot of microbial activity. Indeed, a growing body of work suggests that microbial communities found in soil are strongly influenced by plant diversity. Therefore, it is predicted that microbial diversity should improve under high plant diversity. To investigate this question, we characterized the microbial diversity found in experimental meadows where plant diversity was manipulated to represent different habitat qualities. As predicted, we found that the experimental treatment influences microbial diversity and also influences certain classes of microbial genes. Finally, we investigate microbial diversity in relation to other diversity indicators, such as micro-invertebrate diversity, which could also affect microbial diversity.

Sat-PM1-A-2

Metriocnemus knabi Emigrates from Desiccated to Undesiccated Pitchers of *Sarracenia purpurea*

Lindsey A. Pett (University of Vermont, Burlington, VT) and Sophie Linde (University of Vermont, Burlington, VT)

Abstract - *Sarracenia purpurea* (Northern Pitcher Plant), contain obligate larval invertebrates that aid in the breakdown of prey. *S. purpurea* also has an obligate herbivore, *Exyra fax* (Pitcher Mining Moth) caterpillar, that actively consumes plant tissue leading to loss of pitcher fluid and pitcher desiccation. Desiccated pitchers become unsuitable for the obligate invertebrates that inhabit and aid in nutrient acquisition within *S. purpurea*. In the summer of 2021, we conducted an experiment to determine if the obligate invertebrate *Metriocnemus knabi* (Pitcher Plant Midge) larvae is capable of emigrating to new pitchers when faced with pitcher desiccation. We placed *M. knabi* larvae of varying abundances in experimental pitchers that we drained and desiccated in a way identical to the manner of *E. fax*. After desiccation, we allowed midges 2 weeks to emigrate. At the end of 2 weeks, we dissected experimental pitchers to determine if midges were present and if they survived. We also dissected the rest of the untouched, fluid-filled pitchers within the same plant to determine if any larvae were present. We found that *M. knabi* can emigrate and survive in new pitchers after desiccation, and initial abundance and pitcher availability only matter for survival when pitchers are desiccated.

Sat-AM1-B-2

Fate of Carrion: Implications for Post-Release Viability of American Burying Beetles in New York

John A. Pipino (SUNY Oneonta, Oneonta, NY), Carmen M. Greenwood (SUNY Cobleskill, Cobleskill, NY), Brandon M. Quinby (SUNY Cobleskill, Cobleskill, NY), Amy C.D. Quinn (SUNY Cobleskill, Cobleskill, NY), and Roger J. Masse (SUNY Cobleskill, Cobleskill, NY)

Abstract - The USFWS recovery plan for the critically endangered *Nicrophorus americanus* (American Burying Beetle [ABB]) identifies the once widespread geographic range of ABB in the US as evidence that soil type and vegetation are not factors that restrict habitat suitability for the species. However, habitat structure influences both the small-mammal and avian carrion availability necessary for *Nicrophorus* spp. reproduction, as well as populations of vertebrate scavengers deemed competitors for carrion resources. In July and August of 2021, we conducted surveys over 5 consecutive days at Greenwoods Conservancy in Hartwick, NY, and the E.N. Huyck Preserve in Renssaelaerville, NY, to determine the fate of *Columba livia* (Rock Pigeon) carrion of 3 size classes across 3 habitat types: forest, shrubland, and meadow. We classified the fate of carrion as either buried by *Nicrophorus* spp., taken by vertebrate scavengers, colonized by flies, buried by *Nicrophorus* spp. then scavenged, or left to decay. We found that at Greenwoods Conservancy, 22.3% of carrion was buried by *Nicrophorus* spp., 5.5% was scavenged, 50.25% was colonized by flies, 5.35% was buried first by *Nicrophorus* spp. then later scavenged, and 16.6% decomposed. Results at the E.N. Huyck Preserve indicated 20% of carrion was buried by *Nicrophorus* spp., 16% was scavenged, 60% was colonized by flies, and 4% was buried by *Nicrophorus* spp. then scavenged. Although we recognize that fly colonization (an observation of >100 fly maggots on a carcass) equates to half of all carrion fates, *Nicrophorus* spp. can bury carrion ~12 hours sooner than fly development can encompass a carcass. Similarly, *Nicrophorus* spp. can reach carrion prior to many scavengers found in these studies. Furthermore, observations of *Nicrophorus orbicollis*, the ABB surrogate taxon, predominately using carrion of 30–50 g in size, indicate an available niche in larger-size carrion, more appropriate for ABB reproduction.

Sat-AM1-B-4

The Impact of Development on Rattlesnakes in Connecticut: A Preliminary Study

Andrew Powers (Western Connecticut State University, Danbury, CT) and Theodora Pinou (Western Connecticut State University, Danbury, CT)

Abstract - *Crotalus horridus* (Timber Rattlesnake) is a large viper native to the east coast of the United States of America. However, within New England, the Timber Rattlesnake has experienced significant decline and is considered endangered in several states, including Connecticut. The main cause of this decline is thought to be a combination of human persecution and habitat loss. With the current increase in urbanization and change in land use within the last 3 decades in central Connecticut, the population status of this species is unknown. To evaluate changes to reported population demographics, this preliminary study quantifies the effects of conservation efforts and road density, building density, and canopy cover, over temporal scales, and then compares these factors to population sizes estimated by rattlesnake-den observations.

Sat-AM1-A-4

Seasonal Differences in Chimney Swift Roosting Behaviors

Charlotte M. Probst (University of Notre Dame, Notre Dame, IN) and Joel Ralston (Saint Mary's College, Notre Dame, IN)

Abstract - Migration is an energetically stressful time for birds, especially long-distance, endurance migrants. To mitigate the stresses of migration, birds may use stopover sites to replenish their fuel stores before continuing on migration. Roosting is a little-studied form of stopover used by several aerial insectivore species. Observations at a large *Chaetura pelagica* (Chimney Swift) roost site in Notre Dame, IN, revealed seasonal differences in roosting behaviors. Swifts enter the chimney at a significantly faster rate in the fall than in the spring. Additionally, preliminary data suggests that roost entry may track sunset time more closely in the fall than in the spring. These results suggest that roosting behaviors may be shaped by selective or environmental pressures that differ between seasons.

Sun-AM2-A-3

Assessing Habitat Suitability in Upstate New York for Reintroduction of the Endangered American Burying Beetle

Brandon M. Quinby (SUNY Cobleskill, Cobleskill, NY), Carmen M. Greenwood (SUNY Cobleskill, Cobleskill, NY), Roger J. Masse (SUNY Cobleskill, Cobleskill, NY), Amy C.D. Quinn (SUNY Cobleskill, Cobleskill, NY), and John A. Pipino (SUNY Oneonta, Oneonta, NY)

Abstract - *Nicrophorus americanus* (American Burying Beetle [ABB]), a critically endangered species, is currently represented by 4 known populations within its historic range. One specific goal of the USFWS recovery plan for ABB is to find a suitable location near the northern periphery of its historical range to support a successful reintroduction effort. The mixed hardwood forest habitats of central New York exhibit characteristics deemed favorable to burying beetles. In the absence of an extant ABB population, the presence of other species of *Nicrophoru*s beetles with similar biology and body size to that of ABBs indicate habitat suitability and are often used as surrogate species to address ecological and biological questions. Beyond favorable forest habitat, a critical element in determining habitat suitability for burying beetles in general is availability of small vertebrates that serve as hosts for feeding, breeding, and rearing offspring. Our research aims to monitor the community composition and condition of surrogate *Nicrophorus* spp., evaluate competition for potential reproductive carrion resources between congeners and vertebrate scavengers, and assess the potential carrion prey base by quantifying mammalian and avian host availability so that we may conduct robust habitat suitability assessments for potential ABB reintroduction within upstate New York. In the summer of 2021, we continued ongoing suverys for burying beetles, small mammals, and birds at 2 locations in upstate New York. During this time, we successfully captured 2432 *Nicrophorus* spp. beetles representing 7 species over a total of 838 trap nights. Our small-mammal trapping efforts resulted in 210 total captures over 885 trap nights. Additionally, our relative abundance estimates resulting from our upland game-bird surveys suggest avian communities of the appropriate mass required for ABB reproduction are available as potential carrion resources at our field sites. Furthermore, high numbers of *Nicrophorus* spp. beetles, small mammals (e.g., chipmunks and squirrels) that could serve as appropriate hosts for larger *Nicrophorus* spp., upland game-bird populations, and the ability of *Nicrophorus* spp. to secure reproductive carrion implies that the habitat types and prey base found at our field sites could be suitable for a reintroduction effort of ABB.

Sat-AM1-B-3

Using Small Unmanned Aerial Systems (sUAS) to Survey White-tailed Deer Populations in Northern NJ

Jessica J. Ray (Center for Environmental Studies, Raritan Valley Community College, North Branch, NJ) and Jay F. Kelly (Center for Environmental Studies, Raritan Valley Community College, North Branch, NJ)

Abstract – We used thermal-imaging cameras mounted on sUAS to survey *Odocoileus virginianus* (White-tailed Deer) populations to understand population sizes, impacts to local communities and ecosystems, and to inform deer and forest management. We used a standardized methodology to conduct surveys, record findings, and ensure the most conservative population numbers were reported to land managers. The results were compared to land use, habitat fragmentation, and hunting status in order to explain variation in deer densities. We also explored the relationships to tree regeneration and deer-vehicle collisions at select locations.

Sun-AM2-C-2

An Investigation of Winter Feeding Behavior of Snow Scorpionflies (Mecoptera: Boreidae)

Charlotte N. Reynolds (St. Lawrence University, Canton, NY) and Karl B. McKnight (St. Lawrence University, Canton, NY)

Abstract - Despite numerous reports linking the presence of the snow scorpionflies *Boreus brumalis* and *Boreus nivoriundus* (Mecoptera: Boreidae) to mosses, we have not found sufficient evidence of an obligate association between Boreids and a specific suite of mosses. Therefore, it is unclear whether Boreids are generalist or specialist herbivores, or if they are even herbivores at all. Snow scorpionflies are very small insects active both in the subnivean and on top of snowpack in the winter months and not seen in the summer months. We have attempted to determine the primary food source of the adult *B. brumalis* and *B. nivoriundus*. Through the analysis of species densities of both Boreids and mosses in our collecting areas, the maintenance of live Boreids in the lab with access to various potential food sources, the close observation of Boreid feeding behavior, and stable isotope analysis, we hope to resolve the uncertainty with respect to the primary food source of two of only a small number of Nearctic insects that remain active through the winter months.

Sat-AM2-B-1

Land-use Legacy Effects on Stream Salamanders in Finger Lakes National Forest

Anna Rider (Hobart and William Smith Colleges, Geneva, NY), Kristen Brubaker (Hobart and William Smith Colleges, Geneva, NY), and Brad Cosentino (Hobart and William Smith Colleges, Geneva, NY)

Abstract - We examined the effects of historic agricultural land use on the abundance of stream salamanders in the Finger Lakes National Forest (Hector, NY). This area, once mostly agriculture, has been abandoned and converted to forest across different time periods. We wanted to understand if land-use legacy or current land use have a greater effect on the stream salamander abundances. We also wanted to determine whether the localized habitat quality or the upstream watershed land use has more of an effect on salamander abundances. Using historic aerial photos, we separated the forested areas into reference, old, or young forest. Using lidar-derived digital elevation models (DEMs), we delineated stream networks and upstream watersheds for each site. We collected stream salamanders at 72 stream sites, and species found included *Gyrinophilus porphyriticus* (Spring Salamander), *Desmognathus fuscus* (Northern Dusky), *Desmognathus ochrophaeus* (Allegheny Dusky), *and Euraycea cirrigera* (Two-lined Salamander). We caught a total of 813 salamanders over the course of 6 weeks. Preliminary analysis shows that forest type seems to have a larger effect on salamander abundances than upstream land-use legacy.

Sun-PM2-A-2

Birds Use Polarized Light to Locate Water Bodies

Bruce A. Robertson (Bard College, Annandale-on-Hudson, NY), Devin Fraleigh (Bard College), Jackson Barratt Heittman (Bard College), and Olivia Rothberg (Bard College)

Abstract - Songbirds visualize skylight polarization patterns, but it's unknown if they can use their polarization sensitivity to locate water, a major source of terrestrial polarized light. We exposed wild songbirds to bird feeders modified to manipulate their visual properties (color, brightness, and degree of polarization), with the prediction that polarization will enhance their visual conspicuousness and enhance visitation rates. We also exposed them to heated bird baths with 3 visual treatments (black, white, and aluminum substrates). *Poecile atricapillus* (Black-capped Chickadee) and *Baeolophus bicolor* (Tufted Titmouse) increased their visitation rate to feeders with highly polarized light cues, independent of their color and brightness, and reduced visits in response to the addition of a depolarizing black paint. Both species visited black baths most frequently, consistent with the use of broader-spectrum sources of polarized light to locate water. Our results provide the first evidence that birds can use polarized light cues to locate water bodies and even guide their behavior in other contexts like feeding.

Sun-AM2-A-4

Mollusks of the Northeastern United States and Canada in iNaturalist

Gary Rosenberg (Academy of Natural Sciences and Drexel University, Philadelphia, PA)

Abstract - iNaturalist has more than 66,000 records for mollusks in the northeastern United States in Canada. Using these records effectively, however, can be difficult because the environment (marine, freshwater, or terrestrial) is not indicated. In some contexts, incorrect entries could mislead analyses. In a sample of Caenogastropoda containing 16,217 observations and reported under 104 names, 6 species were extralimital, 6 were misidentified, and 5 were listed under 2 different names. All of the extralimital species were marine. Only about 1 in 1000 entries are affected by these errors, but they inflated the marine species list significantly, from 65 to 75 species. Another area of concern is the distinction of live versus dead specimens. Mollusk shells can persist long after the death of the maker, so occurrence of shells in an area does not prove that a species currently lives there. The Eastern Seaboard thematic collection network funded by the US National Science Foundation, uses iNaturalist for outreach and data mobilization. To be pulled into the project, an observation must be scored for the live–dead attribute. Ideally this is done by the person making the observation, but can be added retrospective on the basis of the photographs on the website.

Sun-AM1-C-3

Preserving an Entomological Nonprofit

Michael Sabourin (Vermont Entomological Society, Marshfield, VT)

Abstract - Preserving an entomological nonprofit. It takes a lot of ingredients. We will discuss the Vermont Entomological Society, Inc., from its inception up to current time, including details of and insights on the history of the society, important members and activities, the effects of the society, and how to maintain the organization for future generations**.**

Sat-PM2-C-2

Emerging Threats to Riverine Aquatic Invertebrates

Peter W Severance (RiverMerrimack, North Chelmsford, MA)

Abstract - Macroinvertebrates play a vital role in cycling carbon through freshwater and riparian ecological systems. They are also the most sensitive and impacted group of organisms in our streams and rivers, and there is great concern about the decline of these populations on a global scale. Here I consider 3 stressors from among a constellation that are being reviewed in preparation for a proposal to baseline the populations of aquatic insect populations of the Merrimack watershed (Massachusetts and New Hampshire). (1) An Urban Pesticide Signature has recently been described, based on a survey of hundreds of pesticides sampled from 271 streams across the US This study has shed light on those that are having the most widespread impacts on aquatic flora and fauna. Aquatic macroinvertebrates are significantly more impacted by these contaminants than either aquatic plants or fish, with the neonicotinoid pesticide imidacloprid having the most exceedances of toxicity benchmarks. (2) Microplastics are entering our waterways in many forms via many avenues: as tire dust carried by road runoff, laundry fibers released to the atmosphere or wastewater streams, breakdown of plastics in refuse, and many others. Their sources, fate, their direct impact on benthic invertebrates, their pathways through the aquatic food web and their synergy with pesticides will be discussed. (3) Anthropogenic light sources—the negative effects of artificial and polarized light on populations of in-stream and emergent aquatic insects.

Sun-AM1-C-2

Mark and Recapture? The Reading Accuracy of VIE vs. PIT Tagging for Small Terrestrial Amphibians

Bethany Shaw (SUNY Oneonta, Oneonta, NY), Alexandra Gomez (SUNY Oneonta, Oneonta, NY), Daniel Sitch (SUNY Oneonta, Oneonta, NY), and Elizabeth Bastiaans (SUNY Oneonta, Oneonta, NY)

Abstract - Mark–recapture surveys are predicated on the necessity to accurately identify an individual during a subsequent capture, but not all marking methods are created equal. Visual implant elastomer (VIE) and passive integrated transponder (PIT) tags are common contemporary methods for individual identification. VIE is favorable for its ease of application and cost effectiveness; however, this marking method presents various readability challenges. And, although PIT tagging is less prone to reader error, this method is more expensive, more challenging to apply, and more invasive for the animal. *Plethodon cinereus* (Eastern Red-backed Salamander) is an emerging model organism for terrestrial amphibians as it is ubiquitous and often highly abundant in northern hardwood forests across its range. As part of an undergraduate lab course in fall 2017, we began a *P. cinereus* mark–recapture survey of 6 coverboard arrays in upstate New York. Initially, we used unique VIE marks to identify individuals across sampling events, but in fall 2020, we began to PIT tag the salamander population. Using the PIT tag unique code as a voucher, we estimate the error rate for reading the VIE marks accurately and make recommendations for how to improve mark–recapture surveys for this small amphibian, especially when marks will be read by inexperienced researchers in undergraduate courses.

Sat-PM2-A-2

The Discovery of Invasive Dandelions (*Taraxacum officinale*) in Alpine Communities on Mt. Washington, NH, and Worldwide: Why is this Species a Successful Alpine Invader?

Nancy G. Slack (Biology Department, The Sage Colleges, Schenectedy, NY) and Allison W. Bell (Northhampton, MA)

Abstract - In 2014, Allison Bell discovered non-native *Taraxacum officinale* (Common Dandelion) invading pristine, alpine, snowbed communities near the summit of Mt. Washington. We have located, and with much help, eradicated, many of the sources of Common Dandelion seed dispersal on Mt Washington. Similar dandelion invasions are currently occurring in many other alpine mountain areas, including Mt. Denali in Alaska, and on mountains in Chile, France, and Japan. Both genetic and field studies at these locations have revealed dandelion traits that make them such successful alpine invaders.

Sun-AM1-B-4

The History, Mission, and Evolution of the Cambridge Entomological Club

Scott Smyers (Cambridge Entomological Club, Cambridge, MA)

Abstract - The Cambridge Entomological Club was founded in 1874 and is the third oldest entomological society in North America**.** The Club published *Psyche* from 1874 to1995, which remains an entomological journal published online by an international publisher. The Club has hosted field outings around New England, co-hosted outings with other regional entomological societies, participated in public outreach, and has provided more than 1200 lectures at Harvard University. I will discuss how the Club has evolved over the years, how to encourage existing members to volunteer for specific projects, and how to attract new members.

Sat-PM2-C-3

Species' Forest Model for the Return of the Natural Landscape

Richard H. Stafursky (Species Forest, Inc., Conway, MA)

Abstract - The Species' Forest natural landscape research model developed by Species Forest, Inc., was begun in 2001 and is located on a 32.4-ha (80-ac) former dairy farm in Conway, MA. This model demonstrates how culturally managed land can revert to the sole control of dynamic natural forces and processes, first by identifying aspects of the cultural landscape, followed by removal of these cultural elements and then adhering to measures for the protection in perpetuity of this natural landscape. I propose that: (1) the cultural landscape always harms the natural landscape, yet the natural landscape never harms the cultural landscape; (2) any acreage within the Great Northeastern Broadleaf Forest of New England can be returned to a natural state; and (3) all the other native plants, animals, fungi and soil microbes must take priority for the return of a species' forest. A species' forest is of, by, and for all the other native species.

Sat-PM1-C-3

Removal of *Euonymus alatus* Results in Increased Species Richness in Eastern Floodplain Forest, USA

Amber Stearns (Westfield State University, Westfield, MA) and Dr. Lauren DiCarlo (Westfield State University, Westfield, MA)

Abstract - *Euonymus alatus* (Winged Burning Bush) is an invasive plant species spreading along the East Coast of the US for which research on successful removal is lacking. To combat this invasion and learn more about its impact on the surrounding ecosystem, we began a long-term restoration project to determine the best methods to control the species within a floodplain forest located along the Westfield River in Westfield, MA. Our questions were twofold: (1) which removal treatment, root removal or cutting, best controls *E. alatus*? And (2) how do different removal techniques of *E. alatus* impact native species establishment? We hypothesized (1) that root removal would best control *E. alatus*. And (2) that native species establishment would increase as a result from root removal and cutting techniques. Within 1 year of the treatments, we counted 6725 newly established plants and identified 41 different plant species. We found significant differences in newly established species richness and community composition, in addition to a decrease in *E. alatus* presence between removal plots and control plots. These results suggest that cutting and root removal can be effective control techniques in sensitive areas.

Sat-AM2-C-3

Loss of Moisture from the Lack of a Snowpack Increases Winter Frond Damage in *Dryopteris intermedia*

Jack T. Tessier (SUNY Delhi, Delhi, NY)

Abstract - Climate change is leading to a decrease in the presence of a consistent snowpack in the northeastern United States. Because the snowpack acts as an insulating layer between the air and soil, many species are affected by its loss. The wintergreen fern *Dryopteris intermedia* (Common Wood Fern) experiences frost damage and reduced photosynthesis when not protected by a snowpack. The question addressed in this study is if moisture in the litter layer is affected by a decrease in the snowpack and how a loss of moisture will affect overwintering fronds of *Dryopteris intermedia*. In this study, I established 20 replicates of 3 treatments, each involving a 1-m^2 area around 1 plant. The control had the snowpack left intact, the snow-removal treatment had snow removed within 24 hours of the end of each storm for the first and last 4 weeks of winter, and the snow removal with barrier matched the snow removal treatment but with a moisture barrier of white landscaping cloth over the plant. The latter 2 treatments had less snow and lower temperature than the control treatment. Litter moisture was highest in the control and lowest in the snow-removal treatment. Frond moisture was lower and frond damage was higher in the snow-removal treatment than in the other 2 treatments. Frond damage was more closely correlated with both frond and litter moisture than with litter temperature. These results suggest that the loss of moisture can be as important as the lack of thermal insulation to damage experienced by *Dryopteris intermedia* when a snowpack is not present in winter.

Sun-AM1-A-1

Survival of Gray and Black Eastern Gray Squirrels translocated across an Urbanization Gradient

John P. Vanek (Hobart and William Smith Colleges, Geneva, NY), James P. Gibbs (SUNY-ESF, Syracuse, NY), and Bradley J. Cosentino (Hobart and William Smith Colleges, Geneva, NY)

Abstract - *Sciurus carolinensis* (Eastern Gray Squirrel) is one of the most common and well-known urban mammals in North America. In the northeastern United States, Eastern Gray Squirrels exhibit 2 color morphs, gray and melanic (black). Melanics were the prevailing color morph in northeastern forests prior to the 1800s and subsequent land-use changes, but today melanics are only common in urban areas. Previous work suggests that melanic squirrels are less cryptic than the gray morph in today's northeastern forests and may have fitness advantage in urban areas where predation pressure is relaxed. To test the hypothesis of differential fitness across the urbanization gradient, we used radio-telemetry to estimate survival rates of each color morph. Because melanics are rare in rural forests, we captured squirrels of both morphs in urban areas and translocated them to urban (n = 28) and rural areas (n = 31). Using the Kaplan–Meier procedure with a staggered entry design and right-censoring, we found daily survival for rural melanics was lower than that of rural grays (P = 0.02), but found no difference between the morphs at the urban release site (P = 0.12). Low rates of carcass recovery precluded a formal analysis of cause-specific mortality between release sites. Our preliminary results suggest that melanic squirrels have a fitness disadvantage in rural areas. Future work will include an additional cohort of tracked squirrels, estimation of attack rates on model squirrels, and integration of survival and genetic data.

Sat-PM1-B-5

Beneficials React to Wildflower Plantings, But Not Always as Predicted

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

Abstract - As described by other presentations in this session, we established trice-replicated sets of habitat plots at the Hudson Valley Farm Hub in Hurley, NY, in 2017. Each set included 1 plot planted with a wildflower-rich seed mix, another planted with a grass-rich seed mix, and a third left as a fallow control. A hay control was later added. We have followed the evolution of the above-ground macroinvertebrate communities since establishment using a suite of sampling techniques, including pit trapping, malaise trapping, and sweep netting. Analyses of the results show significant treatment effects on the beneficial insect community, with bees and perhaps hover flies being more common in the wildflower-rich plots. However, ground beetles, spiders, parasitoid wasps, and lady beetles were generally either less common in the wildflower-seeded plot or showed no significant treatment effect. By exploring correlations with flower abundances, floral functional groups, and the abundances of potential hosts or prey, we try explain some of these patterns. Camera-recorded visitations to freeze-killed *Spodoptera frugiperda* (Fall Armyworm) eggs indicated relatively little variation in visitations across the treatments. Pest abundances were also not consistent—Lepidoptera and *Lygus* spp. (tarnished plant bugs and close relatives) were most abundant in the wildflower-rich plots, but flea beetles, weevils, aphids, and leafhoppers were either more common in the other plots or showed no distinct pattern. Somewhat reflecting the diffuse nature of these results, harvests of unsprayed butternut squash and sweet corn planted adjacent to these plots showed no evidence that crops planted immediately adjacent to the wildflower-rich meadows had enhanced production. While the limitations of our experiment need to be acknowledged (only 1 farm, only 3 replicates), these results are consistent with the work of others who have shown that, in ecologically diverse landscapes like ours, the impacts of small additions of semi-wild habitats on farm production may be modest given the abundance of such habitat elsewhere on the farm.

Sat-PM1-A-4

Tales of a Flora Retold: Cranberry Bog 1994 vs 2019

Donna Vogler (SUNY Oneonta, Oneonta NY) and Krystal Piucci (Oneonta, NY)

Abstract - The Cranberry Bog of Greenwoods Conservancy (Burlington, Otsego County, NY) was surveyed in both 1994 and 2019 for birds, mammals, insects, and vascular plants. This presentation compares the 130 species of vascular flora noted by Taylor (1995) and a survey conducted by Vogler and Piucci (2020) that recorded 200 vascular plant species. While the majority (~80%) of the 1994 flora was rediscovered 25 years later, 2 orchid species were notably absent, and many taxonomic changes had to be updated for comparisons. Dozens of new species in 2019 were likely the result of different taxonomic expertise or survey intensity. For example, 8 graminoids typical of these habitats that had been absent in 1994 were noted in the more recent study. Other new species, including 3 species considered invasive, likely did establish at this site in the intervening 25 years. Other differences may be methodological in habitat delineations particularly in pre- and post-GPS worlds. In short, the vegetation of Cranberry Bog continues to reflect classic bog communities. The taxonomic challenges of this repeated bog habitat survey, however, highlights the concerns of any multi-year surveys such as are now being used as baselines for anthropogenic change.

Sun-AM1-A-4

Wood Turtle Detection Dogs: A Collaborative Approach to Training, Assessment, and Deployment

Lindsay Ware (Science Dogs of New England, Ellsworth, ME), Cheryl Frederick (Center for Wildlife Studies, South Freeport, ME), and Matthew Chatfield (University of Maine, Orono, ME)

Abstract - The use of conservation detection dogs has increased in recent years as an efficient and low-impact method of finding cryptic species. Finding *Glyptemys insculpta* (Wood Turtle) individuals for research is often difficult during their terrestrial phase due to a cryptic appearance and tendency to occupy heavily vegetated areas. A collaboration was formed to assess the feasibility of incorporating canine scent detection into an existing long-term Wood Turtle research project. A short trial season was conducted in 2019 with an experienced detection dog. The trial indicated that further training and use of a detection dog would likely increase the number of Wood Turtles found, thus increasing recapture rates and finding more unmarked individuals in a mark–recapture study. In 2020, a novice dog was incorporated into the project with the goal of (among other things) developing a detailed assessment and documentation protocol for training a dog adept at detecting Wood Turtles. At the conclusion of the documented field training program, the dog was successful in finding telemetered Wood Turtles whose locations were unknown to the human participants at the time of searching. During deployment in the 2021 season, the dog found both non-telemetered and telemetered turtles in unknown locations, thereby contributing data to a mark–recapture study. The assessment and training processes developed laid the groundwork for other ongoing collaborative projects between Science Dogs of New England and the Maine Wood Turtle Project.

Sun-PM2-B-2

Ontogenetic Niche Shifts Present Conservation Challenges for Rare Plants such as Houghton's Goldenrod, a Federally Listed Species and Great Lakes Endemic

Justine Weber (SUNY ESF, Syracuse, NY) and Donald J. Leopold (SUNY ESF, Syracuse, NY)

Abstract - Knowledge gaps in life histories of rare plants present substantial obstacles for applied conservation, especially if the species' ecology is complex or contains ontogenetic niche shifts. *Solidago houghtonii* (Houghton's Goldenrod) is a Great Lakes endemic that is often locally abundant but is limited to ~90 populations in a narrow region along the Niagara Escarpment in Michigan, New York, and southern Ontario. This species is federally listed as threatened, state listed as threatened in Michigan and endangered in New York, and is a species of concern in Canada. While Houghton's Goldenrod is generally uncommon, there may now be enough protected populations to meet the federal recovery criterion, and it may be appropriate to consider the species for delisting from federal protection. However, like many rare plant species, more data are needed regarding long-term trends within and across Houghton's Goldenrod populations. As part of a range-wide study on the species, we collected field and greenhouse data to evaluate its niche characteristics. Preliminary analyses of these data suggested differences between Houghton's Goldenrod's survival and regeneration niches. Here we present evidence of ontogenetic niche shifts in Houghton's Goldenrod using 2 methods: generalized linear mixed modeling and niche breadth estimation. These results have considerable implications for conservation decision-making and prioritization: incorporating ontogenetic niche shift data into management decisions will increase the success of applied conservation science for Houghton's Goldenrod and other rare plant species.

Sun-AM1-A-3

Detecting Tier 1 and Tier 2 Terrestrial Invasive Plants

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Abstract - The Northeast region of the US, and New York in particular, has faced many new invasive species introductions over time because of large and busy ports of entry, early and continued interest in horticulture, and the ease of traveling from large population centers, allowing invasive species to colonize new places. The best way to control invasive species is to prevent them from entering the state or region to begin with or control them while their populations are very small. This talk will cover how to monitor for new terrestrial plant species, with a focus on ones that could enter New York State soon, Tier 1, or have just begun to cause a problem, Tier 2, to increase awareness about them so action can be taken to eliminate them before they become established.

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