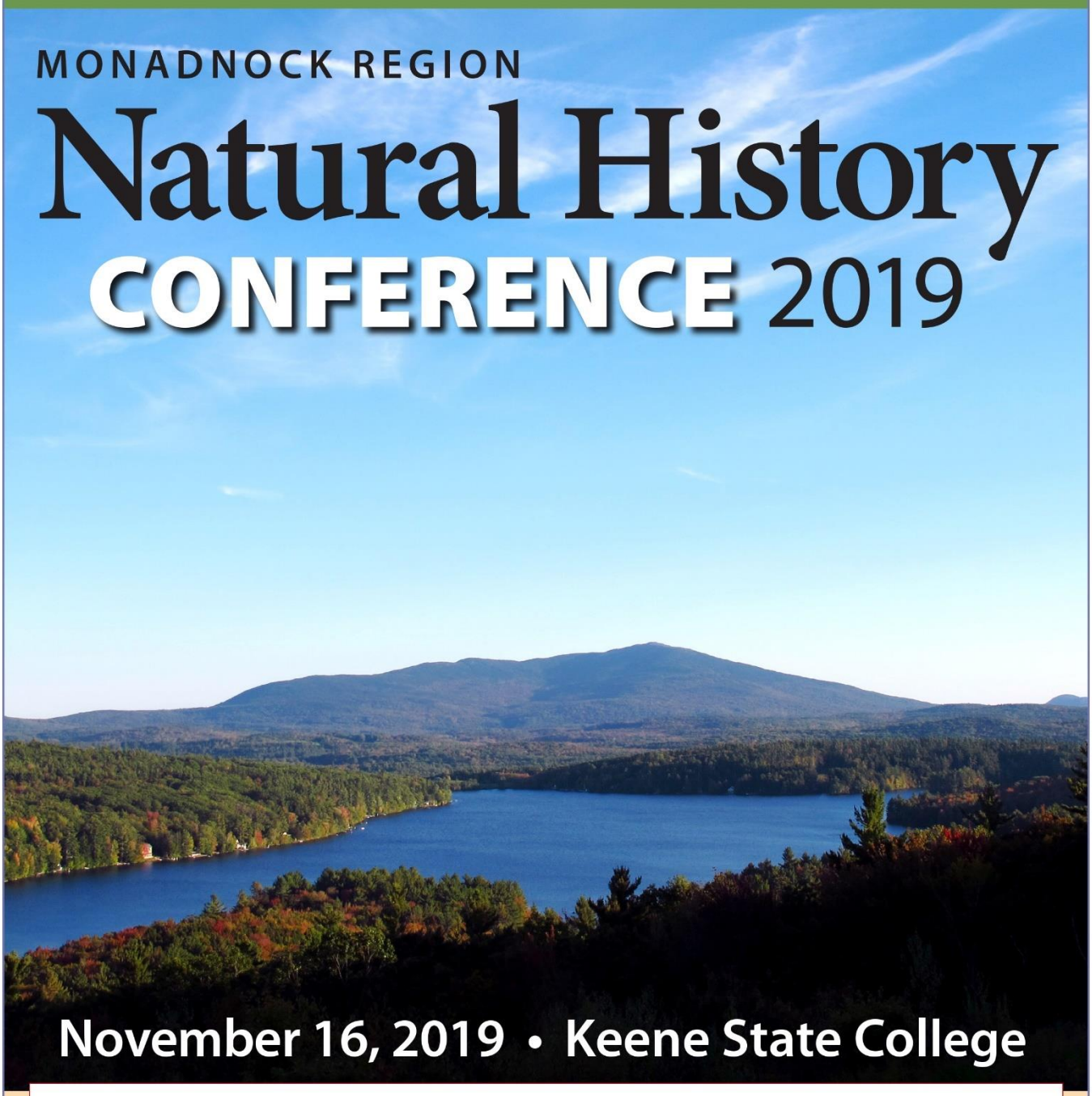
Discover conservation research in the Monadnock Region.

MONADNOCK REGION

Natural History CONFERENCE 2019



November 16, 2019 • Keene State College

SPONSORED BY

50 YEARS
HARRIS CENTER FOR CONSERVATION EDUCATION

Keene STATE COLLEGE

NH Extension

FranklinPierce UNIVERSITY

MERE
Monadnock Ecological Research and Education Project
Antioch University New England

KEYNOTE ADDRESS
At Home on Monadnock

In a region defined by a single mountain, Mount Monadnock holds the heart of many souls. Yet behind its peopled history is a natural history replete with crashing continents and island arcs, mountain ranges and *roches moutonees*, sabertooths and caribou, wolves and fire. In his keynote address, Dr. Rick Van de Poll will describe a few of the thousands of life forms that call Monadnock home, and relay the prospects for their survival in a changing world.

***Dr. Van de Poll** is the principal of Ecosystem Management Consultants (EMC) of Sandwich, NH. He is a certified wetland scientist, professional wildlife biologist, and practicing mycologist. He sits on three governor-appointed committees in New Hampshire, is on the Steering Committee of the New Hampshire Wildlife Coalition, and is President of the Northeastern Mycological Federation. Dr. Van de Poll has performed natural resource inventories on over 350,000 acres of land across 82 towns, including comprehensive study of the Horatio Colony Nature Preserve (Keene) and Otter Brook Farm (Peterborough and Greenfield).*

EVENT INFORMATION

Continuing education credits for attending this conference are available for foresters (4.0 SAF CFEs Category 1) and natural resource professionals (4.0 contact hours). For a certificate of attendance, please see Steve Roberge, UNH Extension Forester (steven.roberge@unh.edu).

WiFi is available to all conference attendees. To access it, select “KSC Guest” from the list of available networks and enter your email address when prompted.

Water fountains and water bottle refilling stations are located on the first floor of both the Science and Student Centers. To minimize waste, we will not be providing bottled water.

Gender-neutral bathrooms are located on the first floor of the Student Center (near the ATM) and opposite Science Center 134.

A private “mother’s room” (Science Center 128) is available for nursing mothers or others who need a quiet, private space. For access to this locked room, please text Gordon Leversee at (603) 852-8148.

Accessible bathrooms are available in both the Science and Student Centers, and both buildings have elevators and push-button-activated door controls. Microphones will be used for the keynote and all oral presentations. For more information or to request additional accommodations, please contact Misty Kennedy at (603) 801-2262.

MORNING SCHEDULE

8:30 – 9:00 a.m.	**Coffee & Registration** | Mabel Brown Room in the Student Center	
9:00 – 9:40 a.m.	**Welcome & Keynote** | Mabel Brown Room in the Student Center	
9:40 – 10:00 a.m.	**Break**	
	Science Center 101	**Science Center 126**
	Humans & Nature	**Forest Habitat Management**
10:00 – 10:20 a.m.	**Robert Goodby** Humans and Nature in the Monadnock Region: The First 12,000 Years	**Tom Brightman** Restoring Young Forest Species in Southwest New Hampshire - How You Can Play a Part in Supporting an Important Forest Ecosystem
10:20 – 10:40 a.m.	**John Harris** Retracing the History of Franklin Pierce University's Rindge Campus through Student-Generated Trail Signs	**Hana Kiewicz-Schlansker** To Fence or Not to Fence: Controlling Deer Browse in Regional Forests
10:40 – 11:00 a.m.	**April Claggett** Abbott Thayer's Monadnock: The Intersection of Natural History, Artistic Research, and World War	**Josh Megyesy** Working Lands for Wildlife - Northeast Turtles - Using State Conservation Plans to Guide Land Use Practices
11:00 – 11:15 a.m.	**Break**	
11:15 – 11:45 a.m.	**Poster Presentations** | Science Center Lobby	
11:45 a.m. – 1:00 p.m.	**Lunch** | on your own	

AFTERNOON SCHEDULE

	Science Center 101	Science Center 126
	Mount Monadnock	**Ecological Inventory**
1:00 –1:20 p.m.	**Charles Kerwin** The Geology of Monadnock	**Rick Van de Poll** 15 Years of Research Observations at Otter Brook Farm
1:20 – 1:40 p.m.	**Karen Saunders** 8000 Years of Vegetation Dynamics at Thoreau's Bog, Mount Monadnock	**Jeff Littleton** Ecological Stewardship for Wildlife Diversity
1:40 – 2:00 p.m.	**Peter Palmiotto** Monadnock's Resilient Forests: Impact and Recovery from the 2008 Ice Storm	**Steven Lamonde and Erin Glocke** Glover's Ledge Bio-Inventory: How a Biodiversity Survey on a Small Property Transformed into a Regional Call for Action
2:00 – 2:20 p.m.	**Emily Drury** Biome as Barometer: Mountain as Microcosmos	**Melissa Doperalski** What Do You See? Citizen Science Opportunities in Wildlife Distribution Mapping and Studies
2:20 – 2:40 p.m.	**Coffee Break**	
	Wildlife	**Water**
2:40 – 3:00 p.m.	**Phil Brown** Ten-Year Trends in Migratory Raptor Numbers at the Pack Monadnock Raptor Observatory, Peterborough, NH	**Catherine Koning** Impact of Phosphorus Inputs on Wetlands and Water Quality in the Pearly Pond Watershed, Rindge, NH
3:00 – 3:20 p.m.	**Chris Volonte** Fall Migration of Northern Saw-whet Owls in Southwestern New Hampshire	**Barbara Skuly** Water Quality Monitoring on the Ashuelot River
3:20 – 3:40 p.m.	**Scott Reynolds** The Value of Long-Term Research on Common Species: Lessons Learned from the Little Brown Bat	**Tom Shevenell** Norway Pond Sediments: A Historical Resource in Understanding the Pond's Evolving Ecosystem
3:40 – 4:00 p.m.	**Eric Aldrich and Dallas Huggins** On the Trail of Bobcats: Tracking and Camera Traps to Study *Lynx Rufus*	**Denise Burchsted** Rivers Without Humans: What Our Rivers Look Like Without Direct Modern Human Impacts
4:00 – 4:30 p.m.	**Networking Time** (optional) | Science Center Lobby	

ORAL PRESENTATION ABSTRACTS

Abstracts are listed in alphabetical order by the lead author's last name. Presenters are denoted with an asterisk (*).

On the Trail of Bobcats: Tracking and Camera Traps to Study *Lynx rufus*
Eric Aldrich (The Nature Conservancy) and Dallas Huggins**

Abstract: Field surveys are an invaluable part of wildlife research, from supplying data and research samples to promoting conservation, informing and engaging the community, and better understanding population dynamics and wildlife behavior. Two New Hampshire naturalists have led four years of field research on local bobcat (*Lynx rufus*) populations in Hancock, NH, in collaboration with the Harris Center for Conservation Education. Expanding on studies by UNH and the New Hampshire Fish and Game Department on bobcat population dynamics, their research focuses on a part of southwestern New Hampshire that has a long legacy of land protection and excellent bobcat habitat. Field investigations coupled with GPS tracking and camera trapping assist in identifying core areas, travel corridors, denning sites, and behavioral aspects of familial and individual bobcats. Continued monitoring can improve understanding of bobcat behavior and habitat use, which can in turn advance land protection goals and improve public understanding of this top predator's role in the ecosystem. As an exemplary charismatic megafauna and seldom-seen top predator, bobcats hold a coveted place for capturing the public's interest in wildlife and habitat. The more we learn and share the bobcat's story, the more we can gain the public's enthusiasm and understanding of wildlife and safeguarding habitat for long-term resiliency.

Session: Wildlife

Restoring Young Forest Species in Southwest New Hampshire – How You Can Play a Part in Supporting an Important Forest Ecosystem
Tom Brightman (New Hampshire Fish and Game)*

Abstract: This talk will include a brief history of young forests in southwest New Hampshire, and focus on the types of species that benefit from young forest and shrubland habitats — along with the stewardship actions needed, and the tools available, for landowners to provide this type of habitat on their property. Young forest and shrubland plant community structure will also be discussed, along with a variety of game and non-game mammals, birds, reptiles, and amphibians.

Session: Forest Habitat Management

Ten-Year Trends in Migratory Raptor Numbers at the Pack Monadnock Raptor Observatory, Peterborough, NH

Phil Brown (Harris Center for Conservation Education / New Hampshire Audubon)*

Abstract: Since its founding in 2005, the Pack Monadnock Raptor Observatory in Peterborough, NH has revealed some interesting trends about migratory populations of diurnal birds of prey (raptors). This research and education project staffed by the Harris Center for Conservation Education and founding partner New Hampshire Audubon is now in its 15th year and has yielded a regionally-significant dataset. Through the Raptor Population Index (RPI), a partnership between four leading hawk watch and migration research organizations – the Hawk Migration Association of North America (HMANA), Hawk Mountain Sanctuary (HMS), HawkWatch International (HWI), and Bird Studies Canada (BSC) – raptor migration data from select hawk watch locations in the western hemisphere are periodically analyzed in order to produce population estimates of raptor species.

The most recent analysis, completed in 2016, utilized hawk watch data collected over a ten-year period between 2006 and 2015. For the first time, Pack Monadnock's dataset was chosen for inclusion due its long duration (10+ years) and consistent methodologies for monitoring migratory raptors. It is the only New Hampshire hawk watch site that has met these criteria and one of only 63 in the western hemisphere. Pack Monadnock's data fills a critical geographic gap in northern New England, which is underrepresented by long-term hawk watch sites, thus providing information about raptor migration across the region and identifying needs for further research.

The 2016 RPI analysis revealed notable trends for many of the fifteen species of migratory raptors that regularly pass through our region. Among these are expected trends consistent with those observed across the Eastern Flyway, such as a continued increase in Bald Eagle and Turkey Vulture numbers, as well as a decrease in American Kestrel, Sharp-shinned Hawk, and Cooper's Hawk. However, other trends were less expected or resulted in a newer understanding of regional migratory raptor populations, such as a slight increase in Northern Harrier and Merlin, a strong increase in Peregrine Falcon, and a decrease in Red-tailed Hawk and Osprey. Reasons for some of these changes are less understood and perhaps quite varied, but the analysis highlights a need for further research on many of these species and a greater need for further raptor migration monitoring in northern New England.

Session: Wildlife

Rivers Without Humans: What Our Rivers Look Like Without Direct Modern Human Impacts

Denise Burchsted (Keene State College)*

Abstract: What should a river look like? This fundamental question lies at the heart of our river management practices. However, it is remarkably challenging to answer this question clearly. To address this fundamental question indirectly, I will show data that addresses the "baseline condition" of rivers in the Monadnock Region, which would be our best approximation of our rivers prior to modern human impacts.

In this talk, I will present data from a physical survey of rivers on protected lands in Hancock and Surry, NH. I will interpret these data in the context of recent maps, showing land use change, and written historical records. My findings are that, most broadly, our valley bottoms were far wetter prior to European colonization, with innumerable ponds and side river channels. The presence of natural dams, which are leaky dams that slow water flow – such as beaver dams and log jams – create these ponds by retaining water, and they also create side river channels by forcing water out

of the main riverbed. These networks of leaky dams, ponds, and side channels are largely absent from our modern landscape. This absence has serious implications for our aquatic ecosystems, which developed in the presence of these features. Only an extensive management program of "cleaning" rivers, which continues to this day, can maintain the river networks we are currently accustomed to. This talk concludes with broad questions regarding implications of these findings for river management.

Session: Water

Abbott Thayer's Monadnock: The Intersection of Natural History, Artistic Research, and World War
*April Claggett**

Abstract: The life and work of Abbott Thayer (1849-1921) — Dublin, NH resident, natural historian, and a leading American artist in his day — present an interdisciplinary case study of the role of nature as a "medium" in the fullest sense of the word. Convinced that his perceptual skills as an artist led him to solve problems that scientists could not, Thayer immersed himself in intense observation of Dublin's woods and made revelations with far-reaching implications that landed on the desks of Churchill, Roosevelt, and Darwin's colleague, Wallace. Both his scientific illustrations and his aestheticized landscapes of Monadnock — rarely taken together in analysis — are better reconciled when nature is understood as mediated by cognitive processes and broad cultural ideas, rather than as "natural."

Session: Humans & Nature

What do you See? Citizen Science Opportunities in Wildlife Distribution Mapping and Studies
Melissa Doperalski (New Hampshire Fish and Game)*

Abstract: Citizens have and can continue to make huge contributions to what we know about the species in our state. Much of what we have learned has come from citizens, consultants, and partners sharing information they have on wildlife sightings, vernal pool surveys, and research and study findings. In this talk, we will discuss the evolution of the New Hampshire Reptile and Amphibian Reporting Program and how you can contribute, as well as other citizen science opportunities that you can get involved in with New Hampshire Fish and Game.

Session: Ecological Inventory

Biome as Barometer: Mountain as Microcosmos
Emily Drury (MacDowell Colony)*

Abstract: This research is concerned with plants, and reassembling plant communities, as registering, indexing, and making visible incremental climate change that is otherwise "unseeable" and therefore "unknowable." It focuses on Mount Monadnock as a site with a richly entangled ecological and cultural history, and as a unique site for observation, description, and the production of narrative during this critical contemporary moment. In this talk, I will present drawings that illustrate these ideas at a variety of scales, using representational tools from the discipline of landscape architecture and accompanying text.

Session: Mount Monadnock

Humans and Nature in the Monadnock Region: The First 12,000 Years
Robert Goodby (Franklin Pierce University) and Tonya Largy (Harvard University)*

Abstract: Native Americans have lived in the Monadnock Region for over 12,000 years. This talk uses archaeological data to reveal their use of the landscape and natural resources, describing settlement patterns, seasonal movements, technology, site settings, and responses to climate change. Archaeological evidence from sites in Swanzey, Peterborough, Hinsdale, and Keene reflect their use of a broad range of terrestrial and aquatic animals, ranging from caribou at the end of the Pleistocene to anadromous fish and timber rattlesnakes during the Late Archaic and Woodland periods, c. 5,000-700 years before present. Site settings show that major rivers, tributary streams, and wetlands were all integral to Native American economies. Archaeological data also contribute to an understanding of long-term patterns and changes in species ranges that has potential utility for modern conservation and wildlife management.

Session: Humans & Nature

Retracing the Land Use History of Franklin Pierce University's Rindge Campus through Student-Generated Trail Signs
John Harris (Franklin Pierce University)*

Abstract: For two decades, students in the Environmental Science program at Franklin Pierce University (FPU) have been documenting the land use history of their 1,000-acre campus in Rindge, NH. Relying on ecologist Tom Wessels' remarkable field guide *Reading the Forested Landscape*, the students have examined landscape clues in order to create trail signs highlighting key features of the five working farms recorded in the 1850 Rindge agricultural census. Utilizing selected student signs, this presentation will trace the evolution of the site's land use history from industry and agriculture to summer estate and academic enterprise. Highlights in this transition include one of the town's earliest home sites, the propagation of Merino sheep, the production of local woodenware, the abandonment of crop land and purchase by an eccentric gentleman farmer, evidence of the Hurricane of 1938 as well as a freak tornado in 1928, the installation of a Boy Scout camp and summer resort, and the discovery of a child's shoe in the southeast corner of the oldest building on campus. The presentation will rely on slides designed and written by FPU students.

Session: Humans & Nature

The Geology of Monadnock
Charles Kerwin (Keene State College)*

Abstract: The summit of Grand Monadnock is 3,165 feet above sea level and is considered to be the most climbed mountain in the world. It has had a long history that began pre-Pangea as volcanic island arcs were shedding sediments into an ocean basin that was closed during the collision of continents that created a supercontinent. Those sediments were buried, cooked, and deformed and later exposed by weathering and erosion processes that culminated with a prolonged ice age. The results are what can be seen today and it is an interesting tale.

Session: Mount Monadnock

To Fence or Not to Fence: Controlling Deer Browse in Regional Forests

Hana Kiewicz-Schlansker[*1]*; Rick Brackett*[2]*; Merrilee Frable*[1]*; Ashley Dawson*[1]*; and Peter Palmiotto*[1]

[1]*Antioch University New England* [2]*Monadnock Conservancy*

Abstract: White-tailed deer (*Odocoileus virginianus*) have been called keystone species and ecosystem engineers, as overabundant populations have the potential to shift species composition in forest ecosystems. With a lack of natural predation and decreased active hunting by humans, population density of white-tailed deer has increased dramatically in places across the Northeast, including the Monadnock Region. Therefore, maintaining the forest composition of desired species presents challenges to forest managers. Is fencing the answer? Do deer really have an impact on plant species composition in Monadnock Region forests? Research at the Maynard Forest, a 91.4-acre property in Gilsum, NH that is owned and managed by the Monadnock Conservancy, provides some answers.

The research on the Maynard Forest was established in 2014 to examine and compare the effect of deer exclosures and beech control treatments on forest regeneration and herbaceous plants. Research plots were established in six patch cuts 1 to 1.5 acres in size. Three of the six patch cuts were randomly selected along with an adjacent forested area of similar size and enclosed by 8-foot high fencing to exclude deer. Within these areas, three treatments were applied: control (no change), a one-time foliar application of chemical herbicides, and a one-time mechanical cutting using loppers and brush saws. Regeneration was sampled three and five years after treatments.

Our results indicate that fencing is an incredibly effective tool that allows rapid growth of regenerating woody species where impacts from deer browse would otherwise inhibit growth. Both mechanical and chemical treatments were effective at reducing average height and abundance of American beech, thereby allowing regeneration of pioneer species. The herbicide treatment seemed to have a suppression effect on height, density, and species richness. Little to no negative impacts of deer browsing were found on herbaceous species. Study design and implementation was a collaboration between the Monadnock Conservancy, Antioch University New England, and UNH Cooperative Extension, and was funded by a NRCS Conservation Innovation grant.

Session: Forest Habitat Management

Impact of Phosphorus Inputs on Wetlands and Water Quality in the Pearly Pond Watershed, Rindge, NH

Catherine Koning[*1] *and Shannon Stroble*[1]

[1]*Franklin Pierce University*

Abstract: Water quality in Pearly Pond (Rindge, NH) has been monitored since 1992, confirming that the lake suffers from excessive phosphorus, causing it to become eutrophic. In some years, this has led to a bloom of blue-green algae, which can be unhealthy and can lead to a decrease in dissolved oxygen. The primary driver of the shift to eutrophic status appears to have been the release of phosphorus from the Franklin Pierce University (FPU) wastewater treatment facility (WWTF) into a complex of wetlands north of the lake from 1967-2008. However, the in-pond concentrations of phosphorus continue to be high even after the treated wastewater was diverted into a system of rapid infiltration beds. Watershed model results and subsequent water quality monitoring in lake tributaries show that the wetlands north of the lake are still contributing phosphorus, but it is unclear whether this represents residual phosphorus loads from the soils in the wetland, or whether it is ongoing inputs from rapid infiltration bed outflow. One other tributary shows

some concerning results which were not predicted by the model. Phosphorus inputs to the wetlands have had impacts on plant biodiversity, including the spread of the invasive species *Phragmites australis*.

Session: Water

Glover's Ledge Bio-Inventory: How a Biodiversity Survey on a Small Property Transformed into a Regional Call for Action

Steven Lamonde[1]; Erin Glocke*[1]; and Michael Akresh*[1]
[1]*Antioch University New England*

Abstract: The Monadnock Region's forest-dominant habitat matrix and mixed land-use history are exhibited at Antioch University New England's 80-acre Glover's Ledge property (Langdon, NH), making this property a suitable representation of regional species diversity and an ideal spot for studying the area's natural and introduced species diversity. Detection of spatial and temporal ecological changes relies critically upon species occurrence datasets. To establish a biodiversity dataset of species occurrence for Glover's Ledge, we conducted a formal, mixed-methods biological inventory. Occurrence data were primarily collected during three intensive BioBlitz events. Additionally, species lists from student-generated reports and casual iNaturalist and eBird observations by visitors complemented our BioBlitz efforts. To identify regionally-unique occurrences from our compiled species list for Glover's Ledge, we compared our records with data from iNaturalist and the Global Biodiversity Information Facility. Over the past five years, Antioch students conducted nine studies and three BioBlitzes, documenting over 2,000 observations and 650 species. Of these species, at least 31 are first records for the Monadnock Region and one is a first record for New Hampshire, to the best of our knowledge. Combined, these efforts display a detailed picture of the property's biodiversity and provide critical baseline data for future forest management and monitoring. Regionally, our data comparison exposed significant gaps in the documented biodiversity of the overall Monadnock Region. Given that habitats at Glover's Ledge are representative of habitats elsewhere in the region, we believe that many new species documented at Glover's Ledge also likely occur elsewhere within the region. Our study underlines an ongoing need to collect and share biodiversity data across the Monadnock Region, which will help researchers better monitor range shifts in climate migrants, the spread of invasive species, and changes in populations over time.

Session: Ecological Inventory

Ecological Stewardship for Wildlife Diversity

Jeff Littleton (Moosewood Ecological LLC)*

Abstract: Ecological stewardship is the careful and responsible management of the land and its natural resources. This type of land management for wildlife diversity has been a key concern for many private landowners, land trusts, and businesses, as well as federal, state, and municipal government bodies.

Amy Bodwell and Carol Saunders have been actively managing their Woodland Views property in Roxbury, NH since 2009. The 235-acre property includes forests, pollinator meadows, shrublands, and shoreland on a rural pond. In 2013, Amy and Carol hired Jeff Littleton, principal ecologist of Moosewood Ecological LLC, to study their property. The goal was to develop a stewardship plan to promote wildlife diversity and ecological integrity, with a special focus on species of conservation concern. This effort included assistance from many Antioch University New England interns and

students, Keene High School students, and various natural resource professionals in forestry, wildlife ecology, and entomology.

This talk will touch upon the various stewardship activities at the Woodland Views property, which have been informed by a long-term ecological monitoring program of wildlife and plants since 2013. Results of the initial ecological inventory and continued monitoring have revealed over 30 species of conservation concern, including a variety of birds, mammals, and pollinators. This talk would appeal to a multifaceted group of landowners that are interested in managing for wildlife diversity and ecological integrity in a changing climate. I will also include some potential funding mechanisms that we have employed at Woodland Views over the past ten years, as well as introduce key personnel at various state agencies that can assist landowners with ecological stewardship planning and management.

Session: Ecological Inventory

Working Lands for Wildlife – Northeast Turtles – Using State Conservation Plans to Guide Land Use Practices

Josh Megyesy (New Hampshire Fish and Game)*

Abstract: Working Lands for Wildlife (WLFW) Northeast Turtles, led by the USDA's Natural Resources Conservation Service (NRCS), is a model of partnership between the USFWS, states, and conservation groups that incentivizes voluntary landowner participation to help sustain populations of wood, spotted, and Blanding's turtles. Like the New England Cottontail WLFW initiative, it relies on voluntary management and/or land protection by private landowners in key areas. For turtle conservation, protecting parcels within intact landscapes using Best Management Practices (BMPs) and habitat management are the primary goals. The New Hampshire Fish and Game Department's (NHFG) Nongame and Endangered Wildlife Program has provided on-the-ground assistance in priority and focal core areas, as well as BMPs that have been developed through regional Competitive State Wildlife Grants. The challenges to making rapid progress include the time commitment for site visits and planning, aligning the goals of landowners, NRCS, and NHFG, and how to share and use sensitive data. In New Hampshire, the two agencies have identified ways to best communicate, share information, and use existing NRCS programs such as the WREP (Wetland Reserve Easement Program) and EQIP (Environmental Quality Incentives Program) to benefit turtles. NHFG and three state land trusts were awarded a grant from the National Fish and Wildlife Foundation to directly fund assistance and land acquisition through the Working Lands for Wildlife partnership. The products and results from these efforts will be discussed, as well as lessons learned and options for overcoming data sensitivity issues.

Session: Forest Habitat Management

Monadnock's Resilient Forests: Impact and Recovery from the 2008 Ice Storm

Peter Palmiotto[1]; Timbo Maddalena-Lucey[1]; Amber Boland[1]; Hana Kiewicz-Schlansker[1]; Carolyn Susa[1]; and David Mallard[1]*
[1]Antioch University New England

Abstract: The impact of climate change on the forests of the Monadnock Region is of great concern. The question we ask is: how resilient are our regional forests to the potential increase in frequency and intensity of ice storms which could result from a wetter, warmer climate? New England's forests have a history of ice storms, such as the severe ice storm of 1998 that left a

mosaic of patchy damage across the region. Summarily, the 2008 ice storm on Mount Monadnock varied across the mountain. In 2017, to assess the impact from the 2008 ice storm, we resampled 100 research plots measured after the storm in 2009. Plots were located at 100' intervals from 1800' to 2700' on all aspects of the mountain. We measured tree diameters and crown damage as well as sapling densities by species and the volume of coarse woody material.

The ice storm's greatest impact was located on the eastern and northern aspects of the mountain, with greater impact between 2000' and 2300' in elevation. Although not a forest-replacing disturbance, damage occurred to 35% of the individual trees, with crown damage generally less than 25%. We measured the most severe damage at 1900' and 2400', with 16% of the trees suffering greater than 50% crown loss. Direct mortality due the storm was 6.8%; nine years later, 9.7% of the trees damaged in the storm had died.

The result of this mortality was an in increase in dead biomass and subsequent decrease in overall live biomass as measured by forest basal area, although individual tree recovery as measured by diameter and basal area growth was not significantly affected. Sapling density increased 16.8% over the nine years since the storm. Overall, the impact of what appeared to be a significant icing event on Monadnock in 2008 was minimal. Although the forest experienced substantial crown damage due to the storm, with species such as red maple and American beech apparently not very resistant to damage, we conclude that overall the forest is quite resilient to ice damage.

Session: Mount Monadnock

The Value of Long-Term Research on Common Species: Lessons Learned From the Little Brown Bat (*Myotis lucifugus*)

Scott Reynolds (St. Paul's School)*

Abstract: Wildlife researchers generally focus on short-term studies that will answer questions immediately relevant to the conservation and recovery of threatened or endangered species. This triage-based approach to funding generally does not support the long-term studies that provide the essential demographic information needed to manage the recovery of threatened species. A long-term mark-recapture project in Peterborough, NH highlights the value of this approach. Over a 16-year period (1993-2009), I worked with a maternity colony of little brown bats (*Myotis lucifugus*) each summer, capturing over 7,500 bats and banding 4,630 individuals. Over this same time period, I and several colleagues collected winter population data at known hibernacula throughout New England. When an emergent infectious disease (White-nose Syndrome, or WNS) appeared in 2006, common species such as the little brown bat were suddenly not so common. Populations throughout New England and New York saw dramatic declines in just a few years, and wildlife agencies were scrambling to develop recovery plans for species that just two years prior were considered ubiquitous and beyond risk. The data collected in Peterborough have helped develop models for the recovery of this species, as well as congenerics such as the Northern myotis and the Indiana bat. Although the original focus of this study was to develop an accurate life history model for a common species, many ancillary products have been generated from these data, including modeling the potential impact of climate change on temperate species. These projects suggest that similar studies would be valuable for dealing with current and future issues with regards to bats and other wildlife species.

Session: Wildlife

8000 Years of Vegetation Dynamics at "Thoreau's Bog," Mount Monadnock

Karen Saunders[*1]; Hana Kiewicz-Schlansker[1]; James Jordan[1]; and Peter Palmiotto[1]*
[1]Antioch University New England

Abstract: Analysis of modern vegetation and of a sediment core from Thoreau's Bog, located at an elevation of approximately 823 m on Mount Monadnock in southwestern New Hampshire, records bog development and vegetation dynamics under changing climate and disturbance conditions during the past 8,000 years.

Stratified random sampling of dwarf shrub/grass, shrub, and forest zones was done in July 2015. Ten plots were randomly placed within each zone, resulting in 30 total plots around the bog. A 2.5 m core was extracted in April of 2015. Two radiocarbon dates were obtained: 2410 +/- 30 BP (Cal BP 2685 – 2350) at 49 cm from the extracted core's surface, and 7420 +/- 30 BP (Cal BP 8335 – 8180) at 247 cm below the surface. Plant macrofossils, charcoal, and total organic matter content were used as proxies for bog development, peat and organic matter deposition, productivity, water availability, and fire.

Thoreau's Bog is presently characterized by thickets of mountain holly (*Ilex mucronate*) and dense tussocks of tall cottongrass (*Eriophorum angustifolium*) growing on a sphagnum moss substrate, with open water in parts of the bog. The forest surrounding Thoreau's Bog is dominated by red spruce (*Picea rubens*), with paper birch (*Betula papyrifera*) and American mountain ash (*Sorbus americana*) each comprising less than ten percent of the overstory.

Increasing organic matter and gradual changes in macrofossil assemblages in the lower, and older, section of the core indicate a shallow pond environment with a gradually encroaching sphagnum mat. A rapid mid-core shift in the relative abundance of macrofossils indicates a decrease in open water and a change to a sphagnum-dominated community. This is followed by a decrease in sphagnum and an increase in woody vegetation and charcoal, indicating a multi-century drier spell with repeated fires in the vicinity of Thoreau's Bog approximately 3,000 to 4,000 years ago, followed by gradual shifts in vegetation bringing the bog to its present state. Insight into vegetation dynamics and the resilience of Thoreau's Bog during the past 8,000 years will be of use in restoration of other Monadnock wetlands that have been influenced or degraded by human activity.

Session: Mount Monadnock

Norway Pond Sediments: A Historical Resource in Understanding the Pond's Evolving Ecosystem

Thomas Shevenell (Norway Pond Commission) and Lisa Doner (Plymouth State University)*

Abstract: Environmental trends in Norway Pond (Hancock, NH) were assessed over the historical time scale (a 500-year period) using sediment cored from the deepest area of the pond. These trends put current ecological conditions of the pond into perspective and provide insight into how the ecosystem may evolve in the future. This kind of scientific basis supports decision-making, application of best management practices, and implementation of improvements, where practical, in response to water quality or deleterious uses of the pond and its watershed.

Sediments are an ideal archive to document watershed events and longer-term processes, both natural and human-related. Our 50-cm core was divided into 0.5-cm segments for analyses. Major, minor, and trace elements analyses were used in conjunction with other physical analyses to interpret the pond environment over the historical period. Pb210-dating created a time scale with depth in the core. This allowed comparison of geochemical signatures with historical events.

Norway Pond is a shallow (5.5 m) 50-acre mesotrophic pond in the midst of natural succession towards a eutrophic (nutrient-rich) state. Its ultimate condition is expected to be a sediment-filled wetland. Based on Pb210 accumulation data, organic and inorganic matter are infilling the pond at a rate of 4mm/year. At this rate, its demise as an open body of water is estimated to occur in 1,500 years.

The rate of pond succession has increased since the settlement of Hancock, evidenced by increases in sedimentation rate, nutrient loading (phosphorous and nitrogen), and deposition of aquatic-derived organic matter. Human impacts are observable in the sediment record, including effects of regional forest clearing and sheep farming (1764-1840); the construction and operation of the railroad through Hancock (1878-1934); and deposition of trace elements (e.g., lead) transported in the atmosphere from outside the region (circa 1890). The Hurricane of 1938 is identified in chemical indicators of soil leaching (Al, Fe, and Ca) and increased inputs of terrestrial carbon, possibly because the pond was used as a wet storage site for logs over a subsequent 10-year period.

Future research will focus on how the pond ecology evolved since the glacier left this area about 15,000 years ago, to learn how changes in climate may have influenced the natural succession of the pond prior to the arrival of European settlers and the commencement of the Industrial Revolution.

Session: Water

Water Quality Monitoring on the Ashuelot River
Barbara Skuly (Ashuelot River Local Advisory Committee)*

Abstract: The Ashuelot River travels 64 miles from its headwaters in Washington, NH to its confluence with the Connecticut River in Hinsdale, NH. Since the passage of the Clean Water Act in 1972, the Ashuelot River has been transformed from a river running many colors to a favorite location for recreation and nature study and a river supporting a healthy aquatic biota. Water quality monitoring is the responsibility of the New Hampshire Department of Environmental Services, yet 40% of New Hampshire river water quality assessments are performed through the Volunteer River Assessment Program (VRAP). Local citizens have collected data on the Ashuelot River since 2000. In this talk, we will take a look at the trends in physical and chemical parameters gathered by citizen scientists on the Ashuelot River, and what the data imply about the health of the river.

Session: Water

15 Years of Research Observations at Otter Brook Farm
Rick Van de Poll (Ecosystem Management Consultants)*

Abstract: Otter Brook Farm is a 1850-acre private conservation area in Peterborough and Greenfield, NH. Since 2004, the landowners have retained the services of Ecosystem Management Consultants to conduct research and education activities at the Farm and to assist with the conservation of their land. After a two-year survey of the natural resources of the property, an eight-year environmental education program with Harris Center for Conservation Education staff was completed in the ConVal School system. In addition, 20 long-term monitoring plots were established and sampled by the principal investigator with assistance from undergraduate and graduate students from UNH, Plymouth State, and Antioch University New England. Citizen (student) scientists conducted investigations and monitored water quality, soil pH, vegetation, vernal pools, terrestrial salamanders, mammal track transects, small mammal live traps, and fungi. With a healthy amount of direct supervision, the students benefited by learning critical research skills and the Farm benefited by increasing its research capacity. Datasets have been published and presented to UNH EPSCoR, New Hampshire Fish and Game, the New Hampshire Water Conference, the New Hampshire Environmental Educators Alliance, and as yearly reports submitted to the landowners. This short presentation will summarize the results of this 15-year effort and cover findings for each of the primary research projects at the Farm.

Session: Ecological Inventory

Fall Migration of Northern Saw-whet Owls in Southwestern New Hampshire
Chris Volonte (Antioch University New England / Kestrel Land Trust)*

Abstract*:* Non-breeding distributions of secretive and nocturnal species such as Northern Saw-whet Owls (*Aegolius acadicus*) have been largely unknown in New Hampshire, and yet identification of migratory and overwintering habitats is a fundamental management step for the conservation of this owl, a conifer-loving species that may be particularly vulnerable to climate change. To improve regional knowledge of saw-whet owls in New Hampshire, I trapped and banded owls at four locations in Cheshire County during the autumns of 2008, 2009, and 2010. My results showed consistent annual capture rates and a bell-shaped capture pattern, indicating that the populations of owls captured during my study were migrants, with peak passage through this region occurring from the second through the last week of October. My study also provided insights into factors determining this owl's migration routes, suggesting that routes are more strongly influenced by availability of forest cover than by landscape features.

Session: Wildlife

POSTER PRESENTATION ABSTRACTS

Abstracts are listed in alphabetical order by the lead author's last name. Presenters are denoted with an asterisk (*).

Assessment of a New Technology for Phosphorus Removal

Miles Fah[1]; Catherine Koning[1]; Shannon Stroble[1]; and Morris Jones[1]*
[1]*Franklin Pierce University*

Too much phosphorus can cause a lake to become eutrophic, with the result that excessive algae blooms can release harmful toxins and can also lead to low dissolved oxygen. Pearly Pond in Rindge, NH is a eutrophic lake; recent modelling studies and ongoing water quality monitoring has shown that the Ingall's Road tributary, which drains a large wetland area, has high phosphorus inputs to the lake. These inputs are the result of historic wastewater inputs to the wetlands. Wetlands can only retain phosphorus when water levels are low or water is flowing rapidly. When water stagnates in wetlands, anaerobic conditions result, which allow phosphorus to be released from the soil. Phosphorus will react with iron under aerobic conditions. The Pearly Pond Management Committee received grant funding to construct an iron-enhanced sand filter at the outlet of the wetland complex. We took weekly water samples from the input and the output of the filter to determine if it was working, and analyzed the samples for total phosphorus. We also measured dissolved oxygen, pH, and temperature in the stream inflow. Preliminary results indicate that the filters are removing phosphorus when the dissolved oxygen is high enough, but most of the water is not flowing through the two arms of the filter, so modifications must be made to correct this problem.

The Effect of Buckthorn on Understory Plant Communities in a Southwest New Hampshire Pine Forest

Kassandra Jaskolski[1] and Rhine Singleton[1]*
[1]*Franklin Pierce University*

In 2003, a long-term study was initiated in several forest types in natural areas on the Franklin Pierce University campus in Rindge, NH to investigate possible effects of the invasive shrub glossy buckthorn (*Frangula alnus*) on native plant communities. Re-sampling in 2008 identified white pine forests growing on wet soils as the forest type most likely to be impacted by buckthorn. This poster will present results from a 2019 study in which permanent plots within white pine forests were again re-sampled to monitor possible impacts of buckthorn on forest understory plants.

Bedrock Geology in Northern Keene, NH and How It Relates to Groundwater Quality

Charles Kerwin[1] and Katie Woltner*[1]
[1]Keene State College*

In the vicinity of Keene, NH, many household wells are drilled into bedrock. The flow of water in crystalline aquifers primarily occurs between the joints and fractures of the bedrock such that porosity and permeability can be affected by the presence of brittle faults. In fault zones, the characteristics of the faults and the jointing can differ with each fault and even along the same fault line, affecting the flow of water within the aquifer.

In the summer of 2017, an area near the north of Keene was mapped, focusing on the identification and characterization of brittle fault structures, silicified fault zones, and jointing. Groundwater and rock samples were also taken in transect across the Mine Ledge Fault (MLF) with the goal of understanding how the bedrock geology affects groundwater flow and quality. Seven water samples from private wells were analyzed for water quality parameters as well as specific major, minor, and trace elements. Eight rock samples were collected from locations near the well sites and analyzed using Inductive Coupled-Mass Spectrometry. The primary element of interest was iron, due to the abundance of iron oxides and hydroxides in the section of the MLF where water samples were taken. The two wells closest to the MLF show elevated concentrations of iron in comparison to the wells farther away. On the contrary, the water and rock sample on the west side of the fault had elevated levels of manganese.

The MLF presents a silicified zone with fault breccia to the north, while to the south there is less silicification and more jointing. Even though jointing is present in the northern section of the fault, locally there seems to be little groundwater flow across the fault. Many of the faults in the study area are normal faults characterized by silicification in the fault plane or zones of bull quartz, however others show very little silicification and have zones that are heavily fractured and jointed. The structural and mineralogical characteristics of the bedrock play a role in the chemistry of the groundwater. The flow of groundwater within the study area is complexly controlled by the characteristics of the faults such that silicified zones impede the movement of the groundwater.

Spilt Rock Falls: A Geologic Puzzle

Charles Kerwin[1] and Andrew Starace*[1]
[1]Keene State College*

The canyon known as Split Rock Falls, located in Surry, NH, has an unusual width to depth ratio for the size of the stream that flows through it. Merriam Brook is a small stream that incises a canyon roughly 50 feet deep and 250 feet wide through bedrock that is largely granitic. The size of the stream and granite's known resistance to weathering and erosion make it unlikely that Split Rock Falls was created by typical stream processes. Early field efforts led to the hypothesis that the stream was exploiting cracks (joints) in the rock. Later work proved that the joints are part of an unknown fault, which may be related to a larger unmapped fault system. Structural and compositional data were collected from seven locations along a 0.5-mile length of the canyon. This research will provide insight toward undocumented geologic structures in southwestern New Hampshire.

Mapping Spatiotemporal Patterns of eBird Sampling Efforts to Inspire Citizen Science Action in the Monadnock Region

Steven Lamonde (Antioch University New England)*

Since its inception in 2002, the Cornell Laboratory of Ornithology's eBird database has collected over 0.6 billion observations of birds from every country on the planet, Antarctica, and countless mid-ocean locations. Nearly 500,000 observers, the vast majority of which are citizen scientists, have contributed to this dataset, from which scientists have gained novel insights into broad-scale avian spatial and temporal patterns. While these findings have led to over 200 publications and many dozens of conservation actions, the eBird dataset still exhibits critical limitations typical of crowd-sourced datasets. Principal among these limitations is unequal sampling effort across regions and seasons. New Hampshire's Monadnock Region is no different, where eBird submissions are spatially clustered and inconsistent across seasons. To inspire greater sampling effort of under-studied places and seasons, I conducted a GIS analysis to identify trends in the spatial and seasonal distribution of eBird observations across the Monadnock Region. Using a tessellation layer of 2.5-mile-diameter hexagons generated in ArcGIS, I summarized and visualized total number, duration, and party-hours of all complete eBird checklists from 1999 to 2019, and total species observed. This analysis yielded predictable trends; most eBird observations over the past 20 years have been concentrated near population centers and during spring migration, where travel is minimal and when species diversity peaks, respectively. By increasing sampling effort of less-frequented places (e.g., Pisgah State Park) through local citizen science initiatives, regional conservation managers will gain a more complete picture of the Monadnock Region's bird populations. Furthermore, more evenly-distributed sampling will better inform the process of identifying and protecting species-rich breeding grounds, regionally important migration stopover sites, and critical resources for overwintering birds.

Modeling Lowland Spruce Fir's Fundamental and Realized Niches to Inform Management at Andorra Forest, Stoddard, NH

Pete Maciaszek[1] and Steven Lamonde*[1]
[1]Antioch University New England*

Lowland spruce fir (LSF) forests reach their southern extent in the southwestern highlands of New Hampshire and provide important habitat for endangered and threatened species. Managing and promoting LSF forest is a goal at Andorra Forest in Stoddard, NH. To inform these efforts, we used ArcGIS to perform a habitat suitability analysis for LSF forest based on key criteria for LSF growth. In addition, we used a binary model to determine LSF's fundamental niche, and a supervised image classification to determine its realized niche. Input criteria for these models included aerial imagery, elevation, slope, depth-to-restrictive surface, and soil data. Combined, the results of the spatial analyses identify distribution of current LSF forests and potential areas suitable for new LSF growth. Our analysis indicated that 17% of Andorra Forest is covered by LSF forest, 99% can potentially grow LSF forest, and 20% is most suitable for LSF forest. These findings will help Andorra Forest target areas for future LSF management efforts.

The Impact of Beaver Dams on Dissolved Oxygen

Jessica Nekowitsch (Keene State College / University of New Hampshire) and Denise Burchsted (Keene State College)*

Natural dams, such as beaver dams, are well known for their physical disruption of waterways. The question is: do these dams affect the overall water quality of rivers? Currently, we are studying the effects of a beaver dam on Hosley Brook in Hancock, NH. The research focuses on the effects of the dam on dissolved oxygen levels within the brook. To collect our data, we placed dissolved oxygen sensors along the waterway in four locations: one upstream of the dam in a free-flowing reach, two more upstream of the dam in a beaver meadow and beaver pond, and one just downstream of the dam. We recorded data every 15 minutes for the first six months of 2015. Preliminary analysis shows that the dissolved oxygen levels are diurnal, meaning they are climbing during the day when the sun is out and then dropping down at night. Most likely, this trend is associated with algal daytime photosynthesis and nighttime respiration. Further analysis of the data indicates higher levels of dissolved oxygen in the beaver meadow when compared to those in the first free-flowing reach. We believe this is caused by photosynthesis in the meadow. The beaver pond we studied has the least amount of dissolved oxygen, indicating that a large amount of respiration is taking place in this area. This is probably due to a larger population of micro-organisms. The number of micro-organisms is higher in this area because they are decomposing organic matter found at the bottom of the pond. Finally, we found that dissolved oxygen levels are roughly the same in the free-flowing reach downstream of the dam as they are in the free-flowing reach upstream of the dam. This means that the dam isn't affecting the overall oxygen levels of the river, even if there are some localized fluctuations.

Blanding's Turtle Home Range Statistical Analysis in R

Erin Nichols[1]; Arianwen Jones*[1]; Steven Lamonde[1]; and Lisbeth Willey[1]*
[1]Antioch University New England

Blanding's turtles (*Emydoidea blandingii*) are semi-aquatic freshwater turtles considered rare and declining throughout most of their northeastern range. Urban sprawl has increased habitat fragmentation and road mortality for these isolated and genetically distinct populations. As part of a collaborative, five-state regional conservation planning initiative supported by the USFWS Competitive State Wildlife Grants program, we conducted a radio telemetry study to evaluate home range size across multiple sites and quantify relationships between movement and habitat cover type. We calculated Minimum Convex Polygons (MCP) and Kernel Density Estimators (KDE) for 20 individuals in high priority areas in southern New Hampshire and northern Massachusetts over two years. We then compared home range sizes between sexes, between sites, and across numerical habitat characteristics (e.g., percent cover of canopy, shrub, terrestrial herbaceous vegetation, emergent vegetation, submergent vegetation, and open water). MCP size varied significantly between sites ($F=6.85$, $df=2$, $P=0.007$) but not between sexes ($t=0.857$, $df=14.64$, $P=0.40$), with males and females showing no significant differences in MCP size. Submergent vegetation ($rho=-0.499$, $P=0.027$) was the habitat characteristic with the strongest relationship with MCP size, and turtles in areas with more submergent vegetation moved significantly smaller distances. Results suggest that without submergent vegetation, habitat quality could decline for Blanding's turtles, possibly causing them to move further to find adequate resources, thereby increasing energy expenditure and the potential for mortality. Based on this information, we suggest that stakeholders promote wetland quality and seek ways to reduce habitat degradation that negatively impacts submergent vegetation. To further investigate this relationship, ideal density and species type of the submergent vegetation should be evaluated to inform additional management recommendations. Site-specific results can also be used to inform management at the local level for these high priority sites.

The Pearly Pond Water Quality Mystery

Victoria Prest[*1]; Ryan Sasseville*[*1]; Catherine Koning[1]; Paul Kotila[1]; and Morris Jones[1]*
[1]Franklin Pierce University

Pearly Pond is a eutrophic, nutrient-enriched lake in Rindge, NH. Most efforts to improve water quality have focused on phosphorus, which has caused the lake to be classified as eutrophic. However, data from the New Hampshire Volunteer Lake Assessment Program has shown that conductivity in the lake is steadily increasing. Conductivity measures ions in solution, and as such can be caused by a number of natural or anthropogenic sources. We targeted two subwatershed areas where high conductivity values are found to determine the possible sources and to identify the causes of the increased conductivity. We took weekly water samples from multiple locations, and analyzed them for iron, sulfides, chlorides, and coliform bacteria to determine if the problem originates in road salt build-up, leaking septic systems, or natural release of iron and other ions resulting from groundwater inputs, enhanced by beaver dam construction.

The Effect of Buckthorn on Forest Plant Communities in Southwest New Hampshire

Rhine Singleton (Franklin Pierce University)*

Glossy buckthorn (*Frangula alnus*) is a non-native invasive shrub found in a wide variety of habitat types throughout the Monadnock Region. In order to detect possible impacts of buckthorn on native forest plant communities, a long-term study was initiated in 2003. That year, forest communities were sampled in permanent 20 m x 20 m sampling plots located in five different forest types in natural areas on the Franklin Pierce University campus in Rindge, NH. After sampling, all buckthorn stems were removed from treatment plots. In 2008, all plots were re-sampled to test for possible effects of buckthorn on native plants. Results revealed either no effects or minor effects within white pine forests growing on wet soils. This study provides a baseline for continued sampling to assess potential long-term effects of buckthorn and other changes in forest plant communities.

Factors Influencing the Survival of American Chestnut Saplings in a Mixed Forest in Southwest New Hampshire

Shigenobu Taki[*1] and Rhine Singleton[1]*
[1]Franklin Pierce University

American chestnut (*Castanea dentata*) was a widespread forest canopy tree found throughout the eastern United States until an exotic fungal blight killed the majority of large trees in the first half of the 20th century. Though there are very few large trees left, small saplings can be found in forests in the Monadnock Region. These saplings do not get very large before they succumb to infection by the blight, but the roots typically survive and send up new stems. This poster will present results of a study of chestnut saplings in a mixed forest on the Franklin Pierce University campus in Rindge, NH. Factors influencing the survival of saplings will be explored.

PRESENTER CONTACT INFORMATION

Eric Aldrich
The Nature Conservancy
ealdrich@tnc.org

Tom Brightman
New Hampshire Fish and Game
Thomas.brightman@wildlife.nh.gov

Phil Brown
Harris Center for Cons. Education
brown@harriscenter.org

Denise Burchsted
Keene State College
dburchsted@keene.edu

April Claggett
apclaggett@yahoo.com

Melissa Doperalski
New Hampshire Fish and Game
melissa.doperalski@wildlife.nh.gov

Emily Drury
The MacDowell Colony
emily.b.drury@gmail.com

Miles Fah
Franklin Pierce University
fahm16@live.franklinpierce.edu

Erin Glocke
Antioch University New England
eglocke@antioch.edu

Robert Goodby
Franklin Pierce University
goodbyr@franklinpierce.edu

John Harris
Franklin Pierce University
harrisjr@franklinpierce.edu

Dallas Huggins
Rocket Insights
dallas.a.huggins@gmail.com

Kassandra Jaskolski
Franklin Pierce University
jaskolskik16@live.franklinpierce.edu

Arianwen Jones
Antioch University New England
ajones13@antioch.edu

Charles Kerwin
Keene State College
ckerwin@keene.edu

Hana Kiewicz-Schlansker
Antioch University New England
hkiewiczschlansker@antioch.edu

Catherine Koning
Franklin Pierce University
koningc@franklinpierce.edu

Steven Lamonde
Antioch University New England
slamonde@antioch.edu

Jeff Littleton
Moosewood Ecological LLC
jeff@moosewoodecological.com

Peter Maciaszek
Antioch University New England
peter.c.maciaszek@gmail.com

Josh Megyesy
New Hampshire Fish and Game
joshua.megyesy@wildlife.nh.gov

Jessica Nekowitsch
Keene State College / UNH
jln1015@wildcats.unh.edu

Erin Nichols
Antioch University New England
enichols@antioch.edu

Peter Palmiotto
Antioch University New England
ppalmiotto@antioch.edu

Victoria Prest
Franklin Pierce University
prestv16@live.franklinpierce.edu

Scott Reynolds
St. Paul's School
sreynolds@sps.edu

Ryan Sasseville
Franklin Pierce University
sasseviller16@live.franklinpierce.edu

Karen Saunders
Antioch University New England
ksaunders@antioch.edu

Thomas Shevenell
Norway Pond Commission
tcshevenell@gmail.com

Rhine Singleton
Franklin Pierce University
singler@franklinpierce.edu

Barbara Skuly
Ashuelot River LAC
bskuly@ne.rr.com

Shigenobu Taki
Franklin Pierce University
takis15@live.franklinpierce.edu

Rick Van de Poll
Ecosystem Mgmt. Consultants
rickvdp@gmail.com

Chris Volonte
Antioch University New England/
Kestrel Land Trust
chris.volonte@gmail.com

CONFERENCE PLANNING COMMITTEE
CONTACT INFORMATION

Karen Bennett
Emeritus Extension Forester
UNH Cooperative Extension
Karen.Bennett@unh.edu

Denise Burchsted
Associate Professor, Environmental Studies
Keene State College
dburchsted@keene.edu

Meade Cadot
Naturalist Emeritus
Harris Center for Conservation Education
cadot@harriscenter.org

Tim Jordan
Board of Trustees
Harris Center for Conservation Education
tgjordan@msn.com

Erica Kamerzel
M.S. Candidate, Environmental Studies
Antioch University New England
ekamerzel@antioch.edu

Misty Kennedy
Business Manager, Campus Events
Keene State College
misty.kennedy@keene.edu

Catherine Koning
Professor, Environmental Science
Franklin Pierce University
koningc@franklinpierce.edu

Gordon Leversee
Special Assistant to the Provost
Keene State College
gleverse@keene.edu

Jackie Lundsted
Conference Planning Intern
Keene State College
jlundsted12@gmail.com

Peter Palmiotto
Chair, Environmental Studies
Antioch University New England
ppalmiotto@antioch.edu

Steve Roberge
Cheshire County Extension Forester
UNH Cooperative Extension
Steven.Roberge@unh.edu

Brett Amy Thelen
Science Director
Harris Center for Conservation Education
thelen@harriscenter.org

Jeremy Wilson
Executive Director
Harris Center for Conservation Education
wilson@harriscenter.org

ACKNOWLEDGEMENTS

The first-ever Monadnock Region Natural History Conference was brought to you by Keene State College, Antioch University New England, UNH Cooperative Extension, Franklin Pierce University, and the Harris Center for Conservation Education, which is celebrating 50 years of connecting people to nature in the Monadnock Region. We're grateful to our volunteers for keeping the day running smoothly and to the conference committee for their time, talent, and months of thoughtful planning. We're also indebted to the many researchers who have shared their work with us, so that we may better understand, appreciate, and protect the remarkable nature of the Monadnock Region. Their curiosity, expertise, and passion for the natural world are an inspiration.

VOLUNTEERS

Denise Burchsted
Justine Gaskamp
Tim Jordan
Erica Kamerzel
Gordon Leversee
Jacqueline Lundsted
Timothy Maddalena-Lucey
Peter Palmiotto
Richard Pendleton
Amy Roberts
Jean Rosenthal
Caitlin Scanlon
Kim Snyder
Jeremy Wilson

CONFERENCE PLANNING COMMITTEE

Karen Bennett
Denise Burchsted
Meade Cadot
Tim Jordan
Erica Kamerzel
Catherine Koning
Gordon Leversee
Jacqueline Lundsted
Peter Palmiotto
Steve Roberge
Brett Amy Thelen
Jeremy Wilson

SPONSORS

50 YEARS
HARRIS CENTER FOR CONSERVATION EDUCATION
Making Tracks Since 1970!

Keene STATE COLLEGE

NH Extension

FranklinPierce UNIVERSITY

Monadnock Ecological Research and Education Project
MERE
Antioch University New England