

# NEW HAMPSHIRE AUDUBON

SUMMER / FALL 2023

# Afield

*Featuring*  
**SANCTUARIES &  
ENVIRONMENTAL  
EDUCATION**





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#### NH Audubon Afield

Dyanna Smith, Editor/Designer

## FROM THE PRESIDENT'S DESK

In the past month, two significant events stand out as particularly notable for our history at NH Audubon. I am so proud of both.

This year, we celebrate the 25th anniversary of our partnership with Society for the Protection of NH Forests and New Hampshire Public Radio: Something Wild. This radio show has focused on New Hampshire's natural history, with stories from the field hosted by SPNHF and NH Audubon staff sharing experiences, knowledge, and immersing listeners in natural soundscapes. Twenty five years is a long run for any radio program, and this speaks to both the diversity of our natural world, and the expertise and importance of this partnership. Our three organizations have a state-wide presence and impact. The staying power of nature-based education on the radio also speaks to how much our citizens and visitors care about our natural environment. Big thanks to NHPR and SPNHF staff for this great partnership!

No less exciting is the acquisition of our newest, and 6th largest, Wildlife Sanctuary. This month we accepted the donation of the Ines and Fred Yeatts Wildlife Sanctuary, a 545 acre gem of a property with diverse, high quality wildlife habitat in Warren, NH. Ines and Fred Yeatts have been acquiring tracts of land over the years because of their deep commitment to protecting forests, grasslands, and wetlands that are important for wildlife. The Yeatt's also helped fund most closing costs for



this property, and we couldn't be more grateful and excited about the new Sanctuary. Notable for this Sanctuary is a high quality grassland that is over 100 acres in size, more than enough to support rare and declining songbirds that require large grasslands. The grassland is surrounded by forest and wetlands which adds to its uniqueness. In addition, the Sanctuary connects with other conservation land, including the White Mountain National Forest. This means we are connecting and growing protected lands, another feature important for wildlife. Please join in celebrating this exciting project.

As always, none of these conservation successes could be possible without your support. Thank you for contributing in so many ways. These NH Audubon successes are also yours.

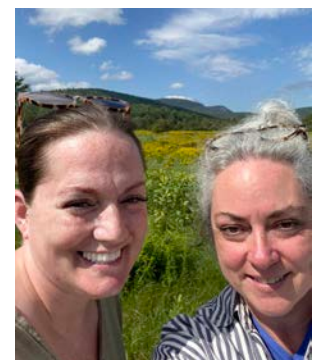
See you out there!

Doug Bechtel, President

## Cover Photo:

*"After a morning at Newfound Center, Colleen and I decided to take an extra 30 minutes to scoot up north and experience the new Yeatts Sanctuary for the first time. It did not disappoint. Standing in the golden meadow, sunshine lighting up the valley, with lush green on all sides, we were tucked in by the ring of mountains and opened up to the world at the same time. Heaven."*

—Dyanna Smith (with Colleen Nebesnak)



Colleen and Dyanna take a quick selfie from the future parking area on Yeatts.

# Yeatts Makes 40

New Hampshire Audubon is pleased to announce the establishment of The Ines and Frederick Yeatts Wildlife Sanctuary in Warren, NH. Yeatt's gift to NH Audubon of the 545-acre property creates NH Audubon's 40th wildlife sanctuary. The new sanctuary abuts the White Mountain National Forest along the west and north borders.

The land is rich in wildlife with signs of bear, moose, porcupine, beaver, mink, and many species of forested upland and grassland birds. Habitat on the sanctuary includes oak-pine forests, important wetland complexes, and grassland fields. It becomes the sixth-largest sanctuary under the protection and management of NH Audubon.

NH Audubon's State of the Birds report (2020) says that 16 of the 21 bird species needing grassland habitat are in decline, including Bobolink and Eastern Meadowlark. The most important strategies to ensure these birds thrive are to identify and protect high quality grasslands, and manage them appropriately. "If we want to get serious about protecting these birds, we have to commit to protecting their habitat and working with partners to do the same," said NH Audubon President, Doug Bechtel.

The donors, Ines and Fred Yeatts, said, "we hope this

land will help save species of wildlife and offer the enjoyment of nature to the sanctuary's visitors." United by their shared passion for the outdoors and wildlife, Ines and Fred Yeatts were inspired to create a biologically diverse wildlife sanctuary.

Ines and Fred both grew up in mountainous regions and share a common love of the natural world. After meeting in Colorado's Front Range, Ines and Fred traveled in the Blue

Ridge, White Mountains, and the Swiss Alps. With nature and wildlife as the foundation of their lives, their vision for this property becomes a lasting legacy that allows others to enjoy and appreciate the mountains and wildlife they both cherish.

"It has been awe-inspiring to work with Ines and Fred," says NH Audubon's Land Manager, T. Parker Schuerman. "Their conservation ethic and their vision to

assemble a mosaic of different habitats that support a broad range of wildlife is completely inspirational."

Plans for the new sanctuary include developing a small parking area, posting an informational kiosk, and designating access trails for walking within the property – all coming in the next year and a half.

"We are so pleased to protect this incredible landscape as our 40th Wildlife Sanctuary," explains Bechtel. "Ines and Fred Yeatts have been extraordinary in their generosity to help ensure these wildlife habitats persist under our care."

**United by their shared passion for the outdoors and wildlife, Ines and Fred Yeatts were inspired to create a biologically diverse wildlife sanctuary.**



*Ines and Fred sign the closing papers that complete their generous land donation, establishing NH Audubon's 40th wildlife sanctuary, with Parker Schuerman, Director of Lands Management looking on. Photo by Paul Doscher.*



*Black Brook is one of two mountain streams bisecting the 545-acre property. Photo by T. Parker Schuerman.*



# Silk Farm Wildlife Sanctuary All Persons Trail & Pollinator Meadow Expansion

*photos and story by T. Parker Schuerman*

## ALL PERSONS TRAIL, PART ONE

In the Summer and Fall of 2022, NH Audubon began building an inclusive outdoor space with our partner, St. Paul's School, at the Concord Silk Farm Wildlife Sanctuary. The vision and design behind this All Persons Trail was (and will continue to be) to engage the Concord community and provide the opportunity for people with all abilities to interact with the natural environment. Together with our trail designer, builder, and consultant, Lew Shelley, of Snowhawk, LLC, NH Audubon constructed a path and interactive open space intended for use by visitors of all backgrounds.

We believe nature is for everyone to enjoy regardless of their gender, age, ability, race, religion, or sexual orientation. We designed this hard-packed surface so that people who use wheeled assistance devices and strollers can move with ease and witness the wonders of nature within the sanctuary. Building off the successful engagement of the LGBTQ+, minority, disabled, and senior communities who face barriers to involvement in nature by our partners at TNC, we utilized their lessons learned and had a real-world test before opening it to the public. NH Audubon, through this action, endeavors to more deeply understand how to design, sign, and support our community through the infrastructure of the trail itself.

The half-mile long trail circles the demonstration pollinator meadow and is made of packed gravel and is generally flat or gently sloped to help with mobility assistance devices. The All Persons Trail weaves through a portion of the sanctuary that includes a wet meadow, woodland edge, agricultural, and grassland habitat, offering educational opportunities for people to experience the music of birds, the color of wildflowers, and



*James Piet (center) and Pat Vincent-Piet (right) join Marc Nutter (left) for an early test exploration of the All Persons Trail.*

the ever-changing adventure of interacting with nature. Part of a larger vision for accessibility at Silk Farm, a new Woodland Loop is under construction, continuing the All Persons Trail into the adjacent forest along our Enchanted Forest path.

*Funding for the All Persons Trail Meadow Loop comes from the Christopher and Dana Reeve Foundation and private donors. A NH Recreational Trails Program grant and the Fields Pond Foundation are funding the Woodland Loop.*

### All Persons Trail Highlights:

- 0.5 mile +/- trail constructed to meet accessibility standards. 5'-6' width with pullouts and rest areas as needed
- Materials include 1-1/2" crushed stone, stone dust or "sure-pack," and geo-tech fabric
- All soil removed for the project is stored for possible future on-site projects
- To engage and further follow up with the community, signs, benches, picnic tables, kiosks, and shade structures will be built
- Finish-work with vibrating compactors and hand tools will be an ongoing project to continue to be added to and improved
- An approx. 0.5 mile universally accessible trail addition to creating a "forest experience" will be planned to connect to the "meadow experience" all-persons trail in 2023, intended to be constructed in Sept and October of 2023



*Lew Shelley (Snowhawk, LLC) worked tirelessly and enthusiastically during construction of the All Persons Trail last fall.*



## POLLINATOR MEADOW EXPANSION, PART TWO

Last year in this issue (Summer *Afield* 2022), we introduced you to our efforts to create a demonstration pollinator meadow. With this project, we endeavor to reduce the invasion and dominance of invasive species in the sanctuary, and restore and heal an old pasture back to native flowers, grasses, and shrubs.

There are two main goals we have for the ecological restoration of the meadow:

1. Increased awareness of the need for native plant meadows to support pollinators.
2. To increase Universally Accessible trail opportunities in our area and bring attention to unequal access and barriers to the outdoors through communications and dialogue.

The demonstration pollinator meadow engages and educates local community members and collaborators in site preparation, seeding, and ongoing maintenance of large fields planted with native wildflowers and grasses that provide forage for beneficial insects from May through October.

Part two of this Pollinator Meadow project occurred in the Fall of 2022. Students from St. Paul's School and volunteers from NH Audubon and UNH Nature Groupie helped peel back landscape textiles and plastic (storing it for later use), and then spread native or local genotype seeds onto the exposed soil, covering and protecting it with a layer of straw.

Through the pollinator meadow, visitors gain a deeper understanding of the plants and wildflowers that support viable populations of our native pollinators - complimenting the pollinator gardens that surround the McLane Center and demonstrating pollinator conservation at different scales.



*Volunteers and Parker roll up the meadow covering before planting seeds.*



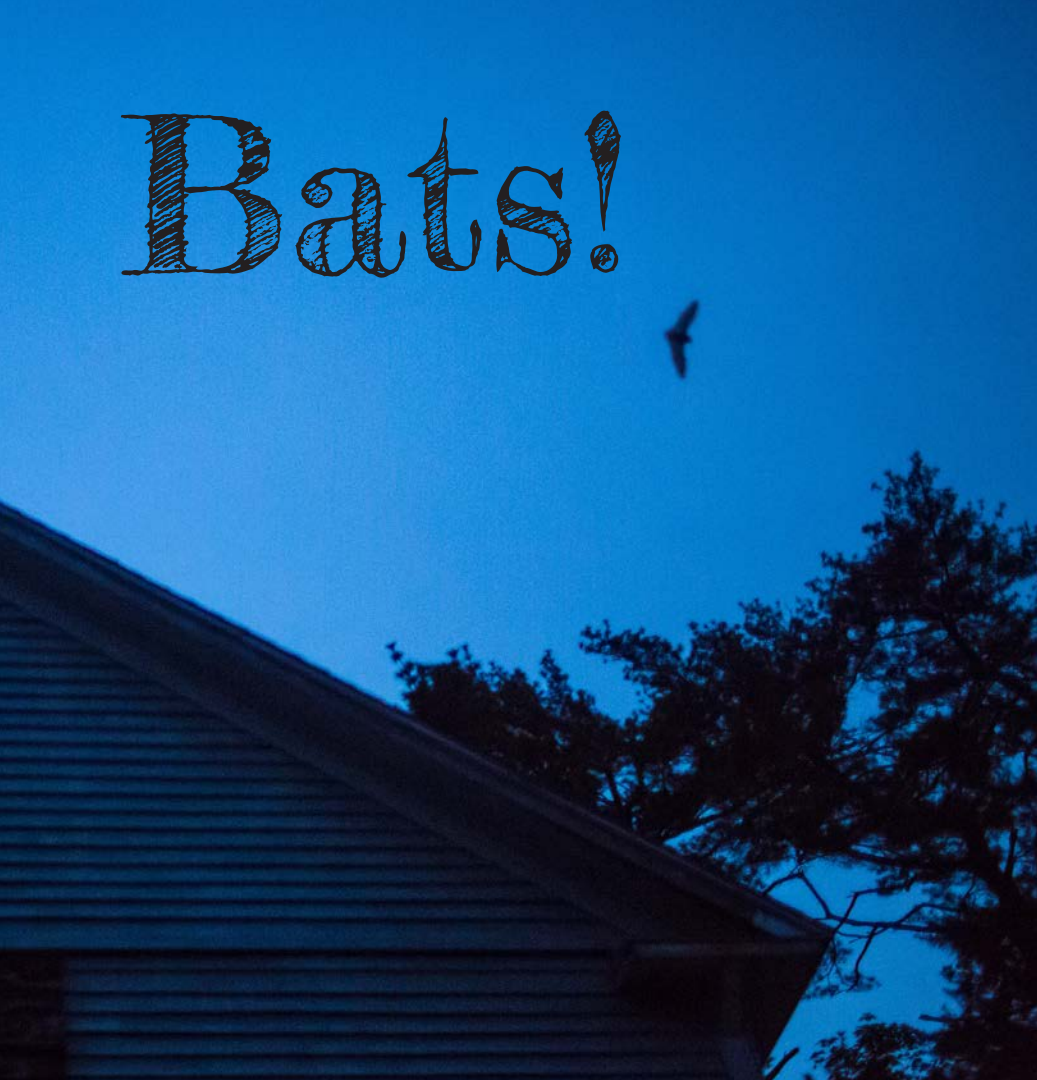
*Results of the pollinator meadow project by autumn of 2022 (above). Volunteers get lost in a large expanse of plastic ground cover, showing the scale of the project and size of the meadow with McLane Center in the background.*

### Pollinator Meadow Highlights:

- Volunteers planted 1 acre of native and local genotype seeds to expand the amount of native habitat created
- Over 3,000 stems of invasive thistle with seed pods were collected and burned away from the site to reduce future meadow invasion.
- In the late season, meadow plants are mowed in the surrounding area to create a lower "structure" and reduce early spring competition.
- The use of prescribed fire in and around the meadow will be applied to investigate an increase in nutrient cycling and a reduction in woody and non-native plant invasion.
- Future action will include reducing invasive species in the surrounding area and restoring habitat.
- Removing non-native shrubs, vines, and trees will be an ongoing volunteer effort.



# Bats!



*Wildlife Sanctuaries Supporting Research*  
by T. Parker Schuerman

During summer months, for the past 20 years, my family rushes outside at twilight each night to search for flying silhouettes in the glowing twilight. My wife, my daughter, and I compete annually to identify the first bat of the season and then the first bats that reveal themselves each night. These evening acrobatics of bats have been my family's summer siren. Bats are the way my family sets our internal clocks toward a different appreciation of time. "Bat Time" is what we call it. As my daughter was growing up, Bat Time was how we calmed ourselves before story time and how we re-connected with hope and nature. This time together at the end of each day was always considered magical and we frequently spent the last 20-30 minutes of every evening watching the barrel rolls and "dog fights" of our resident species of bats. Join me now and learn more about the magic of bats and their importance to us all.

## WHY DOES NH AUDUBON CARE ABOUT BATS?

Bats use a variety of habitats as they feed, roost, and travel through their natural corridors in New Hampshire. NH Audubon's Wildlife Sanctuaries provide some of the state's mostly bat-friendly landscapes. We host one of the most productive maternity colonies of Little Brown Bat (*Myotis lucifugus*) in New Hampshire and also a maternity colony of Big Brown Bats (*Eptesicus fuscus*). We collaborate with NH Fish

and Game Biologist Sandra Houghton, her partners, and volunteers while these intrepid night-scientists conduct annual surveys of bats and their pups. Bats are long lived creatures, and since they only have one or two pups per year (and not every year), it takes a long time for their population to rebound from any harmful population-reducing event.

Bats are highly beneficial to people. In our region, bats are predators of night-flying insects and play a crucial role in controlling insects. They are vital to preserving the natural balance of healthy ecosystems. A nursing female Little Brown Bat may consume her body weight in insects each night during the summer. A study published in *Science* estimates that insect-eating bats provide an effective pest-control service, saving the US agricultural industry a minimum of \$3 billion annually.

In our region, when night falls, bats dominate the night sky and feed at different altitudes and follow variable trophic (or food) levels based on the insects which are seasonably available. I should mention that bats share the night sky with some nocturnal birds, such as Common Nighthawk and Eastern Whip-poor-will, both monitored by NH Audubon.

## JUST THE BAT FACTS, PLEASE: BATS IN NH AND NEW ENGLAND

New Hampshire, Maine, and Massachusetts are home to the same eight species of bats. Five of these bats species hibernate during the winter in caves or mines. The other three are primarily tree dwellers and migrate south for the winter. Vermont is home to the same eight species of bats plus a small, localized population of the Federally and State Endangered Indiana Bat. The last record of the Indiana Bat in Massachusetts was in 1939. Neither New Hampshire nor Maine have documented the Indiana Bat in the state recently.

## LET'S TALK ABOUT ROOSTS, NOT NESTS

The place a bat lives is called its roost, not a nest. Bats need different roosting conditions in different seasons. Bats will often move around to find a roost that meets their needs based on temperature, humidity, protective structure, and exposure to the sun. Many bats shelter in buildings behind hanging tiles, shingles, boards, roof spaces, and in attics. Bats are attracted to hollow trees and loose bark, caves, and rock crevices, and some use all of these small spaces, at different times, during their yearly travels. Bats may also roost in bat boxes, but not in winter.

Male bats are generally solitary in summer, roosting in hollow trees, under loose bark, and in other crevices. Female bats gather in a maternity roost to birth their young. Bats usually give birth to a single baby (called a pup) each year in

late May or early June. They keep their helpless young close and nurture them carefully while in the roost. Pup bats are suckled by their mothers for four to five weeks until they are old enough to fly. Without consistent feeding and care, many young bats do not survive infancy. Female bats use echolocation calls, and sometimes smell, to find their offspring. Young bats are susceptible to temperature. When disturbed, bat pups frequently move and may die of exposure. When strong enough, pups venture out from the roost to learn to forage for food. Maternity colonies start to break up in mid-August as pups leave the roost.

In winter, bats use hibernation roosts. Our bats either fly south (migratory bats) or to caves and mines to hibernate (with occasional use of attic/basements by Big Brown Bats). They experience prolonged torpor which significantly reduces their normal metabolic activities. When a hibernating bat is disturbed, its body temperature spikes upward in preparation for escape. This may cost the bat as much as a month of stored fat reserves. Bats hibernate in all sorts of places, but primarily in manufactured structures or in underground sites, such as caves or mines. Bats will use the same hibernation sites year after year. In our region they gather in colonies varying in size from 10 to 100 or more. Bats require very stable temperatures in these hibernacula, ranging between 40-50 degrees F with humidity sometimes over 80%.

## SO MUCH MORE THAN A FLYING MOUSE!

Bats are incredibly long-lived. They use this time to develop spatial wisdom. According to Jonathan Barchi and his Brown University colleagues, bats develop a three-dimensional neural spatial memory and build mental maps of their surroundings to remember their paths for future flights. Researchers found this out by setting up obstacle courses for bats. They monitored and recorded repeated responses of individual bat's flight patterns over time and after a break in time. Like cows or horses, which have a favorite path back to the barn, or people who commute to work via specific roads, bats develop preferred routes. What we see as erratic flight patterns or crazy commuting corridors are detailed, repeatable mental bat navigational maps (J Exp Biol (2013) 216 (6): 1053–1063.). Bats use this spacial memory to maintain their three-dimensional orientation and efficiently get them back to their roost and pups, and to navigate complex obstacles.

## WHITE NOSE SYNDROME

The fungus-caused white-nose syndrome (WNS) was first discovered on bats in a cave near Albany, NY, in 2006. Since then, it has devastated bat populations. Some species have experienced 90-99% population declines, significantly reducing the number of bat species that hibernate in caves and mines. In North America, white-nose syndrome has caused the deaths of 5.7 million bats. As the fungus grows on hibernating bats, it irritates and possibly dehydrates them, so they wake up. Being aroused from hibernation costs the bats a lot of energy, which makes them lose body fat and can lead to starvation. As a result of WNS, four of the five bat species that winter in New Hampshire caves and mines are now designated as

State Endangered. Endangered bats include the Little Brown Bat, Northern Long-eared Bat, Eastern Small-footed Bat, and Tricolored Bat. Research continues to understand better the fungus that causes WNS. There is currently no way to prevent or effectively treat it.

continued on page 8

## How you can help bats

- Minimize pesticides on lawns and gardens - all eight species of bats that live in New Hampshire eat insects. Reduction of pesticide use also helps our bees and other vital pollinators.
- Promote natural habitat around your home. Maintain some mature forest on your property and standing dead trees. Bats roost in tree foliage, and older trees can provide cavities and flaky bark for roosting. Snags, dying trees, and dead logs also provide habitat to many other living things (e.g., fungi, birds, insects, salamanders, etc.).
- Turn off unnecessary lights and watch for bats at dawn and dusk when their silhouettes contrast against the low light. Tell your friends that bats are wicked-cool and provide benefits like insect control, mosquito consumption and pre-bedtime aerial acrobatics.
- Provide shelter by properly installing a bat box. Build or purchase a bat house if you exclude a bat colony from your home or barn. Bat boxes should be placed 10 to 20 feet high in open areas that receive at least 6 to 8 hours of direct sunlight, with morning sun preferred. Try to avoid areas near artificial lights. Research the best type of bat box for your situation.
- Prevent bats from entering your home by sealing off cracks or holes (1/2 inch or larger). Common entry points used by bats: down chimneys and where chimneys and other masonry meet the side of a house; joints between window frames and house siding; joints around large exterior beams; at building corners; where pipes or wires penetrate the ceiling or walls in attics; between porches or other additions and the main house; at roof edges, ridge caps, soffits, and fascia boards; where walls meet eaves at the gable ends of an attic; and in gaps under shingles.
- If you or a friend have bats roosting in the attic, avoid bat exclusion during the maternity season (May 15-August 15 in New Hampshire) so flightless bat pups will not be separated from their moms.
- Don't visit caves in winter (October 1-April 30); this is the time of year that hibernating bats need to conserve all their energy. Any disturbance can cause bats to use up precious energy reserves and starve to death.

SURVIVAL AND THREATS

Bats are the world’s longest-lived mammals relative to their size. One Big Brown Bat had a life span of 19 years in the wild. Significantly, a Little Brown Bat reached the age of 33. Hawks, owls, and raccoons occasionally prey upon bats in the wild, as well as house cats. They are particularly subject to extermination by the destruction of their roosting habitat. The reasons for habitat decline include their high concentrations in specific locations (especially in their winter caves or summer maternal colonies), their specialized role as aerial insectivores, and their relatively small number of young. Habitat alteration, pesticide use, control practices, and wind power development are all causes of mortality. Natural events such as long winters or fierce storms during migration may also kill bats. Bats die from direct exposure to pesticides. They also die from eating pesticide-sprayed insects (bioaccumulation). NH Fish and Game helps to protect bats by monitoring the state’s hibernating bats in winter, protecting bat hibernacula from human disturbance, encouraging bat-friendly and sustainable forestry, working with private landowners who have summer bat colonies, and advising on wind power facilities.

Despite the recent devastation of WNS, NH Fish and Game, UNH Cooperative Extension and their team of volunteer bat-counting enthusiasts seem to see an upward trend in summer population counts. With time, luck, hope, the protection of maternal bat colonies, and winter roosts bats just might be on the path toward recovery.

Bat Resources, Facts, References and Guidance

[www.wildlife.state.nh.us/nongame/bats-nh.html](http://www.wildlife.state.nh.us/nongame/bats-nh.html)

[www.batcon.org/](http://www.batcon.org/)

[www.fws.gov/story/bats-are-one-most-important-misunderstood-animals](http://www.fws.gov/story/bats-are-one-most-important-misunderstood-animals)

[www.batcon.org/article/designing-better-bat-houses/](http://www.batcon.org/article/designing-better-bat-houses/)

[reviews.chicagotribune.com/reviews/best-bat-houses](http://reviews.chicagotribune.com/reviews/best-bat-houses)

[batlive.pwnet.org/](http://batlive.pwnet.org/)

[extension.unh.edu/resources/files/Resource005446\\_Rep10016.pdf](http://extension.unh.edu/resources/files/Resource005446_Rep10016.pdf)

[www.doi.gov/blog/13-facts-about-bats](http://www.doi.gov/blog/13-facts-about-bats)

[www.whitenosesyndrome.org/static-page/what-is-white-nose-syndrome](http://www.whitenosesyndrome.org/static-page/what-is-white-nose-syndrome)

New Hampshire’s Bats

Common Name	Scientific Name	Status	Range	Summer Habitat	Winter Habitat
Big Brown Bat	<i>Eptesicus fuscus</i>	Species of Special Concern	statewide	buildings, trees	buildings, caves, mines
Little Brown Bat	<i>Myotis lucifugus</i>	NH: Endangered	statewide	buildings, trees	buildings, trees
Northern Long-Eared Bat	<i>Myotis septentrionalis</i>	NH: Endangered Fed: Threatened	statewide	trees, building exteriors (rarely inside buildings)	caves, mines
Eastern Small-Footed Bat	<i>Myotis leibii</i>	NH: Endangered	Southern and Southwest NH counties	in rock talus & deep fissures, sometimes under tree bark	caves, mines
Tricolored Bat	<i>Perimyotis subflavus</i>	NH: Endangered	statewide	tree foliage (rarely in buildings)	caves, mines
Silver-Haired Bat	<i>Lasionycteris noctivagans</i>	Species of Special Concern	probably statewide	trees	migratory
Eastern Red Bat	<i>Lasiurus borealis</i>	Species of Special Concern	Probably statewide	tree foliage	migratory
Hoary Bat	<i>Lasiurus cinereus</i>	Species of Special Concern	Probably statewide	tree foliage	migratory
Indiana Bat	<i>Myotis sodalis</i>	NH: Endangered Fed: Endangered	Do not occur in NH	caves, mines, hollow trees, under tree bark	caves, mines



# Releasing Red A9

by Chris Martin

May 9, 2023 was a beautiful Spring day on Concord's Turkey Pond. Blue sky, strong sun, and just a light breeze. Shoreline red maples were flowering and leaves were just popping. And no bugs! In short, it was a perfect day to release an adult Bald Eagle! 'Red A9' had been under care at Wings of the Dawn Wildlife Rehab Center in Henniker for nearly 14 months, after being picked up from the roadside on Route 202 in Barrington on March 19, 2022. NH Audubon does eagle monitoring and management in part under a contract with NH Fish and Game and rehab work in collaboration with Maria Colby supported by a grant from the Knopf Family Foundation.

As it turns out, A9 had been in rehab before. As a 2-yr old immature, he was found near Little Sebago Lake in Maine on May 9, 2011 (yes, exactly 12 years prior!). Admitted to Avian Haven, he spent 21 months in rehab with a stubborn wing injury, but gradually improved and was banded and released as a sub-adult in Lincoln Co., Maine on Feb 25, 2013. By Summer 2016, he was being seen regularly on Baxter Lake in Farmington, NH along with an adult female eagle. The pair built a nest on nearby Ayers Pond in Barrington and raised young there annually starting 2018. His red ID band was often seen, so when Maria Colby rescued A9 from Route 202 last year, we weren't surprised that it was him. Again, he had major soft tissue damage to his right wing at tip, but it eventually healed nicely.

By June 2022, the Ayers Pond female had found a

new mate, however their 2022 breeding season was lost. And when A9 was ready for release in Spring 2023, the Ayers Pond pair was already raising young.

*The injured eagle is tended to by veterinarians before rehab at Wings of the Dawn.*



*There were numerous sightings of A9 in and around its territory prior to the injury. Photographer Mark Bennett gets a close up of the identification leg band.*

So rather than create conflict by releasing 14-yr old A9 at the site of an ongoing nesting effort, we chose to release him on unoccupied Turkey Pond instead. We haven't had a confirmed sighting of Red A9 since Spring 2023, but boy he sure looked good on his first flight across Turkey Pond!



*An Eastern Kingbird reacts to the eagle's presence near its nest (above). Photo by Mark Bennett.*

*Watch the video of Chris Martin and rehabber Maria Colby releasing A9 on Turkey Pond:*  
<https://www.youtube.com/shorts/xBTiUoJ-CzE>



# Ticks in New Hampshire

Wildlife Sanctuaries Supporting Research  
by T. Parker Schuerman

Ever? Why would anyone *want* to go out and find ticks? The simple answer is for surveillance. For human and animal health, it is important to assess the density and distribution of ticks and understand the presence of diseases carried by them. In the summer and fall of 2022, researchers from the Vector borne Disease Laboratory at the MaineHealth Institute for Research (MHIR) in Scarborough, Maine conducted a New Hampshire-wide survey for ticks in coordination with the NH Department of Health and Human Services (NH DHS). This team of researchers had a focus on black-legged ticks (formally known as deer ticks), as they are the primary tick of veterinary and public health concern in New England. The crew collected on many NH Audubon Wildlife Sanctuaries and other natural areas using corduroy tick “flags” that are dragged through brush and leaf litter, where ticks are looking for a host, or “questing”. The ticks were then identified to species and submitted to the US Centers for Disease Control and Prevention (CDC) to test for pathogens.

Why does this concern you? New Hampshire has not completed statewide tick surveillance since 2009-2010. According to survey authors Chuck Lubelczyk and Molly Meagher, “The goal of this survey was to identify what counties black-legged ticks (*Ixodes scapularis*) are established in (i.e. more than one life stage collected in each county), as well as



The black-legged tick, carrier of multiple infectious diseases in NH.

to provide population density and disease prevalence at a county level, statewide. Tick-borne diseases transmitted by ticks acquired in New Hampshire, rather than travel-related exposure, have been historically restricted to Lyme disease, Anaplasmosis, Babesiosis, Powassan Virus, and Relapsing Fever Disease. Another goal of this survey was to conduct sampling for potentially introduced exotic ticks (ticks not native

to New England) of public health importance, such as Lone star ticks (*Amblyomma americanum*), and Asian longhorned ticks (*Haemaphysalis longicornis*)."

Samples of black-legged ticks were sent for disease testing to the CDCI in Fort Collins, CO. MHIR staff planned to repeat, expand, and return to the Granite State in 2023 to cast a wider and more focused surveillance net across New Hampshire. Their goal is to provide a better understanding of trends as compared to previous surveys, as well as to increase the number of collected individuals so that they can be more precise and get a better picture of the disease testing data.

As you know, a picture tells a story better than any word, especially with data. Below are some graphics from the report that will either put your mind at ease or cause you to grab the nearest bottle of permethrin to dose your boots and field pants.

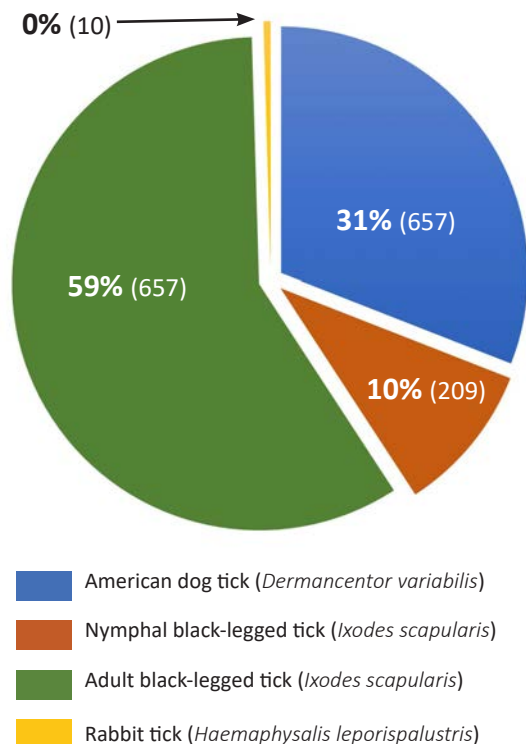
According to the CDC, 2022 was a record-high year for Powassan encephalitis cases, and according to health officials, Maine and New Hampshire were also on track to break records for anaplasmosis, babesiosis, and Lyme disease cases.

Below is a bulleted list of things you should do before and after you venture outside for personal protection against ticks, as recommended by NH DHHS:

- Know when you are in tick habitat and use caution. (Any natural area in New Hampshire should be treated as potential tick habitat.)
- Walk in the center of trails and avoid rubbing against brush.
- Use an EPA-approved repellent like DEET, permethrin, picaridin, IR3535, or oil of lemon eucalyptus.
- Wear light-colored clothing that covers the arms and legs and tuck pants into socks. This provides an easier background for seeing ticks on your clothes.
- Perform tick checks daily and after any outdoor activity.

The most important thing you can do to keep yourself and

Figure 1: Species composition of tick collected statewide across New Hampshire from May-November 2022





your animals safe is conduct frequent and thorough checks. Also, consider removing your field clothes and tossing them in the dryer and when you come indoors. And remember to check your pets, if you let them outside (of course, you shouldn't let cats outside, but that's a topic for another day). We want you to continue to be inspired and enjoy the beauty and the wonders of the natural world, just be smart while doing it!

For a copy of Molly and Chuck's report, email them at the MaineHealth Institute for Research (Vector-borne Disease Laboratory): [charles.lubelczyk@mainehealth.org](mailto:charles.lubelczyk@mainehealth.org), [molly.meagher@mainehealth.org](mailto:molly.meagher@mainehealth.org).

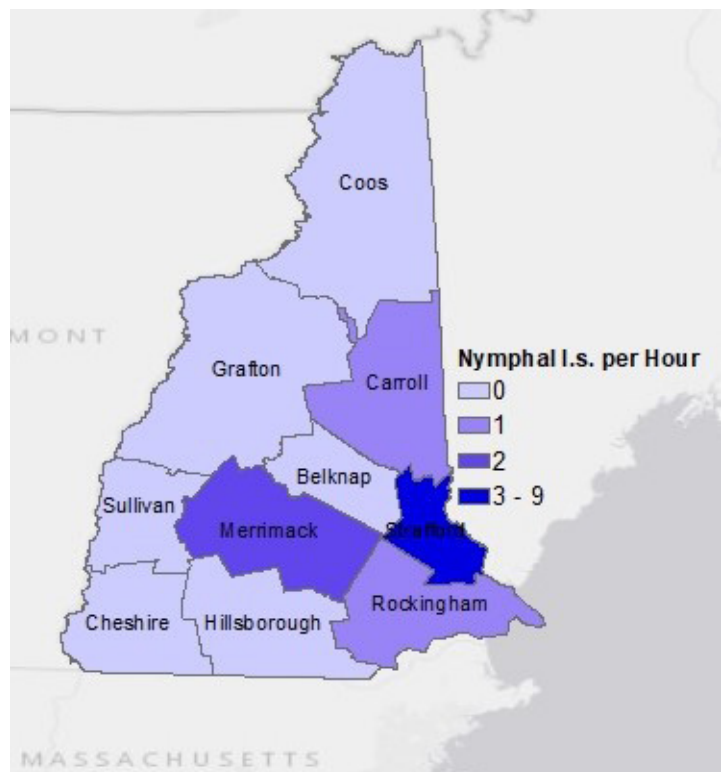
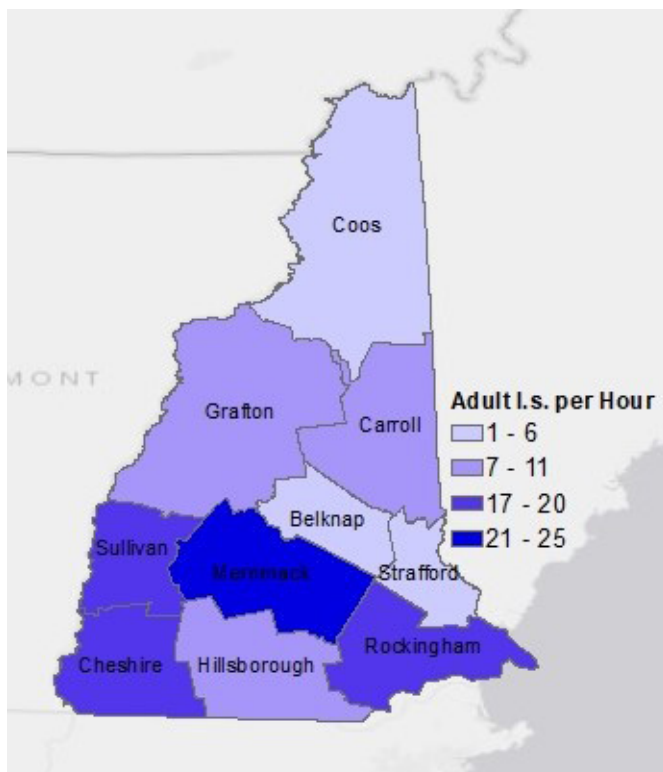
If you have questions about ticks, email the Bureau of Infectious Disease Control at [nhbdc@dhhs.nh.gov](mailto:nhbdc@dhhs.nh.gov) or consult their website: [www.dhhs.nh.gov/programs-services/disease-prevention/infectious-disease-control/tickborne-diseases](http://www.dhhs.nh.gov/programs-services/disease-prevention/infectious-disease-control/tickborne-diseases).

For information on symptoms of tick borne illness visit the CDC website at [www.cdc.gov/ticks/symptoms.html](http://www.cdc.gov/ticks/symptoms.html).



Researcher Molly Meagher conducts a tick drag using courdoroy material to collect "questing" ticks. Photo by Charles Lubelczyk.

Figures 2 and 3: Black legged tick hourly collection rate at a county scale 2022. Charts and data from MaineHealth Institute for Research.





# BEE Living in the Best Habitat?

Wildlife Sanctuaries Supporting Research

by T. Parker Schuerman

NH Audubon is actively engaged in research, restoration efforts, and conservation strategies emphasizing pollinators. In 2022, Alaina Bandanza, a candidate for her MS at Antioch University, conducted a study to deepen our understanding of just how vital wetlands and bogs are, in general, for supporting insect biodiversity with a focus on bees. Alaina is a bit bombastic about the genus *Bombus*, (Sorry, I couldn't help myself) but first a little bumble background.

*Bombus* is the genus of bumble bees in the *Apidae* family. There are seven recognized families of bees: *Apidae* (including bumblebees, honey bees, carpenter bees, and orchid bees), *Megachilidae* (mason bees and leafcutter bees), *Halictidae* (sweat bees), *Andrenidae* and *Melittidae* (solitary, usually pollen specific, ground-nesting bees), *Colletidae* (plasterer bees), and *Stenotritidae*. Alaina was searching for all of these except the last family, which only occurs in Australia. *Apidae* is the largest family and includes bumblebees and our well-known non-native honey bees. In North America, there are approximately 4,000 native bee species occupying ecosystems from wetlands to deserts, and from forests to grasslands.

Bees feed exclusively on sugary nectar and protein-rich pollen from flowering plants, unlike the carnivorous wasps from which they evolved. There are social, honey-producing bees, solitary bees which nest in burrows underground or in wood like carpenter bees, orchid bees, long-horned bees, and cuckoo bees, which are parasitic and lay their eggs in nests of other bees.

The loss of pollinators is widespread and we need more information to see trends and determine conservation strategies. As Alaina eloquently reports, "Plant-pollinator relationships are some of the most ecologically and economically important interactions on Earth. In the United States alone, native bees

are estimated to provide the equivalent of \$3 billion worth of pollination annually. However, bee populations are in decline both worldwide and locally. Obtaining baseline data on bee populations at managed sites in New Hampshire is important to determine the presence of rare and endangered species, to assess changes in their populations over time, and to inform our efforts to conserve native bees and their ecosystems." In other words, we better get our act together if we want to enjoy fruits and vegetables in the future.

Now for the exciting details. Alaina and her research assistant, Lindsay Butler-Hardy, compared bee populations in two sanctuaries. They sampled bees in comparable transects using pan-trapping and hand-netting bee collection methods. Alaina used bee bowls of different colors set out every five meters along a 90-meter transect. Using an alternating color pattern of white, fluorescent yellow, and fluorescent blue souffle cups, they captured 36 bees at a floating peat mat at

Kensan-Devan Wildlife Sanctuary and 37 at a similar bog at Ponemah Bog Wildlife Sanctuary. At the first site, Alaina summarizes that "15 different species from the families *Andrenidae*, *Apidae*, *Halictidae*, and *Megachilidae*" were present. At the second site, "17 species belonging to the families *Andrenidae*, *Apidae*, *Colletidae*, and *Halictidae*" were present. The Latin family names may not mean much to those thrilled to see bumblebees go about their business on blueberries in our backyard, but this biodiversity is beautiful. (Again, sorry, I couldn't resist using the alliteration.)

I talked to my friend Mark Ward, a biologist and bumblebee enthusiast who has conducted surveys in Maine. In his ever-enthusiastic and thoughtful way, Mark said this about Alaina's results: "It's great to have Alaina with her expertise looking at the incredible variety of native bees utilizing NH Audubon wetlands. Looking closely, we begin to grasp how much is happening in the places we love. Having that window into native bee diversity now also provides the opportunity to examine change over time—an important reference point as we seek to monitor decline among the 'little things that run the world'...."





Alaina puts this into perspective by concluding that “each site yielded several vulnerable and rare specialist bee species. At Kensan-Devan, we collected two individuals of *Andrena bradleyi*, a *Vaccinium* (blueberry) specialist mining bee, which is uncommon to rare in New Hampshire. At Ponemah Bog, we caught a high quantity of *Colletes validus* (Blueberry



Bee researchers Alaina Bandanza and Lindsay Butler-Hardy explore one of NH Audubon's bog properties to collect bees (above) like this one, captured during a 2022 study (left). Photos provided by Alaina Bandanza.

celophane bee), a rare specialist on *Ericaceous* plants (heather). Having caught multiple rare species, such as *Andrena bradleyi* and *Colletes validus*, whose preferred host plants are unique to peatland habitats, supports the continued importance of the conservation and protection of peatland habitats for specialist pollinators and other wildlife through properties such as NH Audubon's Wildlife Sanctuaries.”

I close with Alaina's same thoughtful and prescient statement that we started with: “Plant-pollinator relationships are some of the most ecologically and economically important interactions on Earth.” Thanks, Alaina! Well put.

To contact Alaina and learn more about her research and academic interests, email: [abandanza@antioch.edu](mailto:abandanza@antioch.edu).

For more information on bees in general: [www.nwf.org/Educational-Resources/Wildlife-Guide/Invertebrates/Bees](http://www.nwf.org/Educational-Resources/Wildlife-Guide/Invertebrates/Bees)

#### References:

Losey, J. E., & Vaughan, M. (2006). The Economic Value of Ecological Services Provided by Insects. *BioScience*, 56(4), 311–323. [https://doi.org/10.1641/0006-3568\(2006\)56\[311:TEVOES\]2.0.CO;2](https://doi.org/10.1641/0006-3568(2006)56[311:TEVOES]2.0.CO;2)

*continued in right lower column*



Story and photo by Slater Roosa

When the Massabesic Center reopened to the public in October 2021, we started offering weekly bird walks to invite the community back after a long break during the pandemic. Fast-forward to 2023 and the Massabesic Center weekly bird walks have quickly become a staple in our programming for new and experienced birders alike!

The bird walks take place during all four seasons, rain or shine. Participants spend 90 minutes meandering the trails in search of birds in the fields, woods, and on Massabesic Lake. From April 1st, 2022, to March 31st, 2023, we have seen over 165 participants join us over the course of 35 walks. Over 90 different species of birds have been identified as well.

If you or someone you know is interested in learning more about New Hampshire's birds, the Massabesic Center is a great place to start. With the variety of habitats and proximity to Massabesic Lake, the wildlife sanctuary we walk through boasts an impressive variety of birds, including many who take residence in the nest-boxes scattered across the property.

Interesting residents that you may find during a bird walk is a pair of Red-Shouldered Hawks! They have been successfully nesting at the Massabesic Center for the last few years. They are very charismatic birds with a lot of behaviors to observe and often visible near the gardens. You may catch them hunting from a perch overlooking the fields, soaring overhead with a recently caught meal in their talons, or calling to one another. You might also see a secretive Bobolink, like the one pictured above, popping up in the grassy meadow behind the center.

If you would like to join a bird walk, please visit [www.nh.audubon.org/events](http://www.nh.audubon.org/events) for all of our upcoming dates. No prior experience or equipment necessary. We will show you the best tools to use to help you identify birds and can loan you a pair of binoculars if needed. Hope to see you soon!

Mathiasson, M. E., & Rehan, S. M. (2019). Status changes in the wild bees of north-eastern North America over 125 years revealed through museum specimens. *Insect Conservation and Diversity*, 12(4), 278–288. <https://doi.org/10.1111/icad.12347>

Fowler, J., & Droege, S. (2020). Pollen Specialist Bees of the Eastern United States. *Pollen Specialist Bees of the Eastern United States*.





*Raptor biologist Chris Martin leans into the plywood nest box at the Brady Sullivan Tower to retrieve four Peregrine chicks for banding. Note the angry adult female falcon partially visible through the poop-stained glass in the lower left of this photo.*

# Preparing For Peregrines Manchester

by Chris Martin  
photos by Dyanna Smith

Peregrine Falcons have been nesting at the Brady Sullivan Tower in Manchester, NH since 2000. Audubon (NHA) employees and volunteers (including Brady Sullivan Properties and Peregrine Falcon Cam), participated in the examination of the brood. Over the past 23 years, a total of 74 juvenile falcons have fledged from this breeding territory, 100% of them with individual ID bands, and 46% of them have been encountered at later dates. Here is a look at how it went!



*While another looks on, Wings of the Dawn wildlife rehabilitator Maria Colby steadies one chick while Chris applies a coded ID band to its leg (above). Chris corrals the feisty third chick in the line-up as McLane Center receptionist Craig Holmes holds tiny last-hatched 'Perci' (right). Fifth grade students from Hooksett Memorial School came up with names for this year's chicks based on names of NH mountains.*





# Four New to Join the r Sky

annually at the Brady Sullivan  
01. On May 26, several NH  
teers, along with staff from  
Networks (provider of the  
and banding of this year's



*Both adult Peregrines circle repeatedly near their nest box, on the lookout for their chicks, which have temporarily disappeared. After 45 minutes, when the chicks were returned, all became calm once again.*

*Peregrine Project educator Willa Coroka seems thrilled to see all four banded chicks (l-r, Perci, Yetti, Ash, and Mocha) posing for their group photo.*



# The American Chestnut Tree

## Restoration Efforts through Blight Resistant Seedlings

by T. Parker Schuerman

NH Audubon has young American Chestnut trees planted on several of its sanctuaries. We try to use our lands as places to model efforts on how to restore what has been lost and how to protect our future with climate resilient forests. This is where the American Chestnut restoration effort comes in, but first a little background.

### BACKGROUND

The American chestnut (*Castanea dentata*) may have once been the most abundant tree in the eastern forest. It was widely distributed in the south from Mississippi, Alabama, and Georgia up the Appalachian Mountain chain all the way through Pennsylvania and New York then stretching east through New Hampshire to central and coastal Maine. American Chestnut was highly valued for its nuts, rot-resistant lumber, and tannins for treating leather goods. The American Chestnut is known for its fast growth rate and ability to grow to an immense and intimidating size: one stump measured 17 feet in diameter. This hardwood tree was an integral part of the American economy and an even bigger part of the eastern forest's ecology. That is, until the tree was decimated by two non-native pests.

One pest, the chestnut blight (*Cryphonectria parasitica*), is an exotic fungus known to slowly girdle and kill trees above the ground. After the blight was introduced into North America in the late 19th century, whole mountainsides of Chestnut-dominated forests were quickly overwhelmed by the blight. In the southern part of the American Chestnut's range, an exotic root pathogen, *Phytophthora cinnamomi*, was introduced earlier in the 19th century. This exotic sickness killed both the American Chestnut and Chinkapin Oaks. This root pathogen still persists in the south and has been a primary obstacle to species reintroduction because it destroys the American Chestnut's root system and the tree is unable to sprout and thrive. Farther to the north, in the absence of this root fungus, the American Chestnut has managed to persist as short-lived stump and root sprouts, and as individual trees in the forest where the chestnut blight has not yet reached. Stump sprouts found throughout the original range of the American Chestnut occasionally will live long enough to flower and bear fruit.

### RESTORATION EFFORTS

There are two efforts which have been moving forward in the attempt to produce blight tolerant American Chestnut seedlings. These are breeding programs with two different ways



Breeding transgenic flowers with transgenic pollen in Dr. Klak's lab.

to approach the same end goal. One effort is a crossbreeding program by The American Chestnut Foundation (TACF). The goal of this breeding is to produce blight-resistant chestnut trees through a back-cross breeding program involving the blight-resistant Chinese Chestnut (*Castanea mollissima*). The TACF breeding program's end product is mostly an American Chestnut with blight tolerance from the Chinese Chestnut. NH Audubon is a test site for these trees.

The second effort is a gene-splicing program which retains the complete American Chestnut genome with the insertion of a blight tolerance gene from wheat. This transgenic American Chestnut program was started and shepherded by the State University of New York College of Environmental Science and Forestry (ESF). The goal of this breeding effort is to produce blight-resistant pollen and fertile seed nuts from chestnut trees which have had the blight-resistant wheat gene inserted into their genetic code. By using blight-resistant pollen, the program's end-product is to produce a 100% American Chestnut seed which can be grown to produce seedlings for re-introduction efforts.

Both programs have their ardent supporters. The American-Chinese Chestnut cross-breeding program has had an uphill battle producing blight-resistant seedlings. The gene-splicing program has been producing consistent blight-resistant seedlings, but it is waiting for a decision from the US Department of Agriculture and the EPA to be able to do more range-wide substantial plantings. The restoration of American Chestnut is going to be difficult; efforts have been on-going for more than 30 years. What keeps foresters, arborists, geneticists, and environmental scientists motivated is that the benefits of



getting the American Chestnut tree restored to the eastern forest ecosystems would be extremely valuable.

## AN INTERVIEW WITH A SCIENTIST ON THE FRONTLINES OF AMERICAN CHESTNUT RESTORATION

Dr. Tom Klak is an American Chestnut Tree champion and native plant enthusiast whose day job is as professor of environmental studies in the School of Marine and Environmental Programs at the University of New England (UNE). For the past five years, he has been on the cutting edge of real progress working with ESF to develop transgenic American Chestnut pollen, nuts, and seedlings that tolerate the blight. He uses his lab and research to train students, educate the public, and expand the planting of American Chestnut orchards across Maine and New Hampshire. What follows is an interview with Dr. Tom Klak about the science involved with making a large-scale restoration effort for the American Chestnut tree a possible reality.

The goal of this interview is to understand the state of the American Chestnut in terms of where we are, where we've been, and where we are going.

*Thanks for answering my questions this afternoon Dr. Klak.*

I am happy to talk about this important effort.

*Is the Chinese-American cross effective?*

Current evidence indicates that it does not sufficiently work. The blight still infects these trees if they have a predominance of American chestnut genes. There are too many blight-tolerance genes in the Chinese chestnut to move over through breeding. So far, the advanced hybrids are insufficiently blight tolerant.

*Is blight tolerance obtained by the genetic engineered splicing of the wheat gene into the pure American Chestnut tree?*

Yes, saplings with the wheat gene when inoculated with the fungal blight are able to tolerate it. Notably, the gene from wheat when added to the chestnut does not kill the blight, but rather it allows the chestnut to tolerate the blight. This we believe is a durable solution, because it is unlikely to encourage mutations in the fungus.

*What are you doing right now?*

For the last 4+ years I have been speed breeding blight resistant American Chestnut trees in the lab. My students and I take blight-resistant chestnut seeds and grow them in the lab to get pollen produced by the tree within 7-9 months. This produces the male gamete or the haploid set of chromosomes, quickly, so we can use them in the field to pollinate pure American Chestnut flowers in the field.

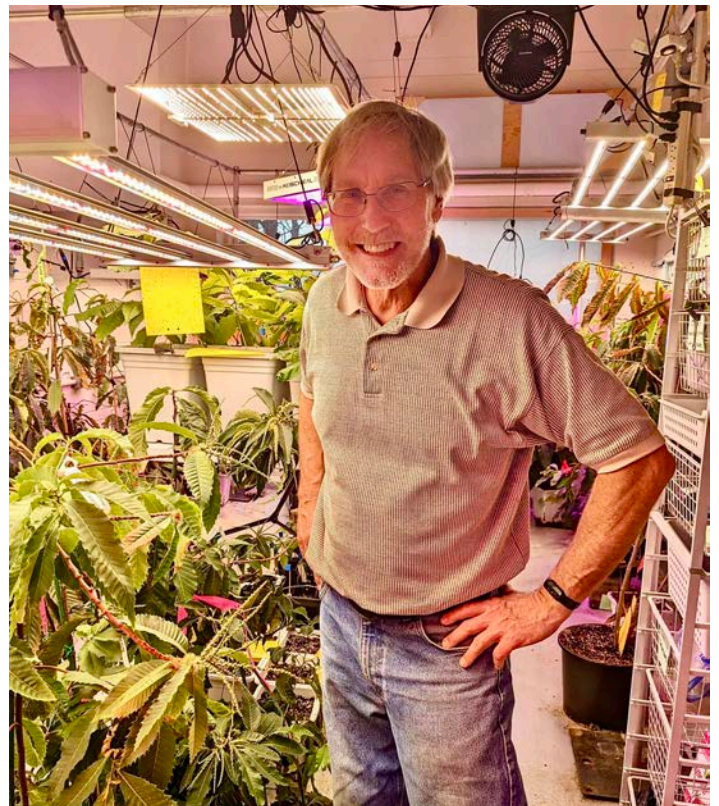
*Has anyone figured out how to speed breed the female flowers?*

So, yes, that is what my lab does now. At UNE we are producing burs and growing embryos from the transgenic flowers that have been pollinated by the transgenic pollen. So, we are producing nuts in the lab from wild trees where we are crossing flowers from the northern edge of the range in Maine with pollen from other parts of the range, such as the central-southern part of the trees range in Charlottesville, VA. Essentially we are doing nature's work by combining trees that

are both geographically diverse and genetically diverse. Large Surviving American (LSA) chestnut trees have the blight, but the blight has not won. We use these trees to produce viable blight -tolerant 100% American Chestnuts. Like what you learned in High School biology with Gregor Mendel and his peas, the breakthrough of this will be producing chestnut plants that have two copies of the transgenic wheat gene, and which have resistance with traits from both (LSA) surviving parent trees from different parts of the range!

*What is the advantage of the bio-engineered wheat gene spliced into the American Chestnut genome?*

It keeps 100% of the American Chestnut genome while adding only a single gene for resistance. This can be seen as largely the preferred option, since the advantage is that there is no loss of genetic material. As soon as you cross with the Chinese there is a loss of thousands of American Chestnut genes, which are evolutionarily adapted, and are needed in a future with climate instability and variability.



*Back to Mendel that monk from Austria, why is this important? Researcher Dr. Tom Klak surrounded by transgenic American Chestnut trees in his lab.*

Twenty-five percent of the nuts produced in the UNE lab from the pure American cross will have two copies of the blight resistant gene. These nuts will produce pollen with every grain containing the gene for blight tolerance. So this is the special pollen produced for the next generation, which is homozygous: where every pollen grain will have the gene. This is exciting because once we produce that pollen in time for the field season of 2024, every nut that is produced will be blight resistant. This essentially removes a big step in the restoration effort, since we won't need to genetically test every nut to see if it has the gene.

continued on page 18



Chestnuts, con't.

We can thus by pass the laborious step of genetic testing. (Of course, we'll continue to do spot checks to ensure we are still producing blight-resistant nuts.)

*How is this going to help?*

In the UNE lab, currently, we have 32 geographically and genetically diverse seedlings which were planted in December of 2021, so they are in the second year now. Every one of these seedlings has produced pollen. We have now stored enough pollen literally to pollinate all the American Chestnut trees that are still healthy and flowering out there. We hoped for and planned on producing this large quantity of pollen to be ready for de-regulation.

*Explain what you mean by de-regulation.*

Currently, we cannot use the transgenic pollen we produce yet in the wild or on any American Chestnut trees still flowering unless the site has a USDA permit. We are waiting primarily for the United States Department of Agriculture and the EPA to approve the use of transgenic American Chestnut pollen. The draft USDA report said that the supportive science is sound, and the risk is minimal, so that the use of the transgenic pollen can be de-regulated. What we are hoping for is that we will be able to use our stockpile of pollen for the summer 2024 breeding period throughout the American Chestnut trees' range.

*How does the conservation community characterize the American Chestnut?*

Throughout the American Chestnut tree's range from Mississippi to Maine, there are millions of chestnut trees in existence but overwhelmingly they are stump sprouts growing from the surviving root systems of trees that where once killed by the blight. These trees rarely make it to maturity, so therefore they cannot repopulate and re-expand in their range. Currently, American Chestnut trees are functionally extinct, and are one step removed from full extinction. Without intervention, there is not enough resistance in the population for it to ever repopulate the eastern forest.

*Ideally, how does American chestnut restoration play out? Based on the success you are predicting, will we have a significant component of native, blight resistant American Chestnut trees as an important component of our forests in the next 25 years?*

Four billion trees across 200 million acres is what American Chestnuts used to occupy. So, to get there certainly won't be in our lifetimes, not even close. Immediately, after de-regulation, my goal is to get as many crosses accomplished as possible. How many wild

flowers across the range of this tree can we put the pollen on that we have stored in the freezer right now? We have more pollen stocked up than there are wild flowers to accept that pollen. Hopefully we will have deregulation in time to take advantage of the early flowering in the South and the late flowering in the north in Maine and New Hampshire. We are lucky here because we have the latest bloom, so we can pollinate flowers as late as July 20th, where in Charlottesville, VA they are done before the end of June. We actually have fast-growing pure American trees in Orono, and even Fort Kent, Maine. The trees in Orono are only three years old and somehow Bucky Owen has gotten some of them to flower. So, if we get as many flowers as we can pollinated, we will have vastly greater quantities of nuts. Perhaps then, next summer we can do more restoration work, and start putting young saplings and seedlings in forest openings. We want to transition from primarily having pollen, to possessing good quantities of nuts, seedlings and saplings to advance our ability to re-introduce these majestic hardwoods back into the forest.

*So we are at the very beginning stage of restoration. Are there any examples in the past of species loss and this type of intervention where a species comes back from the brink of extinction?*

The American Chestnut is the case study to show how to do it and model it for other species. That is definitely a contribution of this biotech work. What does it take to come up with a recipe that works and is supported by good science, then gets through the regulatory process? Hopefully this will be a successful example of that. We might then be able to look at some of the other species we are losing to introduced pests

and pathogens such as Hemlock, Beech, Butternut, Ash and Elm. And how do we deal with all the other invasives that are putting holes in our leaves (spongy moth and winter moth) and holes in our forest?

The plan is to take the success of this process and the hopeful reintroduction of this keystone species and share the knowledge to be applied to other interventions. Biotech is a tool and not



*Dr. Klak preparing to pollinate and protect (bag) wild chestnut flowers with transgenic pollen (top). How the tree looks with the protection in place (bottom).*



necessarily the answer in all cases.

*What do you think Aldo Leopold would think about this intervention and this process?*

Aldo already knew about and had personal expressions of anger with his experience dealing with cheat grass invasions throughout the western US. I think he would be thinking creatively about restorations and dealing with invasive plants and insects. He would be interested in a healthy landscape and options for how we can get there. Aldo Leopold would not be so narrow to think that biotech cannot contribute to restoration.

*Isn't an invasive species an introduction of a complete genome?*

When we brought the genome for fungal blight into this country a century and one-half ago, we brought an entire genome into an ecosystem which wiped out a keystone species. Why aren't we angry about that? Some people think that it is impure to add or splice that one gene from wheat for blight tolerance into the American Chestnut. Our keystone species, the American Chestnut, cannot survive this exotic genome that we introduced. All we are doing is giving the wild tree a chance to survive again. We have been making decisions about what should or should not grow in our cities and suburbs and in our forests and on our farms for thousands of years. The whole world's ecosystem has been incredibly changed by our decisions. The idea that we need to keep nature pure is nonsense. We've changed the ecological balance throughout the world, mostly for the worse. So why don't we try to reverse this process and move it in the right direction?

*Restoration Ecology is one of the youngest sciences. Many times, we don't know the end game and we cannot predict the outcome, or our predictions tend to be way off.*

We are very good at wiping stuff out and we are pretty bad at putting things back together in a meaningful, healthy way. There is no way anyone should be threatened by this effort to splice one wheat gene into the American Chestnut to give it a chance at combating the whole fungal blight genome. Nature works in strange ways. We are finding that it is not a classical "tree of life" that succinctly describes the truth of evolution. It is more a tangled web of life with representations of viruses and bacteria moving genetic code around like Pokémon cards. The marketing ploy that portrays all genetically modified organisms (GMO's) as dangerous is a way for companies to make money without creating understanding. Many of our vegetables have been made better through selective breeding; tomatoes, peppers, wheat, Brussel sprouts, rice, sweet potatoes have all been made sweeter or more flavorful through creative tinkering. None of this is fundamentally different from adding a single gene to a wild tree to keep it alive in nature.

*Thanks for your time this afternoon, Dr. Klak. I am sure our readers would like to know where they can go for more information and to dive deeper into this pioneering work re-introducing the American Chestnut tree to our eastern forests.*

My pleasure, it was a fun and engaging interview. I can be reached at [tklak@UNE.edu](mailto:tklak@UNE.edu). If you'd like to support chestnut restoration, consider becoming a member of the American Chestnut Foundation ([taf.org](http://taf.org)).

## Introducing NH Audubon's *Legacy Guild*

Have you thought about making a gift in your will to support a cause that has been important in your life?

Nearly every year, NH Audubon is the fortunate beneficiary of planned gifts. One of our longtime supporters was Greg Doane, who honored and included us in his estate planning (along with several other environmental nonprofit organizations).

Greg was a longtime NH Audubon volunteer. His wife, Wendy Schorr, had been a 12-year employee at Amoskeag Fishways Learning and Visitors Center, and she and Greg were both fierce advocates of, and donors to, environmental causes. Together, they actively supported many nonprofit organizations through volunteering and generous



*Longtime supporter and donor Greg Doane and his wife Wendy Schorr championed wildlife and conservation through a legacy gift to NH Audubon. Photo by Janet Bourne.*

contributions to protect and support wildlife and habitat conservation. We are grateful for their decades of membership and volunteerism at NH Audubon.

Greg passed in 2021, and his wife Wendy passed in 2010. Greg's brother, Eric Doane, recalls, "They really left a great legacy by living frugally and supporting nature, realizing that it is under constant threats, especially now with global warming."

NH Audubon's new Legacy Guild makes it possible for you to protect New Hampshire's wildlife and provide environmental education for years to come. When you leave a bequest to NH Audubon, you help ensure that our conservation science and nature education will continue, and that New Hampshire's wildlife will have strong advocates for years to come.

*Learn more about becoming a member of the Legacy Guild by emailing Director of Development Hope Jordan at [hjordan@nhaudubon.org](mailto:hjordan@nhaudubon.org), or by calling 603-224-9909, x307.*



# SANCTUARY VOLUNTEER NOTES

Story and photos by T. Parker Schuerman

## SILK FARM WILDLIFE SANCTUARY, CONCORD AND CHASE WILDLIFE SANCTUARY, HOPKINTON

Eddie Damon and Tom Weston were at it again this year helping rent, transport, and operate a vibrating, walk-behind compactor to harden and pack the All Persons Trail. Eddie and Tom also helped with the initial brush cutting and clearing of tall forbs to widen the trail before the sod and 6-10" of soil was dug out and removed making way for better materials and drainage for the trail. The Dynamic Duo also did their best to keep the trails free of debris, branches, and overhanging grasses, especially on Wendy's Loop and the Orchard Trails. Trail and boundary reconnaissance continued at Chase Wildlife Sanctuary as well. Of course, another big acknowledgement goes out for all the super-hero efforts involved in pulling and storing the landscape fabric, and reseeding the Pollinator Meadow. Thanks everyone!

## PONEMAH BOG, AMHERST

George Rollend led a platoon of volunteers again this year at the Ponemah Bog made up of trail and boardwalk stewards, educators, trip leaders, and kiosk maintainers. A true force of nature, George and his compadres do such a great job at the bog throughout the year.



Volunteers enjoy a chilly appreciation picnic at Ponemah Bog Wildlife Sanctuary! Photo by Marti Warren.

## WILLARD POND, ANTRIM

Ashley Richardson and Morgan Jadis lead the Friends of Willard Pond, a group of local pond and trail enthusiasts that keep the parking lot, trails, and put in clean and clear. We owe Ashley and Morgan a huge "shout out" for leading this effort and keeping the trails and environs safe for animals and people.

## DEERING WILDLIFE SANCTUARY, DEERING

Deluca De Luca and Stephen Walker keep watch on both the nature on the trails and the nature of the trails and habitats at Deering Sanctuary. Thanks for your continued support and love of this gem in the rough.

## HOYT WILDLIFE SANCTUARY, MADISON

Again, gratitude should be given to Purity Springs Resort Staff and the leadership of Steven Hoyt for maintenance of the trails and the dam. Honorable and exemplary mention also goes to Heather McKendry who has kept up and kept on the trails for years and has moved on from this responsibility. Thank you guys for your zeal and "storm chasing" attention to detail keeping the trails and trailheads safe.

## KENAN-DEVAN WILDLIFE SANCTUARY, MARLBOROUGH

A new kiosk was erected and trails were maintained by Phil Brown and Andrei Campneau. Maps and educational signs are in the works so that both the views of Mt. Monadnock and the whimsy of the Pond's bog mat can be enjoyed and understood. Thanks Phil and Stephen Lamonde of Moosewood Ecological, LLC for leading walks and talks about our work to increase our understanding of bird populations before and after habitat manipulation.

## FOLLETT'S BROOK WILDLIFE SANCTUARY, NEWMARKET

Although she will be surprised that we paid attention, we must thank Ellen Snyder for her gentle nudging about invasive species and reminders about trail maintenance, early successional habitat needs, and co-management with nearby conservation properties in the Towns of Newmarket and Durham. Thanks Ellen!

## HEBRON MARSH WILDLIFE SANCTUARY

Speaking of getting nudged, Jim and Suzanne Marshall in concert with Roger and Carol LaFontaine led the charge to clean out and put up blue bird boxes around the grassland areas. A cold November day was made warmer by their enthusiasm and easy smiles as we erected new boxes and repaired old bird apartments for next year. An appreciation should be given to other Hebron Marsh enthusiasts who maintained and mowed the grassland and kept an eye or two on Ash Cottage. We won't name names, but we know who you are, and we are watching you.

## PONDICHERY WILDLIFE SANCTUARY, JEFFERSON

Long-time sanctuary steward and forester Dave Govatski and his wife Kathi have kept the magic of this place protected and maintained for years. Thank you for gathering up enthusiasm and volunteers and looking out for the turtles and other wildlife in this very special place.



# TIMBERLAND'S EARTH DAY EFFORT



*Timberland's Earth Day volunteer crew (inset) made a massive impact on Follett's Brook Wildlife Sanctuary, installing the new kiosk, clearing invasives, cleaning up trails, and building trail boardwalks and mobility device accessible picnic tables. Joined by the Town of Newmarket and Great Bay Partnership, it's hard to describe just how much work this group accomplished together on behalf of our Newmarket sanctuary (and the other sanctuaries receiving the picnic tables)! All told, they donated a whopping 705 hours of work time over multiple days and we can't thank them enough for their teamwork and dedication to conservation.*

## DAHL WILDLIFE SANCTUARY, NORTH CONWAY

Heartfelt thanks and appreciation goes out to the Police Department in North Conway for helping some interesting and colorful characters understand that these riverside forests, beaches, and open meadows are for nature to populate and people to enjoy without firepits, tents, and sleeping bags. The North Conway police have helped NH Audubon emphasize a "leave no trace" philosophy and helped many visitors carry out what they carried in, and we'll keep them on speed dial.

Because of the many storms this year, we have plenty of opportunities to work on the trails and sanctuaries throughout the state. Visit our website at [NHAudubon.org](http://NHAudubon.org) to find out how to get involved. Thanks to all our volunteers and we apologize to those we may have overlooked.



## NICE CATCH!

Roger Frieden was lucky enough to witness a Broad-winged Hawk grabbing dinner in Brentwood this April. Broad-winged Hawks will eat a variety of food like this garter snake, as long as it's available. Thanks for sharing this great shot, Roger!



# Growing a Vision the McLane Center Pollinator Garden

Story and photos by Diane De Luca

*"Everything that slows us down and forces patience, everything that sets us back into the slow circles of nature, is a help. Gardening is an instrument of grace"*

*—May Sarton, author and poet who shared her love of gardening in Nelson, NH*

I am thankful for the wide team that believes in the McLane Center Pollinator Garden – our dedicated volunteers, our many funders and supporters, and the visitors who come to share their offerings. All of whom believe in the power of gardens to positively impact our future.



## THE GARDENS

The pollinator garden is our teacher. Every year we take what we learn and continue to grow our garden. Overall the garden thrives with robust blooms across the season. With the gift of close and sustained focus, we are able to discern the pockets that can use a boost, the areas we can improve.

The plants guide us. The Anise Hyssop is flourishing in full sun with tall blooming spikes of lavender flowers that are magnets for bees and other pollinators (above). Tucked into a shadier part of our garden, the Hyssop is still beautiful but not as vigorous. We all note that moving this native plant into the sun will allow it to reach its full potential. These lessons play out in other parts of the garden. Shady sections with poor soil are the biggest challenge. Even with these challenging conditions we are learning. Whorled wood aster, blue-stemmed goldenrod and ferns are all now filling in these spaces.

## OUR POLLINATORS

Community Scientists continue to document the pollinator visitors to our garden. Photos are being uploaded to iNaturalist so that others can enjoy what is being documented. The Pollinator Garden was included in our first BioBlitz in 2022 (top right). The BioBlitz gave us the opportunity to bring together pollinator experts and volunteers to spend the day documenting everything seen and heard in our pollinator habitat. One of our garden volunteers, Kate Osgood, spent the season taking photos to document the changes. Some of her exquisite photos were on display at the McLane Center.

## BUTTERFLY GARDENS

We continue to expand our butterfly garden area by adding plants that will allow for nectaring, especially as migrating butterflies like the Monarch head into their fall migration. These intentionally managed gardens to support Monarchs and other butterflies have been increasingly shown to be critical for sustaining their populations as they migrate across the continent. Common and swamp milkweed fill some of our raised beds and serve as the host plant for the Monarch Butterfly (below). We are filling the surrounding area with joe-pye-weed,



asters, ironweed, and seeded annuals to help allow for nectaring well into fall. Our volunteers regularly search out and find the monarch caterpillar, excited to

follow their growth and share with those who visit the gardens.

## POLLINATOR CONTAINERS

A new initiative this year was the addition of pollinator containers. Lining the walkway into the garden, containers were placed to share ideas for creating pollinator habitat in small spaces, and the ability to make a difference for pollinator



conservation. Each container held plants that were attractive to a diverse group of pollinators. Signage at each pot and in the kiosk area detailed potential plantings and their attractiveness to a particular pollinator.

## PUBLIC EVENTS

A bonus in 2022 was the ability to bring back in person public events and to interact with garden visitors more closely. We continued our collaboration with Bagley Pond Perennials and Denise Dalaker to host an in person Native Plant Sale. Over 300 people attended and we are grateful to all the many homeowners who are working to build native plant gardens.

The Buds and Blooms program, a series of five family friendly offerings focusing on pollinators and developed under a grant from the US Department of Fish and Wildlife Services, were delivered monthly from May through September with support from the Benjamin Couch and Gertrude Couch Trusts. Lessons included interactive games, activities, and takeaways. Participants engaged in dissecting flowers, tracking down pollen granules, seeking “nectar” as a migrating butterfly and matching pollinators with their preferred food source, among many other opportunities to interact with the garden.

For the third year we were able to develop and offer a Pollinator Webinar Series that brought together a distinguished group of presenters with deep expertise in pollinator conservation. The series opened on Earth Day with a general presentation on the importance of pollinator gardens, explored topics that included hummingbirds, native plants, butterflies, bees and culminated with Doug Tallamy and his presentation on the “Little Things that Run the World”. Over 1,000 participants attended the webinar series, with hundreds more viewing the recorded series.

The first annual BioBlitz was conducted in the McLane pollinator habitat. With the help of three expert leaders that included entomologist Mike Thomas, botanist Emma Erler and butterfly specialist Heidi Holman our community scientists were able to make 184 observations and identify 106 species over the course of the day. The observation photos and identification were uploaded to the iNaturalist platform.

## 2023 HAPPENINGS

We were very excited to continue to grow our garden this year and share with visitors. A few of the events that took place in the recent field season included:

*A quiet moment in the garden (right); Great Spangled Fritillary on Purple Coneflower (top inset).*



*The magic of butterflies during the pollinator Bioblitz.*

- An in-person Native Plant Sale coupled with a Spring Craft Fair on June 4
- Continued Community Scientist involvement through the iNaturalist platform
- Butterfly monitoring trainings and the first ever Concord Butterfly Survey on July 29
- Regular “Ask a Pollinator Gardener” tabling through the garden season

We are incredibly thankful for the hard work of our garden volunteers. The garden flourishes because of their dedication: Sandy Bowles, Tom Bowles, Pam Freilich, Geetika Godavarthy,

Ginny Hast, Sheryl Ingraham, Linda Jaworski, Sandy MacIntyre, Nanci Mitchell, Cheryl Moelleur, Lucy Murcado, Kate Osgood, Ellie Peabody, Stephen Walker, Margaret Watkins, Nancy Wilson and Loya Rakesh Yadav.

Sincere thanks to the funders and supporters of the McLane Center pollinator gardens including the Benjamin Couch Trust, the Gertrude Couch Trust, the Butler Foundation, Walker Family Fund, US Fish and Wildlife Service, and the UNH Master Gardener Program.

We would not be able to do this work without your support.



# Resilient Raptors Webinar Series

## *Securing the Bald Eagle's Continued Recovery*

by Willa Coroka

Inspired by last year's success, the NH Audubon's Resilient Raptors Webinar Series returned for a second year. The star of the show for 2023 was the awe-inspiring Bald Eagle. With funds from a generous grant delivered by the American Bald Eagle Foundation, the five-part webinar series sought to highlight the history of NH's largest raptor from the pre-DDT era to today while presenting facts, stats, and personal stories delivered by senior biologist, Chris Martin.

Beginning in January and running monthly through May, each hour-long Zoom presentation covered an array of topics ranging from history and biology to behavior and adaptations and concluded with the current challenges these illustrious raptors face in a continuously changing world.

Attendees interacted with the presenters through allocated Q&A opportunities as well as occasional voluntary polls and were encouraged to follow two livestream nest cameras chosen because of their exceptional quality and proximity to New Hampshire. The US Steel Company's webcam along with the Pittsburgh Hays's webcam, both located in nearby Pennsylvania, provided excellent footage of the not-so-secret life of Bald Eagles. Livestream action provided excellent talking points for both presenters as well as participants and the audience agreed that growing eaglets offer excellent entertainment.

Attendance was better than expected with over one hundred



registrants for each webinar tuning in to learn more about these charismatic birds of prey. NH Audubon partnered with five libraries to expand beyond the Manchester and Concord area as seen in last year's series.

While Manchester City Library and Concord Public Library continued to support Resilient Raptors in 2023, new this year was the Baker Free Library

(Bow), the Chester Public Library, and the Pease Public Library (Plymouth). From flyers and social media posts, email blasts and

**"Your Bald Eagle webinar was amazing. Thank you so much for a wonderful event, getting to know this magnificent bird."**

**-webinar attendee**

displays, each library had a unique spin on how they promoted the Resilient Raptors Webinar Series while providing resources about birds of prey and conservation biology to their communities. We are so grateful for their support and are eager to continue bridging science and nature with literacy and the arts through further educational partnerships.

Recordings of the five webinars are available on our YouTube page under the Resilient Raptors playlist: [www.youtube.com/user/NewHampshireAudubon](http://www.youtube.com/user/NewHampshireAudubon).



Pittsburgh Hays Bald Eagle Camera Live Stream \*\*TWO EAGLETS!!!



# Urban Wildlife Program

## 2022-2023 Progress Report

Story and photo by Willa Coroka

This year's Urban Wildlife Program was the first in two years that found NH Audubon staff visiting students in-person at their respective Manchester city schools. Utilizing a hybrid model that presented the first and fourth lessons in participating classrooms and the second and third remote lessons via Google Classroom, both Willa Coroka (Education Specialist) and Ari Leo (Naturalist Educator) were able to reach a total of five different schools, 14 individual classrooms, and 292 third-grade students!

Meeting weekly over the course of a month, our first grant-funded lesson focused on Habitats. During this program, students are introduced to a variety of NH habitats and encouraged to think like wildlife as they sleuth out the similarities and differences in presented images. A habitat hunt to connect concepts follows this initial presentation before students are challenged with a matching

**The fourth and final program introduces students to a combination of 3-5 reptile and amphibian ambassadors...from turtles and snakes to tree frogs and bullfrogs, there is rarely ever a dull moment in this jam-packed exploratory lesson.**

detailed observations. Before we wrap up, students are offered the opportunity to interact with the various props we use

**Manchester school students were introduced to a box turtle and a painted turtle animal ambassador before "interviewing" them to learn more about the diet, light preferences, and adaptations of each.**

game involving various native species and local habitats. Lastly, students are introduced to two animal ambassadors from the Massabesic Center. A box turtle and a painted turtle are firstly observed before being "interviewed" by inquisitive kids so they can learn more about the diet, light preferences, adaptations, et cetera of each. Students are then encouraged to converse with one another and decide on an ideal NH habitat for each species based on their

throughout our presentation. The Habitat program includes mounts, pelts, skulls, feathers, antlers, quills, and a very popular rubber snake.

Our second and third programs are still virtually delivered and while 2D, they provide students with movement, challenges and engaging discussion. Mammals and Birds are both still remote lessons and may remain that way for the 2024 school year as we continue expanding our outreach throughout the Manchester SAU.



*Naturalist Educator, Ari Leo teaching a class of 3rd graders about reptiles and amphibians at Weston Elementary in Manchester, NH this Spring.*

The fourth and final program introduces students to a combination of 3-5 reptile and amphibian ambassadors who are used to demonstrate the various traits of each classification. From turtles and snakes to tree frogs and bullfrogs, there is rarely ever a dull moment in this jam-packed exploratory lesson.

We look forward to seeing what the 2024 school year looks like as we continue expanding this amazing Urban Wildlife Program!



# Massabesic Gardens: Oh, How They Grow!

Story and photos by Kimmie Whiteman

It has been nearly three years since I began my journey at the helm of Massabesic Center, and if there is any word to describe the experience, it is growth! In every aspect of the center, I see something growing. We're pruning overgrowth, thinning clutter, replacing faded with vibrant, envisioning new ideas and expanding. The metaphors abound, but the happenings in the gardens are mirroring what is occurring in the center itself. Importantly, we are flourishing under the care of our ever-growing team of volunteers and staff.

There are several distinct gardens at Massabesic, and I'd like to share a bit about each with you.

## GARDEN FOR THE SENSES

Facility infrastructure needs, including a new underground propane tank and gas line, a water pipe relocation, and the installation of a new kiosk in front of the center have wreaked havoc on our Garden for the Senses. This space is undergoing a redesign, which is in development. We've supplemented the visual features with potted plants that contain directives on whether you should look at, touch, smell, taste the plants, or listen to the sounds of the wildlife they attract. We used the momentum of destruction to give our rustling grasses a much-needed trim down. Expect them to grow back tall and full this summer to serenade your ears by the xylophone bench.

## CATHY SMALL MEMORIAL GARDEN

In an unexpected location next to the parking lot, the Memorial Garden at Massabesic was installed over a decade ago



*A Cosmos thrives in the gardens at Massabesic Center!*

in remembrance of one of Massabesic's volunteers. This space was recently revitalized by NH Master Gardener Lisa Dumont and the rest of the volunteer team, and provides a peaceful place to sit and watch the comings and goings of the sanctuary – people and birds! The plants are a mix of natives and non-natives, with a special grouping of begonias, Cathy's favorite.

## DEMONSTRATION GARDENS

Our successful partnership with University of New Hampshire Extension's Master Gardener Program is formally in its third year. Together we have created a Demonstration and Teaching Garden, which provides a place for sharing best practices in eco-friendly home and community gardening to benefit the health, well-being, and habitat of humans and wildlife. We hold regular workshops highlighting various areas of the space on topics such as composting, raised bed gardening, vegetable growing techniques, rain gardens, pollinator and bird-friendly planting. A mix of in-person and virtual experiences have helped us teach environmentally sound gardening techniques to over 300 people this past year. Additionally, visitors can often find NH Master Gardeners working in the garden, eager to show off a budding bloom, a visiting butterfly, or just to say hello.

## VEGETABLE GARDEN

The recently erected fence on the sanctuary was designed to allow for maximum visualization of the crops growing within. Effective as a wildlife deterrent, we don't mind sharing with the birds who fly in from above. If we can grow crops in a wildlife sanctuary surrounded by groundhogs and rabbits, let us teach you how, too! Our yield is shared with the animal



*Native plants line a path to the fenced vegetable garden, nearly engulfing Extension Master Gardener Coordinator Ruth Smith.*



ambassadors who live in our centers, as well as New Horizons and the New Hampshire Food Bank in Manchester.

## POLLINATOR GARDENS AND MONARCH WAYSTATION

Our pollinator-friendly garden spaces are thriving! The gardens are a regular destination of wildlife and nature photographers, including our volunteer photography expert, Tracy Brunner, who leads regular workshops at Massabesic to teach nature photography skills.

## BIRD-FRIENDLY GARDEN

Our newest Demonstration Garden element, the Bird-friendly Gardens, are located directly outside the windows of the center. These gardens provide a focused refuge for local birds and help us showcase ways you can forgo feeders to instead provide natural bird food in your yard. These gardens are also ideal for teaching how to keep your windows bird-safe while maintaining excellent bird-viewing opportunities.

## RAIN GARDEN

The Rain Garden was revitalized in 2022 by NH Master Gardeners Betty Jipson and Brian McPherson, with guidance from Lisa Loosigian of NH Department of Environmental Services' Soak Up the Rain Project. The gardens are doing their job catching water runoff from the center's roof and feeding it right back into water-loving plants, such as the hummingbird favorite Cardinal Flower.

## WEDDING GARDEN

In the center of the Demonstration Gardens sits a space we refer to as the Wedding Garden, overseen by long-time volunteer gardener, Dee Cleary. Brimming with peonies, dahlias, hydrangeas, zinnias and more, it creates a stunning backdrop for weddings held on site at Massabesic. With plenty of winter interest left even through the cold months, you can always find visitors taking photos in front of the space or under a pergola. The garden's central location in a sea of native plants helps us teach about greener gardening and ways to include some of the gorgeous ornamental plants amidst wildlife-friendlier alternatives.

## WHAT'S IN A NAME?

A space next to the barn that was originally known as the Hummingbird and Butterfly Garden has recently become part of a formal stewardship agreement with the Massabesic Garden Club. We are looking forward to revitalizing this 20-year-old garden into a native plant haven for wildlife, a move that would



*Dusk captures the garden beauty with Massabesic Center in the background. Made up of multiple smaller garden styles, it takes many hands to maintain by a cast of dedicated volunteers and partners.*

have elated the garden's founder, Chris McLaughlin, who passed away last year.

It is hard to attribute enough credit to our volunteer grounds and garden team. Between our gardeners, the grass mowing team, the builders and the heavy lifters, and even Boy Scouts and Girl Scouts, it truly takes a village to maintain the Massabesic Center and Wildlife Sanctuary. We have thirty-five volunteers on our Grounds and Garden team who remain committed to growth at Massabesic and NH Audubon, and that includes an ever-expanding team. If you would like to get involved, please reach out, or come to one of our upcoming Garden Tours. We can't wait to see you in the soil!



*Past renovations and center maintenance give the Garden for the Senses new room to grow at the entrance to the center.*





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## Enchanted Forest is Back!

**FRIDAY OCTOBER 20 & SATURDAY OCTOBER 21 AT MCLANE CENTER IN CONCORD**

Join us for the always anticipated Enchanted Forest with some brand new skits, indoor activities, treats, and enchanting fun. This event is for ages 4 to adult and is ideal for families, scout troops, youth groups, and anyone looking for an evening of non-scary fall entertainment.

Follow the enchanted trail into the nighttime forest (early tours are during the daylight; later tours are on dark trails in the woods, illuminated by real jack-o-lanterns). Encounter larger than life creatures and characters as they perform skits about mysterious activities in nature, then gather

around a campfire for engaging stories.

Fifty-minute tours will run from 5-9pm, but plan to allow at least 30 minutes before or after to enjoy



**This year's Enchanted Forest will explore some rare New Hampshire animals to celebrate the 50-year anniversary of the Endangered Species Act.**



the indoor activities, live animals, face painting, games, raffle and refreshments!

Arrive 15 minutes before your scheduled tour to allow for check-in and orientation. The event is rain or shine – skit sites are covered, and indoor options are available for severe weather.

Cost: \$12 for members, \$15 for non-members. Group rates available for scout and youth groups: call for availability.

**Preregistration for a specific day and time slot is required. This popular event sells out! Sign up early for your preferred time slot.**

Register online at [www.nhaudubon.org/EF](http://www.nhaudubon.org/EF).

Call Anita Fernandez at 603-224-9909 ext. 400 with any questions.