Pennsylvania Natural Heritage Program

information for the conservation of biodiversity

WILD HERITAGE NEWS

Winter 2017-2018

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Photo Banner:
EYE Con participants conduct a salamander study

Miranda Crotsley
DCNR, Jennings EE Center

A Network of Connections

by

Scott Schuette and Jeff Wagner

PNHP has the good fortune of being a robust program with a wide range of expertise. We are a partnership that draws on the research and resource management experience of three state agencies and a large regional conservation organization. However, our strength is not confined simply to taxonomic expertise or information management capacity. A big piece of what we do and what we strive to do is connect our information and expertise to those outside of our partnership. We want to see our information and expertise used for good conservation wherever the opportunity exists. With the Western Pennsylvania Conservancy as the non-profit partner of PNHP, we have the flexibility of extending ourselves into other areas of interest such as training and education, collaborative research, and outreach to public and private resource managers. In this edition of our newsletter, we will look at some of our projects and initiatives that are particularly collaborative and help to make connections that extend our reach and impact.

Our staff scientists recognize that it is imperative to expose more people to conservation principles and provide them with a deeper understanding of the natural world if we want new generations to care about the environment and conservation. A good example of our foray into the education realm is our Experiencing Your Environment through Conservation (EYE Con) Program. For the past three years, we have received grants from DEP to collaborate with DCNR at Jennings Environmental Education Center, Raccoon Creek State Park, and Ohiopyle State Park to host summer camps for high school

Adam Hnatkovich

EYE Con participants examine a soil sample from a forest community at Jennings Environmental Education Center.

students. Over these four day outdoor programs, participants interact with conservation professionals who have made protecting the environment their career. Throughout the week students are immersed in the practice of field biology and ecology to better understand what field scientists do and why.

Adam Hnatkovich

PNHP staff lead students from the Environmental Charter School on a birding excursion.

The work we do with a public charter school and a private school in Pittsburgh is another example of our staff engaging younger generations. Through their environmental curriculum, we instruct field classes that focus on several aspects of field and conservation science. The students get to meet scientists and see the outdoors from a different perspective.

Effectively engaging other groups of people requires that our staff scientists have in-depth training on a variety of subjects. To enrich our understanding of the regional diversity of plants and animals, some of our scientists attend workshops offered by other organizations. These include the "sedge camp" offered by the New York Flora Association, the Master Naturalist series at the Edge of Appalachia Preserve in Ohio, and the plethora of field and identification courses offered by the Eagle Hill Institute in Maine. The Eagle Hill courses are week long intensive explorations into biodiversity and ecology and are considered among the best offerings in eastern North America. Over the last two years, our staff scientists attended courses that increased their identification skill sets in sedges and moths, both groups with high diversity in Pennsylvania.

Pete Woods

Brian Pfeiffer, an instructor for Eagle Hill Institute's butterfly and moth course, teaching butterfly identification.

As we grow professionally and hone our expertise, we also provide training opportunities to the public through our own series of workshops. The Pennsylvania Botany Symposium provides local identification workshops on a variety of plant groups, such as grasses, sedges, goldenrods, and aquatic plants. We also provide training through our iMapInvasives program where people learn how to enter observations of invasive species into a statewide database.

Lisa Smith

A participant in the grasses, sedges, and rushes introductory workshop during the PA Botany symposium is examining the floral structures of grass flowers.

A natural outgrowth of the networking that happens during workshops and training activities is collaborative research projects. One such project was between PNHP Inventory Manager Scott Schuette and Bucknell Professor Chris Martine to investigate and collect material for genetic analysis of the state's only population of the state endangered, cliff-dwelling golden corydalis (*Corydalis aurea* ssp. *aurea*). This effort involved PNHP field staff, Bucknell students and staff, and members of the Merrill Linn Conservancy to highlight the importance of rare plant conservation in Pennsylvania as the subject of the new episode of "Plants are Cool Too" video series. With scientists rappelling over the side of the cliff, the film crew collected footage of the descent and plant surveys with a drone that was launched from a boat on the

Chris Martine

PNHP botanist Scott Schuette is directing Dr. Jason Cantley toward a population of *Corydalis aurea* during filming of an episode of "Plants are Cool Too."

Susquehanna River. After two days of filming that included subsequent surveys from the base of the cliff and students assisting with collecting material and pressing plants in the field, Martine and Schuette discussed the potential of a continued partnership between PNHP, DCNR, and Bucknell to establish a rare plant conservation genetics program.

Throughout the entire project, images and videos of the work were posted to various social media outlets highlighting the activities. An unintended and fortunate consequence of this close collaboration was the discovery of the globally imperiled plant, white alumroot (*Heuchera alba),* via a picture that Chris Martine posted to Twitter that was later identified by the regional expert in the alumroot group. Subsequent discussions and investigations of existing herbarium material led to the drafting and submission of a publication to the online journal PhytoKeys that added a new plant species to the Pennsylvania Flora.

Pete Woods

Open and forested wetlands provide essential breeding and nectaring habitat for Baltimore checkerspot (*Euphydryas phaeton*).

This is just one example of collaborative research projects that PNHP views as important to building the strength of the program partnerships. This year saw several other types of collaboration across the program including regional projects that demonstrated the program's expertise. As a member of the NatureServe Network, we assisted with a regional species ranking project as well as a regional species distribution modeling effort. With funding awarded through the Northeast Regional Conservation Needs Program, we participated with other programs in an effort to better understand and predict the distribution of fourteen rare wetland butterflies. Similarly, we collaborated with other northeastern U.S. programs to refresh information concerning the distribution of the bog turtle – a federally endangered species. All of these efforts have led to additional work and helped us focus on expanding our collaborations at a local level.

JoAnn Albert

PNHP staff with Erie County landowners discussing best management practices for a vernal pool on their property.

Each of the initiatives and projects we have talked about incorporate some form of outreach and support of public or private conservation efforts. However, we have several projects focused directly on outreach to private landowners and other land trust organizations across the state. Our vernal pools work over the last nine years is a good example of how we have taken our information and understanding of these important wetlands and reached out to those in the best position to help conserve them.

As we move into the upcoming year, we see exciting opportunities for research collaborations, as well as outreach efforts with private landowners and other land trusts, and have confidence that our network of connections and collaborations will grow.

Training

Eagle Hill Institute
iMapInvasives

Eagle Hill Institute, Maine
Sedges and Rushes Workshop
Jaci Braund

They say the best way to learn something is to become immersed in the topic. This learning method is probably more common for foreign languages, but it is also quite effective for learning difficult groups of plants. In July, I participated in a weeklong workshop on sedges and rushes at the Eagle Hill Institute in Steuben, Maine that stretched my botanical knowledge to the next level. Our instructor Tony Reznicek, the Curator for the University of Michigan Herbarium, has been teaching this course at Eagle Hill for 13 years. Tony has spent the majority of his professional career teasing out sedges, cataloging plants all over the world, and writing the field manual of Michigan flora (published in 2012).

Jaci Braund

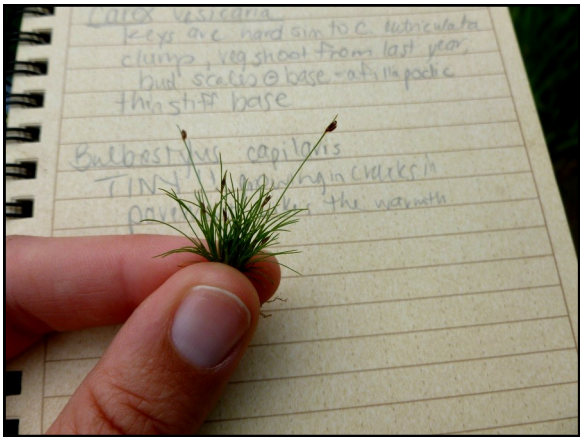
Carex canescens grows in wetlands and is common from Pennsylvania throughout New England.

We spent the first morning in a gravel pit on Eagle Hill's property, which was not exactly what I thought we would be doing in picturesque Maine. However, this early successional pit had an extensive amount of diversity compared to the surrounding landscape and provided a chance to see many seed-banking species as well as species that respond well after a fire (or a bulldozer that replaces a fire cycle). One of the more intimidating aspects of sedges and rushes is that not only is the key incredibly long, but there are many unique terms and characteristics that require a microscope to view. Tony taught us a trick to divide the key in half or separate it into sub-genera. This was the first of many "ah-ha!" moments during the week and each of them in turn made that intimidating key seem relatively easy.

Over the course of the week, we botanized in a variety of different habitats to see different species. We celebrated the Fourth of July by visiting a salt marsh, where certain species stick to specific areas of the marsh. We found *Carex paleacea* and *Carex hormathodes* strictly at the edge of the marsh, not penetrating the salt and found *Bolboschoenus maritimus* and *Carex mackenziei* among other halophiles (salt tolerant species) in the middle of the marsh. Our botanizing led us to a surprising rich fen meadow behind the administrative building for the town of Steuben, where we focused on vegetative characteristics of sedges such as *Carex utriculata* and *Carex vesicaria.* Halfway through the week we were still exploring new habitats with different species. We went to a beautiful lake to review some of the aquatic species and then to the forest to observe some "woodland danglers" as Tony referred to them. After a quick dip in the lake, we all hiked up Schoodic Mountain. The trail didn't have many species of sedges, but the 360-degree view at the top was incredible! The botanizing at the end of the week included a heath, another gravel pit, Acadia National Park, a marsh where freshwater and saltwater meet, and lastly, the Petit Manan Wildlife

Jaci Braund

Juncus militaris is Endangered in Pennsylvania but is fairly common in shallow water in Maine.



Jaci Braund

Bulbostylus capilaris is one of the tiniest sedges and is usually found in gravelly areas of roadsides.

Jaci Braund botanizing at Acadia National Park

Refuge. We hiked out to the ocean at the refuge, walked north along the pebbly beach until the natural retaining wall held a bog on the other side. The bog was several acres and allowed for orchid-gawking at its finest.

As I was writing this article, I was using the Rite in the Rain notebook I decided to buy before I left. I was thankful I did. I filled up almost an entire notebook with notes on the species we saw, inflorescences taped on the pages and several pages of "Carex Tips." We observed 94 species of sedges and rushes, with 78 present in Pennsylvania. This overlap in the species was a pleasant surprise and made the course even more useful.

Eagle Hill Institute, Maine
Moths and Butterflies Workshop
Pete Woods

In the summer of 2016, I attended the week long "Moths and Butterflies" seminar offered by Eagle Hill Institute at the Humboldt Field Station in Maine. My main goal was to improve my moth identification skills,

Pete Woods

The entire class converged on a single tiny crowberry blue (*Lycaeides idas emptri*), at the only bog in the United States where the species is known to occur.

for the purpose of conducting inventories in Pennsylvania. Bryan Pfeiffer of Vermont taught butterflies, and Hugh McGuinness of Washington, DC taught moths.

In classroom sessions we learned about the taxonomy, morphology, and natural history of moths and butterflies. Every morning in the lab we sorted moth specimens from the traps we had set out the night before and practiced identifying moths. Every afternoon we had a butterfly field trip, when we practiced recognizing field marks, learning the way different species move in the air, swinging a net to catch a butterfly, holding a butterfly safely without injuring it, and improving our photography skills.

Pete Woods

Photographing moths at the lights at night.

Every evening we would turn on black lights and mercury vapor lights hanging on the outside walls of the buildings, which would attract moths from the surrounding forest. Just like the moths, we would spend hours perching near one light and then another, to observe, photograph, and identify the moths. Hugh would patiently remind us of the moths' names and point out their field marks, again and again, until it started to sink in. It was a hard decision to go to sleep each night, because new moths would keep showing up throughout the night. We didn't sleep in, because sunrise was the best time for moth photography. In the cool of the morning the moths could be moved from the walls onto more natural backgrounds, and the natural light made for better photos than the harsh purplish light bulbs.

One night a nearby trap caught a silver-spotted ghost moth (*Sthenopis argenteomaculatus*), a large and uncommonly seen species whose caterpillars bore into alder roots. I had always wanted to see the mating

dance of this moth, so that night at dusk I went back to the shrub swamp, and searched for moths with my flashlight. Thirty minutes after sunset, the males began to fly. Each one would choose a spot above or between shrubs and fly in a U-shaped pendulum flight about three feet wide. The purpose of this flight is to disperse the moths' pheromones on the air to attract females. Within a half hour, all of the moths were done dancing and disappeared. The next evening, many of the students came to see the dance, and we were rewarded with several dancing males. On the following day a film crew was visiting, and we took them to see the moths… but we didn't see a single dancing moth that evening. There have been several reports of these moths in Pennsylvania, and we are not yet sure if they are rare, or just rarely seen, but my experiences here gave me the knowledge I needed to do surveys for these moths in Pennsylvania.

Pete Woods

Silver-spotted ghost moth, *Sthenopis argenteomaculatus*. The red spot on the shoulder is not a wound (moths don't have red blood) but is the normal color of the base of the wing.

Pete Woods

This is a photo of the best moth we saw all week. Why do I say that, when the pink-and-yellow rosy maple moth (*Dryocampus rubicunda*) is very common in both Maine and Pennsylvania? Read the rest of this article for the answer.

It was valuable to gain experience with a number of moths and butterflies which are rare in Pennsylvania but are more common in Maine. Learning to recognize a moth or butterfly in the field is different from learning it from photos in a book. Part of finding and identifying a species is recognizing its habitat, learning how it moves and how the patterns on its wings look when it is in flight. In addition to the silver-spotted ghost moth, and several species that I am familiar with in Pennsylvania, I saw the following Pennsylvania species of concern for the first time: sundew dart (*Hemipachnobia monochromatea*), blueberry gray (*Glena cognataria*), black-banded orange moth (*Epelis truncataria*), cranberry spanworm moth (*Ematurga amitaria*), Arctic skipper (*Carterocephalus palaemon*), silvery blue (*Glaucopsyche lygdamus*), and the smallest dragonfly in North America, the elfin skimmer (*Nannothemis bella*). The next summer, when I caught a glimpse of a small orangish moth fluttering in a northern Pennsylvania bog, I knew immediately that it was the rare *Ematurga amitaria*.

I met an additional species of concern, shown in the last photo (bottom left). Look closely, there are two camouflaged moths sharing the photo with the rosy maple moth. Can you find them? These two moths are *Cerma cora*, commonly called the bird-dropping moth, a poor name since it clearly mimics lichens rather than bird droppings. Humboldt Field Station is known as the most reliable place in the world to find this globally rare moth. There has been only one sighting in Pennsylvania in recent decades, and field work is needed to follow up on it.

Much of a field biologist's expertise comes from long, usually solitary hours in the field and lab, but it is important to spend time learning directly from experts. It is also quite refreshing to spend time with other people who share my obsession to understand the small creatures we share this world with. I have continued to correspond with the students and teachers about moths, and Hugh McGuinness has identified hundreds of my moths online, including several cryptic species new to Pennsylvania that I might not have picked up on if not for his input.

I wish I could be a permanent summer resident at the Humboldt Field Station. The week-long natural history seminars offered by the Eagle Hill Institute are outstanding training opportunities and they cover a broad range of taxa and topics.

Invasive Species Data Supports Protection Efforts

Amy Jewitt

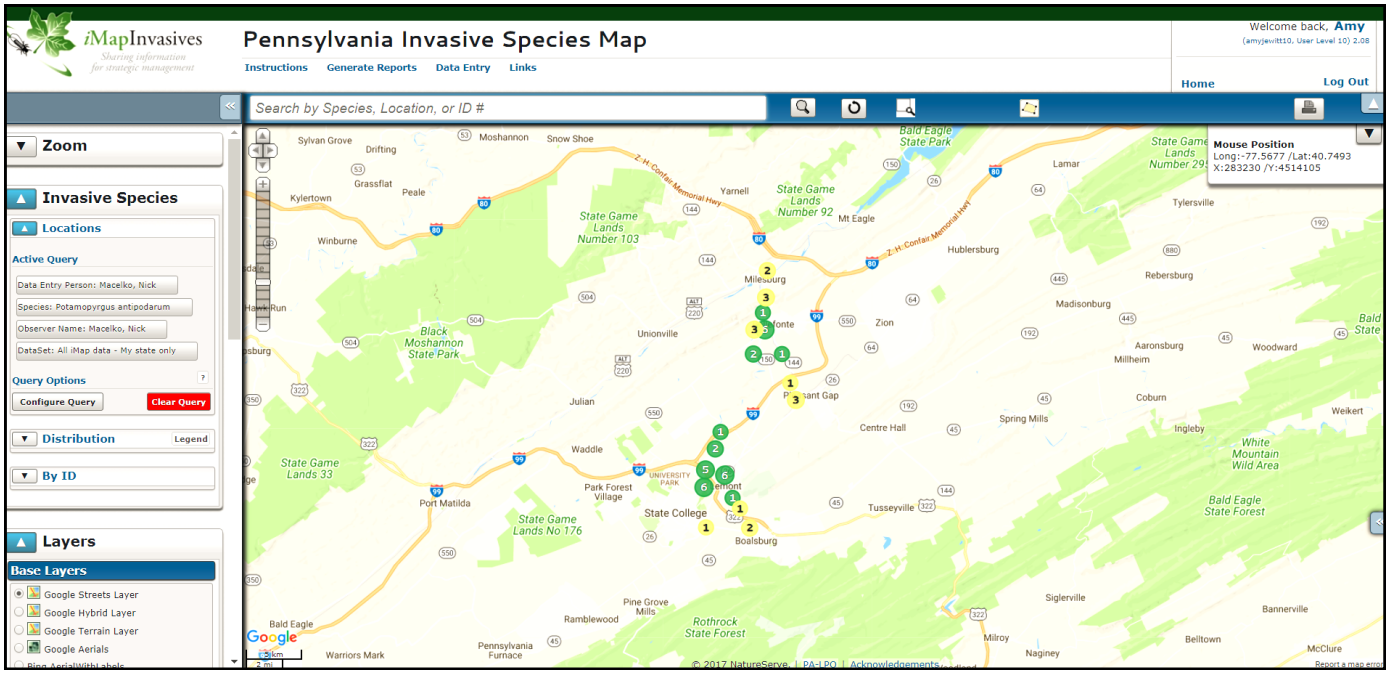
As a citizen scientist and a registered user of the Pennsylvania iMapInvasives database, Nicholas Macelko has learned how to use the iMapInvasives mobile app to record his findings of invasive species, and in particular his observations of New Zealand mudsnail (NZM) in Centre County. By documenting findings for this high priority aquatic invader, he helps natural resource professionals across Pennsylvania understand the current distribution of NZM and potential places where it may spread in the region. In 2017, Pennsylvania iMapInvasives staff trained citizen scientists, land managers, and natural resource professionals in the use of the program.

Nicholas Macelko

New Zealand mudsnail

Individuals and organizations often use iMapInvasives data for academic research or scientific analysis. Dr. Bethany Bradley of the University of Massachusetts Amherst utilized data from a variety of sources, including iMapInvasives, to determine the types of data needed to create spatial modeling maps that would predict locations where invasive species could spread and potential abundance at these sites. The study drew two conclusions: 1) occurrence data alone was not sufficient to understand invasive plant abundance at any one location and 2) abundance (i.e., assessment) data is the key piece of information needed to determine and prioritize treatment measures. We encourage documentation of assessment data on sites such as iMapInvasives by those in the field collecting invasive species data.

In July 2017, iMapInvasives staff conducted a special training for an event called the Water Chestnut Chasers Challenge. Participants searched the state's lakes, ponds, rivers, and streams for water chestnut, an invasive aquatic plant. Water chestnut forms monocultures on the surface of a waterbody, ultimately threatening native biodiversity and hindering recreational activities. The plant has distinctive whorls of green leaves and a small white flower, which blooms in the middle of the plant in mid-summer. Our training included information on how to enter observation,



Observation records of New Zealand mudsnail recorded by Nicholas Macelko. These findings of the New Zealand mudsnail help paint a picture of species distribution in the region

Ron Keeney
Conewango Creek Watershed Association

Water chestnut plant

assessment, and survey data, as well as know locations of water chestnut in the state. Participants in the event recorded both presence and absence findings in iMapInvasives for each waterbody they searched.

Results from the Challenge found 11 new waterbodies (or sections of a waterbody) where water chestnut was not previously known to exist. An additional 61 waterbodies (or sections of a waterbody) that were searched resulted in absence data for water chestnut. Both presence and absence data are crucial information for natural resource managers to guide future survey and treatment efforts. All data were catalogued in iMapInvasives and are available for view by any registered user. In particular, watershed specialists and natural resource professionals across Pennsylvania are encouraged to review a special data analysis that discusses the findings from this event, available on the Pennsylvania iMapInvasives website at https://docs.wixstatic.com/ugd/ed0c71_8caa758a4043466c9ed6654da2ab4f71.pdf.

The Water Chestnut Chasers Challenge, the spatial modeling project, and the NZM observation data documented using the mobile app all serve as good examples of how iMapInvasives compliments the goals and conservation priorities of the Pennsylvania Natural Heritage Program. By documenting locations of invasive species, plans for protection of rare, threatened, and endangered species can be better informed. By analyzing invasive species abundance data, risk assessments can be created which are then useful for prioritization of future survey and treatment efforts. Lastly, by combining the efforts of citizen scientists, land managers, and natural resource professionals, we can gather a diversified pool of invasive species data for use in strengthening our knowledge base of which invaders pose the biggest threat to species of greatest conservation need in Pennsylvania.

In 2018, another round of trainings will be conducted by Pennsylvania iMapInvasives staff including both webinar and in-person sessions. To see a schedule of trainings for 2018, please visit the Webinar Training page of the Pennsylvania iMapInvasives website at https://www.paimapinvasives.org/training---webinar-trainings. If you would like to request in-person training for staff at your organization, please contact Amy Jewitt, Pennsylvania iMapInvasives Coordinator, at ajewitt@paconserve.org or 412-586-2305.

Nicholas Macelko

Bradford Reservoir in Bucks County, seen here, is currently suffering from an extreme infestation of water chestnut, which covers almost the entirety of the water's surface.

Education

Shadyside Academy
Environmental Charter School

Shadyside Academy Assessment
Jessica McPherson

Over the last year PNHP and WPC Community Forestry and Garden staff have worked with Shadyside Academy, a private school near Pittsburgh, to provide an ecological assessment of the campus grounds for their middle and high schools, and worked with teachers to bring local ecology into their classrooms. We described the natural areas on the campuses, which include forests and wetlands, and inventoried the native and exotic plant species present. We provided an overview of our findings to the middle and high school science teachers, as well as some background on local ecology to help contextualize the wild areas found on their campuses. One way we've connected with teachers is to orient the sixth grade environmental science class to diversity and ecological processes found in the wet meadow and small tributary before they started field projects.

Gavin Deming

Morrow's honeysuckle (*Lonicera morrowii)* is a non-native invasive species on the property.

Shadyside Academy initiated this project to assess their grounds as part of an interest in more ecologically oriented management of their campus, including stewarding the more intact natural communities present on campus, controlling invasive species, and utilizing native species in landscaping. Our staff are working with various parts of the school community to explore how to move this work forward and build educational connections wherever possible. For example, the high school environmental club would like to convert a hillside with a maintained lawn to a meadow of native plant species. We met with the club to provide some background on restoration ecology work, such as different approaches to finding native plant material, and considerations such as pH and moisture levels to match site environmental factors to plant habitat requirements.

Gavin Deming

We identified areas with potential for restoration of native plant communities, such as this wet area currently maintained as a lawn.

The meadow restoration project would provide abundant opportunities for student engagement. Science projects could be designed to investigate plant characteristics that could be used to guide the selection of species for planting and for monitoring the success of those plantings. This would give students insight into both biology and horticulture. Add to that the use of the meadow by pollinators or other animals and a connection can be made to the network of life that is present even in a school field. We also shared the results of our ecological inventory with the school community through a parent nature walk on campus, which may help to engage parent and student volunteers in restoration projects such as controlling garlic mustard or other invasive species.

Gavin Deming

WPC staff inventory a forest remnant.

Environmental Charter School Birding Class

David Yeany

Introducing students to wild animals, natural habitats and their ecology allows them to begin to understand the natural world on a deeper level. Since 2012, PNHP has been doing just that through our involvement with the birding class at the Pittsburgh Environmental Charter School (ECS). Laura Micco, who has taught this course to fourth through eighth graders, reached out to PNHP when she wanted to incorporate the experiences and knowledge of real world, local scientists into her curriculum for the two dozen or so new students she teaches each quarter. Using Frick Park as an outdoor classroom, students learn about bird identification, ecology, field data collection, seasonal migration and bird conservation issues, like habitat fragmentation and building window collisions.

Adam Hnatkovich

An ECS birding class at Tom's Run with PNHP ornithologist, David Yeany

PNHP staff make strong connections with Micco's students while leading them on field excursions on their school campus, Frick Park and to Western Pennsylvania Conservancy's Tom's Run Nature Reserve. By sharing real examples of bird conservation problems and solutions from PNHP's work ranging from the recovery of bald eagles to addressing the plight of our forest interior birds to the importance of habitat management using cases like the piping plover, we introduce students to a world of important environmental issues that they had never heard of before. Even more importantly, by providing expertise in bird identification and avian ecology students learn that the "black-winged red bird" they just saw outside their school is a scarlet tanager, and one of our forest interior bird Species of Greatest Conservation Need. Just as birds can be accessible indicators of ecosystem health, they are also great teaching tools to engage students in ecological study.

David yeany

Scarlet tanager

A major goal of this work is to help students become familiar with the natural world around them. Through that process, we hope they will develop an attitude of conservation and understand that it matters whether or not our native birds and their habitats persist into future generations. The ECS birding students are bright and full of questions. Micco encourages an open dialogue between PNHP scientists and her students and this makes our work seem that much more real to them. Micco has described the partnership with PNHP as a "holy grail" relationship that provides a conservation and learning experience for her students unlike that found anywhere else.

Through these experiences, we hope that students will be inspired, that they will develop a passion for biodiversity, and ultimately, be empowered to become our next generation of conservationists.

Resource Management

Massasauga Habitat
Vernal Pool Landowners
Land Trust Services

Massasauga Habitat Restoration

Ryan Miller

Typically the winter months are spent entering last season's field data, writing reports, and planning for upcoming projects. However, we also use the winter months to conduct some very important stewardship work for a unique endangered species.

Pete Woods

Eastern massasauga

A small crew of PNHP zoologists has been gathering during the coldest weeks of the year to improve habitat for the massasauga rattlesnake. While the snakes are hibernating deep underground in crayfish and mammal burrows that provide access to unfrozen groundwater, we are busy removing trees and brush that have overgrown the preferred old-field habitats that they prefer. One of the primary reasons the massasauga population is declining nationwide is from vegetative succession that casts shade over the once sunny fields and grassy areas that the snakes use for basking and foraging. Without these sunny areas, the cold-blooded snakes cannot carry out important functions like food digestion or gestation.

Over the past 10 years, PNHP staff have been working at massasauga sites on state and private land to help remove the brush and young trees that create shade and discourage the snakes from using the habitat. We use chainsaws and brush clearing saws in sensitive

Ryan Miller

A skid-steer cutting brush

wetland areas where the snakes are likely to be hibernating. During the winter or in less sensitive areas, we also have used contractors with rubber-tracked skid-steers with a brush cutter mounted on the front. These machines are very effective at removing large areas of brush in limited time and if done when the ground is frozen, there is no soil or wetland disturbance and more importantly no chance of disturbing or hitting a snake. This work also benefits species that prefer early successional habitat, like woodcock and grouse, which have also seen a decline in their populations.

The opportunities to conduct this important work have come from partnerships with the USDA Natural Resource Conservation Service, the Pennsylvania Fish and Boat Commission, the Pennsylvania Game Commission, the Pennsylvania Department of Conservation and Natural Resources and from generous private donations. These entities have provided funding for the habitat restoration, sent staff and equipment to conduct the work, and provided

Ryan Miller

Massasauga habitat before (left) and after restoration (right)

access to the areas that are in need of restoration. Private landowners have also been great partners in massasauga conservation. Many have been willing to meet with us to learn about the snakes, to share what they know and have seen over the years, to discuss permanent habitat protection through property easement or acquisition, and to allow habitat restoration activities. In December, one landowner granted the acquisition of 2.5 acres of massasauga habitat after learning about the snakes and their plight. Together, we have restored or expanded over 100 acres of habitat on public and private land. This winter our work will focus on Western Pennsylvania Conservancy property through a partnership with the Game Commission's Voluntary Public Access-Habitat Incentive Program (VPA-HIP).

Vernal Pool Grant Advances Conservation

Betsy Leppo

JoAnn Albert

PNHP staff surveying a vernal pool in Crawford County.

The Western Pennsylvania Conservancy recently received an $80,000 Community Conservation Partnerships Program (C2P2) grant from the Pennsylvania Department of Conservation and Natural Resources Bureau of Recreation and Conservation to conduct vernal pool and wet meadow research and conservation activities. PNHP will contribute an additional $80,000 in match for a total grant package of $160,000. We will use this grant to build upon decades of work that the Pennsylvania Natural Heritage Program has undertaken to advance wetland education, inventory, management, and long-term conservation.

Historically Pennsylvania had an estimated 1,127,000 acres of wetlands. Over the course of several hundred years, we lost approximately 56% of our wetlands, leaving us with less than 500,000 acres of wetlands today. Small wetlands such as vernal pools and wet meadows likely suffered a higher rate of loss since they are easily overlooked and were easy to drain or fill. Vernal pools and wet meadows can support specialist wildlife, and wet meadows are an important habitat for native pollinator insects. Small wetlands are particularly vulnerable to impacts from invasive species, forest pests, climate change, timber management, development, and other changes on the landscape. This project will support outreach and stewardship efforts that identify, protect, and restore vernal pools and wet meadows.

Betsy Leppo

Vernal pools provide habitat required by unique wildlife like this marbled salamander (*Ambystoma opacum*). Females lay small clutches of eggs in dry vernal pools in early fall and tend the eggs until the pool begins to fill with water.

We will visit sites and formulate management recommendations in collaboration with private landowners, conservation organizations, and natural resource agencies. We will also participate in and host trainings and workshops for landowners and partners to help them protect wetlands in their communities. We will also develop a wetland restoration demonstration site and workshop similar to what we conducted on The Nature Conservancy's Forest Pool Preserve in Cumberland County in 2010 and Gifford Pinchot State Park in York County in 2016. For more information on this project, please contact Betsy Leppo in Harrisburg at bleppo@paconserve.org or JoAnn Albert in Pittsburgh at jalbert@paconserve.org.

Betsy Leppo

Wet meadows are productive habitats full of plants needed by native pollinators. Swamp milkweed is a favorite nectar source for many butterflies, including this zebra swallowtail (*Eurytides marcellus*).

Helping Land Trusts Plan

Jeff Wagner

Pennsylvania can boast upwards of 100 land trusts scattered around the state, sometimes overlapping in their service areas, sometimes quite independent in a remote part of the commonwealth. Most are small organizations with limited or no staff but individually and in composite, these organizations protect thousands of acres of land and water each year. Smaller land trusts do not generally have access to or can afford consultation with professional biologists when trying to understand the resources on any given property of interest.

Rocky Gleason

PNHP staff conducted an inventory of a property that is part of Great Marsh, Chester County and was recently acquired by French and Pickering Creek Conservation Trust.

A grant from DCNR through the Community Conservation Partnership Program (C2P2) gave PNHP the chance to assist land trusts in better evaluating property that they own or ease or that they are thinking of acquiring. Along with inventory, general assessment and monitoring, we can also help with mapping, GIS analyses, and planning.

So far, we have worked with eight land trusts across the state. We have visited and inventoried remote acidic wetlands for the North Branch Land Trust in northeastern Pennsylvania, and mapped the vegetation and documented invasive species at a wetland in Centre County for ClearWater Conservancy. We evaluated and mapped land owned by Hollow Oak Land Trust in Allegheny County and surveyed for a rare plant on cliffs in Union County for the Merrill Linn Conservancy and the Pennsylvania Bureau of State Parks.

We will continue our work through 2018, follow-up with some of the projects we were engaged with from

Ephraim Zimmerman

The Hollow Oak Land Trust owns and manages properties predominantly in Moon and Robinson townships, Allegheny County

last year and select some new projects for this coming field season. Our experience has been very positive and we see that land trusts jump at the chance to collaborate and utilize our expertise to take a deeper look into the properties they own and manage. We will be presenting some of our work at the upcoming Pennsylvania Land Trust Association (PALTA) conference in April. If you are representing an organization that might be interested in taking part in this effort, please contact us or stop by if you attend the PALTA conference.

Vegetation map of Hollow Oak Land Trust's Forest Brooke Wetlands Conservation Area for use in management and stewardship activities.

Collaboration

Allegheny Bird Conservation Alliance
Pollinator Protection Plan

Allegheny Bird Conservation Alliance
David Yeany

In 2015, we were presented with a new opportunity for collaboration as we joined seven other local and regional conservation groups to form the Allegheny Bird Conservation Alliance (ABCA). The Natural Heritage Program at the Western Pennsylvania Conservancy teamed up with the Carnegie Museum of Natural History (CMNH), Allegheny Land Trust, National Aviary, Audubon Society of Western Pennsylvania, Humane Animal Rescue and Wildlife Center, Pittsburgh Parks Conservancy, and the American Bird Conservancy. Together we secured a National Fish and Wildlife Foundation (NFWF) grant that would bring together our previously individual efforts around shared goals for bird conservation.

David Yeany

Volunteers plant native shrubs, including spicebush, at Dead Man's Hollow to benefit forest interior birds like Kentucky warbler, a Species of Greatest Conservation Need.

Through the NFWF grant, awarded to CMNH, we addressed several bird conservation needs. We were able to continue the BirdSafe Pittsburgh project researching bird-building collisions in the Pittsburgh region. We advanced habitat conservation for forest interior birds at Dead Man's Hollow Conservation Area – one of the last remaining patches of intact forest in Allegheny County, and improved backyard stopover habitat for migratory birds with invasive species removal and native tree and shrub plantings. Pulling from each organization's membership base, we engaged local communities by recruiting volunteers for these habitat restoration activities. We continued educational work with groups like the Pittsburgh Environmental Charter School and hosted outreach events to raise

Colleen Yeany

After a showing of *The Messenger*, a documentary about songbird declines, ABCA partners discuss solutions to the threats facing migratory birds.

awareness about threats to birds, including a public viewing of the conservation documentary *The Messenger* followed by a panel discussion with conservation professionals from each ABCA member organization.

One unexpected result of our partnership's work was gaining recognition by the U.S. Fish and Wildlife Service and designation for Pittsburgh as an Urban Bird Treaty City – an honor held by just 28 U.S. cities. Building upon the designation, ABCA borrowed the main tenets of the Urban Bird Treaty with all organizations formally committing to work jointly on bird conservation in Western Pennsylvania focusing on the following goals:

1. Protect, restore, and enhance habitats for birds.
2. Reduce hazards to birds.
3. Educate and engage citizens in monitoring, caring about, and advocating for birds and their conservation.
4. Foster youth environmental education with a focus on birds.
5. Manage invasive species to benefit and protect birds.
6. Increase awareness of the value of native birds and their habitats, especially for their intrinsic, ecological, recreational, and economic significance.

Looking ahead, with a solid foundation of work already begun and core goals to narrow our focus, the ABCA will continue to seek opportunities to make western Pennsylvania a better place for birds and people. For example, an upcoming collaboration will be tracking movements and habitat use of breeding Swainson's thrush and wintering evening grosbeak with CMNH utilizing nanotag radio transmitters and the Motus Wildlife Tracking System.

Unveiling the Pennsylvania Pollinator Protection Plan
Betsy Leppo

Betsy Leppo

Monarch butterfly (*Danaus plexippus*)

Pennsylvania Natural Heritage Program staff and collaborators serve on various committees of the Pennsylvania Biological Survey (PABS), whose purpose is to increase knowledge of, and foster the perpetuation of, the natural biological diversity of the Commonwealth of Pennsylvania. Early in 2017, members of the Invertebrate Technical Committee of PABS joined the Pennsylvania Pollinator Protection Plan Task Force that developed the first iteration of the Pennsylvania Pollinator Protection Plan (P4). The P4 outlines the current status of pollinators in Pennsylvania, and provides recommendations for best practices and resources to support and expand pollinator populations. The P4 was developed as a collaborative effort with contributions from 36 individuals representing 28 state and national organizations and stakeholder groups. There are chapters on Best Practices for Forage and Habitat, Best Practices for Pesticide Use, and Best Practices for Beekeepers. The P4 is extensively hyperlinked to other online resources and can be viewed and downloaded at Pennsylvania Pollinator Protection Plan Website.

Betsy Leppo

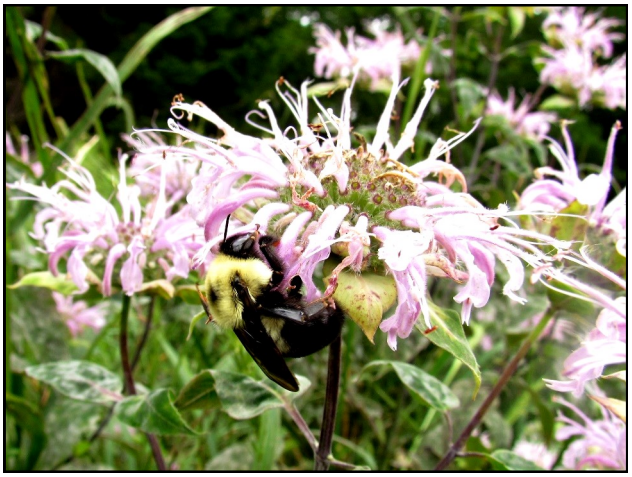
A flower fly (Syrphidae Syrphinae Syrphini)

A draft of the P4 was released for public comment in September of 2017. After the public review and comment period, a final section was released with recommendations for research, policy, and communication. The P4 was officially unveiled at a press conference held on January 8, 2018 at the Beekeepers Learning Center of the Pennsylvania Farm Show. Going forward, the P4 will be periodically updated as new information, recommendations, and programs arise. Comments for consideration in future updates of the P4 can be submitted online at http://ento.psu.edu/pollinators/p4-comments

Dr. Christina Grozinger, Director of the Center for Pollinator Research at Penn State University, has created a listserve for all of the people involved in the P4 task force and advisory board. In addition to P4-specific information, the listserve will be a place to share information regarding the P4 plan, other pollinator research, and related job postings. If you are interested in being added to the P4 listserve, please contact Dr. Grozinger at cmgrozinger@psu.edu.

Betsy Leppo

American copper (*Lycaena phlaeas*)



Betsy Leppo

Two-spotted bumble bee (*Bombus bimaculatus*)

Measures of Progress

The following Measures of Progress represent a significant cross-section of results of the work that we do as a program. These measures will be reviewed and updated, as needed, to best reflect the activities and goals of PNHP. Progress for these measures reflects seasonality of program activity.

Measure of Progress	Annual Goal (2017)	1st Quarter	2nd Quarter	3rd Quarter	4th Quarter	Cumulative Total	Percent of Annual Goal
Biotics Records Updated	300	137	207	111	200	655	>100%
New EOs Documented	800	234	286	141	551	1212	>100%
New Records Entered into PACE	350	0	0	291	164	455	>100%
Field Surveys Reported	300	76	104	127	119	426	>100%
New CPPs Developed	400	275	228	141	146	790	>100%
NHAs Updated	150	0	0	0	0	0	0%
Sites Actively Monitored	35	0	0	42	5	47	>100%

PNHP performs many functions and provides many services as part of its mission. The measures of progress that are detailed here are meant to capture a number of important program activities and provide a picture of our progress in achieving our essential goals. The program goals and the measures provided for those goals will change over time as we complete certain aspects of our work and as new program responsibilities arise.

Biotics Records Updated indicates the amount of activity expended in improving and updating the more than 20,000 records in the PNDI database.

New EOs Documented is a way to measure the success of our inventory effort in finding new occurrences of elements of ecological concern (plants, animals, and exemplary natural communities). Biotics records are created for each new Element Occurrence documented.

New Records Entered into Pennsylvania Conservation Explorer (PACE) indicates our level of activity in reviewing, quality controlling, and entering biotics records into the environmental review data layers. The timely and consistent refreshment of these data are critical to providing protection to the state's species of greatest concern.

Field Surveys Reported is a strong indicator of the effort expended on one of the basic functions of the program – inventory of the state's flora and fauna. Every field visit results in the entering of a field survey, regardless of the outcome of the survey.

New Conservation Planning Polygons (CPPs) Developed is a measure of our progress in creating ecological based mapping for the species and natural communities that we track as part of the PNDI database. Our goal is to have CPPs for all species and communities that we track.

NHAs Updated is a measure of our effort in developing, mapping, and describing sites (Natural Heritage Areas - NHAs) that are important to conservation of Pennsylvania's biodiversity. This process began with County Natural Heritage Inventory projects and will now continue at a statewide level with the updating of existing sites and the creation of new sites. Site polygons will be based upon and consistent with CPPs.

Sites Actively Monitored indicates how many established geo-referenced plots that we visited and sampled. These sites allow us to collect data on structure, species composition, and physical context (soils, hydrology, etc.) in a systematic way and by following the same protocols to directly compare future data to previous data.