

Pennsylvania Natural Heritage Program
ANNUAL REPORT 2024



MESSAGE FROM THE PROGRAM

We are fortunate to have a strong natural heritage program and had a successful year in 2024. We have many staff who specialize in various taxa and consequently we are able to add depth, from a biodiversity perspective, to many of our projects. Whether wetland classification work where we include insect and bird surveys to complement the cataloguing of vegetation or old growth assessments that include bryophyte and fungal (including lichen) surveys, we approach sites from a multifaceted viewpoint.

This was an intensive year for our work with invertebrates. We dug deeply into the assessment of over 1,400 invertebrates as part of the 2025 State Wildlife Action Plan (SWAP) update. With this update, we will have completed more assessments and gotten a better picture of the status and distribution of a number of groups as compared to what we were able to do for the 2015 update. We also took on numerous freshwater mussel projects to assess the possibility of reintroducing or supplementing populations into a number of waterways. Through our work, we also helped in seeing a rare crayfish listed as PA endangered.

Over the last decade we have worked closely with the Pennsylvania Game Commission to bring attention to a number of small mammals for which little recent data exists. Determining the distribution and assessing the size of populations is critical to taking effective conservation action for these species. Our work on the least weasel is a prime example of how difficult and time-consuming but ultimately rewarding this work can be.

We continue to update Natural Heritage Areas (NHAs), which traditionally had been through county specific inventories. We are mid-stream in our updates of York, Cumberland, Adams, and Franklin counties, but are also updating NHAs that are not part of a county-based project. With new database tools and continued orientation of our staff, we are moving toward seamless, continuous updating that will simply be a part of our core work.

Maybe every program in the network has its 15 minutes of fame and we are getting ours through an excellent invasive species film produced by our staff and Great Lakes Media & Film. The film, *Seeing The Unseen: Aquatic Invaders & What's at Stake*, is being featured in many venues and film festivals and has received great reviews! If you haven't seen it, do. The film can be viewed at <https://shorturl.at/0f6MS>.

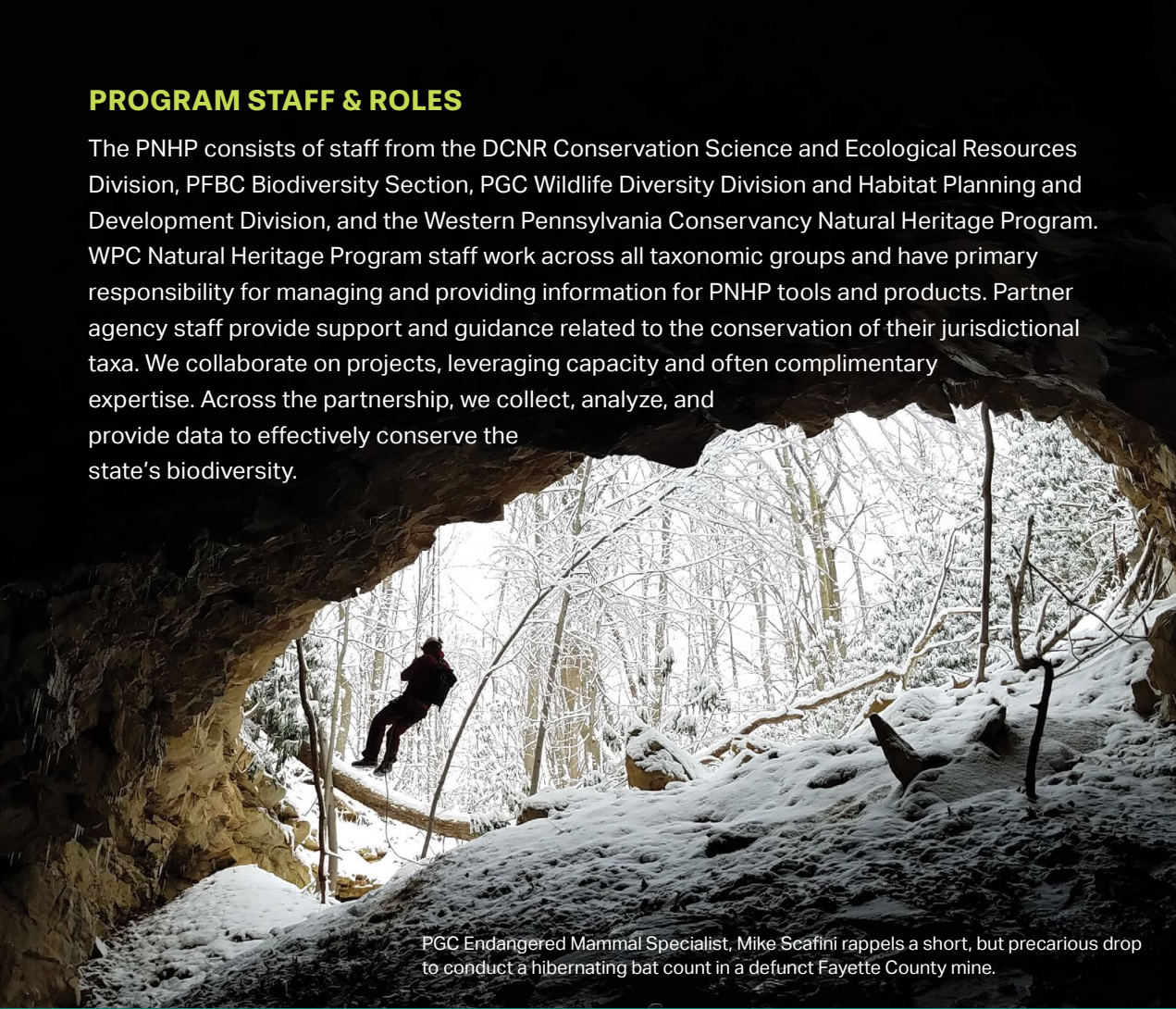
Greg Kedzierski helps prevent the spread of invasive species by using artificial lures while fly fishing French Creek.



OUR MISSION: *The Pennsylvania Natural Heritage Program provides scientific information, expertise, and assistance to support the conservation of biological diversity.*

PROGRAM STAFF & ROLES

The PNHP consists of staff from the DCNR Conservation Science and Ecological Resources Division, PFBC Biodiversity Section, PGC Wildlife Diversity Division and Habitat Planning and Development Division, and the Western Pennsylvania Conservancy Natural Heritage Program. WPC Natural Heritage Program staff work across all taxonomic groups and have primary responsibility for managing and providing information for PNHP tools and products. Partner agency staff provide support and guidance related to the conservation of their jurisdictional taxa. We collaborate on projects, leveraging capacity and often complimentary expertise. Across the partnership, we collect, analyze, and provide data to effectively conserve the state's biodiversity.



PGC Endangered Mammal Specialist, Mike Scafani rappels a short, but precarious drop to conduct a hibernating bat count in a defunct Fayette County mine.

DCNR, PGC, PFBC, WPC

The primary PNHP partners involved are indicated at the end of each project description.



PNHP is a member of NatureServe, an international network of state, provincial, and national natural heritage programs and conservation data centers. By developing tools, creating data standards, determining global species status ranks, consolidating data across the network, and providing numerous other network services, NatureServe offers a common point of contact and guidance for programs across the Americas. Our Conservation Explorer tool is an example of a NatureServe product tailored to PNHP use within Pennsylvania. Network programs serve on the U.S. Section Council (advisory body to NatureServe) and individual programs work together with NatureServe on numerous projects. PNHP, along with NatureServe and our international network of programs, work to share innovations and expertise to make each program stronger and more efficient.

Our projects and initiatives depend on the support of our partner organizations as well as funders from both the public and private sector. We would like to thank all of the program's funders and supporters for helping PNHP to be successful in meeting the biodiversity information needs of the state, region, and Natural Heritage Network.

Our Partners



In Cooperation With



SCIENCE

We approach each project as an opportunity to learn more about Pennsylvania's ecosystems and species, documenting new discoveries and population changes. We work across many different taxa – terrestrial and aquatic, vertebrate and invertebrate, and with many partners to collect critical biological information needed for conservation at all scales.

DISCOVERIES

EASTERN IRONCLAD BEETLE

PNHP ecologists found a new population of eastern ironclad beetles (*Phellopsis obcordata*) in Bald Eagle State Forest, making it the fifth known population of the species from the state. These flightless beetles are excellent indicators of old growth forests because they require shelf fungi associated with old hemlock trees to live and reproduce and cannot disperse to a new habitat if their forest is logged. **WPC, DCNR**

Feathery Neckera moss (*Neckera pennata*)

Andrews' bracted squirrel-tail moss (*Leucodon andrewsianus*)

MOSES OF OLD GROWTH TREES

While exploring and documenting different types of old growth plant communities, our PNHP Botany Program Manager found new populations of two rare moss species, Andrews' bracted squirrel-tail moss (*Leucodon andrewsianus*) and feathery Neckera moss (*Neckera pennata*). **WPC, DCNR**

NOTEWORTHY BOTANY DISCOVERIES IN THE GLACIATED NORTHWEST



Northern Yellow Lady's Slipper Orchid

Northern yellow lady's slipper orchid (*Cypripedium parviflorum* var. *makasin*) is a showy, northerly species that is at its southern range limit in the Great

Lakes Region of the U.S. and rare in Pennsylvania. PNHP ecologists found a new high-quality occurrence of this species during iMapInvasives surveys in an expansive palustrine forest community.



Northern Bog Orchid

Northern bog orchid (*Platanthera aquilonis*), is a rare, inconspicuous, edge-of-range, boreal orchid species known from high-quality forested wetlands and woodlands of Pennsylvania's glaciated

northern tier. PNHP ecologists discovered a new population of several plants alongside other rare species in a hemlock and black ash palustrine forest in Erie County.



Clinton's Wood Fern

Clinton's wood fern (*Dryopteris clintoniana*) is a rare species known from a few palustrine forests concentrated in the state's glaciated northwest. This showy fern species is readily identified by its distinct

sori pattern in summer. PNHP ecologists found multiple new occurrences for this species in three separate wetland complexes, each of which had dozens of healthy, fertile plants as well as young plants. **WPC, PGC**

MUSHROOMS IN THE ALLEGHENY RIVER

Wading downstream of Kinzua Dam in the Allegheny River last June, PNHP staff searched for and found five delicate *Psathyrella* mushrooms growing submerged on sticks. Tim and Darlene Corio (Rochester, NY), who made the curious discovery the year before, were our guides. While the species name is taxonomically murky, this find represents the first time a gilled mushroom has been documented growing underwater in Pennsylvania. **WPC, DCNR**



A *Psathyrella* mushroom growing on a stick underwater. This specimen is young and about the size of a thumbtack.

STIFF TICK-TREFOIL

Stiff tick-trefoil (*Desmodium obtusum*), previously thought to be extirpated from Pennsylvania, was recently re-discovered in the state by a community scientist on iNaturalist who had unknowingly photographed the species. PNHP staff identified the observation and collaborated with the community scientist to survey and document the population. **WPC, DCNR**



THE GOOD OLDENLANDIA DAYS

This annual member of the coffee family lives in muddy drawdown zones of pond shores and seasonal ponds of the coastal plain; it was newly reported to Pennsylvania in 2009. With just one known occurrence in Pennsylvania not seen since its first reporting, and with that site impacted by broad-scale herbicide application, PNHP botanists sought to determine if the species was still present in 2024. With some intensive searching we relocated the plants and recorded thousands of plants at the site. It's likely that the size of this population fluctuates from year to year based on hydrological conditions. **WPC, DCNR**

INVERTEBRATE FINDS

This year we were lucky enough to find several previously unknown populations of species of concern that we were not specifically looking for. While driving between study sites, one of our PNHP invertebrate zoologists stopped to investigate a large patch of Carolina vetch (*Vicia caroliniana*) growing along a road bank and found Appalachian silvery blue (*Glaucopsyche lygdamus lygdamus*) caterpillars on the flowers of their sole food plant. Another roadside stop yielded caterpillars of the brick-red borer moth (*Papaipema marginidens*) boring in the shoots of wild yam (*Disocorea villosa*), marking the first time PNHP has found caterpillars of this moth since the recent discovery that this species uses wild yam as a food plant. Another noteworthy find was common roadside skipper (*Amblyscirtes vialis*) at a reclaimed coal mine where he was searching unsuccessfully for a different butterfly. **WPC**



This ant has given away the location of the well-camouflaged Appalachian silvery blue caterpillar that it is tending.

GREEN SALAMANDER HABITAT STUDY FINDS THEM UTILIZING TREES AND DEBRIS

During the 2024 field season the PNHP zoology team and Pennsylvania Fish and Boat Commission staff conducted a habitat use study of the green salamander, which was funded by a WRCF grant. During the study we surveyed four sites with different age class forests and searched for green salamanders during the daytime and nighttime once a month. Such an in-depth look at green salamander habitat use in Pennsylvania has never been completed. The vast majority of the salamander observations were on sandstone outcrops and boulders. However, about three percent of the observations were on live trees, dead trees, and coarse woody debris. This shows that while the majority of the salamanders utilize the sandstone as their main habitat, some do leave the rock habitats and utilize trees for foraging and other activities. This confirms the importance of instituting healthy forest buffers and protecting vegetative cover around occupied rock habitats. **WPC, PFBC, DCNR**

A green salamander observed climbing down a tree during a nighttime survey.

LONG-TERM FOREST BIRD MONITORING BEGINS WITH NEW MAPS STATIONS IN WESTERN PA

Through DCNR WRCF funding, WPC collaborated with Bird Lab to launch two new MAPS (Monitoring Avian Productivity and Survivorship) bird banding stations at two WPC nature reserves – Bear Run in Fayette County and Toms Run in Allegheny County. MAPS is a continent-wide program to collect vital demographic data critical to tracking bird population trends. Our first season resulted in 230 birds banded with 81 recaptures. Banded birds included forest interior species as well as seven Species of Greatest Conservation

Need (SGCN) – black-throated blue, black-throated green, black-and-white, and Canada warblers, Louisiana waterthrush, gray catbird, and wood thrush. Our

work at Bear Run established monitoring for the only PA-confirmed breeding population of Swainson's warbler. We encountered 11 unique individuals, including 6 newly banded birds (two juveniles) and two recaptures of birds banded in 2022 and 2023. We also joined a range-wide migratory connectivity study of wood thrush by deploying radio nanotags on 25 birds, allowing full annual cycle tracking via Motus. **WPC, PGC, DCNR**



Wood thrush banded and tagged with a Motus transmitter at Toms Run Nature Reserve.



WOOD TURTLE HABITAT MANAGEMENT

PNHP staff and Pennsylvania Fish and Boat Commission maintenance staff restored potential nesting habitat for a wood turtle (*Glyptemys insculpta*) population as part of a multi-state Competitive State Wildlife Grant. Availability and quality of nesting habitat is a limiting factor for the persistence of wood turtles. In June female wood turtles travel from the stream and floodplain to a sun-exposed slope with loose soils where they will dig a hole, deposit up to 10 eggs, cover them, and leave. These slopes are often far from the stream, across busy roads, or in disturbed areas such as agricultural fields that will not remain uncultivated for the incubation period of 2-3 months. By creating or maintaining open canopy nesting habitats closer to the stream, we can reduce the risks to the females making these journeys and have an opportunity to monitor the use of the habitats in the future. **PFBC, WPC**



INVERTEBRATE ZOOLOGY

FORMERLY POLLUTED RIVERS GET A SECOND CHANCE

In Pennsylvania, rivers severely polluted from mining and industry were once barren of life. With water quality improvements, there are opportunities to restore the fauna to waterways such as the Clarion and Kiskiminetas Rivers. PNHP staff from PFBC and WPC partnered with WPC Watershed Conservation and PennWest Clarion University on a project with the goal of returning 40,000 mussels to the rivers, restoring riparian habitats, and conducting outreach. The project builds upon previous Clarion River restoration efforts that stocked nearly 37,000 tagged mussels along 38 river miles. In October 2024, 2,316 tagged, two-year-old, common mussels were stocked at three Clarion River monitoring sites adjacent to DCNR and PGC lands. Concurrently, the partners also newly stocked the Kiskiminetas River with 2,316 common mussels at three sites adjacent to public lands. This effort is anticipated to jumpstart population restoration in both rivers. A video of the stocking is viewable on YouTube at <https://www.youtube.com/watch?v=2eSFR2cZjpQ>. [PFBC](#), [WPC](#), [DCNR](#), [PGC](#)



WPC PNHP staff and volunteers place freshwater mussels in the Kiskiminetas River.



First digger crayfish collected from Pennsylvania.

ONE OF PENNSYLVANIA'S RAREST CRAYFISH LISTED AS ENDANGERED

The digger crayfish is a burrowing crayfish species that was not known from Pennsylvania until it was discovered by PNHP biologists and colleagues in 2014. Following this discovery, an intensive survey for the species was conducted. The species was only found at eight sites in and around SGL 101 in Erie and Crawford counties and two sites approximately 12 miles to the south in Pymatuning State Park. The digger crayfish probably once occupied a much larger area in northwest Pennsylvania, but the destruction of wetland habitat likely eliminated the species from much of its former range. Given ongoing threats and rarity, efforts began in 2023 to add the digger crayfish to Pennsylvania's list of threatened and endangered species. This status provides the species legal protection in the state. On March 2, 2024, these efforts bore fruit, and the digger crayfish was listed as endangered in Pennsylvania, becoming the first non-mussel invertebrate listed as endangered or threatened in the state. [PFBC](#), [WPC](#)



Digger crayfish.



Dave Lieb extracts a crayfish from a burrow.



Digger crayfish chimney.

WHITE MONKSHOOD CONSERVATION ON STATE LANDS

The Pennsylvania Plant Conservation Alliance (PPCA) is a program of DCNR and part of PNHP whose mission is to conserve globally rare plants in Pennsylvania. One such species is the globally vulnerable white monkshood (*Aconitum reclinatum*). This Appalachian endemic is known from only two populations in southwest Pennsylvania, one on DCNR land and the other on State Game Lands. We have been working to better steward these populations in recent years including development of a new monitoring protocol with WPC botanists, management of competing invasive and native vegetation, and fencing plants from deer. One particularly exciting project we've been facilitating is seed collection and propagation. PPCA has been collecting seed over the past three years at both populations for Longwood Gardens to grow. This past summer we had our first successful outplanting into the DCNR population. Twenty plants were planted and tagged. We'll continue working with Longwood to augment the populations of this PA Endangered perennial. [DCNR](#), [WPC](#), [PGC](#)

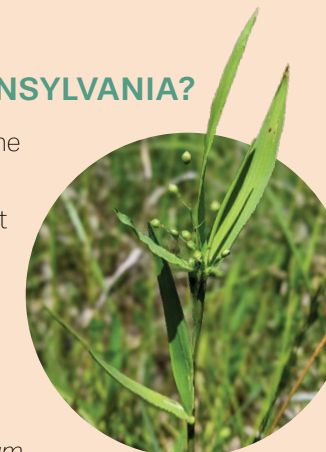
HOPE FOR BEAUTIFUL BARBARA'S BUTTONS

Beautiful Barbara's buttons (*Marshallia pulchra*) is a lovely plant that has declined over the years due in part to habitat alterations and invasive species competition, but there is hope for this plant. Increased communications between PNHP, Ohio State Park, and other state natural heritage programs has raised awareness for the need to conserve this species. PNHP scientists working closely with staff at Ohio State Park are developing a recovery strategy to save this beautiful flower from extirpation in Pennsylvania. This strategy will focus on removal and control of invasive species while monitoring population responses to management. We will share our experiences with other conservation biologists in the range of this species to ensure long-term persistence in Central Appalachian bedrock river scour communities. [WPC](#), [DCNR](#)



WHICH WITCHGRASSES ARE IN PENNSYLVANIA?

This year WPC received WRCP funding to reassess the taxonomy and statuses of witchgrasses in the genus *Dichanthelium* in Pennsylvania. The goal of the project is to confirm which *Dichanthelium* are or were present in the state, propose new conservation ranks and/or legal statuses where necessary, and identify priorities for future field work. To do this we will use data from preserved specimens collected from the past 200 years. However, many *Dichanthelium* specimens have been misidentified or identified too broadly, so the project will focus on verifying, refining and correcting as many specimens' identifications as possible. With over 7,200 *Dichanthelium* specimens collected from the state, there's a lot of work to be done. Thankfully we are teaming up with botanist Justin Thomas (Institute of Botanical Training, NatureCite), who has worked extensively with the genus. There's a lot to be learned, and we're eager to embark on this exciting project! [WPC](#), [DCNR](#)



MONITORING OUR RAREST PLANTS

It was a year of status change for northeastern bulrush. Since its federal listing as endangered in 1991, efforts increased across the species' range to learn more about the bulrush. Long-term monitoring by PNHP staff, along with work by other collaborators, led to a better understanding of population dynamics and habitat needs, and ultimately, contributed to the proposed federal delisting of the species.

Continued monitoring of another recently delisted federal species, running buffalo clover (*Trifolium stoloniferum*), provided important information regarding species responses to management. Two populations showed positive responses, while a second unmanaged population declined in numbers. Darlene Madarish, WPC/PNHP volunteer, discovered two new populations of this species.

PNHP monitoring efforts at the only two known locations of one of Pennsylvania's rarest orchids, small-whorled pogonia (*Isotria medeoloides*), led to the discovery of three new plants at one location and a rediscovery of one plant not seen in 5 years at the other. [DCNR](#), [PGC](#), [USFWS](#)

Northeastern bulrush



CALCAREOUS BARRENS: OUR FIRST HABITAT RECOVERY PLAN

We drafted our first Habitat Recovery Plan for calcareous barrens. Calcareous barrens are uniquely diverse because they host high-pH specialists, sun-loving species, and rock-loving species, all in addition to a high diversity of “rich forest” species. In Pennsylvania these sites vary by region. They include grasslands in central valleys, originally maintained with fire by Native Americans; shaded cliffs on Mauch Chunk geology in the Laurel Highlands; and woodlands perched on dry, convex slopes across the southern half of the state. Many are found on steep cliffs cut by rivers and large creeks over millennia. Our plan includes a site assessment protocol designed to determine past site history and identify focus species for monitoring and management. Site history provides important clues for future management needs; sites where fire was historically infrequent may primarily need invasive stewardship, while sites historically maintained by fire will require controlled burns to prevent conversion of open barrens to generic forests. **WPC, DCNR**



A xeric limestone prairie in Centre County with flat-topped goldenrod (*Solidago rigida*), a grassland specialist, in bloom.

ASSESSING OLD-GROWTH FORESTS IN PENNSYLVANIA

PNHP ecologists continued their exploration of old-growth forests in Pennsylvania. This year we focused on refining and testing rapid assessment methodology used to identify characteristics associated with old-growth forests and score the condition of these stands. Our staff collected additional information on the plants, bryophytes, and plant communities found in old-growth forests, and continued surveys to better understand the birds associated with these habitat types, specifically focusing on forest interior birds and boreal birds. Since many of the old-growth forests are eastern hemlock types, Swainson’s thrush was a main bird target. In total, we visited 14 sites this year, including the old-growth stand at Dutlinger Natural Area in Susquehannock State Forest. This area was newly added to the Old-Growth Network in 2024. **WPC, DCNR**



ASSESSING WETLAND CONDITIONS ON DCNR LANDS

With funding from an EPA Wetland Development Grant, PNHP ecologists continued our work on wetland systems in Pennsylvania. Our current project focuses on the development and testing of wetland assessment methods aimed at helping land managers understand the condition of their resources. The results of these assessments can be translated into more informed management practices in wetlands and the surrounding watersheds. This year we met with DCNR staff to better identify assessment needs and did some preliminary testing of existing wetland assessment protocols. We are currently working on a draft assessment protocol that will be completed in early 2025 and tested during the field season. **WPC, DCNR**



SPECIES HIGHLIGHT:

SMALL MAMMALS

From the time of early European settlement in Pennsylvania until the mid-1800s, the understanding of mammal species was limited and often based upon folklore. From then through the 1950s, knowledge of Pennsylvania mammals expanded dramatically and set the foundation for sound species management by the Pennsylvania Game Commission (PGC), which was established in 1895 to enact protections for rapidly disappearing birds and mammals. With exceptions, some of the most robust information on Pennsylvania mammals was gathered during the PA Mammal Survey (1946-1951). Yet, in many cases, little is known about the population status or ecological roles that many of the state's mammals play. Through the PNHP partnership, we're working to answer the most critical questions for our understudied mammals to inform better ecosystem management. That information is used for sound species and habitat conservation through the partnerships coordinated by the PGC. Today, the agency has become one of the leading management agencies in the country for birds and mammals.

GLIDING GLAUCOMYS

Survey results from the PA Mammal Survey showed that the nocturnal northern flying squirrel (*Glaucomys sabrinus*) was a common species in Pennsylvania at the time. Since then, competition from the southern flying squirrel (*G. volans*) and habitat degradation have led to a precipitous decline in *G. sabrinus*. A statewide follow up survey from 2000-2002 focused on *G. sabrinus* concluded it was very rare, with only a couple dozen individuals found at a handful of sites. This documented decline led PGC to list the species as state-endangered in 2007. This project also documented some hybridization with *G. volans*, complicating management and conservation efforts. A modern and more sensitive survey technique using ultrasonic acoustics is being deployed today, and thankfully this technique has been finding more of the endangered northern flying squirrel!



RUGGED ROCK RODENTS

The Allegheny woodrat (*Neotoma magister*) is a state-threatened species found in surface rock communities and was historically tied to the consistent food supplied by the American chestnut (*Castanea dentata*). When Pennsylvania biologists perceived a decline in the species, they began documenting places where woodrats remained as well as where colonies had recently been lost. This dataset provided the foundation for more recent statewide surveys to document current distribution of the species and, unfortunately, its >70% decline throughout Pennsylvania. These survey results now guide the PGC in prioritizing on-the-ground conservation actions including habitat management, supplemental feeding, and translocation to maintain genetic diversity within colonies of shrinking populations.

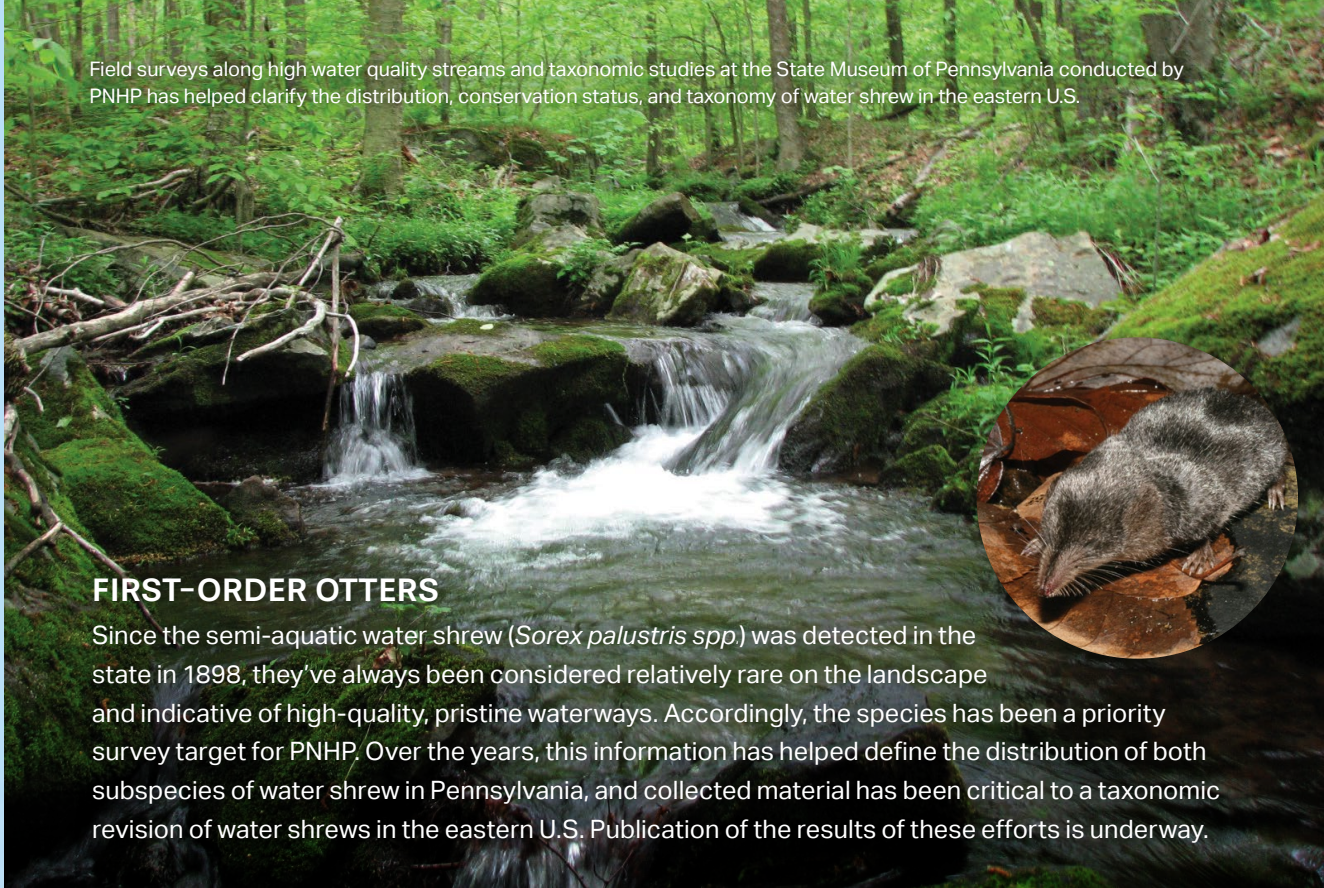


SLIGHT-STATURED SHREWS

The diminutive least shrew (*Cryptotis parva*) is an obscure insectivore, having only been sighted in Pennsylvania a handful of times since the 90s. Although it is a state endangered species, there is a scarcity of information about its ecology, distribution, and abundance in Pennsylvania. No official efforts to address this information gap have been conducted since a survey in 2004-2005, which documented a single specimen. To better understand and manage for this species WPC and PGC are partnered on initiatives to survey for presence of least shrew by using a combination of eDNA and passive trail camera surveys.



Field surveys along high water quality streams and taxonomic studies at the State Museum of Pennsylvania conducted by PNHP has helped clarify the distribution, conservation status, and taxonomy of water shrew in the eastern U.S.



FIRST-ORDER OTTERS

Since the semi-aquatic water shrew (*Sorex palustris spp*) was detected in the state in 1898, they've always been considered relatively rare on the landscape and indicative of high-quality, pristine waterways. Accordingly, the species has been a priority survey target for PNHP. Over the years, this information has helped define the distribution of both subspecies of water shrew in Pennsylvania, and collected material has been critical to a taxonomic revision of water shrews in the eastern U.S. Publication of the results of these efforts is underway.

LEAST WEASEL – THE LEAST KNOWN CONSERVATION STATUS?

The smallest carnivore in the world lives right here in the commonwealth, and it's very likely that you've never seen it. The least weasel (*Mustela nivalis*) weighs as much as two AA batteries and, when curled up sleeping, easily fits into the palm of your hand. The last dedicated study of this species was conducted in the 1950s, and since then there have been only occasional reports of this elusive mammal. WPC partnered with the Pennsylvania Game Commission to demonstrate a long-term decline through analyses of historic data and begin testing detection methodologies to survey for this tiny species. Using unique modifications to trail cameras, we were able to passively collect images of small mammal species and were fortunate to document least weasel from two sites out of 21 surveyed. This is the first study to attempt to collect images and videos of live least weasel in Pennsylvania, and throughout the project over 740,000 images were captured and reviewed. Results suggest this species is far rarer than 70 years ago during the last least weasel study, which examined data from the bounty system.



THREATS AND OPPORTUNITIES FOR BAT CONSERVATION

White-nose syndrome (WNS) was documented in Pennsylvania in December 2008 and quickly decimated the state's hibernating bat population. Winter hibernacula counts and summer netting data estimate cave bat loss to be >99%, prompting both state and federal protections. Fortunately, survivors from all six bat species that hibernate in Pennsylvania are documented, and there are many avenues of conservation work in action to help those survivors. Examples include implementing migration projects to find maternity colonies and hibernacula, altering environmental conditions inside hibernacula to promote bat survival, gating hibernacula, and installing hundreds of bat boxes in key habitats. Managing healthy bat habitats is a big initiative of both PGC and DCNR, and through the U.S. Fish and Wildlife Service a State Lands Habitat Conservation Plan (HCP) for bats was developed which enables streamlined habitat management and enhancement where federally endangered bats may occur.



Mike Scafani searching cracks for bats

COLD-WEATHER CRICETIDAE

In Pennsylvania, the boreal rock vole (*Microtus chrotorrhinus*) is restricted to the cool habitats found along high-elevation rocky streams in the northeastern part of the state; making the species inherently vulnerable to climate change impacts. With records from only three counties there is not enough information to assess threats or to determine the extent of remaining populations that may be at risk. The best approach to better understand the distribution and needs of this species is to revisit historic sites and survey new locations with favorable conditions. WPC will be leading efforts to survey for this species through a Wild Resource Conservation Program grant. Results will help in review of the rock vole's current conservation status in Pennsylvania.



WHY CAN'T WE SMELL THAT SMELL?

There are very few Alleghanian spotted skunk (*Spilogale putorius*) records for Pennsylvania, with less than ten reported by trappers and fur buyers during the PA Mammal Survey. Those recorded during the survey were from southern Bedford and Fulton counties, making a 2012 Alleghanian spotted skunk "capture" on a trail camera from Fayette County quite a surprise! Through a Wild Resource Conservation Program grant, WPC zoologists will coordinate with the PGC and DCNR to revisit the known historic locations and suspected Alleghanian spotted skunk haunts where we'll be conducting systematic trail camera surveys to help inform a species conservation status review.



IN SUMMARY

The PNHP partnership is committed to informing wise management of the commonwealth's mammals. Critical to that pledge is the identification of targets for conservation through understanding current taxonomy, distributions within the state, locations of rare mammal populations, and the health of each of those populations. From incorporating remote sensing and specialized trail cameras, eDNA, acoustic surveys, and unique twists on other traditional survey methods, to manipulating caves and mines to provide critical habitats for WNS affected bats or the Allegheny woodrat, the PGC and PNHP partnership is considered a leader in the nation on management of mammal Species of Greatest Conservation Need. Still, mammals as a whole are largely a neglected group. To understand the full spectrum of needs for appropriate habitat, species, and ecosystem management, we need more information on the status of our fellow mammals and the role of their populations in healthy ecosystems. WPC, PGC, DCNR, USFWS

INFORMATION

PNHP information is far from static. Each year brings new records and new ways of distributing our information. Additionally, this information is critical in planning our field work. New projects that add data focused on specific species, groups of organisms, and natural features will build on and make available a wealth of information.

ASSESSING CONSERVATION PRIORITIES FOR THE CHARISMATIC MICRO FAUNA

Pennsylvania’s Wildlife Action Plan (PA-WAP) prioritizes organisms for conservation based on their status as Species of Greatest Conservation Need – those considered vulnerable and responsibility species for Pennsylvania. Wildlife conservation often focuses on large, furry charismatic megafauna, while insects, spiders, and other invertebrates (micro fauna) are overlooked, despite their importance to ecosystems. To advance their prominence in statewide initiatives, PNHP staff evaluated conservation statuses of approximately 1,400 invertebrates, many of which had not been previously assessed. We gathered information from museums and databases to determine the distributions, state rarity ranks, threats, habitats, and conservation actions for moths, beetles, crustaceans, craneflies, and other terrestrial and aquatic groups. The information developed for the 2025-2035 PA-WAP will determine the conservation needs for at-risk organisms. [PFBC](#), [PGC](#), [WPC](#), [DCNR](#)



Although pretty, lesser celandine is an herbaceous invasive plant that outcompetes native spring ephemeral wildflowers.

iMAPINVASIVES

Tracking the locations of invasive species in Pennsylvania is a primary goal of the Pennsylvania iMapInvasives database, a free-to-use online platform that encourages reports for all taxa of invasive species from natural resource professionals and members of the public. Each year, the database grows with new information submitted for novel findings, emerging invaders, and common species whose distributions are helpful to know for management purposes.

The following table highlights invasive species observations reported in 2024 and totals for all records added since the database began in 2011. Note: All “presence” information has been expert-vetted by trusted professionals.

In addition to presence reports, the iMapInvasives program tracks areas where invasives have not yet been found (not-detected) and management efforts (documented treatment). [WPC](#)

	2024 PRESENCE RECORDS ADDED*	DATABASE TOTAL – PRESENCE*	DATABASE TOTAL – NOT-DETECTED	DATABASE TOTAL – DOCUMENTED TREATMENT
Terrestrial	2,955	48,850	8,606	938
Aquatic	93	15,988	2,583	154
Plants	2,882	50,365	9,084	1,035
Animals	165	14,395	2,091	21
Protists	1	78	6	

*Confirmed records only

INFORMATION

SPATIAL FEATURE RECORDS IN BIOTICS

TAXONOMIC GROUP	NEW SPATIAL FEATURES ADDED IN 2024	SPATIAL FEATURES UPDATED IN 2024	SPATIAL FEATURES CUMULATIVE TOTAL
Birds	6	4	3,891
Butterflies & Moths	11	15	1,602
Communities	31	18	2,809
Fish	187	104	2,564
Freshwater Mussels	213	362	5,610
Fungi & Lichens			33
Geologic & Hydrologic Features			332
Mammals	565	695	4,230
Non-vascular Plants		2	55
Other Invertebrates	18	347	2,574
Reptiles & Amphibians	21	40	12,425
Vascular Plants	475	457	28,240
Grand Total	1,527	2,044	64,365

To more accurately reflect our annual progress, we are now reporting the number of mapped features processed. In 2024 the Heritage Program added over 1,500 individually mapped locations of plants, animals, communities, and natural features to our Heritage Database. In addition to mapping new locations, we updated over 2,000 existing records with new survey information.

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INFORMATION

SPATIAL FEATURE RECORDS IN BIOTICS

TAXONOMIC GROUP	NEW SPATIAL FEATURES ADDED IN 2024	SPATIAL FEATURES UPDATED IN 2024	SPATIAL FEATURES CUMULATIVE TOTAL
Birds	6	4	3,891
Butterflies & Moths	11	15	1,602
Communities	31	18	2,809
Fish	187	104	2,564
Freshwater Mussels	213	362	5,610
Fungi & Lichens			33
Geologic & Hydrologic Features			332
Mammals	565	695	4,230
Non-vascular Plants		2	55
Other Invertebrates	18	347	2,574
Reptiles & Amphibians	21	40	12,425
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APPLICATION

Our work is conservation focused, and we look for opportunities to match our information and expertise with planning, management, and stewardship efforts that will benefit vulnerable species and the communities where they live.



Scott Schuette, Brian Daggs, and Noah Yawn revisited vegetation plots along transects across the Little Arnot Run floodplain in 2024.

RESTORING THE ECOLOGY OF LITTLE ARNOT RUN THROUGH PROCESS-BASED RESTORATION

In 2024, PNHP worked with the Allegheny National Forest (ANF) staff, a team of scientists from WPC's Watershed Conservation Program, and Bucknell, Commonwealth, and Gannon universities to complete an assessment of Little Arnot Run following large woody material additions and removal of artificial barriers to stream flow. Funded by an EPA Wetland Program Development Grant to DCNR, WPC and ANF coordinated restoration activities in 2021. From 2021-2024 PNHP and partners assessed fish, macroinvertebrate, and plant communities, and organic carbon and water quality parameters. WPC documented an increase in wetland area and PNHP observed a slight change in the composition of wetland plants on the floodplain. We also documented changes to the flow of water across the floodplain, as abandoned creek channels and oxbows were reconnected during rainfall events. However, change comes slowly with these methods and additional monitoring is needed to assess change to the Little Arnot Run watershed. **WPC, DCNR**

ECOLOGICAL ASSESSMENT OF DEER LAKES PARK

PNHP biologists and WPC community forestry staff partnered with the Allegheny County Parks Foundation and Parks Department to complete an ecological assessment at Deer Lakes Park in northeastern Allegheny County. This park is the sixth of the county's seven parks to be assessed through this partnership. Deer Lakes Park has seen a variety of land uses prior to becoming a park; however, quality, mature forest areas still remain and were identified through historical aerial imagery. These forests were the focus of much of our inventory and assessment efforts.

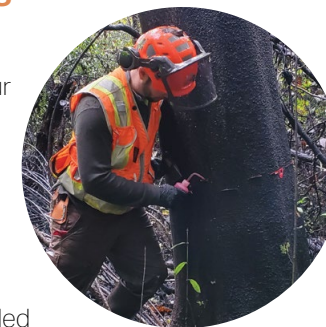
Within the park, we mapped 8 natural community types in addition to 5 anthropogenic, disturbed types following PNHP's community classification. We tallied 276 vascular plant species, of which 82 were exotic, 194 native, and 7 of special interest or on PNHP's watch list. Six areas of high ecological integrity were identified based on conservative species assemblages, natural community quality, and absence or low presence of invasive species. The park will use this collaborative report to guide management and stewardship activities to improve the ecological value of Deer Lakes Park. **WPC**



An emergent marsh around Middle Lake at Deer Lakes Park.

INVASIVE PLANT MANAGEMENT FOLLOWING SIGNIFICANT ASSESSMENT EFFORTS

In 2024, through a generous private donation, WPC executed chemical treatment of invasive plants in four natural areas in Pennsylvania that were assessed as part of a project funded by the Richard King Mellon Foundation. These treatments targeted various plant communities on calcium-rich soils that host populations of rare plants and face significant threats from invasive plant species. The target habitats included rich fens in the northwest glaciated region, a rich mesic cove forest in the Laurel Highlands, and a limestone woodland in the Ridge and Valley region. We worked closely with licensed herbicide applicators to implement treatment strategies that maximize invasive plant control while avoiding unwanted harm to the native plants at the sites. Precise application methods such as cut-stem fill, hack-and-squirt, and cut-stump treatments were commonly used. These sites remain a priority and this work is expected to continue into 2025. **WPC, PGC**



FOUR COUNTY INVENTORY KICKS OFF

This spring, PNHP started a 2-year inventory project in south-central Pennsylvania, focused on Adams, Cumberland, Franklin, and York counties. Coordinated by the South Mountain Partnership, whose focus on the South Mountain Conservation Landscape touches all four counties, the goal is to collect data and provide an updated assessment of the biological and ecological conditions to support conservation. The most recent inventory of these counties occurred in 2005, and updates were needed. In our first year of the project, we conducted surveys in all counties, and documented plants and animals of conservation concern. Some data on fungi was also collected. Additional survey work is planned for 2025. **WPC, DCNR, PGC, PFBC**



COLLABORATION AND COMMUNITY

Collaboration helps PNHP expand our knowledge and capacity while helping our partners manage ecological resources through our expertise and unique datasets.

ASSESSING SUBMERGED AQUATIC AND RIPARIAN VEGETATION OF AN IMPORTANT BIODIVERSITY AREA

In July, PNHP worked with U.S. Army Corps of Engineers to characterize submerged aquatic vegetation (SAV) and riparian plant communities of the Upper Middle Allegheny River between Warren and Tionesta, Pennsylvania. From boats, we recorded aquatic species at over 600 SAV points, mapping dense beds of water celery (*Vallisneria americana*), scrub-brush-like hornleaf riverweed (*Podostemum ceratophyllum*), and curtain-like stands of pondweeds (*Potamogeton nodosus*, *P. illinoiensis*, *P. zosteriformis*) and waterweed (*Elodea canadensis*). We visited 400 points within riparian communities, identifying high quality examples of Silver Maple – Floodplain Forest with rare tufted hair grass (*Deschampsia cespitosa*), green dragon (*Arisaema dracontium*), and sweet Indian plantain (*Hasteola suaveolens*), as well as sites invaded by Japanese and Bohemian knotweed (*Reynoutria japonica*, *R. x bohemica*). This work will support efforts to improve evaluation of impacts to riparian habitats associated with management of the Kinzua Dam. **WPC, DCNR**



Brian Daggs surveys for submerged aquatic vegetation (SAV) in the Upper Middle Allegheny River with U.S. Army Corps of Engineers biologists.

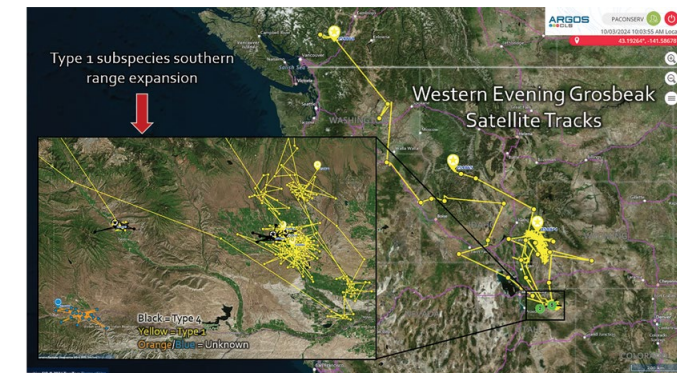
VERNAL POOL HYDROLOGY MONITORING

The Pennsylvania Natural Heritage Program has been working with partners including the Penn State Master Watershed Stewards to monitor the health of vernal pools in two state parks in Pennsylvania. We have informally monitored some of these wetlands for decades and watched the effects of climate change materialize in these small and fragile habitats. We needed a cheap and effective way to collect better data on the hydrology of vernal pools, including water depth and the timing and duration of dry phases. In 2023 we obtained grant funding to install water depth gauges and photo stations, along with small temperature and light sensors to collect continuous data. The photos and water depth readings are collected by trained volunteers and other park visitors and are available for download from the Chronolog and CrowdHydrology websites. The manually collected information pairs well with the sensor readings and helps us to interpret and visualize the data we are collecting. **WPC, DCNR**



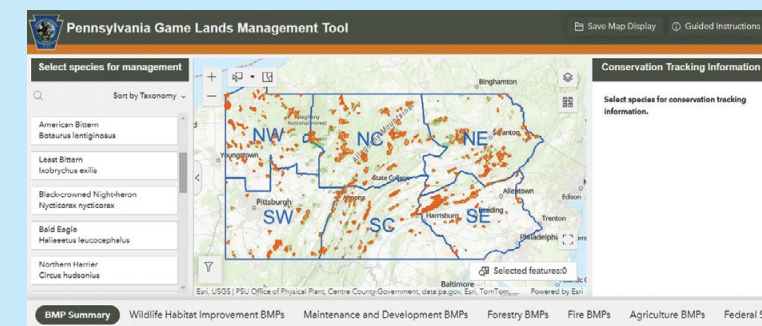
EVENING GROSBEEK PROJECT EXPANDS WESTWARD

Our evening grosbeak project assessing migratory connectivity as part of the Road to Recovery initiative expanded to the western United States. This moved us closer to a long-term goal of collecting 10 full annual cycle tracks for grosbeaks in each of five major regions of the winter range. PNHP, Finch Research Network, Carnegie Museum of Natural History's Powdermill Avian Research Center, and the Utah Division of Wildlife Resources teamed up to mark 51 birds for tracking, 12 of which were outfitted with satellite and GPS tags. Evening grosbeak has five distinct subspecies identified by unique flight calls. All grosbeaks in Midwest and Northeast populations are Type 3 subspecies. Work in Utah included the first tracking of western subspecies Type 1 and Type 4. These data also revealed new southern breeding range expansion of Type 1 grosbeaks. In 2024, we again partnered with Friends of Sax-Zim Bog to deploy satellite tags on nine grosbeaks in Minnesota. Since 2021 we have collected 31 tracks from non-breeding to breeding season, including tracks from Pennsylvania, Maine, Minnesota, New York, and Utah. **WPC**



A NEW TOOL FOR MANAGEMENT OF PENNSYLVANIA GAME LANDS

The Pennsylvania Game Lands Management Tool (PGLMT) is a web-based mapping application that allows PGC staff to access spatial and tabular data to improve habitat management projects on State Game Lands. Originally developed in 2012, the PGLMT includes descriptions, general habitat management guidance, conservation opportunities, and best management practices for species of conservation concern located on State Game Lands. This year, PNHP staff, in collaboration with all PNHP partners, completed substantial upgrades to the tool by updating the data system, modernizing the interface, and providing an improved framework for collaboration and data sharing across agencies. With a new web application, the PGLMT will provide PGC staff an enhanced viewing and searching experience to benefit work on Pennsylvania State Game Lands. **WPC, PGC, DCNR, PFBC**



SPREADING THE WORD

In addition to social media and our quarterly newsletter, we also share information and expertise through education and outreach. From taxonomy workshops to helping landowners understand the resources on their property, we look at these opportunities as extremely valuable in mobilizing other scientists and the public to conserve biodiversity.

Kayakers enjoy paddling on French Creek, a waterbody currently under threat by the invasive round goby.

HARNESSING THE POWER OF AN EMOTIONAL CONNECTION: AN INVASIVE SPECIES FILM-MAKING JOURNEY

In 2023, the Western Pennsylvania Conservancy in conjunction with Great Lakes Media & Film set out to create a new documentary-style film titled *Seeing The Unseen: Aquatic Invaders & What's at Stake*. By using videography to highlight the impacts of aquatic invasive species on the Lake Erie watershed and surrounding areas, the film transcends typical communications about invasive species by telling a story that many who enjoy outdoor recreation can relate to. In showcasing the impacts of round goby, starry stonewort, and narrow-leaf cattail on activities such as birding, kayaking, and angling, the film creates a personal connection for viewers to be more aware of these and other invaders that often go undetected. Also intertwined into the film is the case for caring about issues related to invasive species along with actions viewers can take to prevent their spread. The film can be watched online at <https://shorturl.at/Of6MS>. **WPC**

NEW EVENT ENCOURAGES STATEWIDE SEARCH FOR INVASIVE JUMPING WORMS

In July 2024, the Pennsylvania iMapInvasives Program hosted a new event called the Jumping Worm Jamboree. This statewide survey encouraged natural resource professionals and community scientists to get outside, search for, and report their findings of invasive jumping worms (*Amyntas* and *Metaphire* species). A total of 19 people searched in residential yards and gardens, parks and forests, and commercial areas. Both presence and absence findings were reported to iMapInvasives. Jumping worms were chosen as the focus of this event to raise awareness of their negative impacts on Pennsylvania's environment and economy. Prior to the event, jumping worms were known from 27 of Pennsylvania's 67 counties. Data from the Jamboree brought that tally up to 30 impacted counties, with current information showing their presence in all corners of the state and several areas in between. Learn more about the 2024 Jumping Worm Jamboree here: <https://shorturl.at/Mkmsp>. **WPC**

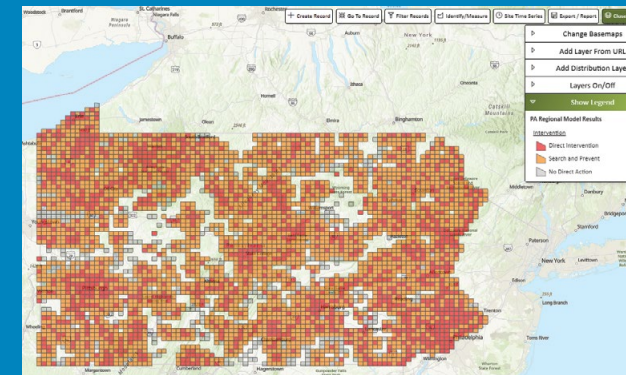


Jumping worms observed in Philadelphia, PA by Kirk Wattles, Penn State Master Gardener.

SPREADING THE WORD

PARTNERS AND PRIORITIES IN INVASIVE SPECIES MANAGEMENT

In 2024, we completed a project funded by the Richard King Mellon Foundation to foster collaborative efforts to assess and monitor invasive species populations and develop a state-wide prioritization model for invasive species management. We selected 10 sites of ecological significance that would engage key partners and stakeholders. PNHP staff completed assessments of invasive plant species' extent and impacts at each site, which are summarized by species with digital mapping. At a larger scale, we collaborated with NatureServe, New York Natural Heritage Program, and faculty from Cornell University to create a prioritization model for Pennsylvania that produces invasive species management recommendations using breeding bird atlas blocks as geographic units. This model, which mimics an existing model for New York State, is made viewable through iMapInvasives for individuals that request access. **WPC, PGC, DCNR**

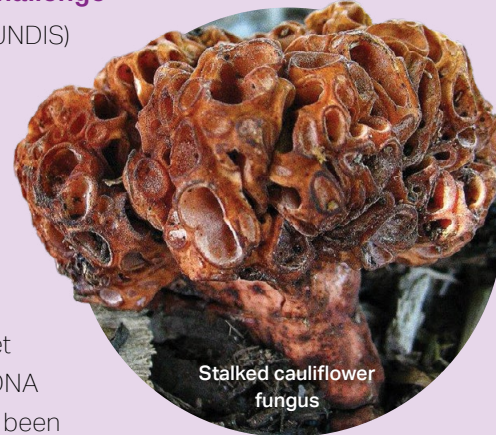




RARE FUNGI, COMMUNITY SCIENCE, AND STATEWIDE CONSERVATION: PNHP'S MYCOLOGICAL MISSION

The Northeast Rare Fungi Challenge

The Fungal Diversity Survey (FUNDIS) created the Northeast Rare Fungi Challenge to promote the search for 20 charismatic, underdocumented species that may be threatened. Volunteers monitor iNaturalist and Mushroom Observer and ask observers to mail target species to the FUNDIS lab for DNA sequencing. Eight targets have been found in Pennsylvania. The holotype of the fibercap strangler (*Squamanita umbonata*) was collected from Ohiopyle State Park in 1908 but not seen since. The stalked cauliflower fungus (*Wynnea sparassoides*) was found in 2004 from a rodent hole in Pittsburgh's North Park. The swamp elfin saddle (*Helvella palustris*) and Peck's bolete (*Butyriboletus peckii*) only have a few historic records. The yellowish-green Entoloma (*Entoloma flavoviride*) and Billie's bolete (*Boletus billieae*) were each found once in 2016. The Appalachian spindle coral (*Clavulinopsis appalachiensis*) and the rooting tube-pore polypore (*Pseudofistulina radicata*) are active in a few locations each. **WPC, DCNR**



Stalked cauliflower fungus



Rooting tube-pore polypore



Appalachian spindle coral

The Statewide Race to Round Up Our Fungal Community

The first Audubon guide to fungi was written in 1980 by Gary Lincoff (1942-2018) from Pittsburgh. He had no degree in mycology but rather a BA in philosophy. His enthusiasm was infectious, and he often encouraged people to quit their jobs to study fungi full-time. Many amateur mycologists are less interested in foraging than they are in documenting fungal diversity and observing obligate rust fungi on rare plants, cryptic LBM (little brown mushrooms), overlooked lichens, and whatever truffles the squirrels are digging. As a result of their submissions to labs, there are now over 700 "temporary codes" for Pennsylvania fungi representing specimens whose DNA barcodes are unique from available data for described species. A directory of the state's mycology clubs now lives on PNHP's website, and the community has been more than willing to share their historical foray species records, collaborate to address inventory gaps, and support fungal conservation priorities and stewardship of Pennsylvania's wild fungal heritage. **WPC, DCNR**



Hemlock reishi (*Ganoderma tsugae*)



The Campaign for Pennsylvania's Official State Fungi

A campaign to designate state fungi was launched in September 2024 by the Pennsylvania Biological Survey's Mycological Technical Committee, which includes several PNHP staff as members. Seven other states have official state fungi – Utah, Oregon, Minnesota, Illinois, Texas, Vermont, and California. Only California has both a state mushroom and state lichen. The committee opted to be mycologically inclusive and advocate for the dual adoption of both a mushroom and lichen species. Candidates had to be native, widespread in the state but not globally, and relatively easily identifiable. They solicited species nominations from the state's mycology clubs and created a public survey. The winners were the hemlock reishi (*Ganoderma tsugae*), which grows on our official state tree, eastern hemlock (*Tsuga canadensis*), and the Pennsylvania toadskin lichen (*Lasallia pennsylvanica*), which was described from Pennsylvania in 1801 and appears to be more observed here than anywhere else in the world. **WPC, DCNR**



Pennsylvania toadskin lichen (*Lasallia pennsylvanica*)

STAFF CHANGES

LAUREN SHERMAN joined the Heritage Team in June 2024 as an Assistant Zoologist. A native Pennsylvanian, she holds a B.S. from Gettysburg College and an M.S. from the University of Kentucky. Lauren works with a variety of taxa and is overseeing a number of mammal research projects.

Lauren surveys for green salamander.

WORKING WITH THE NEXT GENERATION OF 'OLOGISTS

Providing internships and work-study experiences for college students are direct ways PNHP contributes to the education and training of future conservation scientists. In 2024, PNHP hosted three students,



LAUREN MCCONAHY

WPC Heritage Intern

Lauren McConahy graduated with a Masters Degree in Biology from Juniata College, advised by Dr. Norris Muth. During the 2024 field season, Lauren assisted PNHP botanists with an assessment of the globally vulnerable Kate's mountain clover (*Trifolium virginicum*) on rare shale barren communities around Raystown Lake in Huntingdon County.



LUCY RUZANIC

WPC Heritage Intern

Lucy Ruzanic is a Masters student in Sustainability at Chatham University, advised by Dr. Ryan Utz at Chatham's Eden Hall Campus. In 2024, Lucy worked with PNHP ecologists to characterize the plant species composition of restored riparian areas in the Robinson Fork watershed in Washington County, Pennsylvania.



ALEX SANDOVAL

Federal Work-Study Student

Alex Sandoval is a Junior majoring in Information Science at the University of Pittsburgh. He is the PNHP federal work-study student for the 2024-2025 school year, helping with transferring data into our new Natural Heritage Area database, data quality control for the iMapInvasives database (funded by the Great Lakes Restoration Initiative), and general file management.



IN MEMORIAM: JOE WISGO

We are deeply saddened to report the passing this year of Joe Wisgo, an important member of the PNHP team and good friend to all. Joe joined the PNHP team in 2011 as an intern, he was promoted to zoologist soon thereafter and over the years grew into the role of being one of the top small mammal experts in the state. He was known not only for his great knowledge and skillset as a mammalogist and conservation biologist, but mostly for his kindness and infectious fun-loving attitude. For those of us who spent the most time with Joe in the field, our work is just not the same without him. Although Joe left the program to chart another path in 2023, he remained a good friend to our staff, and we cherish the many memories we made with him. We will always miss you, Joe!

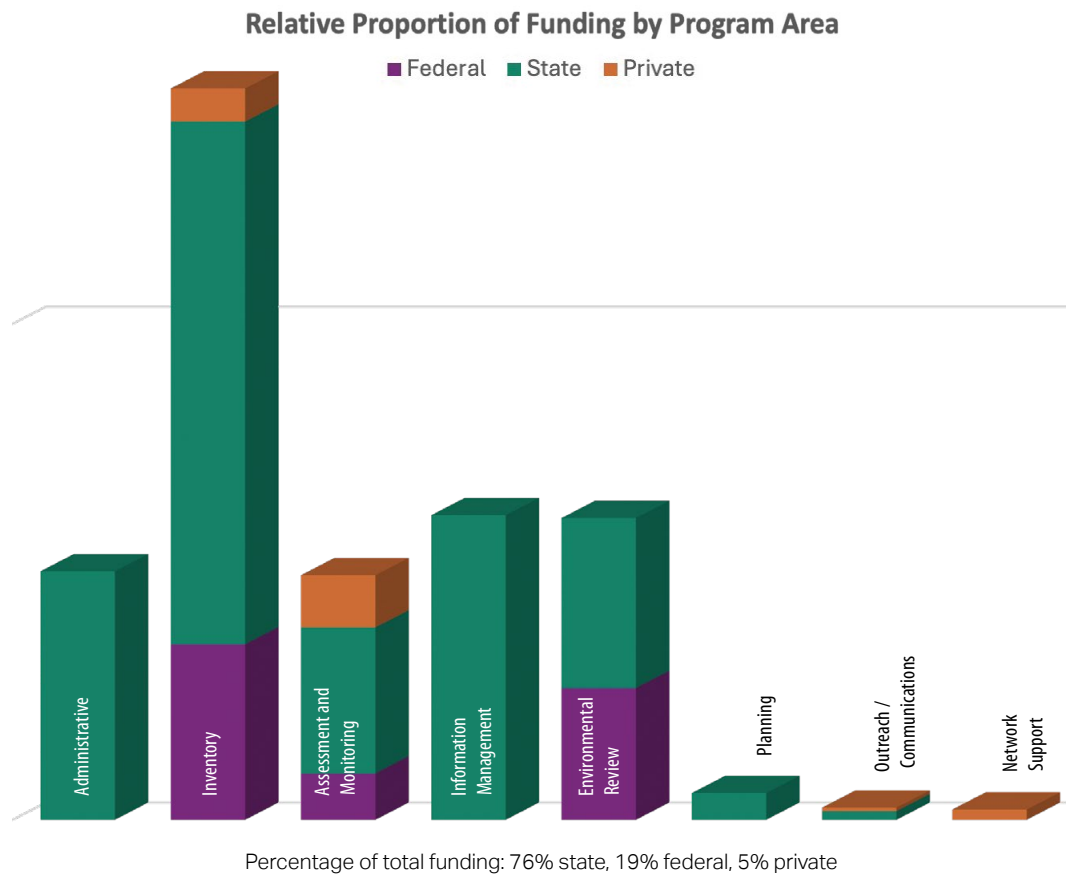




FINANCIALS

PROGRAM FUNDING – 2024

Our funding reflects the large amount of work we do with state and federal agencies. Local sources of funding include counties, municipalities, and NGOs. We also raise funds from private sources including businesses and private foundations. Inventory work represents the largest single investment of funds in the program. Environmental Review, Assessment and Monitoring, Information Management along with Inventory represent over 75% of the program expenditures, these being the core functions of PNHP.



WE WOULD LIKE TO RECOGNIZE THE MANY ENTITIES AND PROGRAMS THAT SUPPORTED OUR WORK IN 2024:

Pennsylvania Department of Conservation and Natural Resources

- Bureau of Forestry
- Wild Resources Conservation Program
- Community Conservation Partnership Program Grants
- Bureau of Forestry Research Fund
- U.S. Fish and Wildlife Service, Section 6 grants
- U.S. Environmental Protection Agency, Wetlands Program Development Grants

Pennsylvania Department of Environmental Protection

- U.S. Environmental Protection Agency, Wetlands Program Development Grants
- Clean Water Fund

Pennsylvania Game Commission

- State Wildlife Grants
- Pittman-Robertson Fund

Pennsylvania Fish and Boat Commission

- State Wildlife Grants

Pennsylvania Department of Agriculture

- Research Grants

Pennsylvania Department of Transportation

U.S. Forest Service

- Allegheny National Forest
- Great Lakes Restoration Initiative Funds (Cooperative Weed Management Program)

U.S. Fish and Wildlife Service

- Great Lakes Restoration Initiative Funds
- Science Application Funds

U.S. National Park Service

U.S. Army Corps of Engineers

NatureServe

National Fish and Wildlife Foundation

The Charles Kaufman Fund

Allegheny County Parks Foundation

The Knobloch Family Foundation

The Richard King Mellon Foundation

Nuttall Ornithological Club

Longwood Gardens

Pashek+MTR

Woods and Waters Consulting, LLC

Finch Research Network





Pennsylvania Natural Heritage Program

Department of Conservation and Natural Resources

Rachel Carson State Office Building
PO Box 8552
Harrisburg, PA 17105

Western Pennsylvania Conservancy

800 Waterfront Drive
Pittsburgh, PA 15222

Pennsylvania Game Commission

2001 Elmerton Avenue
Harrisburg, PA 17110

Pennsylvania Fish and Boat Commission

1601 Elmerton Avenue
PO Box 67000
Harrisburg, PA 17106

www.naturalheritage.state.pa.us



CONTRIBUTORS

Photo Contributors

Stephen Bucklin (31)
Cal Butchkoski, PGC (19)
Kierstin Carlson, WPC (32, back cover)
Claire Ciafré, WPC (5, 6, 13, back cover)
Brian Daggs, WPC (21, 25)
Erik Daniels, iNaturalist (5)
Charlie Eichelberger, WPC (3, 17, 18, 19, 32, 33, back cover)
Robin Eng, DCNR (Cover)
Mary Ann Furedi, WPC (13, 15, back cover)
Kathy Gipe, WPC/PFBC (9)
Rachel Goad, WPC (6, 24, 25)
Tracy Graziano, PGC (16)
Great Lakes Media & Film (2, 28)
Nathan Hartley, Reflorest (25)
Jerry Hassinger (30, 31)
Devin Hilty (30)
Hannah Huber, WPC/DCNR (6, 30, 31, back cover)
Tanya Khan, West Liberty University (11)
Megan Kresse, WPC (back cover)
Betsy Leppo, WPC (27)
Shawna Lockwood, Master Watershed Steward (27)
Zachary Loughman, West Liberty University (11)
Jessica McPherson, WPC (14)
Bethany Melvin (back cover)
Ryan Miller, WPC (8, 33, back cover)
Norris Muth, Juniata College (32)
John Plischke III (30)
Greg Podniesinski, DCNR (31)
Elanor Ray, iNaturalist (5)
Sally Ray (33)
Lucy Ruzanic (32)
Jason Ryndock, WPC/DCNR (back cover)

Photo Contributors (Cont.)

Ian Smith, Watersmith Guild (10, back cover)
Jerzy Strzelecki (18)
Greg Turner, PGC (17, 19)
Kirk Wattles, Penn State Master Gardener (29)
Pete Woods, WPC (7, 20, 34)
Noah Yawn, WPC (4, 5, 12, 13, 23, 26, 35, back cover)
David Yeany, WPC (9)
Ephraim Zimmerman, WPC (24, 34, back cover)

Text Contributors

JoAnn Albert, WPC
Kierstin Carlson, WPC
Claire Ciafré, WPC
Brian Daggs, WPC
Charlie Eichelberger, WPC
Mary Ann Furedi, WPC
Kathy Gipe, WPC/PFBC
Rachel Goad, WPC

Steve Grund, WPC
Amy Jewitt, WPC
Hannah Huber, WPC/DCNR
Tom Keller, PGC
Susan Klugman, WPC
Megan Kresse, WPC
Betsy Leppo, WPC
Dave Lieb, WPC/PFBC

Jessica McPherson, WPC
Ryan Miller, WPC
Cheyenne Moore, DCNR
Molly Moore, WPC
Kate Otterbein, PGC
Greg Podniesinski, DCNR
Scott Schuette, WPC
Lauren Sherman, WPC

Greg Turner, PGC
Jeff Wagner, WPC
Mary Walsh, WPC
Nevin Welte, WPC/PFBC
Pete Woods, WPC
David Yeany, WPC
Ephraim Zimmerman, WPC
Noah Yawn, WPC

