



Pennsylvania Natural Heritage Program

information for the conservation of biodiversity

WILD HERITAGE NEWS

Summer 2020



Searches for Saxicoline Salamanders

by

Charlie Eichelberger

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Photo Banner:
Green salamander in a rock crevice

Charlie Eichelberger

The light summer showers were shuffling to the east over Chestnut Ridge, and the sun was sinking over the Monongahela River on an early August evening in 1951. Neil Richmond, newly appointed curator of Herpetology at Carnegie Museum of Natural History, was following up on a hunch that the little-known green salamander (*Aneides aeneus*) would be found north of the Mason-Dixon Line.

Twenty years earlier, Richmond had pushed the range northward in West Virginia by 290 km (180 miles), and along with Dr. M. Graham Netting, postulated that the species would be found further northward into Pennsylvania. During several brief surveys, Richmond started working from the West Virginia line northward for approximately 20 km (12 miles) along the ridge searching rock crevices along the way, attempting to determine the factors that may be limiting the green salamander's northern range. The first step was to find out if and where green salamander occurred, and then compare the habitat to those sites found further south. He finally had success after

scrambling down the slopes of Chestnut Ridge, just a stone's throw from the West Virginia line, and combing the damp rocks with his flashlight.

Although Richmond had aspired to do more searches for the species to hammer out its distribution in Pennsylvania, his broad research interests took him in other directions, and for nearly a quarter century the green salamander was recorded only from this original collection location. Richmond's successor, C.J. "Jack" McCoy, in his 1982 publication *Amphibians*



Paul Wiegman

Charles Bier surveying for green salamander in 1987 along an expansion of a large gas pipeline running through State Game Lands.

and Reptiles in Pennsylvania urged more dedicated efforts to search for green salamanders, as there was concern that the species may have been lost from the state.

This call was picked up by Charles Bier soon after the formation of PNHP (then known as the Pennsylvania Natural Diversity Inventory - PNDI). The early years of PNHP focused on mapping specimen data as precisely as possible for the least known species by searching natural history collections and literature. This initial round of work relied on collaboration with museum curatorial staff and continues still today. Using the habitat descriptions and search methodologies of Richmond and others, Bier began hunting rock habitats and redocumented the species in 1983.



Charles Bier on a recent quest for green salamander in a "rock city."

From that location, he systematically spread out his efforts over Fayette and adjacent counties, picking his way along outcrops and "rock cities," which are complexes of sandstone float blocks whose arrangement resembles tall buildings separated by streets and avenues. Bier's extensive survey work refined the limited range and habitat of this rare specialist to the Pottsville Sandstone outcrops south of the Youghiogheny River, 33 km (20 miles) north of Richmond's 1951 find. His data helped the Pennsylvania Fish and Boat Commission more accurately assess the status of the green salamander, resulting in the species being listed as state-threatened in 1991. Across its range, it is considered to be globally vulnerable to extinction (NatureServe rounded rank G3).

Aneides is the genus of climbing salamanders, and as such, they have unique adaptations including elongate toes with squarish toe pads which enable them to cling completely upside down! A prehensile tail also assists with climbing. Their dorso-ventrally compressed



Squared toe tips of the genus *Aneides* are a unique adaptation to aid climbing.

bodies enable them to fit into crevices too tight for other salamander species, including the sympatric and considerably chunkier northern slimy salamander (*Plethodon glutinosus*). For camouflage, green salamanders sport a mottled green on dark gray pattern, allowing them to blend into lichen spattered rocks. Eggs are laid in clusters suspended from the ceilings of the crevices, and the female fervently guards the eggs until hatching. Juvenile green salamanders resemble scaled-down versions of the adults.



The American chestnut (*Castanea dentata*) was once one of the most common tree species in the Appalachians before the introduction of the chestnut blight. Historical accounts of green salamander surveys in old-growth forest detail the species penchant for finding retreat under sloughing bark and cracks of standing trees, and within the decaying wood of fallen chestnut.

Interestingly, some of the original publications on green salamander were before widespread timbering operations, and the descriptions of habitat suggest that the salamanders were found among the shaded, damp trees and decaying wood of old-growth forests associated with shaded rock outcroppings. Some of



Charlie Eichelberger

PNHP Zoologists Ryan Miller and Joe Wisgo approach a Fayette County rock outcrop. Minutes after this photograph was taken, green salamanders were documented on this rock face. This new occurrence is over a mile from the nearest known location and fills a large data gap that we had identified early in 2020.

these descriptions don't even mention the salamanders being found in rock crevices, and subsequent researchers have suggested that the preferred habitat was tied to primeval forests, relying on rock crevices primarily for winter brumation. As forests are cut, populations may hang on only by retreating to the limited rock crevices, confined for many decades until the forests mature and can provide sufficient shade, moisture, and woody habitat allowing for the recolonization of surrounding forest. With the extensive timbering that occurred throughout Pennsylvania's green salamander range and subsequent timber cuts as the forests matured, despite searches of the forests surrounding occupied rock outcrops, Bier has observed the species on trees and dead wood on only three occasions, once in a tree and twice on logs. All of these sightings were immediately adjacent to rock.



Charlie Eichelberger

GIS Manager and drone pilot, Brad Georgic, takes flight over a green salamander site. We are exploring creating 3D maps of occupied sites to better monitor green salamander populations.

As more detailed and sophisticated GIS resources become available, PNHP zoologists are more accurately able to predict potential green salamander habitat, and beginning this past winter, we reevaluated what we know (and some of what we don't know) about where this species lives. It became clear that several large data gaps needed to be surveyed, and accordingly we've been searching these potential patches of habitat. As expected, not all of the potential habitat pans out, but we have recently been successful at filling some of the largest data gaps with important information on this obscure species. Our hope is to establish even more rigorous habitat mapping, including the use of drone technology to help more closely monitor populations of this imperiled species.

Through wise management practices by the Department of Conservation and Natural Resources and the Pennsylvania Game Commission, portions of the forest surrounding green salamander sites are improving. Unfortunately, the forests around most of the green salamander locations are still in the rotation for forestry management. These sites would benefit from increasing the no-cut berth around the outcrops, allowing the salamanders to recolonize the forests that were once home. Regrowth would also benefit other characteristic rock denizens overlapping the range and habitat of the green salamander, including the state-threatened Allegheny woodrat (*Neotoma magister*) and the regal common raven (*Corvus corax*).



Charlie Eichelberger

A prime example of convergent evolution, Allegheny woodrats have very pronounced pads on their feet which complement the squared toe pads on the green salamander. These adaptations enable both species to get a firm grip while moving through their rocky homes.

Although much has been learned since Richmond's find on that August 1951 evening, the species remains one of Pennsylvania's most imperiled amphibians. Its

inherent rarity, highly specialized habitat needs, and threats from habitat fragmentation by rights-of-ways, roads, wind energy facilities, incompatible forestry operations, and outright habitat destruction from quarrying operations have the green salamander pinched into some of the last vestiges of suitable habitat. Long-term conservation and recovery will require strategic and careful forestry planning to repair habitat damage and reconnect our remaining colonies.



Charlie Eichelberger

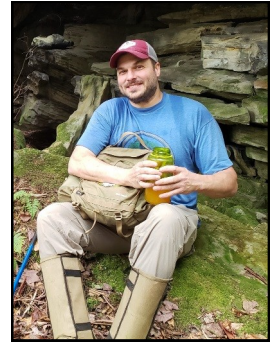
The state threatened green salamander has tight habitat requirements, small populations, and a limited distribution in Pennsylvania; all of which make the species highly vulnerable to local extinction.

Even with those conservation measures, comparatively small population sizes, threats from disease, acid precipitation, genetic isolation, and especially climate change have the green salamander in a precarious spot. If the green salamander's range is truly limited by the impassable Youghiogheny River, changes to habitat from climate change will undoubtedly cause further declines. In fact, a study focusing on Appalachian Highland salamanders using modeled climate data suggested the effects of climate change will begin to lead to losses of suitable salamander habitat by as soon as 2020. Accordingly, Bier and the PNHP staff are planning to do additional surveys north of the Youghiogheny to confirm that the species truly is confined by the river. Agile climbers that literally and figuratively live life "on the edge," the green salamander needs a heightened and dedicated conservation focus to ensure the species retains its place as an important member of Pennsylvania's natural heritage legacy.

Special thanks to Charles Bier, Ryan Miller, and Joe Wisgo for their contributions to this article.

About the Author

Charlie Eichelberger has been with the PNHP for 15 years, currently serving as the Terrestrial Zoology Coordinator. His work is primarily focused on secretive and undersurveyed mammals and herptiles. He loves his job, and the people he works with.



Climate Change Connections: Mapping Priorities for Species Movement Conservation

by

Jeff Wagner & David Yeany

While changes have already been documented for many species, their ranges and movement patterns will continue to shift as climate changes and temperatures rise. Some species will shift farther north, some will move higher in elevation, some may move to wetter habitats, and some will have limited options. A species' ability to move depends upon how well natural land cover and specific habitat types are connected across the landscape.



David Yeany

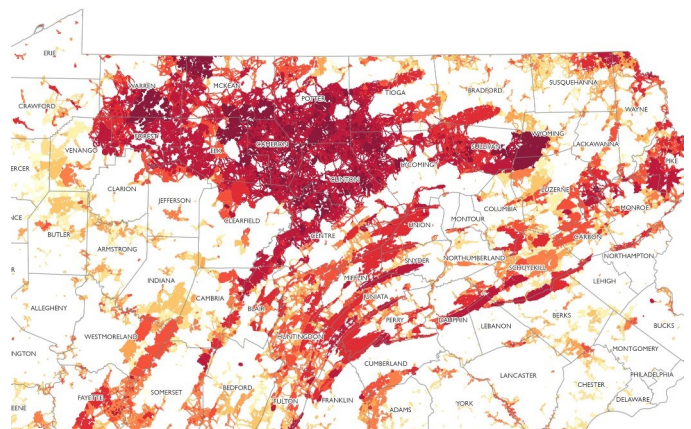
Wood thrush (*Hylocichla mustelina*) is a widespread yet rapidly declining forest interior breeding bird, a Species of Greatest Conservation Need (SGCN), and a representative species used to create the Nature's Network Cores and Connectors.

Where large infrastructure exists, features like highways and towns have broken natural connectivity and only highly mobile species (e.g., many birds) can cross them successfully. For the majority of species, development and the resulting habitat fragmentation creates dead ends to movement. By identifying and mapping available pathways for movement of a broad suite of conservation priority species, we can start to look for opportunities to keep those connections intact, make improvements, or restore them.

Last year we began a project with funding from DCNR to examine landscape connectivity across Pennsylvania and prioritize habitat corridors based on their biodiversity importance and resilience to climate change. We based this work on an analysis known as [Nature's Network](#) – a study coordinated through the USFWS involving many partners and contributors, PNHP included. Nature's Network is the result of GIS analysis for a suite of representative species – surrogates

for hundreds more with similar sensitivities and habitat needs, along with physical and environmental data to model the core habitats (i.e., hubs) of species concentration and the connectors (i.e., corridors) that exist between them. With this foundation, we incorporated additional data sources, some developed by PNHP, to further refine and customize the analysis and mapping to Pennsylvania's needs. Our end result is a network of habitat cores and connectors prioritized by their importance to biodiversity and their ability to facilitate movement of species across the landscape as climatic conditions change.

The conservation planning units included in the backbone dataset are derived from the terrestrial and wetland habitat cores and connectors (Nature's Network). The cores are currently intact, well-connected habitat blocks, selected to cover approximately 25% of the landscape in the northeastern United States. Cores contain widespread ecosystems like hardwood forests, rare wetlands, and important habitat across the northeastern U.S. for representative species occurring in Pennsylvania. The connectors provide a structural network linking together habitat cores and allowing for species movements among habitat patches.



This map shows the results of our GIS model, with cores and connectors identified and represented by their overall connectivity value – ranging from the highest 10% (100th percentile) to the lowest 10% (10th percentile). Darker red colors indicate cores and connectors with overall higher connectivity importance and priority for climate change conservation. These priorities were also stratified by major ecoregions to account for ecological variation.



David Yeany

A variety of barriers to species movements exist on the landscape—many are anthropogenic (e.g., roads, transmission lines, residential development, etc.), while others are natural barriers such as the Youghiohony River here in the Laurel Highlands.

We developed a custom spatial model in GIS to prioritize these habitat units for maintaining connectivity within Pennsylvania in the face of climate change. Our model included five main data sources:

Regional Flow – These data from Nature’s Network represented the predicted movement of wildlife species across the landscape and considered dispersal barriers, movement concentrating factors, and landscape permeability. We weighted this factor at 50% in our model.

Resilience – These data from The Nature Conservancy represented how robust the landscape will be to climate change. Landscape areas of higher resilience have a greater variety of microhabitats, topographic variation, and diverse geologies. We weighted this factor at 20% in our model.



David Yeany

Areas of the landscape with higher resilience to climate change offer topographic and geologic diversity supporting a variety of landforms and microhabitats.

Landscape Condition – These data from PNHP depict the cumulative impact of anthropogenic stressors on the landscape (e.g., development) and are a measure of landscape integrity. We weighted this factor at 10% in our model.

Geophysical Settings – These data were originally developed by The Nature Conservancy, representing combinations of geology and elevations that form the foundation for terrestrial habitats. These values were ranked, giving higher priority disproportionately under-protected settings. We weighted this factor at 10% in our model.

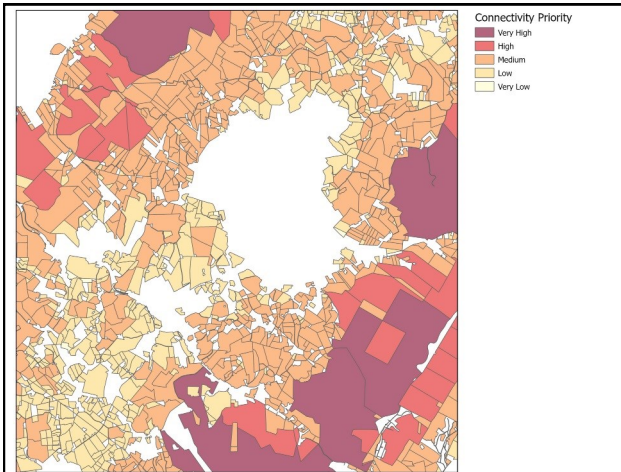
Natural Heritage Areas – These data from PNHP represented the primary biodiversity value for each core and connector, with higher values given to those units that included Natural Heritage Areas for rare, threatened, or endangered species and natural communities. Natural Heritage Area significance ranks were used to distinguish variation in these values. We weighted this factor at 10% in our model.



David Yeany

Wood turtle (*Glyptemys insculpta*) is a Globally Vulnerable SGCN and served as a representative species of riparian habitats in the creation of Nature’s Network Cores and Connectors. It is threatened by connectivity barriers such as roads and railroads which lead to direct mortalities and fragment its habitats.

There are several products of this project, the statewide climate change connectivity map and information described above and a number of regionally-based, detailed examinations of cores and connectors in select focal areas. This more detailed work takes the analysis down to the parcel level to help reveal the complexity and potential options for maintaining or improving the functionality of any given connection. This is the level at which anyone – agencies, municipalities, land trusts, or private landowners – will ultimately be working when considering projects and



In the map above, we have taken connectivity values for cores and connectors and accounted for parcel size and proportion of corridors within parcels to determine which parcels are higher priority for climate change connectivity conservation – whether that be land protection, habitat management, or restoration.

funding to better manage, protect, or increase connectivity for habitat cores and connectors across local landscape areas.

We received input from the DCNR Climate Change Committee and suggestions for these regional focal area analyses. We hope these will serve as pilot studies to demonstrate how statewide, broad-scale mapping and information can be developed and positioned for proactive climate change conservation for plant and wildlife species.

It is our hope that this work can serve as a foundation for land protection and habitat management that is directed toward climate change conservation planning



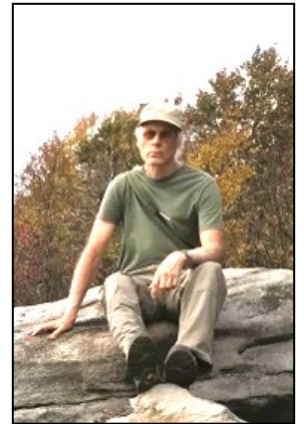
David Yeany

Prairie warbler (*Setophaga discolor*) is an SGCN that nests in scrub/shrub habitats and was a representative species used to develop Nature's Network. Our climate change connectivity map can be used to help maintain these early successional habitats in well-connected, resilient landscapes.

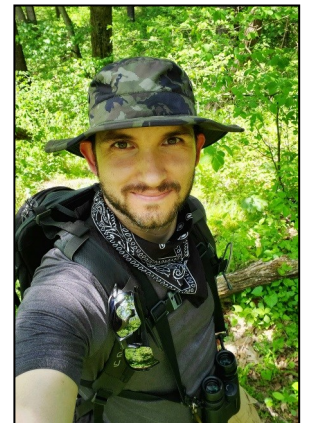
and adaptation. The Pennsylvania climate change connectivity map is a resource that can be used alongside existing tools such as the Pennsylvania Conservation Explorer and the Wildlife Action Plan's Conservation Opportunity Area Tool. We see the possibility of incorporating new and additional information into our model which may change some of the mapping results, especially at the regional level, but we believe that the statewide map will be fairly stable. This climate change connectivity map should provide enough information to allow Pennsylvania agencies and conservation groups to define state-based priorities and to develop strategies that will improve the quality and protection status of habitat connections throughout the state.

About the Authors

Jeff Wagner directs the Natural Heritage Program at WPC and works with the PNHP partners to administer and manage the overall program for the state. Jeff previously served as a Community Ecologist and County Natural Heritage Coordinator for the program. He is delighted to work with an expert staff of curious, experienced, and all around great people.



David Yeany joined PNHP in 2011 and currently serves as Avian Ecologist. He has a B.S. in Biology from Messiah College and a M.S. in Applied Ecology and Conservation Biology from Frostburg State University. His projects generally focus on bird community monitoring, bird-habitat relationship studies, avian movement tracking with Motus, and mapping and prioritizing wildlife habitat through spatial conservation planning.



Notes from the Field

Adapting to Change: Our Program in the Times of a Pandemic

Jeff Wagner

We were just a few weeks away from our first forays into the field when the state began its Covid-19 response. As with many people and organizations, it took some time before we started to understand the depth and breadth of the situation and began to strategize about how to continue our work with no real end of restrictions in sight. Fortunately, the PNHP staff at WPC and our partner agencies were in a good position to work remotely, as many often do when they travel around the state. However, our issues had less to do with connection and communication and more with completing deliverables for the many projects that require field work and data collection.



Ephraim Zimmerman

Ephraim Zimmerman and Chris Tracey follow mask and social distancing guidelines while installing trail cameras along the Youghiogheny River to monitor hydrology on river scour ecosystems.

We had to consider each project and its goals and shift tasks around, change scopes, and in several cases extend the projects into 2021. None of the solutions was perfect in averting the significant loss of opportunity to collect field data. Still, we figured out how to work toward the ultimate goals of the projects and positioned staff to meet those goals.

This pause in travel and aggressive field schedules has also offered our staff some added time to make headway in entering data, do further research on species and communities they are working with, and pull together information for possible publication. No

one was lacking for work to do, and many found it to be a busier and more demanding time with all of the virtual meetings and extra family obligations.

We have settled into a more regular workflow and we know pretty much what the rest of the year holds for us and what we want to accomplish. But with the many variations of school start-ups and other Covid related issues still very much with us, there will be challenges. We are heartened by the great cooperation and problem solving that has gone on within the PNHP partnership and beyond with our collaborators and funders. We all have a strong desire to see the work we do to help conserve biodiversity continue robustly. Our ongoing collaboration and cooperation will be key to advancing this work even in strange and trying times.

Frosted Elfin and Appalachian Grizzled Skipper Update

Betsy Leppo

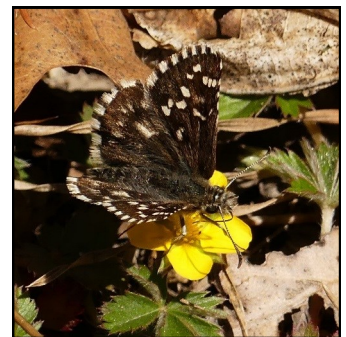
This June we completed a project funded by the Pennsylvania Department of Agriculture and the North Atlantic Landscape Conservation Cooperative to study frosted elfin (*Callophrys irus*) and Appalachian grizzled skipper (*Pyrgus wyandot*) butterflies.

Our goal was to revisit known locations, both recent and historical, to determine which sites still support the butterflies today and evaluate the quality of the habitat at occupied and vacated sites. The summer 2019 issue of the PNHP newsletter has a full-length article on this project and results from 2019 surveys.



Frosted elfin

John Peplinski



Appalachian grizzled skipper

John Peplinski

Searching Stems for Signs



Ben Coulter



Ben Coulter

Frosted elfin caterpillars disappear from their host plant, yellow wild indigo (*Baptisia tinctoria*), by the end of June or early July, but they don't go far. They pupate in the leaf litter near their host plants and rest there until they emerge as adults the following spring. Their feeding damage, however, remains visible on the wild indigo plants for the rest of the year. Mature larvae often partially girdle the stems, but it usually doesn't kill the plant. These photos show

typical frosted elfin feeding patterns. They may chew a semi-circle around the stem, a meandering channel, or a round patch. Wild indigo stems always have thin, brown, slightly raised 'seams' that encircle the stem at regular intervals. The stems also tend to accumulate a variety of scrapes, dents, and dings. It is easy to get misled by those marks, but the frosted elfin chewing damage is really distinctive in the depth and pattern of the channels they create. If you see marks on wild indigo stems resembling these photos, please take a picture and send it to Betsy Leppo at bleppo@paconserve.org.

We planned to use the spring 2020 field season to search for potential habitat, host plants, and butterflies in the vicinity of older historical sites that were documented simply by the nearest town name. To prepare for these surveys, we used a variety of tactics to identify potential habitat within the vicinity of vague historical records. We reviewed a variety of online and heritage databases for leads on locations of butterflies and their host plants. We sent out a flier requesting information on populations of yellow wild indigo (*Baptisia tinctoria*) and lupine (*Lupinus perennis*) to staff in the Bureau of Forestry and Game Commission. This outreach effort netted numerous reports, and we appreciate the help of everyone who distributed the flier and sent us locations.

For sites where we did not obtain leads from local knowledge or databases, we mapped potential habitats within 10 km of historical localities using aerial imagery.

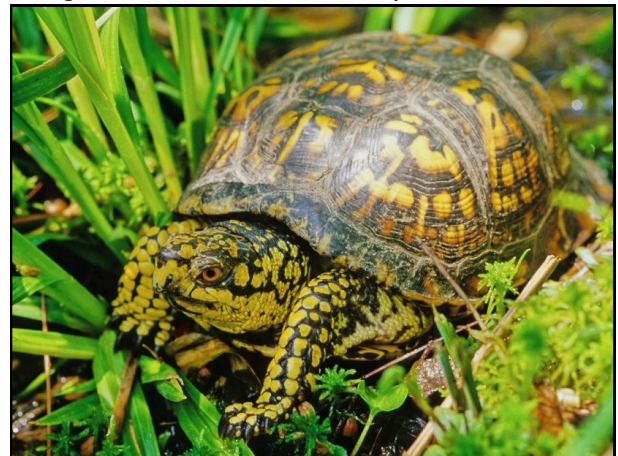
We focused on rights-of-way and other early successional habitats that could support the caterpillar food plants. We used a preliminary frosted elfin potential habitat model to help us prioritize survey locations and provide feedback for the model. We also began talking to staff at the USDA Natural Resources Conservation Service about using their ecological site descriptions (<https://edit.jornada.nmsu.edu/catalogs/esd>) and associated GIS data. Ecological sites are defined by specific soil and physical characteristics. They can be used to identify locations that could support our target host plants which like sandy and well-drained soils. This ecological data can be used to augment the work we did mapping potential habitats and may be useful in future habitat modeling.

Unfortunately, we had to cancel our springtime surveys for these butterflies due to Covid-19 travel restrictions. We shifted our efforts to working on additional mapping of potential habitats around vague historical records and in other areas of the state where we think we have a better chance of finding suitable habitat. This additional effort has yielded more specific and targeted priorities for future surveys. We also developed detailed site summaries and management recommendations for the two active frosted elfin sites. The land managers now have a customized resource for these butterfly populations that was written with their input and review.

Eastern Box Turtle Assessment

Kathy Gipe

PNHP biologists are participating in a population monitoring protocol for the eastern box turtle (*Terrapene carolina*) across its range in Pennsylvania and the northeast. The eastern box turtle is distinctly recognizable for its high, domed, and colorful yellow, orange, and brown shell, or carapace. The shell on its



Charlie Eichelberger

Eastern box turtle (*Terrapene carolina*)



Quinn Metheny

Tim Schumann and Charles Bier conducting a mussel survey circa 1986. When PNHP first started studying mussels in Pennsylvania there were no species listed as federally endangered or threatened; today there are seven and much of the population data for those came from heritage studies. Data from surveys like this, conducted decades ago, is irreplaceable and must be carefully maintained.

all of our materials to make sure Charles's field surveys are fully documented in digital format. This can mean transferring analog audio survey narration to digital format and transcribing it, transforming files created in software we no longer have into something readable in a current format, or scanning field notes and paper maps, and then making sure all of these materials are completely processed in the Biotics database. The digital files can then be backed up and easily accessed on the server.

After we complete the process for Charles Bier, we will continue working on files from other biologists who provided data to the program before our current enterprise geodatabase system was created. When formerly common species suddenly become rare, these surveys can be a treasure trove of locations to search for surviving populations. We might be working from home, but we are as busy as ever, making sure that what is known about Pennsylvania's rare flora and fauna can be effectively used in conservation research and planning.

Progress on Southwest Inventory Updates

Anna Johnson

Over the past 30 years, PNHP has completed a County Natural Heritage Inventory (CNHI) for every county in Pennsylvania. These inventories detail the location of habitat for species and natural communities of concern and highlight threats and conservation recommendations to guide management. Once completed, however, inventories need to be regularly updated to keep pace with Pennsylvania's rapidly changing landscape. With over 4000 Natural Heritage

Areas (NHAs) across the state, keeping the data up-to-date is a challenging task!

PNHP conservation planning staff has been hard at work over the last six years or so, improving the CHNI process. Field data collected can now be more quickly incorporated into our databases with the aid of more precise GIS tools and digital apps. We have also substantially updated the way we generate spatial data and write reports describing each Natural Heritage Area. We now rely on GIS-based tools to draw NHA boundaries rapidly using consistent biological standards. We also have developed scripts and databases that allow us to quickly summarize important information about each NHA and bring all the important information into one place so our scientists can draft the site accounts. These tools increase the speed of updates, as well as improve the consistency and relevance of the conservation recommendations for each site.



Robert Cox

Many of the updated NHAs in southwestern Pennsylvania lie along streams and rivers. Despite ongoing industrial activity, these waterbodies remain rich in biodiversity.

We are putting this new workflow to the test in southwestern Pennsylvania, by updating the ten southwest counties at once, by far our largest inventory project to date. Some of these counties, such as Allegheny, Washington, and Westmoreland, haven't been updated since the 1990s, and much has changed in that time. Habitat for plants and animals has changed as young forests have transitioned to older forests, some natural areas have been restored, and the water quality in our streams and rivers has improved. However, human impacts such as urbanization and natural gas development have led to habitat degradation and fragmentation. Finally, what PNHP considers of conservation concern has changed due to delisting of species whose populations have recovered or the listing of other species whose numbers have declined. Almost

all of the previous NHA boundaries in the southwest have been redrawn, some have been removed entirely, while many new ones have been delineated. This has led to a net increase of ~140 NHAs, and a grand total of ~650 NHAs in the ten-county region. The overall area covered by NHAs in the southwest, however, has declined substantially since previous updates, mostly the result of our more precise mapping of ecological resources.



Pete Woods

Flamed tigersnail (*Anguispira alternata*), a rare snail species which is often found in calcareous habitats.

One of the many exciting improvements in the southwest inventory update is the inclusion of data about land snails. This group of invertebrates was entirely absent from earlier updates, as little was known about them in the state. However, they are now tracked by PNHP - the result of collaborative work with Tim Pearce of the Carnegie Museum of Natural History. Many of the rare land snails that occur in southwestern Pennsylvania are found on areas of calcareous bedrock, which also support many other rare species. One example of a newly documented site of particularly high snail diversity is the Simpson Hill NHA which overlooks Dunlap Creek and the Mon-Fayette Expressway in Fayette County. It hosts the greatest known snail diversity of any one location in Pennsylvania, with at least 37 snail species documented, many of them rare. We look forward to releasing data to the public about this site and the other ~650 NHAs early in 2021!

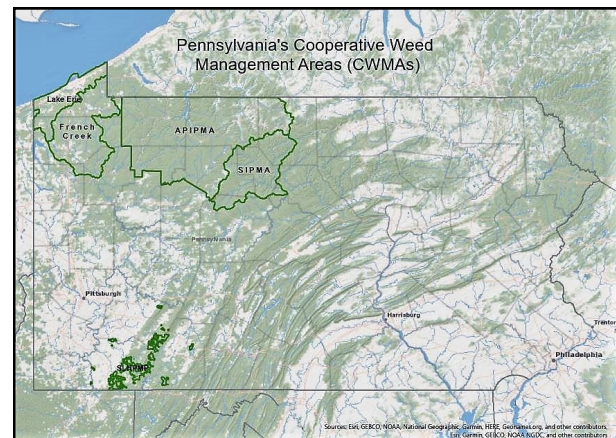
Statewide Invasive Species Management Program Planned for Pennsylvania

Amy Jewitt

In March 2020, members of the Pennsylvania Governor's Invasive Species Council (PA GISCC) voted to create a statewide invasive species management program in Pennsylvania. Referred to as PRISMs (Partnerships for Regional Invasive Species

Management), this initiative would divide the state into approximately 6-8 regions, each led by a single host organization directing strategic efforts to manage high priority invasive species or sites within their designated boundary lines. Each PRISM would collaborate with a team of local partners to conduct management efforts deemed most important in their region. PRISM partners would likely comprise representatives from state agencies, non-profit and academic organizations, and also local business owners, citizen scientists, and others.

The idea for a PRISM program in Pennsylvania originated from New York State where this same format for a statewide invasive species management system has been in place since 2013. The funding to support PRISMs comes largely from a line item in the New York state budget that specifically supports invasive species control and outreach efforts. With eight PRISMs in place in New York State, work to manage invasive species has not only been possible due to the dedicated funding source from the state, but also successful at effectively surveying for and managing high priority invaders including hemlock woolly adelgid (*Adelges tsugae*), giant hogweed (*Heracleum mantegazzianum*), and hydrilla (*Hydrilla verticillata*). More information can be found at <https://www.dec.ny.gov/about/92815.html>



Pennsylvania currently has several invasive species management collaborations (see map above) actively managing invasive plants, animals, and insects in several parts of the state. These include the Lake Erie Watershed Cooperative Weed Management Area, the French Creek Watershed Cooperative Weed Management Area, the Allegheny Plateau Invasive Plant Management Area, the Sinnemahoning Invasive Plant Management Area, and the Southern Laurel Highlands Plant and Pest Management Partnership.

Similar to PRISMs, Pennsylvania's invasive species management areas are each led by a single organization, operate within a specified region, and collaborate with a team of local partners to complete invasive species surveying, mapping, and management tasks. However, unlike Pennsylvania's current invasive species management areas, the planned Pennsylvania PRISM program would operate all across the state, not be solely dependent on their limited fundraising ability and capacity, and be able to address common problems more effectively and efficiently.

To learn more about the NYS PRISM program, visit <https://www.dec.ny.gov/animals/47433.html>.

To learn more about the PA GISC, please visit the Pennsylvania Department of Agriculture's website https://www.agriculture.pa.gov/Plants_Land_Water/PlantIndustry/GISC/Goals_and_Initiatives/Pages/default.aspx

To learn more about one or more of Pennsylvania's current invasive species management collaborations, please contact the appropriate leader.

Lake Erie Watershed Cooperative Weed Management Area (LEW CWMA):

Leader: Tom Cermak (tjc29@psu.edu)

Funding sources: Grants and partner contributions

French Creek Cooperative Weed Management Area (FC CWMA):

Leader: Brian Pilarcik (brian@crawfordconservation.org)

Funding sources: Partner contributions

Allegheny Plateau Invasive Plant Management Area (APIPMA):

Leader: Maddie Stanisch

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Funding sources: Grants

Sinnemahoning Invasive Plant Management Area (SIPMA):

Leader: Jon-Marc Burdick (jmburdick@camerondc.org)

Funding sources: Grants

Southern Laurel Highlands Plant & Pest Management Partnership (SLHPPMP):

Leader: Heather Fowler (heatherdfowler@yahoo.com)

Funding sources: Grants, private donors, in-kind donations, and fundraisers

Sampling Begins for Bees of Barrens Project

Pete Woods

Surveys for our Bees of Barrens project (B.O.B.) started this spring at four sites. This project will provide baseline data about which bees are present at some of our rarest natural communities, and how they respond to vegetation management to maintain the barrens. The surveys are funded by the Pennsylvania Department of Agriculture, and we are leveraging these funds by using volunteers to help survey additional sites. This project is part of a larger effort by the Northeast Association of Fish and Wildlife Agencies to study bees at xeric habitats throughout ten states in the region. Two rounds of sampling were completed this spring. Three more rounds will occur during the summer and fall, and the surveys will be repeated in 2021.



A bee in the genus *Augochlora* nectaring on blue vervain (*Verbena hastata*).

Pete Woods



At this shale barren above Sideling Hill Creek in Fulton County, the main nectar source for bees during May is Appalachian Phacelia (*Phacelia dubia*).

Pete Woods

Barrens habitats can support a number of bee species not found elsewhere. In barrens, the abundance of exposed soil provides critical habitat for many species of ground-nesting bees. Additionally, a barren, like any natural community, supports a distinctive set of plant species, some of which are

critical for certain pollen specialist bee species. Our sites for this study include the sand dunes of Presque Isle, scrub oak shrublands at Scotia Barrens (State Game Land 176), shale barrens at the Western Pennsylvania Conservancy's Brasfield Tract at Sideling Hill, and ridgetop scrub oak - pitch pine woodlands at Big Pine Flats in Michaux State Forest.

Seepage Wetlands

Mary Ann Furedi



Mary Ann Furedi

The perfect setting for seep selfies!

This spring was beyond ordinary for all of us, but COVID-19 didn't stop PNHP ecologists from doing some socially distant fieldwork. In May and June, our ecologists continued their work on an EPA funded project that began in 2019. The focus of this research is to further understand the plant communities of seepage wetlands, also known as seeps for short. Seeps are small-patch, groundwater fed wetlands that may be found in headwaters or the low slope transition associated with floodplains and larger wetland systems. Fractures in the underlying bedrock allow groundwater to seep to the surface thus creating a saturated environment where moisture-loving plants can grow. We can think of seeps as unique semi-aquatic pockets surrounded by terrestrial habitat. Seeps play an important role in contributing to the water balance of associated streams and wetlands while also serving as nurseries for aquatic insects which, in turn, support other organisms. Additionally, seeps add to the overall plant biodiversity of the landscape.



Lisa Smith

A beautiful vertical seep in the Laurel Highlands

Previous work by PNHP ecologists helped to identify some seep plant communities in Pennsylvania. A study completed in 1998 focused on calcareous and circumneutral seeps and resulted in the addition of several seep plant community types to the Pennsylvania Plant Community Classification. However, there are likely other types in the state, and the current project provides an opportunity to identify them. Through this project, PNHP ecologists have begun to locate and collect plot data on seep plant communities associated with acidic bedrock and moist, vertical rock faces. This spring, our ecologists focused their effort on exploring seeps dominated by skunk cabbage and golden-saxifrage to see if there are regional differences in plant species and environmental characteristics. What better way to socially distance during a pandemic than to spend time outside in a skunk cabbage patch?



Mary Ann Furedi

A great example of one of the many Skunk cabbage - Golden saxifrage seeps visited by PNHP ecologists this spring.

If you would like to learn more about the seep plant communities found in Pennsylvania, please check out the community descriptions on our website at <http://www.naturalheritage.state.pa.us/Communities.aspx>. If you've seen a seep in Pennsylvania and want to share the location, please feel free to email Mary Ann Furedi at mfuredi@paconserve.org.