



# Pennsylvania Natural Heritage Program

information for the conservation of biodiversity

Wild Heritage News

October—December 2011



## Playing Peek-a-boo with a Rare Salamander

by

Ryan Miller

The green salamander (*Aneides aeneus*) is one of the most unique salamanders in North America. Everything from their brilliant green markings, to their little square rock-gripping toes, to their habitat use makes them different from most salamanders. The Pennsylvania Natural Heritage Program and The Western Pennsylvania Conservancy became involved with the state Threatened green salamander when it was rediscovered in Pennsylvania by Charles Bier in 1983. Since then he has mapped what is known as the green salamander's current range in Pennsylvania and learned their habits and habitat. I have been studying the salamander with Charles since 2007 and have learned much about this amazing creature.

The green salamander has green mottling on a grey or black background on the top of its head and back. The average size is 3 to 5 inches. They have a laterally compressed (flat) body which aids their movement within the crevices of rock formations, and square-shaped toes that help them grip the rocks. They have brilliant yellow irises that show up well

when using a flashlight to look into the rock crevices.

The green salamander is not common throughout its range. It is found in pockets along the Appalachian Mountains from as far south as Alabama to the northern terminus of its range in Fayette County, Pennsylvania. Its preferred habitat in Pennsylvania is Pottsville sandstone outcrops and formations within heavily forested areas. In other states, it has been found in other types of rock and also has been known to wander into the forest away from the rocks and even reside in trees.

In Pennsylvania the green salamanders spend their summers in small crevices in the rocks. They are truly habitat specialists, preferring "not too wet but not too dry" and "not too wide but not too narrow" crevices. It has been shown that they prefer clean crevices with no debris, dirt, spider webs, or other occupants like invertebrates. Yes, they are picky about where they reside on the rocks! They move from crevice to crevice foraging on invertebrates and during the winter they

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Photo Banner:

Green salamander  
Ryan Miller

hibernate in deep crevices within the sandstone to avoid the freezing temperatures.



Green salamander

Ryan Miller

The salamanders breed in late spring, and the females lay their eggs by attaching them to the roof of isolated “nest crevices.” The female will vigorously defend the crevice from intruders like other salamanders and invertebrates. A clutch usually consists of 10-20 eggs that develop throughout the late summer and hatch in late September. The hatchlings are miniature replicas of the full-sized adults and can fit on a penny.

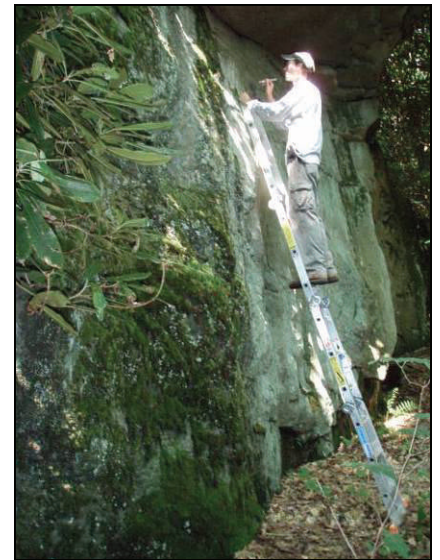
Field surveys for the green salamander are quite in depth. They start in the office with desktop GIS map analysis with topographic maps and geology overlays. We select areas that stand out as steep rock outcrops within the boundaries of the Pottsville sandstone formation for field assessment. Sometimes these areas are not easily accessed and require hours of hiking in steep terrain through green briar, rhododendron, and mountain laurel. Once at the site we begin carefully examining cracks and crevices on the faces of the cliffs, outcrops, and boulders. We use a small flashlight to illuminate the crevice to locate the salamanders which blend in quite well with their dark bodies and lichen-like patterns. Sometimes we carry in ladders to survey tall cliffs and boulders, and also have been known to hold each other up to quickly check crevices that are over our heads. Once we find a green salamander, we take detailed notes on its location, habitat, and morphology, and take photographs of the habitat and the animal itself. All of this is done without removing them from the crevices so they remain undisturbed.

Not all surveys turn up salamanders. Rock habitats can be relatively easy to find by looking at maps. However, once we’re on the ground at the site, all of the habitat pieces may not add up because it’s either too dry, too wet, too hot, too cold, too sunny, too much moss/organic matter, or not the correct rock composition.

After 5 years of looking at the salamanders in their habitat, I have developed a habitat and search image. On some surveys I have found myself stepping back to look at a huge rock formation and calling my shot, seeing a decent crevice from a distance and walking up to find a green salamander staring back at me with bright yellow eyes. Salamander surveys can also be humbling however, I have been caught (by Charles and others) scouring crevices inch by inch across huge rock formations only to be followed up and told “you missed one.”

Most of the work with the green salamander over the years has been environmental review projects. However, this past field season I was lucky enough to be able to survey for the salamanders in Forbes State Forest for a DCNR Bureau of Forestry rare species update project. During these surveys we spent time hiking along rock formations where we discovered or updated three green salamander occurrences. To add to the excitement, I discovered some timber rattlesnake and copperhead basking sites as well. Nothing makes your hair stand up quicker than walking along the rocks and hearing the tell-tale buzz of a timber rattlesnake nearby!

Pennsylvania is lucky to have this unique fauna reside within its borders. However, it does face threats. Logging near the rock formations can expose the rocks to sun and wind, essentially drying them out and making them unsuitable. Rock quarries and mines can eat up huge areas of habitat. Most



Charles Bier

Ryan Miller using a ladder to search a boulder for the green salamander.

recently, energy development from wind and fossil fuels has fragmented habitat with roads and well pads, and removed trees near habitat for pipelines. To protect remaining colonies from development or destruction, forested buffers around the habitat can be established. It is certainly a rare animal worth protecting.

## Butler County Natural Heritage Inventory Update

by  
Pete Woods

In the two decades since the first County Natural Heritage Inventories (CNHIs) were published, our methodology has evolved and our taxonomic coverage has broadened. Conditions on the ground have changed, records need to be updated, and additional areas need to be surveyed. A second generation of CNHIs is beginning, and Butler County is the first of these completed for western Pennsylvania.

The original Butler CNHI was completed in 1991, and the new CNHI was completed in October of 2011. Butler County is now known to contain 139 populations of rare species that are tracked by PNHP. Butler County ranks 27<sup>th</sup> out of Pennsylvania's 67 counties in the overall number of populations of rare species. Seventy-two Natural Heritage Areas (NHAs) have been delineated to encompass these resources. Most of the sites from the first inventory are included as NHAs in the second inventory, but we have redrawn them to meet our new standards of identifying Core Habitat and Supporting Landscape. We designated numerous new NHAs around new finds, and some of the old NHAs were eliminated because the species for which they had been drawn were no longer present at the site.

Not all of our data comes from PNHP field work. Approximately 15 of the new Butler County records came from local naturalists. By cultivating these partnerships, we will continue to receive data in years to come as these naturalists explore Butler County.

Most of the NHAs are centered on waterways, floodplains, wetlands, and the steep slopes above waterways. Clusters of NHAs are present along



A female Halloween pennant on cattails in the marsh where Muddy Creek flows into Lake Arthur

Pete Woods



Beaver ponds along Blacks Creek

Pete Woods

Slippery Rock Creek, Connoquenessing Creek, and Buffalo Creek. The largest wetlands in the county include Muddy Creek Marsh and The Glades. Upland NHAs away from waterways in Butler County play host to osprey nests, grassland birds, a bat hibernaculum, habitat for American columbo, a small patch of old growth beech forest, an esker, and a prairie.

The landscape of Butler County is underlain by sandstone with interspersed layers of shale, siltstone, coal, and limestone. These rocks have been shaped by erosion for millions of years since the Allegheny Plateau was uplifted. More recently, several episodes of glaciation have re-sculpted the northwestern edge of the county, leaving features such as kettles, eskers, and fens which support species not found elsewhere in the county. The forests of Butler County have been heavily timbered and converted to agriculture, but some large patches of second growth forest remain, especially in the eastern and northern parts of the county, as well as on the north side of Lake Arthur. Forests range from dry oak-dominated forests to steep hemlock ravines, to diverse mesic forests on lower slopes, to the bottomland oak-hardwood swamps and floodplain forests along the creeks. Other wetlands in Butler County include cattail and mixed forb marshes, shrub swamps, vernal pools, and at least one fen.

Butler County has a long history of agriculture, timber extraction, and mining. While good quality forest and stream habitat remain, impacts from development and energy extraction continue. Many of the streams in Butler County have been impaired by acid mine drainage (AMD) and by siltation. In recent years, water

quality conditions in some streams have improved, as a result of the work of local watershed groups that have installed numerous AMD treatment systems in the Slippery Rock Creek and Connoquenessing Creek watersheds.

Most of Butler County's rare species are rare within Pennsylvania, but are globally secure. However, several species are considered globally rare, including the eastern massasauga rattlesnake, the eastern hellbender, the wood turtle, and the West Virginia white butterfly. These species are a priority for conservation, and finding new populations of them was a highlight of this project.



Pete Woods

Eastern massasauga rattlesnakes are habitat specialists, using open meadows close to the wetlands in which they hibernate.

The eastern massasauga rattlesnake, in particular, has declined since the first inventory. It has been extirpated from many sites, probably due to a combination of wetland disturbance, succession of open fields to shrubland and forest, mining and development of habitat, and human persecution. The handful of good quality sites remaining in Butler County represents most of the extant sites that maintain massasauga populations in the commonwealth. This project gave PNHP biologists a chance to revisit old sites, and we found massasauga at one site where they had not been seen in many years. Another declining species is the western chorus frog. Large populations were present here in the 1970s, but they have since disappeared for unknown reasons.

The eastern hellbender, the largest salamander in North America, was not previously known from Butler County, but a chance find of two hellbender eggs that had washed out of a nest revealed a previously unknown population. Further surveys are needed to determine the exact location and size of the population and the quality of the habitat. The West Virginia white

butterfly and the wood turtle are only moderately rare in our region, but both species have experienced steady declines over many years, to the point that both species are now considered



Pete Woods

globally rare. This inventory documented several new populations of both species. Having this baseline information will help us follow these populations over time. And now, before these species become critically rare, we have an opportunity to find the best remaining populations and work toward protecting their habitat.

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There are a number of protected tracts of land in Butler County. Public lands managed at least in part for conservation include Moraine State Park, Jennings Environmental Education Center, the Slippery Rock Creek Natural Area, State Game Land #164, and State Game Land #95. Several land trusts are active in the area protecting a number of other areas. The results of this project will help guide the future work of these land trusts.

The Butler CNHI will also be used by county planners, to steer development away from sensitive areas. With the Butler County Greenways project underway, the NHAs and other information from the CNHI will be a critical part of the greenways analysis.



Pete Woods

West Virginia white butterflies fly for about a month each spring. They live in forests with abundant and diverse wildflowers.

## The Pennsylvania Rare Plant Forum

April 21, 2012

The 2012 meeting of the Pennsylvania Rare Plant Forum will be held at Juniata College on Saturday, April 21. The Rare Plant Forum is a function of the Vascular Plant Technical Committee of the Pennsylvania Biological Survey, and for over thirty years has served in an advisory role to the Commonwealth of Pennsylvania for issues related to the conservation of the native flora of Pennsylvania. In addition to discussing proposed changes to the list of Plants of Special Concern in Pennsylvania (POSCIP), there will be a few related presentations. This is an excellent opportunity to connect and work with other botanists, amateur and professional, who share your interest in the flora of Pennsylvania. All people interested in the conservation of Pennsylvania's native flora are encouraged to attend this meeting.

Prior to the meeting on Saturday, there will be an afternoon excursion on Friday afternoon to Martin Gap Natural Area in Rothrock State Forest, a favorite natural area in central Pennsylvania. Following the field trip, there will be a group dinner at a local restaurant.

For more information on the meeting, including registration, please contact Ephraim Zimmerman, Chair, Pennsylvania Rare Plant Forum, [ezimmerman@paconserve.org](mailto:ezimmerman@paconserve.org). ph: (412) 586-2319.

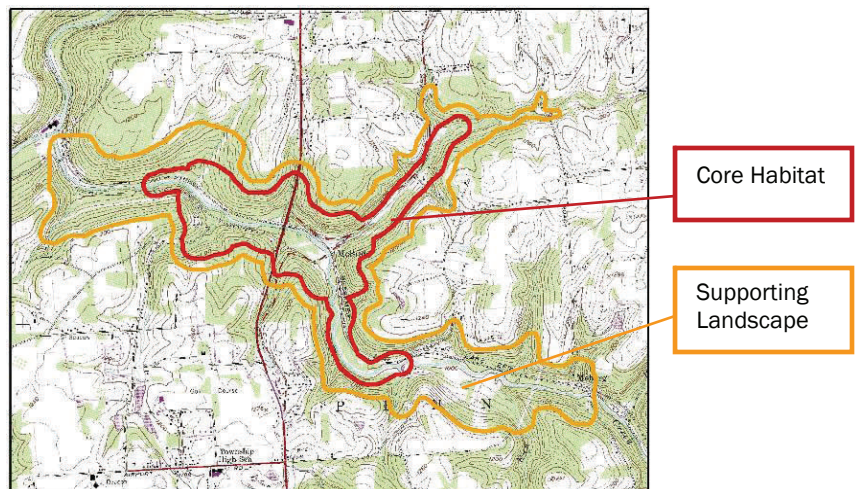


Betsy Leppo

## New Term! Natural Heritage Areas

PNHP has conducted county-based inventories over the past 22 years and during that time the projects have evolved both in depth and scope. One of the products of these inventory reports are maps highlighting locations of rare, threatened, and endangered species and uncommon natural communities. These sites have been referred to as Biological Diversity Areas, Conservation Areas, and various other names in the past. As the first step in an effort to streamline the data we produce, these county-inventory sites will now be referred to as Natural Heritage Areas (NHAs).

This name change will have several benefits including the standardization of site names across the state and a more direct relationship between this name and the Pennsylvania Natural Heritage Program. Additionally, it allows for the more straightforward inclusion of geologic features which are tracked but are not always considered biodiversity elements.



A Natural Heritage Area showing Core Habitat and Supporting Landscape

## Notes from the Field

### Botany/Ecology

PNHP staff have initiated the Pennsylvania Game Commission's Game Lands Management Tool project. This tool will provide the PGC with valuable conservation planning information for all species of concern within Pennsylvania. WPC PNHP staff are coordinating the development of Conservation Planning Polygons (CPPs) and Best Management Practices for species of concern, as well as site management plans that will be incorporated into comprehensive management plans for each Game Land. Through this project, we will also update old records for species of special concern on State Game Lands. We selected Adam Hnatkovich, formerly part of the Environmental Review team in Harrisburg, to coordinate the project.

Scott Schuette joined PNHP and WPC in Pittsburgh to coordinate inventory efforts in western Pennsylvania. His background in bryology will advance the knowledge of Pennsylvania's bryophyte flora with the first step being the development of a tracking list for these under-studied plants. Since coming to PNHP he has analyzed herbarium records from Missouri and New York botanical gardens and found that Pennsylvania harbors 526 moss species, 126 liverwort species, and 5 hornwort species. Of the 526 moss species, 118 are known from a single occurrence, making those species potentially rare in the commonwealth.



Andrew Strassman

*Thuidium*, a genus commonly known as fern moss, is recognized by capsules that resemble a duck's head.

PNHP staff surveyed two limestone habitats in Mifflin and Snyder counties for rare plant species. The highlight was discovering a new population of grooved yellow flax (*Linum sulcatum*); a state Endangered species.

We provided the final report for the 'Outreach and Technical Assistance for Seasonal Pools in Pennsylvania' grant to the Pennsylvania Department of Conservation and Natural Resources, Bureau of Recreation and Conservation. This grant was funded through the Community Conservation Partnerships Program (C2P2), Environmental Stewardship Fund. From 2009 to 2010, PNHP staff produced management plans and other educational materials for



Pete Woods

Ice on a vernal pool in Erie County

landowners with vernal pools on their properties. As a part of the C2P2 project, we updated the Seasonal Pool website and added a new educational materials page <http://www.waterlandlife.org/319/educational-materials>. A booklet, poster, and presentation are available online that provide information on how to recognize vernal pools and the wildlife that use them. We also developed a series of kiosks that describe a vernal pool wetland restoration project that was completed in 2010 in Cumberland County, Pennsylvania. Our goals in providing these materials were to help landowners care for the vernal pools on their property and encourage educators to teach others about these fascinating wetlands.

We are now wrapping up data entry from 2011 for the limestone conservation assessment project and starting to plan for 2012. Our data analysis to date demonstrates the conservation importance of limestone habitats in our state. Only 6% of Pennsylvania's land area has strongly calcareous geology, and these areas have been converted to agriculture and development at over three times the rate of the state as a whole. While 60% of Pennsylvania is forested, only 17% of the area on calcareous geology remains forested. Our classification of plant pH preference shows that while 8.5% of Pennsylvania's native vascular plant species grow mainly or exclusively on calcareous soils, these include 20% of our rare species (S1-S3). As we plan for 2012 fieldwork we would love suggestions for particularly interesting or high quality sites on limestone that we should include in our inventory.

## Zoology

In 2011, Heritage staff participated in a Great Lakes mussel project that conducted more than 100 surveys of Lake Erie bays, wetlands, and tributaries, including Presque Isle Bay and Conneaut Creek in Pennsylvania. The researchers discovered more than 2000 live mussels from 22 species inhabiting Great Lakes coastal wetlands. Planning has begun for additional surveys in Presque Isle Bay in 2012.



Fatmuckets (*Lampsilis siliquoidea*) and spikes (*Elliptio dilatata*) from Conneaut Creek surveys

Mary Walsh

Ryan Miller presented the Blanding's Turtle Survey and Status Assessment Results at the Regional Science Consortium Annual Symposium and to the PABS Herptile Technical Committee. The presentation outlined the need for more research on the Presque Isle population, which is believed to be the last population remaining in the state.

PNHP staff also assisted the PGC with fall swarm bat trapping at Canoe Creek State Park and Glen Lyon Mine. Unfortunately, bat numbers at Canoe Creek have taken a huge plunge in 2011 due to White Nose Syndrome (WNS) with only 38 bats captured this fall, down from 2,098 captured in 2010. One ray of hope is that there are still bats at Glen Lyon mine where WNS has been present since the winter of 2008-2009. Although numbers are greatly reduced, the presence of bats at this mine suggests that some of these individuals are able to tolerate the disease.

## Information Management

We presented the Field Survey Geodatabase (FIND) to staff and partners at the December 2011 PNHP all-staff meeting. Data Management staff are in the process of preparing training materials. We anticipate that WPC Heritage staff will start using and testing FIND in late February while we continue to schedule training and deployment for partners. Tyson Johnston has taken on the task of managing FIND and has been working to finalize the database structure and configure it on the Cloud Server so it will be accessible through the internet.

We have hired Kristen Erath as the Special Projects Coordinator for Conservation Planning Polygon (CPP) Development. Kristen previously worked with the Maine Natural Heritage Program, and will be supervising the CPP GIS Technicians who will be starting in 2012. Kristen has been meeting with staff and project managers to help align CPP development with current project needs.

## Conservation Planning

In November, conservation planning staff presented a framework for developing the Lehigh Valley Conservation Greenways implementation plan to the Lehigh Valley Planning Commission and NHI Update Advisory Committee. This framework included parcel level recommendations for conservation action focused on biodiversity targets in four priority greenway networks.

Conservation planning staff provided GIS and other technical support for a WPC land protection project funded by the National Fish and Wildlife Foundation to prioritize golden-winged warbler habitat in the Central Appalachian region.



Golden-winged warbler

Bill Hubick <http://www.billhubick.com>

This past October, David Yeany joined PNHP as a conservation planner in the WPC Pittsburgh office. David will be working on a variety of conservation planning and outreach projects in addition to managing the statewide Natural Heritage Inventory dataset. This dataset contains Natural Heritage Areas which represent critical habitats for Pennsylvania's tracked species and communities and serves as a primary conservation planning tool. He brings a strong background in ornithology and bird conservation to PNHP and is excited to conduct field-based bird studies as well as avian conservation analyses utilizing GIS.

## County Inventory

Survey efforts for the Lehigh Valley CNHI update (Lehigh and Northampton Counties) concluded for the year. We conducted roughly 60 surveys throughout the two-county area, and of these, elements of concern were documented at 21 of these locations.

## Measures of Progress

The following Measures of Progress have been expanded and defined more precisely for 2011. We believe that these measures represent a significant cross-section of results of the work that we do as a program. These measures will be reviewed and updated, as needed, to best reflect the activities and goals of PNHP. Progress for these measures reflects seasonality of program activity.

Measure of Progress (2011)	Annual Goal	1st Quarter	2nd Quarter	3rd Quarter	4th Quarter	Cumulative Total	Percent of Annual Goal
Biotics Records Updated	200	140	311	406	114	971	100%+
New EOs Documented and Entered into Biotics	800	157	188	272	231	848	100%+
New Records Entered into HGIS	300	116	144	158	41	459	100%+
Percent of HGIS Records > 10 Years Old	50	53	51	50	51	N/A	N/A
Field Surveys Performed	400	0	354	346	34	734	100%+
New CPPs Developed	1000	41	73	54	237	405	41%
Site Polygons Created and Attributed	400	0	47	221	72	340	85%

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

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

**New EOs Documented and Entered into Biotics** is a way to measure the success of our inventory effort in finding new occurrences of plants, animals, and exemplary natural communities. All new records entered into the database are counted.

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

**Percent of HGIS Records > 10 Years Old** is an indicator of the currency of data critical to the environmental review process. Keeping records as current as possible helps reduce the time needed to make decisions and determine a course of action for a given project under review.

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

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

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