



Pennsylvania Natural Heritage Program

information for the conservation of biodiversity

Wild Heritage News

January—March 2013



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Photo Banner:
Pete Woods

Snow trillium, one of the earliest blooming flowers in Pennsylvania, grows in rich deciduous forests.

The Work of Winter

by

Denise Watts, Charlie Eichelberger, Ryan Miller, and Betsy Leppo

Summer is truly an active time as our biologists head out into the field in earnest – the office turns quiet and weeks go by without coworkers seeing one another. It’s a different pattern of work in the winter but the effort and scope of what we do is as great as ever. Here is a sampling of the work that our staff carried out this winter.

Winter Plant Surveys

As part of the Chester and Berks County Natural Heritage Inventory updates, we are revisiting locations where species of concern were found in the past, in order to keep this information current and note any changes that might be occurring to the species or their habitat. While most of these surveys are done in the summer

months, there are some exceptions in this area of the state, where there are a few plant species that are easier to locate after most other plant species have died off for the season.

Crane-fly orchid (*Tipularia discolor*) and puttyroot (*Aplectrum hyemale*) are two of these species. Both are typically found growing on stream sides and rich forested slopes. These two orchid species flower in the summer, but the flowers are small and inconspicuous. What makes these species different is the fact that they produce leaves in the winter that disappear in the spring. Crane-fly orchid has a green leaf with a purple underside. Puttyroot has a wrinkled green leaf with parallel, whitish veins. We survey for



Crane-fly orchid

Sally Ray



Puttyroot

Sally Ray

these species in the winter because it is easier to spot the single leaves produced by each plant with less competing vegetation in view. So while we need to avoid snow cover, winter provides our best chance to spot these unique orchids.

We have relocated three populations of crane fly orchid and one population of puttyroot in surveys conducted to date in Chester and Berks counties. One new population of crane fly orchid was also found in the course of these surveys. A few more surveys are planned before this window of opportunity closes.

Subterranean Surveys

A dedicated survey effort of Pennsylvania's aquatic cave invertebrates has not been conducted in nearly 20 years, and as a result, many records for Pennsylvania's cave amphipods, isopods, and planarians are overdue for updating. To access caves and mines with cave invertebrate potential, PNHP staff have teamed with Pennsylvania Game Commission Wildlife Diversity biologists during their winter hibernating bat surveys. While invertebrate surveys could occur at any time of year, obtaining permission from private landowners to conduct these surveys can be a challenge, and piggy-backing the bat surveys with invertebrate surveys improves our efficiency.



Charlie Eichelberger

Two occurrences of Price's cave isopod were updated this quarter.

Just what are cave obligate invertebrates? These animals have evolved without pigment and eyes, and some have accentuated touch receptors, including large antennae and sensitive hair-like structures on the appendages that allow them to navigate in these lightless environments. Appearing as miniature white shrimp (amphipods), pill bugs (isopods), or slow moving blobs (planarians), these animals often have globally restricted ranges, at times coinciding with the limits of our physiographic provinces, both of which have been influenced by glaciation. Caves also serve as direct

conduits to our groundwater, and just as the presence of certain stream macroinvertebrates indicate the health of waterways, cave invertebrates can chart the condition of our groundwater resources.



Charlie Eichelberger

This cluster of little brown bats shows the telltale sign of White-nose Syndrome. The fungus growing on the faces of these bats has led to a decline of over 99% for this species.

Highlighting the need to update and monitor these populations is the massive ecological change occurring as our smaller cave-hibernating bat populations continue to be decimated by the White-nose Syndrome (WNS) fungus, *Geomyces destructans*. PGC biologists have conducted systematic bat hibernacula counts in the winter months for decades, and the data collected have been critical in monitoring the effects WNS has had on our species of hibernating bats. The PGC has documented overall declines in hibernating bat numbers of 98%, and our formerly most common bat, the little brown bat (*Myotis lucifugus*), has declined well over 99%. The functional elimination of these species in caves may have drastic effects on our cave invertebrates and the ecosystem as a whole, since the bats provide an influx of energy into these isolated subterranean systems through the nutrients and organic matter in their guano.

Cave surveys are physically challenging, often requiring contortion to navigate tight spots known as "squeezes." In other cases, vertical cave equipment including ropes, harnesses, ascenders, and cable ladders are needed to survey passages beyond vertical drops. As PGC staff scan the ceilings for the remaining bats, PNHP staff search small pools and streams for isopods, amphipods, and planarians.



Greg Turner, PGC

Zoologist Charlie Eichelberger barely fit through this 20 foot long "squeeze" in a Lycoming County cave.

We update older known records of cave invertebrates, and collect material from previously unsurveyed caves to allow for future species identification.

This quarter, surveys of five caves in Berks, Fulton, Lycoming, and Mifflin counties updated three records, and found one new cave invertebrate occurrence. A very healthy population of Price's cave isopod (*Caecidotea pricei*) was updated in Berks County. This cave has several "lakes" and we observed hundreds of half inch long isopods scurrying along the bottom of the pools. Hopefully, in time this work will provide a picture of the effects that WNS has on our populations of aquatic cave invertebrates of concern.

Massasauga Habitat Management

Winter is a great time for wildlife habitat management. For an animal like the eastern massasauga, habitat management may keep it from becoming extirpated from Pennsylvania. The massasauga has slowly been disappearing from Western Pennsylvania for a few reasons but perhaps the most widespread and reversible is natural succession - woody vegetation encroaching on the preferred open, old-field habitats that the massasauga uses. To combat this problem, over the past two winters zoologist Ryan Miller and other PNHP staff and volunteers have been removing many acres of woody vegetation from known massasauga sites with funding from a Sierra Club Huplits Grant.

Winter is often the best time for habitat management, because many animals are hibernating or have migrated and there is little chance that management activities will disturb them. In the case of the massasauga, the snakes are just a few feet below us hibernating in groundwater seeps that never freeze. The massasaugas use crayfish burrows, rodent burrows, and other holes to access the water table. If we cut trees and brush while the snakes are underground it keeps both us and them safe.

As we fell the brush and trees by hand we create brush piles for the other animals to utilize. Rabbits and other mammals use the brush piles for cover. Birds like grouse, woodcock, and turkey nest in them. Woodcock have been found nesting in the brush piles within weeks after being built.

The cold winter weather can also freeze the soft wetland soils allowing us to use heavy equipment in these ecologically sensitive areas. Some of the woody vegetation can be so overgrown that chainsaws and



Before (top) and after images of the restoration area.

Ryan Miller

weed whackers are not enough. For really thick patches of brush, we need tractors and rubber tracked skid steers with brush hogs or mulching attachments to eat through the tangles of brush. In some cases we can drive the equipment across the frozen ground and wetlands without sinking in or leaving ruts behind.

As winter disappears and spring blooms, the snakes come out of their holes and are greeted with sunshine and open areas of herbs and grass, instead of shade and thick brush. They will have an easier time thermoregulating, and because they won't have to travel as far to find suitable basking spots, they are less susceptible to predation. A little bit of hard work in winter goes a long way in saving this endangered species.



Eastern massasauga rattlesnake

Pete Woods

Vernal Pools

Late winter and early spring are an opportune time to visit vernal pool wetlands. Vernal pools are small, shallow basins in the forest that are filled with water each winter and spring by rain and snow melt then dry up for a period of time during the summer. The



Charlie Eichelberger

Jefferson salamander

temporary nature of these pools is important because fish can't become established that would otherwise prey upon the eggs and young of vernal pool species. Vernal pools animals that require temporary wetland habitats for the development of their young are called vernal pool indicators (or obligates). Pennsylvania's large and secretive mole salamanders are vernal pool indicators along with two other frogs and several species of small freshwater crustaceans.



Charlie Eichelberger

Spotted salamander exiting a pool.

Adult vernal pool amphibians spend most of the year quietly living in the forests that surround vernal pools. But on rainy nights in early spring, when air temperatures stay above approximately 42°F, they leave the safety of their forest nooks and travel to vernal pools to breed and lay eggs. Steady rains typically coincide with peak migration nights, but as long as the ground is wet they can move without rain if it's warm enough. The earliest breeders, Jefferson salamanders (*Ambystoma jeffersonianum*) and wood frogs (*Lithobates sylvaticus*), start arriving at pools in February in milder winters.

Soon after the spotted salamanders (*Ambystoma maculatum*) arrive, followed by spring peepers (*Pseudacris crucifer*) and American toads (*Anaxyrus americanus*). The progression of the spring amphibian migration and

breeding lags behind by a week or two in northern counties and at high elevations, but generally by late March - early April vernal pool life is in full swing. The duration of breeding activity varies according to species and weather conditions. Wood frogs and mole salamanders tend to have a short and concentrated breeding season that lasts for a week or two. Surveys for indicator species egg masses and larvae are more effective than searching for adults because the egg masses are visible for weeks and the tadpoles can be observed in the shallow waters of the vernal pool.

The word vernal refers to spring when vernal pools reach their greatest size and become a hub of wildlife activity. But there is activity in vernal pools even before the arrival of spring.



Sally Ray

Marbled salamander larva

The larvae of the fall-breeding marbled salamander (*Ambystoma maculatum*) and delicate translucent crustaceans called fairy shrimp (genus *Eubranchipus*) can be seen swimming under the surface of ice-encrusted pools. The marbled salamander larvae gain a size advantage by feeding and growing for several months before the other mole salamanders larvae hatch out later in the spring. The fairy shrimp can hatch in late winter as well which allows them to complete their life cycle before the vernal pool is fully occupied by the different predators that can eat them. Vernal pools provide a great opportunity to observe wildlife in late winter and early spring while waiting for the return of warmer weather.



Betsy Leppo

Tioga County, Clay Mine Trail vernal pool

Down Time is a Myth: Winter Museum Work

by

Scott Schuette, Steve Grund, Betsy Leppo, Rocky Gleason, and Joe Wisgo

The relationship between PNHP and the major regional natural history museums is deep and long-standing. Many Heritage staff devote a portion of their time to maintaining this relationship which offers real benefits to the museums and to our program. An excellent example of this comes from John Kunsman, who spends three to four hours per week working at The State Museum Herbarium updating the museum's botany collection, which had been dormant for many years due to a reduction in curation staff. As a result of John's efforts, the Heritage program has access to a significant botanical collection and the museum can now re-open the collection to new specimens.



Plant specimens are stored in special sealed herbarium cabinets that protect them from insect damage. Formerly, insecticides were used inside the cabinets, but now museums simply freeze the specimens before storage.

Steve Grund

When PNHP first started tracking rare species, the challenge was to determine which species were rare. Museum collections are the largest and most reliable source of data to make such determinations, and the best source of data to determine where those species are or once were known to exist. In addition to using the data from historic collections, PHNP also relies on these collections and, for difficult groups,

specialists at museums to identify our own specimens. We have worked collaboratively with Carnegie Museum of Natural History (CMNH) on several larger projects that involved many taxonomic groups.

Our specimens in turn are deposited at the museums for long-term documentation of our work. We use the winter months to process plant and animal specimens for deposit in various museum collections. For example, Rocky Gleason and John Kunsman mounted and labeled nearly 200 voucher specimens from the 2012 field season to deposit in the PNHP East collection housed in Harrisburg or The State Museum in Harrisburg, while an additional 300 specimens will be sent to the

Carnegie Museum of Natural History in Pittsburgh. These activities are important to providing a snapshot of Pennsylvania's biodiversity for future generations.

Sometimes our work with specimens in the winter results in the discovery of rare species we found during the summer, but were unable to immediately identify. PNHP botanist Steve

Grund visited Rosecrans Bog last summer and updated records for several rare plants. He also collected a bur-reed, but was unable to confirm its identity in the field. In January he looked at the specimen, and it turned out to be *Sparganium androdadum*, a Pennsylvania Endangered species not previously known from Clinton County. This brings the number of known extant stations for the species in Pennsylvania to a grand total of three.

Collecting these specimens, identifying them, and preparing them for curation is a time-consuming, but important process. Some of the characteristics required for identification, such as the branching of hairs on the abdomen of bees, require high magnification and painstakingly careful observation. Plants must be pressed in newspaper and dried in a plant press; doing this well is both an artistic and technical skill.



Herbarium specimens provide permanent and verifiable records of where plant species have been observed.

John Kunsman



Ecologist Jessica McPherson identifying plant specimens that she just collected at a limestone site in Fayette County.

Steve Grund



Botanist Steve Grund preparing plant specimens to be pressed and dried, so they can be submitted to a herbarium for permanent documentation.

John Rawlins
Carnegie Museum of Natural History

As an example of the process of depositing specimens, when Lepidoptera (moth and butterfly) and Odonata (dragonfly and damselfly) specimens are brought in from the field they are frozen. At processing time they are first sorted into family groups then identified to species. To be fully vouchered with a pinned mount displaying the wings, Lepidoptera specimens are spread and dried on a pinning board for 1-2 weeks, then removed. Ultimately spread specimens are placed in a well-sealed case and organized by taxonomic groups. Odonata specimens to be fully vouchered must be 'fixed' in acetone to preserve their colors and remove fats that will damage the specimen over time. After the acetone bath, specimens are dried and placed with their wings pressed closed in clear plastic sleeves. The prepared specimen can be stored in a tightly sealed shoebox or specimen drawer. All voucher specimens are labeled with species identification and site locality data. Ultimately data on species of concern is entered into the PNHP database. For some projects, we send specimens as they were collected in the field directly to the Carnegie Museum of Natural History where they complete the sorting, identification, voucher, and databasing work.



A spread specimen of the Pandora sphinx moth.

Betsy Leppo

The entire bryophyte collection housed at the Carnegie Museum of Natural History was transferred to Missouri in 1981. Scott Schuette traveled to the Missouri Botanical Garden Bryophyte Herbarium to verify the Pennsylvania liverwort collection for the statewide checklist update. During that time he confirmed over 400 liverwort collections dating back to the late 1800s. These species are now accounted for in the database and will be included in the updated checklist. To illustrate the importance and necessity of herbarium work, Scott found two species that represent new state records mixed in with other collections. These species along with specimens of serpentine barrens moss (*Ptychostomum reedii*) are being requested on loan for further examination and verification.

PNHP staff have deposited hundreds of terrestrial small mammal specimens into The State Museum's mammal collection. These activities boosted the museum's mammal collection to over 34,000 specimens that are either preserved in alcohol or submitted as skins or skulls. Preparation of the skulls involves subjecting them to the activities of flesh-eating mealworms which have a voracious appetite for muscle and brain tissue, to assist in cleaning the skulls. While most of the mammals sent to the museum are common species, occasionally species of special concern are submitted as voucher specimens for projects conducted statewide. Having these reference specimens allows zoologists to document the locations and ranges of our rare animals as they move around the forests and streams in Pennsylvania.

Museum related work is just one of the things that keeps PNHP biologists busy in the winter and taken together, is of great value to the scientific community as well as to PNHP and our partners. Hibernation and dormancy may be a common adaptation in the natural world but for good or bad, does not apply to our staff.

Native Plants Benefit from Wild Resource Conservation Program

by
Steve Grund

The Wild Resource Conservation Program (WRCP) was established in 1982 to support projects that help preserve Pennsylvania's biological resources. Over the years, the fund has supported a wide variety of important projects, many of which would have languished without the support of WRCP.

The Pennsylvania Natural Heritage Program has benefited greatly from WRCP and what we have accomplished with its support is substantial: County Natural Heritage Inventories for a host of counties, freshwater mussel surveys throughout the Susquehanna basin, development of the Climate Change Vulnerability Index for over one hundred species, assessment of bird use of shrub wetlands, and a number of other projects. In essence, WRCP enables us to do many of the critical tasks of a Natural Heritage Program, like keeping taxonomy current, adjusting conservation statuses to accommodate new information, and addressing survey needs for rare species that would not have been given attention otherwise. Also included is our work as partners in the Pennsylvania Biological Survey and in NatureServe – the Heritage network's umbrella organization.



Rocky Gleason

John Kunsman surveys a dwarf ridgetop forest from a high perch in search of openings and other micro-habitats for rare plants.

We recently completed a WRCP grant that funded general botanical work during the 2010 and 2011 field seasons, as well as early spring of 2012. We conducted 90 field surveys for 52 species of special concern in 29 counties under this grant. A few examples of that work follow.

Blue false-indigo (*Baptisia australis*)

This is a small shrub with showy flowers; you may have seen it in gardens. In nature it grows among boulders and in flood-scoured cobble flats along large rivers. The native range of the species is mostly south and west of Pennsylvania, but the northern limit is along the Allegheny River. We discovered a number of new stations for this species using our WRCP botany



Charles Williams

Blue false-indigo

grant, and also as part of the Venango County Natural Heritage Inventory. The species was frequently documented along the Monongahela, Allegheny, and Ohio rivers in and near Pittsburgh in the late 19th and early 20th centuries. However, development along the shores of the rivers and the conversion of the rivers to navigation pools, which has disrupted the flood scour process, has eliminated the species from Allegheny County. As a result, the portion of the range along the upper Allegheny River has become isolated, increasing conservation concern for the remaining stands. Invasive species such as reed-canary grass (*Phalaris arundinacea*) and Japanese knotweed (*Fallopia japonica*) now threaten the remaining populations.

Twinflower (*Linnaea borealis*)

Twinflower is a circumboreal (distributed primarily in the boreal regions of the earth) species named by Johann Jacob

Dillenius for Carl Linnaeus, as it was Linnaeus's favorite plant. It is a common species in northern latitudes, and like many northern species, it extends southward in the Appalachian Mountains. It is



Derek Anderson
University of Wisconsin, Stevens Point

Twinflower

known from two counties in West Virginia. Further south, it was collected only once, in the late 19th century, on Mount LeConte in eastern Tennessee.

In Pennsylvania, the species has been documented at ten localities. It was most recently seen in 2002, at a cold-air drainage in Huntingdon County. Several recent attempts to relocate the plants at the Huntingdon County location by PNHP botanists and others have been unfruitful. It is not clear why the population has apparently failed, and disturbance at the site could be responsible, but in examining the bigger picture (most of the other sites have been searched enough to suspect failure), it is plausible that this species is one of the first to be lost from Pennsylvania's flora as a result of changing climate conditions.

Tuberled spike-rush (*Eleocharis tuberculosa*)

This sedge is mostly restricted to the Atlantic and Gulf coastal plains. The population at a small bog in Somerset County was discovered by Jim Bissell of the Cleveland Museum of Natural History in 2008. We revisited the site in 2011 to gather details on population size and habitat for this and other rare plants. The site is about 200 miles separated or disjunct from the nearest known site. There was once a population of this species in Montgomery County, but despite many attempts to relocate the plant, it has not been seen there since 1898.



Tuberled spikerush

Steve Grund



Steve Grund

This small bog in Somerset County is the only known site for tuberled spikerush in Pennsylvania.

Mountain pimpernel (*Taenidia montana*)

Mountain pimpernel is a globally rare species; an Appalachian endemic known only from the mountainous districts of Virginia, West Virginia, and Maryland, with just a few stations in Bedford County, Pennsylvania. Typically associated with shale barrens, it can also occur in forests if the geology is right. One of the populations, in Buchanan State Forest, had been declining due to deer herbivory and illegal ATV activity. The Bureau of Forestry, in cooperation with PNHP, erected a deer enclosure, and PNHP botanist John Kunsman has been monitoring the site, performing minor management as necessary. We are happy to report a significant increase in flowering and fruiting, followed by the appearance of cute little baby pimpernels, allowing us to forecast a bright future for this population.



Mountain pimpernel

Jodi Skipper
Bureau of Forestry

Much has been accomplished for Pennsylvania's rare plants with WRCP grant money in addition to field surveys. Our work helped make taxonomic changes, which are important because we rely on good taxonomy to define a species. Our data has helped specialists describe new species, or decide that what was once considered to be two species should really be considered one variable species. Our work can help change the status of a species by finding more locations than previously known or by confirming that the species is truly hard to find and rare. Keeping up with all these changes is a challenge, and most sources of funding do not cover this sort of work; WRCP grants have filled the gap. If you have the license plate with an owl or an otter, or if you check the owl box on your state tax return and make a donation, or simply send in a donation to the Wild Resource Conservation Program, we thank you for doing your part to help Pennsylvania's native flora stay healthy!

Notes from the Field

Isoetes Range Extended

PNHP biologists Jessica McPherson and Steve Grund found a quillwort (*Isoetes*) in a vernal pond in Clinton County last summer while looking for new populations of northeastern bulrush (*Scirpus ancistrochaetus*). Quillworts are spore-bearing plants related to clubmosses. To identify quillworts to species, one must usually find spores and examine them under high magnification. We could not find any spores, but Daniel Brunton, a quillwort specialist in Ontario, kindly offered to look at our specimen to see if he could identify it. He found just a few spores in the soil at the base of the plant, which was enough to identify the specimen as *Isoetes valida*, a rare species in Pennsylvania. This find represents an extension of the range of the species to the northwest of about 100 miles.



Quillwort (*Isoetes valida*)

Jessica McPherson

Growing Our Data

We receive data from a variety of sources including in-house PNHP staff, outside consultants, and biologists from our partner agencies. During the first quarter of 2013, we entered over 100 new records into our Biotics database. These records included new plant populations, bald eagle nests, small mammal collections, amphibians and reptiles, natural communities, and moths. The small mammal records included collections from The State Museum of Pennsylvania and Carnegie Museum of Natural History. The plant and natural community records were part of a Lehigh/Northampton CNHI update. The moth records resulted from state park and county natural heritage inventory work conducted by Betsy Leppo. Betsy's work, resulted in one new moth record in Pike County, the graceful underwing moth (*Catocala gracilis*), which has not been documented before in Pennsylvania.

Developing Conservation Planning Tools

This quarter, the CPP Team added 900 new or replacement polygons to the CPP geodatabase. We also received several new specifications, including the final approved Indiana bat and bog turtle specifications from the U.S. Fish and Wildlife Service (USFWS) and four new amphibian specifications from the Pennsylvania Fish and Boat Commission (PFBC). Specifications and polygons are 100% complete for plants and 50% complete for communities and animals. Our goal is to have completed specifications and polygons for all current records for PNHP tracked species by the end of 2013.

Riparian Plants

Mary Ann Furedi, monitoring coordinator, has been planning the details of a new project that begins this spring. The EPA-funded project will focus on the riparian zones of headwater streams in Pennsylvania. The riparian zone is the transition area between where a stream channel ends and terrestrial communities begin, and serves multiple important functions including thermal buffering, enhancement of bank stability, and food web contributions. This area can be damaged by disturbances that occur near streams or within the upper watersheds where headwater streams are found. The overall goal of this project is to document and better understand the plant species composition and distribution patterns along headwater streams and how they differ across Pennsylvania. Information from this work will be used as a reference for vegetation composition which will help inform mitigation strategies.



Riparian zone along a headwater stream

Mary Ann Furedi

High Elevation Wetlands

We recently completed an EPA funded project focused on high elevation wetlands. In Pennsylvania these wetlands include many plant communities and rare species that are at the southern limits of their ranges. These communities and species may be susceptible to degradation and range shifts due to future climate change. To detect changes in populations and geographic ranges, we need to have information on the communities and species as they exist in Pennsylvania currently. This project was developed to establish a network of long-term monitoring sites throughout the state to establish baseline data on a group of communities and species thought to be susceptible to climate change.



Tony Davis

Bruce Lake Bog in Delaware State Forest, Pike County

The final project report provides the documentation for 31 high elevation wetlands and will facilitate future monitoring efforts at these sites. The report provides directions to and descriptions of each site, community and species targets, sampling locations, methods utilized, and the species and environmental data collected. Community and species protocols provide the framework for adding new sites and species, and for collecting, cataloging, and reporting data. The data reported in this initial project report provide the baseline for future monitoring at the 31 sites.

Gull Point Habitat Restoration

PNHP ecologists are working with staff from Presque Isle State Park and the Pennsylvania Game Commission to restore critical Great Lakes shore habitat for the federally endangered piping plover, state endangered common tern, and several Great Lakes beach/dune specialists within Gull Point Natural Area. The restoration work, which involves removing exotic, invasive species, began in 2011 under a grant from the USFWS Great Lakes Restoration Initiative. Since the

project was first implemented, Presque Isle interns and staff, PNHP ecologists, and partners from the Cleveland Museum of Natural History mowed and sprayed herbicide to control giant reed (*Phragmites australis*), purple loosestrife (*Lythrum salicaria*), and other invasive native and non-native species as well as woody vegetation such as willows (*Salix exigua*, *S. eriocephala*) that degrade plover habitat on over 30 acres of Great Lakes Region Palustrine Sand Plain. In 2013, staff will continue to monitor the response to control measures and continue to treat re-sprouting invasives.

Mussel Report

PNHP staff malacologist, Nevin Welte, drafted a technical report entitled "*The freshwater mussels of Pennsylvania's Ohio River: evaluating recent survey data, defining what constitutes a significant mussel resource in the Ohio River, and recommended revisions to the Adaptive Management Group protocol*" for the Adaptive Management Group, which is the working group that focuses on commercial sand and gravel dredging in the Allegheny and Ohio rivers. Nevin participates in the group as a scientific advisor to PFBC. The purpose of the report is to use Ohio River mussel survey data collected since ~2000 to make informed biologically-based revisions to the survey protocol and determine a method for defining Ohio River set-aside areas. The report is currently under review by the PFBC, PA DEP, and USFWS.

An Unexpected Discovery



Ryan Miller

Woodrat hutch

While conducting surveys for green salamanders, Charles Bier and Ryan Miller stumbled across a 6-foot tall "hutch" of an Allegheny woodrat. Only documented in Pennsylvania a handful of times, hutch building is more common in the western species of woodrats.

Moth Identities

This quarter we completed moth identification work from the previous field season. We documented over four hundred moth species in three South Mountain state parks (Kings Gap, Pine Grove, and Caledonia), including sixteen new locations of species of concern. We also identified several hundred moth species with three new locations of species of concern in other focal areas in Centre, Schuylkill, Lehigh, and Northampton counties. Photos of two species of concern documented during the Kings Gap State Park Bioblitz are included, the apple sphinx (*Sphinx gordius*) and the huckleberry sphinx (*Paonias astylus*).

Biodiversity Areas

In March Christopher Tracey (Conservation Planning Coordinator) participated in an International Union for Conservation of Nature (IUCN) workshop on the criteria and delineation of Key Biodiversity Areas (KBAs). The workshop was part of an effort to standardize this global approach. PNHP staff are co-organizing a workshop at the NatureServe Biodiversity Without Boundaries workshop in April to continue to explore the development of KBAs across the network.



Apple sphinx moth (*Sphinx gordius*)

Betsy Leppo



Huckleberry sphinx moth (*Paonias astylus*)

Betsy Leppo

Measures of Progress

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

Measure of Progress	Annual Goal (2012)	1st Quarter	Cumulative Total	Percent of Annual
Biotics Records Updated	200	60	60	30
New EOs Documented	800	147	147	18
New Records Entered into HGIS	300	71	71	24
Field Surveys Reported	500	0	0	0
New CPPs Developed	4000	894	894	22
NHAs Updated	120	0	0	0
Outreach to Local Government	20	0	0	0

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

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

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

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

Field Surveys 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.

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

Outreach to Local Government is a measure of our initiative to increase interaction with local government and reflects our commitment to seeing our information used and refined to meet the needs of planning efforts within the counties and municipalities of the commonwealth.