

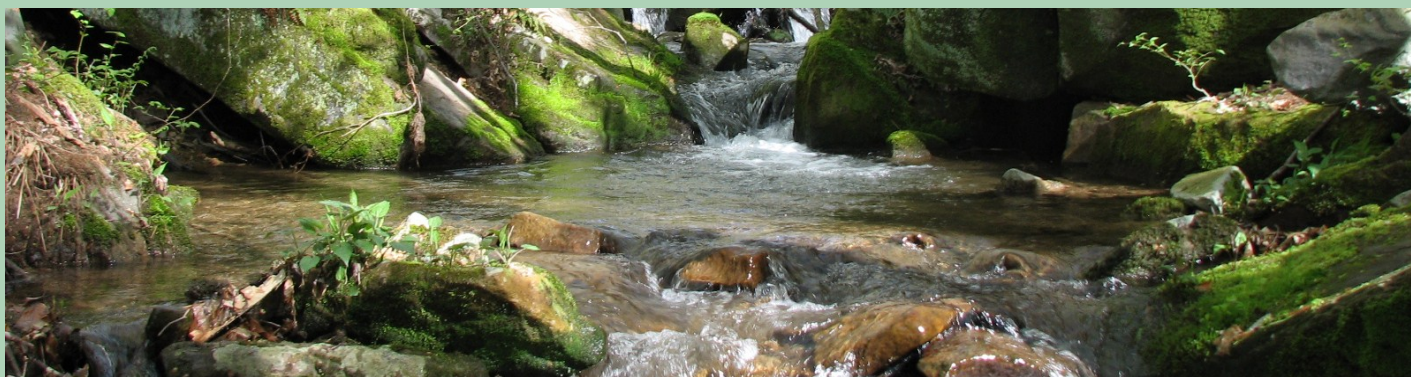


# Pennsylvania Natural Heritage Program

information for the conservation of biodiversity

Wild Heritage News

January—March 2012



## Inside This Issue

Cameron CNHI	Pg 1
Mussels of the Allegheny River	Pg 3
Bryophytes	Pg 5
Bureau of Forestry Update	Pg 7
Field Notes	Pg 8
Measures of Progress	Pg 12

Clean, tumbling mountain streams are common in Cameron County, and serve as habitat for native brook trout and species of concern like the northern water shrew.

Photo Banner: Joe Wisgo

## 65th CNHI—Cameron County “The Heart of the Wilds”

by

Charlie Eichelberger

In 2008 while we were reviewing topographic maps and aerial photography in preparation for PNHP’s inventory efforts in Cameron County, it became clear that this is a unique part of Pennsylvania. The expansive forests, steep slopes, and high mountain streams combined with the sparse population make this one of the most scenic and remote counties in the commonwealth. Known as “the Heart of the Wilds,” Cameron County is situated in the deer-camp region of the state, often only visited by out-of-towners during hunting and fishing seasons. For those who live in Cameron County, the natural resources and wild character serve as the economic life blood with both the timber industry and ecotourism serving as important economic drivers. Cameron County is particularly famous for being within Pennsylvania’s elk range, which during the fall rut draws scores of wildlife enthusiasts.

Many of the potential survey sites we delineated in planning for fieldwork were a challenge to access because of the rugged landscape and few-and-far-between roads. Cameron County contains extremely important habitat for a number

of our “big woods” species that require these remote areas, including the timber rattlesnake (*Crotalus horridus*) and northern water shrew (*Sorex palustris albibarbis*), as well as several species considered “globally vulnerable” to extinction, such as the mountain earthsnake (*Virginia pulchra*) and northern barrens tiger beetle (*Cicindela patruela*). Expansive wetlands in the southwestern portion of the county provide critical habitat for several plant species of concern, including creeping snowberry (*Gaultheria hispida*), netted chainfern (*Woodwardia areolata*), and the diminutive screw-stem (*Bartonia paniculata*).



Charlie Eichelberger

Cameron County houses a considerable portion of the global range of the mountain earthsnake. About the size of a pencil, this species is rarely seen, spending most of its life under cover.



Charlie Eichelberger

Cameron County is noted for its remote and rugged landscapes.

Cameron County is 93% forested and contains some of the largest unfragmented forest blocks in the state, several being over 5,000 acres. About half of the county is state forest, state park, or state game land with most of the other large holdings owned by several timber management organizations. Development and population is mostly confined to the boroughs of Emporium and Driftwood, with villages and camps clustered along the picturesque branches of the Sinnemahoning Creek.

In contrast to the many headwater streams with high water quality in the county, the larger waterways show the scars from past resource extraction. The branches of the Sinnemahoning Creek, with the exception of a population of eastern floater (*Pyganodon cataracta*) found in the reservoir at Sinnemahoning State Park, have lower than expected biomass and diversity of freshwater mussels. The scarcity of freshwater mussels in the county is suspected to be the result of a history of pollution events, including abandoned mine drainage (AMD) and effluent from the 19<sup>th</sup> century tannery industry. Unfortunately, large scale pollution events have also occurred in Cameron County in recent times, including a 2006 sodium hydroxide spill from a train derailment along the Sinnemahoning Portage Creek. This spill alone is estimated to have killed more than a million fish in the affected branches of the Sinnemahoning, in addition to the loss of many other aquatic species.

From 2008 to 2011, PNHP staff conducted hundreds of field surveys for species of concern across the county as part of the Cameron County Natural Heritage Inventory (CNHI). We were able to assess as many as ten sites per day or as few as one, depending on whether or not we had to ascend 1,000 foot steep slopes or hike for miles due to limited road access. Dense thickets of mountain laurel hindered access to some sites, leaving field staff scratched and bruised from forcing our way through seemingly impenetrable shrubs. Our efforts often paid off,

and the difficult hike in was rewarded by the unforgettable experience of seeing a pile of gestating timber rattlesnakes basking in an area that they have probably occupied for 10,000 years or more.

The Cameron CNHI is the sixty-fifth of its kind to be completed, and brings us one step closer to having a statewide assessment of areas warranting conservation efforts. The inventory has identified 29 Natural Heritage Areas (NHAs) based on 61 extant occurrences of species of concern. Sinnemahoning Cliffs is the largest NHA in Cameron County and straddles the border with Clinton County. This area serves as critical habitat for the state threatened Allegheny woodrat (*Neotoma magister*). This species was once widespread across the rocky, mountainous regions of the state, but has been reduced to less than two dozen active metapopulations (scattered populations that interbreed). The Sinnemahoning Cliffs NHA may be one of the healthiest Allegheny woodrat metapopulations remaining in the state. Because of the unique population dynamics of this species, unfragmented landscapes are needed to conserve our remaining woodrat populations. The Sinnemahoning Cliffs NHA may aid local planners and DCNR in the long-term management of this unique area by providing them with more information regarding the extent of the population, habitat, and recommendations on how to manage the land with the needs of the woodrat population in mind.



Charlie Eichelberger

The Allegheny woodrat is found in the rocky cliffs along the Sinnemahoning Creek.

Although remote, Cameron County faces challenges that range from invasive species like the hemlock wooly adelgid (an insect responsible for declines in hemlock populations throughout the eastern U.S.) to new development and infrastructure related to shale gas development. The information from this project will help the Pennsylvania Bureau of Forestry, Pennsylvania Game Commission, private landowners, and industry to better plan and help maintain the wild character relied upon by the plants, animals, residents, and visitors to this unique area.

Copies of the Cameron CNHI will be available soon for download on PNHP's website at <http://www.naturalheritage.state.pa.us/CNHI.aspx>



## Mussels of the Allegheny River Navigational Pools

by

Beth Meyer and Mary Walsh

One of the region's biodiversity hotspots, the Allegheny River is valued for its rich fauna, scenic beauty, recreational opportunities, and natural resources. One of the preeminent reasons that biologists take great interest in the river ecosystem is the diverse mussel communities it supports. The Allegheny River is home to five federally endangered freshwater mussel species: northern riffleshell, clubshell, rayed bean, snuffbox, and sheepnose. Approximately 35 mussel species are found in the Allegheny and it may hold the best global populations of the endangered northern riffleshell, clubshell, and rayed bean. For this reason, any areas of the Allegheny River that have not been surveyed are of significant interest to resource managers.

Like all freshwater species, native freshwater mussels are highly imperiled. Of approximately 300 North American species, over 37 are considered extinct, and two-thirds are considered imperiled. For example the rayed bean, which was federally listed in February 2012, has experienced a 73% reduction in its range. Mussels are threatened by habitat alteration, including water pollution, the construction of dams, channelization, and dredging. Each mussel species is uniquely adapted to a particular habitat type and they are unable to move if the habitat is altered.

A unique life cycle also makes them more likely to be imperiled. Native freshwater mussels, which are in the class Unionida, require a host, usually a fish, for the larval mussels to live on before they fall off into the substrate (river bottom) as juvenile mussels. The larvae, called glochidia, attach to the fish's gills, but they are so



Beth Meyer

Federally endangered clubshell mussels found in the navigational pools of the Allegheny River.



Tamara Smith

The Allegheny River near Templeton, Pennsylvania

small that they do not harm the fish. Without the presence of the correct host fish the mussels are unable to reproduce.

As filter feeders mussels are particularly sensitive to water quality. Mussels were recently used by the EPA to set new water quality standards, making water regulation more protective. Their filtering cleans the water and also makes nutrients more available for other aquatic life. Healthy mussel communities help to maintain healthy streams, rivers, and lakes.

The Pennsylvania Natural Heritage Program undertook surveys in the navigational pools of the Allegheny River to gain a better understanding of the mussel communities and rare species persisting in this altered habitat. Before dams were built on the Allegheny River a series of riffles, runs, and pools was present; during low water the river was so shallow that a person could wade across in many places, even near the confluence at Pittsburgh. The fast and shallow waters became large, deep pools once the locks and dams were installed. Although these navigational pools are enjoyed by recreationists and allow industry to bring goods to and from Pittsburgh and the town of East Brady seventy-two miles upstream, the habitat for aquatic organisms is vastly different from its previous natural state.

The current eight lock and dam structures on the Allegheny River were built in the 1920s and 30s to create a minimum depth of 12 feet to allow year round navigation for commercial vessels. The dams are



Tamara Smith

Aquatic ecologists Mary Walsh and Beth Meyer prepare for a dive survey.

fixed-crest, with water flowing over the top, and provide no flood control. In addition to the habitat alteration caused by the dams, heavy industry and other land uses in the area have degraded the water quality, and commercial sand and gravel extraction has removed substrate. Since the construction of the dams, no comprehensive mussel surveys had been conducted in the navigational pools prior to this project.

With scuba tanks on their backs, PNHP aquatic ecologists descended into the murky depths of the Allegheny River to assess the mussel resources. A pair of divers surveyed 100-meter transects, searching an area one meter wide. Each 100-m transect was divided into 10-m segments. For each 10-m segment we recorded depth and time spent and estimated percent substrate types. We surveyed a total of 134 transects in pools 4-9. Surveys focused on areas less than 30 feet deep, which is the best potential habitat for mussels. However, we did survey some deep areas and a shallow free-flowing section of the river upstream of the navigational pools for comparison. We discovered a total of 23 species including the endangered northern riffleshell, clubshell, and rayed bean.

The mussel communities found reflected water velocity and habitat gradients in the pools. The river is faster moving and has sandy gravel substrate at the upstream end of the pools. At the lower end of the pools the river slows as it approaches the dam and the habitat becomes silty.



Beth Meyer

Federally endangered northern riffleshell found in the navigational pools of the Allegheny River

We found species that prefer flowing water and are intolerant of silt in higher numbers in the riffles and runs upstream of the navigational pools as well as in the upstream portion of each pool. Northern riffleshell, clubshell, and rayed bean occurred more often in the faster waters with firm sediments. Conversely we found species that tolerate slow moving water and silt further downstream in each pool and throughout the survey area. Depth was another important habitat gradient for mussels. We documented no live mussels deeper than 30 feet and found 95% of all live mussels in depths less than 20 feet.

In addition to mussel surveys, WPC conducted bathymetry mapping of pools 4-9. We analyzed river depths, measured with a commercial fish finder, to create depth maps of the river bottom. In pools 4-8, we found that 37% of the river bottom is deeper than 20 feet, and 20% is deeper than 30 feet. River depths in some places approach 70 feet. Much of this depth was likely created by sand and gravel extraction, because commercial barges only require depths of nine feet.

Natural Heritage ecologists discovered that rare mussel species do persist in the Allegheny River navigational pools despite past pollution and ongoing disturbances. However, their abundance is lower than in the free-flowing river upstream. The richness and abundance of mussels helped to identify the important habitat for mussel species within the navigational pools.

With information gained on rare species, mussel communities, habitat associations, and the diverse natural resources of the Allegheny River, the remaining habitat can be protected.

This project was funded by a State Wildlife Grant administered by the Pennsylvania Fish and Boat Commission and by the Colcom Foundation. Many additional PNHP staff provided assistance with this project.



Eric Chapman

The survey crew sorts and identifies mussels found during a survey. After the data has been recorded the mussels are returned to the river.



## Bryophytes Are Plants Too

by

Scott Schuette

Spring is upon us and before most of the showy wildflowers are displaying their annual regalia, the bryophytes are full of vigor. Many people will wander through the forest or along a quiet



Haircap moss

Justin Vreeland

stream during this time of the year, remarking on how lush and green the landscape looks. However, few people note the mosses responsible for the green beauty and express little more than a passing curiosity for the miniature landscape.

What is a bryophyte? The name refers to a general group of plants that swell up when hydrated, which makes them more noticeable after spring rains. Bryophytes are non-flowering plants that produce spores instead of seeds, and have a very simple growth form, lacking roots and vascular tissue. They are the oldest existing group of plants having persisted and evolved on land for nearly 500 million years. There are approximately 17,500 species of bryophytes, which is second in number only to flowering plants.

These tiny plants provide food, shelter, and ecological services for the thousands of other species that inhabit any given ecosystem. For example, there is evidence that bryophytes are a secondary food source for insects and other animals when other resources are scarce. The use of bryophytes as shelter is well-documented in the animal world. In any given moss mat several species of invertebrates, including tiny arthropods, tardigrades, nematodes, rotifers, and annelids can be found living among the confines of the little stems and leaves. This community of invertebrates and bryophytes is proving useful for monitoring habitats for heavy metals and other pollutants.

Mosses are commonly found woven into the nests of chickadees and wrens, often in the spots where eggs sit in the nest every year. This might be because of the antimicrobial properties exhibited by mosses or it might simply be because the moss provides a soft place to sit.

Another group of organisms that rely upon the friendly confines of mosses are the reptiles. Spotted turtles (*Clemmys guttata*) and bog turtles (*Glyptemys muhlenbergii*) enjoy the comfort of the sphagnum peatlands. Sphagnum mosses have the uncanny ability to retain water, so these habitats are ideal for the turtles' nesting sites ([Click for more information](#)).

Bryophytes reduce soil erosion during heavy rains and flood events, and continue the process of moving nutrients through the system. Different bryophyte species have specific nutrient thresholds. Thus the bryophyte community is a likely indicator of nutrient levels and the overall health of an ecosystem. Another key function bryophytes perform is water retention in an ecosystem. When mosses colonize open rock areas, they are able to capture water and hold it long enough for other organisms to use and survive the harsh environment. These are but a few of the ecological services that bryophytes provide. Their importance is often underestimated, but it is becoming clear that these little plants hold a significant place in the proper functioning of an ecosystem.



Steve Grund

Bryophytes colonize any available suitable habitat and play a crucial role in stabilizing barren soils after disturbance.

Bryophytes are more than just mosses. The group is composed of three separate types of plants: liverworts, mosses, and hornworts. The name liverwort came from early botanists who thought the plants looked like liver cells, thus believing they would help treat ailments of the liver. Based on fossil and molecular evidence, liverworts are the hypothesized first land plants. There are nearly 5000 species of liverworts, of which 126 are found in Pennsylvania. Liverworts are subdivided into three groups based on their growth form. The most

common and probably the largest liverwort in Pennsylvania is *Conocephalum conicum*. An interesting characteristic of this plant is the Pine Sol-like odor present when it is broken open.



Andrew Strassman

Liverworts in the genus *Conocephalum* have a snakeskin-like appearance and are commonly found on sandstone rocks along streams.

This is due to the plant making volatile chemicals called terpenoids that presumably ward off herbivores. Another relatively common, but different type of liverwort is *Pellia epiphylla*, which can be found growing on or near wet sandstone rocks, usually with *Conocephalum conicum*. The last and most species rich group is the leafy liverworts. These plants range in size from large (visible to the naked eye) to microscopic and are commonly found growing on other plants. They grow on various substrates ranging from soil, rocks, tree bark, and decaying logs. There are undoubtedly more liverwort species in Pennsylvania and further collection and documentation of these plants is crucial to fully understand the diversity.

Hornworts are named for their unique horn-shaped “fruiting” structure. The group has the fewest number of species, projected to be around 500, of which only 200 have been named. Most of the hornwort diversity is outside of the continental United States. There are only five hornwort species reported in Pennsylvania. While this is an underestimate of the hornwort



Scott Schuette

Hornworts can be found growing on exposed soils, such as agricultural fields, and occasionally on rocks in streams.

diversity in the state, the number of species is probably no more than seven. So keep an eye out in early successional habitats for dark green leaf-like structures with conspicuous little horns protruding.

Mosses have the most species (~12,500 species) and so, are most often collected by field biologists. Sphagnum mosses are one of the more distinctive mosses in this large group. They have a unique growth form and anatomy that allows them to absorb and retain up to 25

times their dry weight in water! This quality has led to its use in wound dressings and diapers, as well as use as a soil additive commonly referred to as peat moss. In addition, sphagnum has acidifying properties that make it capable of “making habitat” suitable for growth. Researchers determined nearly 30% of the world’s soil carbon is stored in 3% of the world’s sphagnum-dominated peatlands. This is important because these boreal peatlands are crucial carbon sinks, pulling carbon dioxide out of the atmosphere and storing it. While Pennsylvania lacks the extensive peatlands of boreal regions, there are at least 35 species of sphagnum reported for the state in many small and scattered peatlands. Collections from high elevation wetlands across the state have revealed that at least 15 different species occur in those habitats. The diversity in these unique habitats and the ecosystem services they provide needs further study to determine levels of rarity.



Sphagnum moss

Scott Schuette

Since the last newsletter, we have refined the moss list to 466 species and included their NatureServe global (G-rank) status. This is an increase of 18 species from the checklist put together by John Atwood in 2009. One very interesting species added to the list is *Bryum reedii*. This G1 species has only been collected once in Pennsylvania on rocks of serpentine barrens in Chester County in 1966. A G1 rank is defined as being at “very high risk of extinction due to extreme rarity, very steep declines, or other factors.” A return trip to the site is planned for June this year as part of a project to verify the extent of the species in the state. In addition to the moss list of species, updates to the liverwort and hornwort lists are in progress. While *B. reedii* is a good candidate for tracking, bryophytes are a group of plants that currently lacks an agency responsible for conserving and managing them. Globally, bryophytes have very limited, if any, legal protection. However some countries recognize bryophytes in legislation that protects their habitats. These plants are the early warning system, sensitive to pollution and microclimatic changes, and can indicate high quality habitat. We need to protect them, but to do that, we need to first adopt, rank, and include them as crucial components for tracking in the unique ecosystems and habitats we protect throughout the state.



## Addressing Survey Needs for the Bureau of Forestry

PNHP staff have mobilized and are undertaking a substantial inventory of under-surveyed state forest land in order to furnish the Bureau of Forestry with the most accurate and up-to-date information regarding populations of species of concern. This information will aid the Bureau in effectively managing the state forest system for multiple uses while taking into account some of the state's most unique plant and animal resources. We are working with the Bureau to identify areas with older records that need to be updated, and to target areas where limited inventory efforts have previously occurred.

In 2011, PNHP staff working on state forests conducted more than 350 field surveys for species of concern, resulting in over 200 new occurrences and updates to existing records targeted for review and resurvey. Results are continuing to be processed, particularly from the extensive invertebrate surveys which have identified some of the most important sites in Pennsylvania for lepidopteran (moths and butterflies) diversity. For 2012, our staff will be continuing with a similar approach but moving to several areas where the Bureau of Forestry has indicated pressing needs for more current and additional information.



Charlie Eichelberger

PNHP conducted field surveys in most of the State Forest Districts in 2011, including this site in Sproul State Forest along the West Branch of the Susquehanna River.

## Invertebrate Surveys on Bureau of Forestry Lands



Pine Elf

Betsy Leppo

Pennsylvania has an impressive amount of scrub oak barrens within its borders. The name "barrens" implies desolation, but two recent studies looking at the insects of barrens show that this habitat is a utopia for many rare and unusual insects.

One study of barrens moths took place at the Big Pine Flats Barren in Michaux State Forest, Cumberland County. This survey effort generated abundant new data on the unique moth community at Big Pine Flats. We collected over 6,600 specimens and identified approximately 300 species. Ten moth species of concern were known from previous surveys in these barrens. We reconfirmed nine out of ten of these species in our recent surveys, and documented sixteen new moth species of concern along with one uncommon butterfly. The final report contains life history, biogeography, and management recommendations for the rare Lepidoptera at Big Pine Flats. Special notes on survey effort, site heterogeneity, and non-target considerations for gypsy moth spray programs are included.

Another comprehensive invertebrate biodiversity survey is nearing conclusion. We sampled the Slaughtering Ground Barren in Sproul State Forest, Clinton County using survey methods that targeted a variety of invertebrates, including yellow pans (for pollinators), pitfalls (for ground dwellers), malaise (for all fliers), and blacklight traps (for night active fliers). The Carnegie Museum of Natural History is currently sorting, identifying, and curating the volumes of invertebrates collected in this survey and will provide results later this spring. Preliminary results indicate that this site supports some very rare and unusual species of Lepidoptera for the state. Also, preliminary botanical and natural community surveys confirm that this area supports a unique assortment of plants and plant associations. More information on these surveys will follow in a future PNHP newsletter edition.

## Notes from the Field

### County Inventory

We completed the Cameron CNHI project, which will soon be available on the PNHP website. The Natural Heritage Areas from the Cameron CNHI project have been added to the online Statewide CNHI Map <http://www.naturalheritage.state.pa.us/cnhi/cnhi.htm>. Report writing continues for the Jefferson and Erie CNHI projects with Jefferson representing the last of our initial CNHI reports. From here on, all CNHI projects will be considered updates. We will prioritize counties and regions for updating based on the age of records, the level of survey effort directed at a county over the years, and important needs or initiatives happening in or including a given county. Essentially, we are working across the state, feeding information into the statewide map and making provisions through our planning and outreach to alert counties and municipalities of updates to their CNHI information.



Rocky Gleason

Marsh marigold and skunk cabbage are among the early bloomers of seeps at the base of the Kittatinny Ridge in Northampton County.

The Lehigh Valley CNHI update project, which includes both Lehigh and Northampton counties, is entering its second and final year of field surveys. First year field survey preparations have begun for the Beaver, Berks, and Chester CNHI updates. These are among the earliest first round counties we inventoried (1993, 1991, and 1994 respectively) and consequently have the oldest mapping and records. The updates in the east will cover a contiguous band of counties, include three regional planning regions (Metropolitan Planning Organizations – MPOs), and account for a real diversity of habitats stretching across the Piedmont Section of Pennsylvania.

Additionally, we will be working in a number of NHAs in another section of the state which includes Lycoming, Sullivan, and Union counties. Although not part of an official CNHI update, we will be able to update critical records, provide additional information to the Bureau of Forestry and Game Commission about state lands in that area, and continue servicing statewide needs as part of our evolving strategy.

### Botany/Ecology

We completed the final report for the “Natural Resources Inventory and Management Recommendations for Big Pine Flats Biological Diversity Area.” Big Pine Flats is an approximately 10,000 acre area of Michaux State Forest that was designated as a Natural Heritage Area for its numerous species of special concern as well as several unique ecosystems. PNHP staff conducted inventories in 2008 and 2011 for plants, vegetation, herpetofauna, small mammals, birds, and moths within Big Pine Flats. This report summarizes the results of natural resource inventories and provides ecological management recommendations for important biodiversity areas. Management recommendations were created through collaboration with biologists from several state agencies. We found the ridgetop barrens habitat on Big Flat supports 26 known moth species of concern and is a focus for restoration management. Other important management areas include high-quality vernal pool complexes, seep wetlands, and talus slopes.



John Kunsman

Yellow-fringed orchid, a Pennsylvania threatened species, grows in seeps and swamps at Big Pine Flats.



Northern water shrews (*Sorex palustris*) have been identified as a species that may be negatively impacted by climate change. We conducted water shrew surveys during the 2011 field season and plans are underway for survey efforts in 2012. We are also currently developing the habitat assessment protocol which will be implemented during the 2012 field season.



Sally Ray

Clean forested waterways are targeted habitats for northern water shrews. Here, a PNHP biologist checks a small mammal trap line set along Hicks Run in Elk County.

PNHP staff are continuing to explore the potential impact of climate change on aquatic species included in Pennsylvania's State Wildlife Action Plan (WAP) using the climate change vulnerability index (CCVI) developed by NatureServe. Currently, we have focused our efforts on exploring the vulnerability of mussels of special concern in Pennsylvania to climate change and developed a subset of Pennsylvania fish that we will assess using the CCVI.

In February, PNHP staff initiated a project in conjunction with the Bureau of State Parks to perform a natural resources inventory of state parks in the South Mountain area, including Kings Gap, Caledonia, Pine Grove Furnace, and Mont Alto state parks. The focus of this project is to identify and provide management recommendations for species of concern within the parks. The warm weather has allowed for an early start, and surveys are already underway for small mammals and rare plants. As part of this natural resources inventory, Kings Gap will host a bioblitz on June 2, which is open to the public. The bioblitz will provide an opportunity for PNHP staff and volunteers to work together to survey Kings Gap for all species, from common plants to rare moths.

Assessments of aquatic vegetation are important indicators of riverine ecosystem integrity and can alert national park managers to water quality degradation and eutrophication from upland land uses outside of the park boundary. Regular inventory and mapping can provide critical information for assessing the status and trends of riverine ecosystem health. It has been over 20 years since a comprehensive inventory of submerged aquatic vegetation (SAV) was conducted in the Delaware River within the Upper Delaware Scenic and Recreational River and Delaware Water Gap National Recreational Area. Although National Park Service personnel have recently digitized maps produced from that inventory, the accuracy and reliability of these maps is unknown. The purpose of this project will be to resurvey a subsample of the SAV beds to identify the species composition and extent of vegetation and collect associated environmental data. A scope of work has been developed for this project in addition to initial project planning to determine potential access points associated with SAV beds along the Delaware River.

We submitted a request for Traditional Section 6

funding (federal funds set aside for work on threatened and endangered species) in January 2012 to support the initiation of a long-term monitoring program for northeastern bulrush (*Scirpus ancistrochaetus*), a federally listed plant with a stronghold in Pennsylvania. Long-term monitoring is needed to better understand the species' habitat



Charlie Eichelberger

Northeastern bulrush

requirements and population fluctuations due to environmental conditions that, in turn, can be used to help direct management activities. The proposed program will employ two levels of monitoring effort, low intensity monitoring which will involve a resurvey of all known populations in Pennsylvania over a five-year rotation period, and high intensity monitoring which will incorporate a more thorough exploration of environmental variables associated with a subset of vernal pools where northeastern bulrush is found.

PNHP made significant progress in the first quarter of 2012 on the Pennsylvania Game Commission Game Lands Management Tool project (PGLMT). We initiated production of draft conservation planning polygons (CPPs) for plant species on game lands. Planning was completed for inventory updates of plant species occurring on state game land, and field work began in March: inventory staff has visited Indefatigable Swamp and Opossum Swamp in SGL #57, and Eschenbaugh Swamp and Pond Swamp in SGL #127. PNHP has worked closely with DCNR Ecological Services to facilitate review of PGLMT products: these products include CPPs, best management practices (BMPs), and site-specific management plans for DCNR species. PNHP has created templates for BMPs and site-specific plans, and has established goals for the use of these documents in the PGLMT. In early April, PNHP will meet with Ecological Services to discuss the structure and function of BMPs and site-specific plans.

### Conservation Planning

Conservation Planning staff are providing support to the statewide Conservation Planning Polygon (CPP) project to improve the CPP development process and to significantly reduce project costs by designing and implementing GIS tools that create local maximum watersheds for Core Habitat Polygons (CHP). Many of the drawing specifications for tracked plants require a local watershed to be delineated as the Supporting Landscape Polygon (SLP). With the use of these custom watershed tools, watershed delineation time can be reduced by an estimated 80% compared to hand delineation using topographic maps.

Staff continued promoting the use of County Natural Heritage Inventories and the Natural Heritage Areas database in county level planning by meeting with the new planning director for Indiana County. Meeting with county planners and assessing opportunities for integrating NHAs into local land use planning is part of a developing statewide conservation planning outreach strategy.

Due to our involvement in the *Pennsylvania Energy Impacts Assessment* (2010) and new capacity for bird conservation, we are contributing to a collaborative project of the Appalachian Mountain Joint Venture that is assessing impacts of energy resource development on forest birds in Pennsylvania. This project will use breeding bird data collected during the 2<sup>nd</sup> Pennsylvania Breeding Bird Atlas and energy impact projections from the 2010 report to characterize changes in forest landscape metrics and how these changes might affect forest songbirds.

### Zoology

In addition to planning for 2012 surveys, zoology staff have started fieldwork for amphibian species of concern, including the mountain chorus frog.



Ryan Miller

Mountain chorus frog

We presented interim results of northern water shrew (*Sorex palustris*) surveys at the Pennsylvania Chapter of The Wildlife Society meeting, and staff attended the Mammal Technical Committee meeting and the Northeastern Bat Working Group meeting. Staff are also wrapping up deposition of nearly 200 specimens of small mammals collected in 2011 to the State Museum of Pennsylvania's Section of Zoology and Botany.

With assistance from Pennsylvania Game Commission biologists, PNHP zoologists conducted surveys for cave obligate invertebrates at eight sites. We discovered a number of new occurrences and updated several known occurrences including the only known Pennsylvania location for Franz's cave amphipod (*Stygobromus franzi*).



Scott Bearer (TNC), Insert: Charlie Eichelberger

PNHP accompanied PGC and TNC biologists on a survey of Aitkin Cave. Small pools in the cave are home to Price's Cave Isopod, a blind, pigment-less cave-obligate crustacean. How these cave obligate species will respond to the 99% loss of the hibernating bat population from white-nose-syndrome remains to be seen.

Zoologist Ryan Miller, assisted by Pennsylvania Fish and Boat Commission staff, conducted habitat management on over 20 acres of eastern massasauga (*Sistrurus catenatus*) habitat, assisted the Bureau of State Parks with burn management, and met with the PGC to review improvement of timber rattlesnake (*Crotalus horridus*) habitat on state game lands in the northwestern part of the state.



### Information Management

After years of effort by several staff members and student volunteers to develop new data collection tools utilizing the latest GIS and database technology, Information Management completed Phase I of the Field Information Networked Database (FIND) rollout this winter. This new field survey geodatabase is useable online and offline, streamlines data entry and data flow, increases data integrity and security, and will enable us to keep more of our field information in one place. We held four, six-hour training sessions in February for WPC Heritage staff members on the basic usage of new mobile GPS hardware, mobile mapping software, and the mobile and desktop versions of FIND. During a week-long testing period users were able to experiment with many aspects of FIND and provide preliminary feedback to Information Management staff. On March 19, FIND 1.0 went “live” for real data entry by WPC Heritage staff. While staff members use the new geodatabase and continue to provide feedback, Information Management is preparing for the next version of FIND, to be released in time for the 2013 field season. FIND 2.0 will include many refinements and may better integrate with other Heritage geodatabases. FIND 2.0 is also expected to be ready for use by the partner organizations so data can flow seamlessly between everyone who is collecting it or reviewing it. We congratulate Tyson Johnston, who has been promoted to Conservation GIS Specialist I since taking the lead in development and support of FIND.

The Conservation Planning Polygon (CPP) Development team is now fully staffed. In addition to Project Coordinator Kristen Erath, we have GIS Technicians Michael Maret, Leah Phillips, and Ben Plunkett. CPP staff are working with a number of Heritage staff to coordinate specification and polygon development and are creating CPPs for plants statewide. CPP processing is being prioritized in collaboration with County Natural Heritage Inventory projects and the Pennsylvania Game Lands Management Tool project. Working with the Heritage Planning section, CPP staff have implemented and created tools to automate and standardize polygon delineation.

Through funding from the Great Lakes Restoration Initiative (GLRI) provided through the Pennsylvania Fish and Boat Commission, we are continuing development of the Pennsylvania node of the iMAP invasives website for aquatic invasive species in the Lake Erie and adjacent watersheds. The database will track where the invaders are, where treatments have been applied, and what might be coming next. PNHP staff are searching out data sources, coordinating with data providers, participating in regular Lead Partner Organization and project planning conference calls, and working with iMAP and Heritage GIS staff to develop data QC strategies and GIS layers. The Pennsylvania node is on track to be live in April 2012 for viewing and data entry.



Kierstin Carlson

Tyson Johnston demonstrates FIND-Mobile on a Trimble Nomad to botanist Steve Grund.

## 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 Goal
Biotics Records Updated	200	127	127	64%
New EOs Documented	800	169	169	21%
New Records Entered into HGIS	300	96	96	32%
Field Surveys Performed	500	32	32	6%
New CPPs Developed	3000	1037	1037	35%
NHAs Updated	120	29	29	24%
Outreach to Local Government	20	2	2	10%

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.