



Pennsylvania Natural Heritage Program

information for the conservation of biodiversity

Wild Heritage News

Spring 2015



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Photo Banner:
John Kunsman

Round-leaved fame flower,
Chester County

Natural Heritage Updates for Beaver and Chester Counties

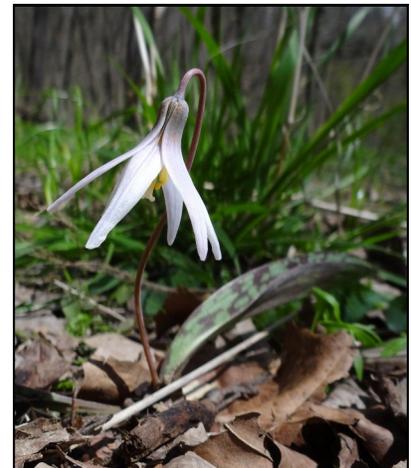
by

Peter Woods and Denise Watts

This winter we published the update to the Beaver County Natural Heritage Inventory (NHI) and are approaching completion of the update to the Chester County NHI. The original NHIs for Beaver and Chester counties were completed in 1993 and 2000, respectively, and field work for both updates began in 2012. We update Natural Heritage Inventories for several reasons; (1) to document changes at the sites described in the original NHI, (2) to visit new sites not surveyed previously, (3) to broaden the taxonomic coverage of the NHI by including invertebrates and other species not included in the first NHI, and (4) to apply new standards for drawing Natural Heritage Areas.

The Beaver County NHI update includes 29 Natural Heritage Areas, which are designated around 123 populations of 67 species of concern. As a result of Beaver County's long history of agriculture and coal mining along with more recent development pressures, natural areas are limited and those that remain tend to be concentrated along waterways and steep slopes.

One of the habitats in Beaver County that supports rare species is found in rich forested valleys and floodplains. Exposures of limestone, mostly in the southern half of the county, along with glacial deposits in the northwest corner, contribute to calcareous soils. Where mature forests persist in small valleys and on floodplains, these limestone rich soils support several rare wildflowers such as snow trillium (*Trillium nivale*), declined trillium (*Trillium flexipes*), and white trout lily (*Erythronium albidum*), as well as the



Peter Woods

This white trout lily was blooming in the Wildflower Reserve at Raccoon Creek State

West Virginia white butterfly (*Pieris virginiensis*). These species and habitats are threatened by high densities of deer, and by invasive exotic plants such as garlic mustard, Japanese knotweed, Japanese barberry, and Japanese stiltgrass. Springs and seeps occur in these valleys and can support the Monongahela blue crayfish (*Cambarus monongalensis*), which is the subject of an ongoing study of burrowing crayfish in Pennsylvania.



Peter Woods

A stand of twisted sedge (*Carex torta*) grows along this bend in the Little Beaver Creek where it briefly flows into Pennsylvania before returning to Ohio.

Another important habitat in Beaver County is streams. Many of the streams in the county have been affected by abandoned mine drainage, but water quality has been improving as a number of treatment systems have been built. The freshwater mussels that were once present in these streams have not returned, but a number of the county's other species of conservation concern are doing well, including queen snakes (*Regina septemvittata*), southern redbelly dace (*Phoxinus erythrogaster*), and several rare species of damselflies and dragonflies.



Peter Woods

Queen snakes give live birth to their young in late summer to fall. This newborn queen snake was found during a survey in Beaver County. Fall is a good time to survey for queen snakes because it is when the population peaks.



Peter Woods

A pair of russet-tipped clubtails. Note that the female (right) has a cluster of eggs on her abdomen.

The Ohio River still supports a number of rare species, even though its history of flow modification and dredging has extirpated many species that used to be there. A number of fish and mussel species of concern are present, and the threehorn wartyback mussel (*Obovaria subrotunda*) has been rediscovered after an absence of over 100 years, apparently having recolonized from lower reaches of the river. Increasing numbers of osprey and bald eagles nest along the Ohio and Beaver rivers. Perhaps the most unexpected finds of the project were two globally rare dragonflies that occur at one site on the Beaver River. One species, the russet-tipped clubtail (*Stylurus plagiatus*), had never before been found in this part of Pennsylvania. The other species, aptly named the elusive clubtail (*Stylurus notatus*), had not been seen in Pennsylvania since 1927.

These finds highlight the importance of developing a network of local naturalists who can contribute time and data to an inventory project. Ben Coulter is a local dragonfly expert who accompanied PNHP staff for the discovery of the russet-tipped clubtail, and when he suspected that he saw elusive clubtails, he returned to the site again and again until he captured one. The waterways and forests of Beaver County undoubtedly harbor additional surprises waiting to be discovered, but this project has improved our understanding of the county's biodiversity.

Compared to Beaver County, Chester County presents a very different landscape, with different conservation targets and more intense development pressures. Initial settlers of the region converted the landscape to pastures, crop fields, and other agricultural uses. The proximity to Philadelphia has encouraged the extensive conversion of former farms to suburban development, in many places leaving only small patches of disturbed

remnant habitats. Numerous conservation organizations are active within the county, attempting to conserve the remaining natural habitats that support common and rare species that have been able to persist despite the challenges that they face.



Stephanie Seymour

Much of Chester County has been converted to early successional habitats.

The Chester County report is large because it includes 170 Natural Heritage Areas that capture 650 occurrences of 172 different species and natural communities. Many of the species found in the county are categorized as species of concern in Pennsylvania because their ranges extend into the state only in the southeast. These species may be more common in the center of their ranges, but in Pennsylvania they are rare. Many of the species of concern documented in the county are those that prefer or can tolerate early successional habitats and disturbed areas.



Denise Watts

A number of grass species of concern were documented in Chester County, including Heller's witchgrass (*Dichanthelium oligosanthes*). Management is typically needed for these species to be able to persist.

The standout locations in Chester County are clearly the serpentine barrens, a globally rare community type with a restricted range that supports a number of rare

species found only in this specialized habitat. Several larger serpentine barrens, most notably Unionville, Chrome, Nottingham, and Goat Hill, occur in Chester County. Other small pockets of serpentine habitat are also found along the southern border of Chester County. A large number of species of concern are found on serpentine barrens, including many moths that use pitch pine, grasses, and other serpentine species as host plants. Serpentine barrens typically need intensive management to prevent succession and loss of the grassland habitat that supports many species of concern. Some of the larger barrens have active management that is preserving these habitats, but small, privately owned locations may be lost through natural succession.



Charlie Eichelberger

The state threatened round-leaved fame flower is one of a number of species of concern found on serpentine barrens, a unique habitat located along the state line in the southeastern portion of Pennsylvania.

The Chester County NHI update has made us consider once again how we prioritize rare plants and animals that may be found on roadsides and other marginal habitats. We want to direct conservation efforts to the most fruitful areas where good habitat and viable populations can continue.

PNHP provides these two studies to the people of Beaver and Chester counties, with the hope that they will find them helpful in preserving the biodiversity and unique habitats within each county. We offer many thanks to the planning commissions, local conservation organizations, and interested citizens for their help with this project.

Natural Communities and Heritage of Raccoon Creek State Park

by
Adam Hnatkovich

Over the last field season the Pennsylvania Natural Heritage Program conducted biological surveys at Raccoon Creek State Park in order to provide conservation recommendations for use with park management plans. PNHP has provided similar management guidance for ten other state parks and, in recent years, to the Pennsylvania Game Commission (The Pennsylvania Game Lands Management Tool; PNHP Newsletter, 2013, Oct-Dec issue). These projects represent proactive conservation planning and are an important avenue to communicate our data to public land managers.

Raccoon Creek State Park spans approximately 7,572 acres and is located in southern Beaver County. The park was created in the 1930s by the National Park Service (Raccoon Creek National Recreation Demonstration Area), and was transferred to the Commonwealth of Pennsylvania in 1945. During the decade of the park's establishment, historical aerial photography (circa 1937) shows that agricultural and pasture land covered a significant portion of the landscape throughout the region. As farming declined and previous agricultural land was retired, woodlands and forests re-established. As a result, the forests of Raccoon Creek State Park are diverse in age structure and composition. More importantly, Raccoon Creek State Park protects significant forested acreage within the Raccoon Creek watershed and, along with nearby Hillman State Park and State Game Lands 189 and 117, public lands serve a valuable conservation function in Beaver and Washington counties.



An Oak-Mixed Hardwood Forest providing dense shade and supporting diverse understory plant communities.

Adam Hnatkovich

Raccoon Creek State Park contains a variety of forest communities, which add to the aesthetic values of the park. The majority of the park is dominated by red oak, white-oak, and a mix of other hardwood species like sugar maple and hickory. Most of the stands in Raccoon Creek State Park are mature, providing dense cover and shade. Large patches of closed canopy forest like those found in the park are important for migratory song birds as well as a host of common animals that require interior forest for nesting and survival.



Adam Hnatkovich

Dry Oak-Heath Forest is a rare plant community at Raccoon Creek State Park.

Rich forested habitats known as Sugar Maple-Basswood Forest are the rarest forest community in the park: these communities are moist, dense canopy forests that have relatively rich herbaceous plant communities. They are often found in protected coves and along lower slopes. Another rare community is the Dry Oak-Heath Forest. In the park, these communities were found most often on south-facing slopes and near ridgetops. While much less diverse in their herbaceous vegetation, Dry Oak-Heath Forests support specific shrub species, including blueberry, huckleberry, and often mountain laurel. Sugar Maple-Basswood and Dry Oak-Heath forests may be very uncommon in the region, and therefore, have conservation value at Raccoon Creek State Park. Conifer-dominated stands also thrive in the park and occupy significant acreage, offering additional habitats for birds and animals seeking winter cover.

Common riparian plant communities at Raccoon Creek State Park include Floodplain Meadows, which are dominated by wingstem (*Verbesina alternifolia*) and species of goldenrod. These communities typically

occur at or just above flowing water and support a tall, dense herbaceous layer that is characteristically “meadow-like.” Floodplain Meadow communities provide important breeding, nesting, and foraging areas for bird and insect species. The most common riparian community at the park is the Sycamore Floodplain Forest. This community is an important part of the river floodplain ecosystem and is dependent on periodic disturbance from natural flooding. Large contiguous floodplain forests provide important habitat for wildlife

species requiring large blocks of interior forest, such as Neotropical migratory birds. Additionally, abandoned oxbows, pools, and depressions within the floodplain provide important breeding habitats for reptiles and amphibians. Dominated by sycamore (*Platanus occidentalis*), this community is found along Traverse Creek and Raccoon Creek, and near the dam at Raccoon Lake. Most notably, Sycamore Floodplain Forests are found in the Wildflower Reserve along Raccoon Creek.

The Civilian Conservation Corps Influence at Raccoon Creek State Park



Civilian Conservation Corps barracks at Raccoon Creek State Park.

Courtesy of Raccoon Creek State Park

From 1933 to 1942, the Civilian Conservation Corps (CCC) recruited over 2 million men to work on conservation projects throughout the United States (Speakman 2006). Pennsylvania offered abundant opportunities for conservation projects (Speakman 2006), and hundreds of thousands of men were stationed at CCC camps across the state (DCNR 2015). Pennsylvania had 151 CCC camps, and was second only to California in the number of camps (California had approximately 168).

The National Park Service built a number of Recreation Demonstration Areas, which were a collaborative effort of the CCC and the Works Progress Administration (WPA; DCNR 2015). One of these Demonstration Areas included Raccoon Creek National Recreation Demonstration Area, which was later transferred to the state and designated as a state park. Other Demonstration Areas that were transferred to the state include Blue Knob, Hickory Run, French Creek, and Laurel Hill state parks.

In addition to National Recreation Demonstration Areas, the CCC had a tremendous impact on Pennsylvania’s state park system: Speakman (2006) suggests at least 29 state parks were the recipients of CCC projects. CCC activities on state parks varied widely across Pennsylvania, and included the building of cabins, stone dams, earth and stone dams, picnic shelters, kiosks, park offices, foot bridges, water lines, and roads.

At Raccoon Creek State Park, there are 128 historic structures associated with the CCC. These structures included buildings at each of three organized group camps in the park. Buildings at one of the group camps (Organized Group Camp No. 1; 49 buildings) have been described as significant examples of Emergency Conservation Work (the original name of the CCC) architecture, and this architecture is not found at any other Pennsylvania state park. Structures at Organized Group Camp No. 1 utilized log and frame construction, using American chestnut logs that were placed on stone foundations. In 1987, 813 acres of Raccoon Creek State Park, including organized group camps, the park office, and park maintenance area, were placed in the National Register.

Speakman, J. 2006. *At work in Penn’s woods: the civilian conservation corps in Pennsylvania*. The Pennsylvania State University Press. State College, PA.



Historic (top) and modern (bottom) photos of CCC cabins at Raccoon Creek State Park. Using a log and frame construction, the architecture of these cabins was unique to Raccoon Creek State Park.

Courtesy of Raccoon Creek State Park



Harbinger-of-spring

Peter Woods

The Wildflower Reserve at Raccoon Creek State Park supports a number of state-listed plants, including harbinger-of-spring (*Erigenia bulbosa*), snow trillium (*Trillium nivale*), white trout-lily (*Erythronium albidum*), and beard-tongue (*Penstemon laevigatus*). A

number of rare invertebrate species have also been documented in the Reserve, including silvery checkerspot (*Chlosyne nycteis*), West Virginia white (*Pieris virginensis*), and blue-tipped dancer (*Argia tibialis*).

PNHP incorporated a new component to our natural resources inventory at Raccoon Creek State Park. WPC Watershed Conservation staff assessed three streams, collecting water quality data and surveying for state-listed fish species. They documented one state-listed fish species in two streams in Raccoon Creek State Park, in addition to other common freshwater fish species including creek chub (*Semotilus atromaculatus*), blacknose dace (*Rhinichthys atratulus*), central stone roller (*Campostoma anomalum*), redbside dace (*Clinostomus elongatus*), and multiple species of darter (*Etheostoma* spp.)



Sarah Parker

Aquatic plants usually cannot be observed directly from a boat, so we pull up samples with a grapple hook attached to a rope.

We also sampled aquatic vegetation at Raccoon Lake and Upper Lake. Aquatic plants are critical components of lake ecosystems, providing food and shelter for fish and other aquatic animals, oxygenating the water, and

stabilizing sediments. Both lakes are sections of Traverse Creek that have been impounded by dams. Upper Lake was created in the 1930s as part of the Raccoon Creek National Recreation Area and Raccoon Lake was developed in 1948 shortly after the establishment of Raccoon Creek State Park. Aquatic vegetation is restricted mostly to coves where tributary streams join the lakes and to shallow water immediately adjacent to the shoreline. At both lakes, submerged aquatic plant cover was dominated by non-native species: Eurasian water-milfoil (*Myriophyllum spicatum*) in Raccoon Lake, and brittle waternymph (*Najas minor*) in Upper Lake. Native submerged aquatic plant species were widely scattered in the lakes, generally in small patches. Continued management of invasive aquatic species will help to reduce dense mats of vegetation that can be detrimental to recreation and will encourage native aquatic plant communities.



Peter Woods

Blue-tipped dancer

Our work with Raccoon Creek State Park goes beyond natural resource management planning, inventory, and community mapping. In 2013, we performed a comprehensive survey of riparian plant communities in first and second-order streams within Raccoon Creek watershed. We surveyed eight streams in the park, along with streams in nearby Hillman State Park and State Game Lands 189. We collected data on stream size and substrate, stream-bank erosion, and vegetation from in-stream, stream-side, and upland plant communities. We conducted identical stream and riparian vegetation assessments in other watersheds throughout Pennsylvania, including those of Kettle Creek, Youghiogheny, French Creek, and Tionesta Creek. This statewide data set will be used to define plant communities associated with higher order streams, examine differences in riparian vegetation within and across watersheds, and provide information that DEP can apply to their mitigation strategies.

Notes from the Field

Prescribed Fire on Public Lands

PNHP staff continue to work with The Nature Conservancy to improve conservation planning for prescribed fire on public lands. Along with climate and environmental factors, a number of authors have shown that fire has been an important disturbance that influenced Pennsylvania's historic and contemporary forests. Significant sources of fire have included lightning and Native Americans. In Pennsylvania and in the northeast, Native Americans are thought to have purposely used fire for (among other reasons) to open forests for hunting, agriculture, and travel.



Adam Hnatkovich

Prescribed fire application at Jennings Environmental Education Center (DCNR Bureau of State Parks).

Understanding the source of fire, and the frequency and scale at which forests were impacted by fire is important for fire management programs in Pennsylvania. Knowledge of historical forest conditions and fire frequency are useful to identify priority fire management areas and to develop appropriate monitoring strategies.

To improve our understanding of fire management on public lands, PNHP interviewed land managers at the Pennsylvania Game Commission and Bureau of State Parks, and staff at the Bureau of Forestry participating in active prescribed fire programs. Other interviewees included members of academia, Natural Lands Trust, the National Park Service, and private consultants who are active in the prescribed fire community. From these interviews, PNHP staff were able to collect information on the history of regional fire programs and

the current fire management goals of public land managers. Following the passing of the Prescribed Burning Practices Act (2009) fire programs have grown consistently within each agency. On state forests and game lands, prescribed fire is being used to stimulate oak forest regeneration. Pennsylvania's state forests and game lands support some of the healthiest oak stands in the state. Following timber harvest, fire can benefit regenerating oak seedlings by reducing competing vegetation, such as red maple or sweet birch. Scrub oak is also being managed with fire on state game lands, where it provides valuable habitat for bird, butterfly, and moth species.

Prescribed fire is also being used to manage grasslands at a number of state parks. Moving forward with this project, PNHP staff will provide DCNR with a list of parks where fire management could benefit native plant communities. This spring, we will visit Nescopeck and Pine Grove Furnace state parks and identify potential fire management areas.

Dragonfly Publications

The Pennsylvania Odonate Database was initially developed by the Pennsylvania Natural Heritage Program in 2007 with support from a Wild Resource Conservation Program grant. The database has been periodically updated since then and now includes over 15,700 records of dragonflies and damselflies. The database has information on over 550 sites throughout Pennsylvania and contains data from the present and the past, with some historical records dating back to the late 1880s. The Pennsylvania Odonate Database was instrumental in several recent publications that describe the odonate fauna of



Betsy Leppo

Fawn darner (*Boyeria vinosa*), a species of dragonfly, on a cardinal flower

three sites in the central part of the state. This published data is now available to a broader scientific and conservation community and will hopefully serve to increase interest in the native insects found in the commonwealth. Citations for these publications are below:

Shiffer, Clark N. and Harold B. White, III. 2014. Dragonfly and Damselfly Colonization and Recolonization of a Large, Semi-Permanent Pennsylvania Pond. *Northeastern Naturalist* 21(4):630-651.

Shiffer, Clark N., Betsy Leppo, and Harold B. White, III. 2014. Odonata of Black Moshannon State Park, Centre County, Pennsylvania. *Argia* 26(4):7-10.

Shiffer, Clark N., Betsy Leppo, and Harold B. White, III. 2015. Odonata of Beaver Dam, Huntingdon County, Pennsylvania: A Record of Faunal Succession in a Changing Habitat. *Argia* 27(1):12-23.

Dragonfly Society Meeting

The annual meeting of the Dragonfly Society of the Americas (DSA) will be in State College, Pennsylvania from June 25-28, 2015. This meeting is an international gathering of dragonfly experts and enthusiasts of all ages. We will explore a variety of streams, bogs, ponds, meadows, and wetlands in central Pennsylvania during field trips on June 26 and 28. Saturday the 27th will be spent in a conference setting with presentations and posters. Pre- and post-meeting field trips (June 24-25 and June 29-30) will explore sites further afield. This meeting is a great opportunity to collect and share photographs, specimens, and stories. At the annual meeting, we will recognize one of Pennsylvania's most dedicated odontologists, Clark Shiffer, whose decades of meticulous surveys at several sites in central Pennsylvania have recently been summarized in articles in the *Northeastern Naturalist* and in the DSA publication of *Argia*. Details on the meeting are available at <https://sites.google.com/a/udel.edu/nedsa/home/2015>. PNHP staff are assisting with this event, please contact Betsy Leppo (bleppo@paconserve.org) for more information.

Conewango Creek Restoration

Rarely do we have an opportunity to erase over 100 years of human impacts and attempt to restore a stream's freshwater mussel fauna to its pre-settlement condition. However, over a five year period beginning in 2009, that is exactly what we have worked towards along Conewango Creek in Warren County, Pennsylvania.



Nevin Welte measures northern riffleshell mussels that will be placed into Conewango Creek.

Brian Ferry, Warren Times-Observer

As of the early 1900s, the Conewango Creek watershed harbored a diverse mussel community consisting of common mussels as well as the state and federally endangered northern riffleshell (*Epioblasma torulosa rangiana*), clubshell (*Pleurobema clava*), and rayed bean (*Villosa fabalis*). Pollution and construction of two dams across

Conewango Creek – Carters Dam near the confluence with the Allegheny River and Hospital Dam three miles further upstream – diminished the endangered mussel population and blocked the movement of fishes and mussels between these two waterways. Most freshwater mussel species are dependent on the presence and free movement of specific fish hosts that complete their reproductive cycle, and the loss of these host species results in the subsequent loss of the mussels that depend on them.

In recent decades, the dams were determined to no longer be necessary and were slated for removal. PNHP and Pennsylvania Fish and Boat Commission (PFBC) biologists assisted American Rivers and the Pennsylvania Department of Environmental Protection (DEP) as part of the state and federal permitting process for the removal of the Conewango dams by



Processing endangered mussels at Hunter Station bridge.

Brian Ferry, Warren Times-Observer



Brian Ferry, Warren Times-Observer

Tagged endangered mussels

conducting pre- and post-dam removal mussel surveys, salvaging mussels, and preparing biological assessments. PNHP surveys documented a vibrant common mussel community still in the Conewango, although the endangered species were few and far between. In 2014, following the removal of the two dams, PNHP staff worked closely with PFBC to collect, tag, and

relocate nearly 500 endangered northern riffleshell and clubshell from the Allegheny River to two Conewango Creek pilot study sites. The survival and growth of these pilot populations will be monitored in the coming years to determine whether additional endangered mussels can be stocked in Conewango Creek.

Forest Interior Bird Habitat Relationships

The Pennsylvania Wilds region in the north central part of the state spans 12 plus counties and contains some of the largest remaining blocks of unfragmented, core forest in the state. This area is a stronghold for populations of forest interior-dwelling bird species (FIDS) – often area-sensitive species that require large tracts of unfragmented, mature forest to maintain healthy populations. With a large proportion of these forests managed as state game lands, state forest, and the Allegheny National Forest and with continuing pressure from shale gas development, there is a need to better understand how forest interior birds respond to different forest habitat characteristics and conditions.



David Yeany

Surveys for forest interior birds like the hermit thrush (*Catharus guttatus*) should help inform forest management decisions for these forest specialists.

PNHP will partner with Audubon Pennsylvania to help address this need which was identified as a priority by the DCNR Wild Resource Conservation Program. As part of this work in 2015, we will conduct off-road point-count surveys for breeding birds within core forest on agency-managed lands within the Pennsylvania Wilds. Our aim is to survey between 700 and 800 point locations across several northern hardwoods, oak, and conifer forest community types. In addition to bird surveys, we will conduct forest stand validations within each survey area to confirm community typing and collect information on forest conditions (i.e., disturbance) as well as forest structure.

By making a connection between FIDS abundance data and forest community characteristics that are important to agency foresters, we can provide useful information about managing our core forests to benefit the birds which need them the most. This project is also being conducted in cooperation with ongoing research at Penn State University. PNHP data will augment these studies and provide a finer look at forest habitats within broader community types.



David Yeany

The Canada warbler (*Cardellina canadensis*) is a Partners in Flight Continental Watch List species due to long-term population declines.

iNaturalist

iNaturalist is a platform that allows citizen scientists to map and share observations of any species. Users can submit observations, usually documented with photographs, and other members of the iNaturalist community can verify or refute the identification of the species observed to help make a high-quality record.

From the over 20,000 iNaturalist observations in Pennsylvania, PNHP biologists have harvested many records of rare species. Some of these records will qualify for inclusion in our database, while those that need more documentation will be targets for future field work. Last year, PNHP used this platform for a Bioblitz to easily bring together data from numerous observers armed with cameras and mobile phones. In some ways, a County Natural Heritage Inventory is like a two-year long bioblitz, and PNHP staff are now looking into using iNaturalist as a tool to engage the citizens of a county, and allow them to contribute to

the effort to map the rare species and ecologically important places in their county.

If you would like to contribute to our growing knowledge of Pennsylvania's biodiversity, check out iNaturalist.org or try the mobile phone application.

Part of Something Larger

PNHP works extensively with our partners and cooperators in the commonwealth on all sorts of projects that provide information concerning biodiversity conservation. But we are also a member of the Natural Heritage Network and NatureServe and occasionally, we get the chance to be involved in projects that cross state lines and enlist numerous other network programs. Our recent Appalachian Trail project is an example of such a collaborative effort.



Rocky Gleason

The AT is filled with rocky ridgelines and views like this section near Wind Gap, Pennsylvania.

The National Park Service Vegetation Inventory Program (NPS VIP) with cooperative support from the U.S. Geological Survey (USGS) Vegetation Characterization Program (VCP) and NatureServe has been developing plant community mapping of the Appalachian Trail corridor for a number of years. NatureServe involved member programs all along the corridor in this substantial undertaking which began several years ago. The information and mapping for this project will allow NPS to better manage and understand changes in the lands that makeup the Appalachian Trail corridor.

The first step in the process was to classify the plant communities that lie within the trail right-of-way. By using the visible and digital signatures of the communities that the participating programs had visited (and PNHP was one), USGS staff were able to characterize all distinct patches of vegetation to community type. The next step is to assess the accuracy the of the



Rocky Gleason

The AT passes through thousands of acres of forest like this section in eastern Pennsylvania near Stroudsburg.

community types that USGS staff assigned via on the ground surveys. That's where the project is right now.

By the end of this year, our staff will have visited hundreds of points that USGS selected within the plant community types along the trail corridor from northern Virginia through northeastern Pennsylvania. We will continue this year where we left off and move through the Delaware Water Gap into New Jersey. Once we navigate to the points, we record specific information on the overstory, understory, and herbaceous layers as well as certain physical and structural details. The information is then used to confirm that the plant community is typed correctly and if needed, refine the typing and classification. To prevent bias, the ecologist is not told which plant community was mapped at each sampling location. If the observer knows ahead of time what the mapped community is at a location, there is a temptation to bias the field observation towards the mapped type because it is perceived as "right."

Once assembled, the information about and mapping of the Appalachian Trail corridor will represent an incredible data set that can be used for many purposes. One intriguing application is the observation of the effects of climate change along this 2000+ mile, linear, north to south corridor. Future projects that resample the same types of data using the same protocols as we followed will be able to show changes in composition, structure, and wholesale replacement of community types wherever they may occur. The data that each Heritage program and other collaborators collect lays the foundation for long-term monitoring of the plant communities (and the species that make up those communities) up and down the east coast. We are glad to be a part of something larger than just our state and we thank our national partners for involving us.

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 (2014)	1st Quarter	Cumulative Total	Percent of Annual Goal
Biotics Records Updated	300	115	115	38%
New EOs Documented	800	137	137	17%
New Records Entered into HGIS	350	65	65	19%
Field Surveys Reported	500	0	0	0%
New CPPs Developed	400	0	0	0%
NHAs Updated	120	92	92	77%
Sites Actively Monitored	35	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 Reported 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.

Sites Actively Monitored indicates how many established geo-referenced plots that we visited and sampled. These sites allow us to collect data on structure, species composition, and physical context (soils, hydrology, etc.) in a systematic way and by following the same protocols to directly compare future data to previous data.