



# The Temperate Times

Official Newsletter of the Northeast Temperate Network

Volume 7, Issue 1 - Winter 2013

## NETN Staff Finally Takes a Bath -

-ymetric profile of both Marsh-Billings-Rockefeller NHP's Pogue pond and Saint-Gaudens NHS's Blow-Me-Down pond. As part of the Network's water quality monitoring program, staff from NETN and Marsh-Billings-Rockefeller NHP took to the ice on a couple of blustery February days and gathered a series of bathymetric measurements from the frozen surface of the two NETN park ponds. Bathymetry is the study of the depth of a lake, pond, or ocean floor - essentially the underwater equivalent of topography. The tools used reached across the hi-tech/lo-tech spectrum. On the upper end was a highly accurate Trimble RTK GPS system used to pinpoint dozens of spots on the ponds where measurements were taken. Using an ice auger, a hole was drilled in the ice, and (here comes the lo-tech solution) a weighted water bottle tied to a measuring tape was lowered through the hole to calculate depth.

*'bath', cont. page 3.*

## New Website Features Easier Navigating

The NETN website has gone through another major overhaul. If you have ever surfed other National Park Service websites, you will recognize the general layout of NETN's new site, and eventually all I&M networks will have their sites updated to this new standardized layout.

You will still be able to learn about all the monitoring programs NETN conducts across its 13 parks, and get detailed information about each vital sign that is part of the monitoring program, but the ways you can access these pages has changed a bit.

Since most of the network's monitoring programs address multiple vital signs, the website is now organized around protocols, rather than the vital signs themselves. Many vital signs also apply to multiple parks in the network, which helps to create the framework for a standardized, comprehensive monitoring program.

*'website', cont. page 3.*



NETN staff prepares to take bathymetry measurements on the frozen surface of Marsh-Billings-Rockefeller NHP's Pogue pond. Ed Sharron photo.

# Volunteers to Help Monitor Appalachian Trail Natural Resources

NETN has published two new monitoring protocols for the Appalachian National Scenic Trail (A.T.) that will help the network keep track of important resources found along its winding path. This winter, both a rare plant monitoring protocol and a forest health monitoring protocol were finalized.

Over its more than 2,100 mile journey from north to south through mostly forested territory and often at relatively high elevations, the A.T. passes through an amazingly diverse number of ecosystems and habitat types. While this allows for many unique and rare plants to exist along certain areas of the trail, it also contributes to the challenge of fashioning an adequate way to monitor these resources. Due to its relatively high position in the landscape, its view shed may also be affected by land use changes and fragmentation occurring at a distance.

## Rare Plants

The importance of rare species to the A.T. has been formally recognized since at least 1989, when surveys were undertaken in cooperation with state Natural Heritage offices to inventory rare, threatened, and endangered (RTE) species within the trail corridor. Between 1989 and 2001, A.T. Natural Heritage inventories were conducted in each of the 14 Trail states that documented more than 1,700 occurrences of RTE species as well as rare or exemplary vegetation communities in more than 500 Natural Heritage Sites within the trail corridor. Of these, about 300 occurrences are globally rare species, and several federally endangered or threatened species have been documented along the Trail. Most of the rare species occurrences are plants. While rare plants are found in every Trail state, notable hot-spots or clusters of rare species occur in the Presidential Range of the White Mountains of NH, the Mt. Rogers-Whitetop area of southwest VA, and the Roan Mountain area along the border of NC and TN. In 1989, the A.T. and Appalachian Trail Conference (ATC) began a program to monitor rare plant species occurrences identified through the A.T. rare plant inventory program using volunteer monitors. Due to the large size of the area of interest (namely - the entire length of the A.T.), the new protocol will restrict monitoring to locations documented to harbor High and Very High priority occurrences of rare plants. In addition to rare plant occurrences documented by the original rare plant inventories, new occurrences will be documented and evaluated for inclusion in the monitoring program as they are discovered by monitors or others in



The A.T. between Hughes Gap and Iron Mountain Gap in TN. Brenda Wiley photo.

the area, or as new information is obtained from the state Natural Heritage offices.

The monitoring season will coincide with peak flowering times of the rare plant species monitored, and will vary by region and species. In general, monitoring will occur during the spring and summer months, running approximately from April to September. Using volunteer field monitors greatly expands the monitoring program's reach, as well as outreach, facilitating public engagement and creating opportunities for public education.

## Forest Health

Because of the unique geography and logistical challenges associated with the A.T., the NETN long-term forest monitoring protocol was modified to monitor forest vegetation along the trail. The changes reduce the gear requirements to a level appropriate for backcountry work, make it cheaper and faster to implement, and more suitable for a volunteer, and likely less skilled field crew. The protocol includes methods for collecting data to assess the health and ecological integrity of forested ecosystems found along the trail. Within A.T. forested systems key stressors include land use change and habitat fragmentation on lands adjacent to the trail's corridor. Other primary concerns include invasive exotic species, atmospheric deposition and ozone pollution, climate change, and visitor impacts. Due to the long and narrow characteristics of the A.T., adverse impacts in the vicinity can have disproportionately strong effects on its resources.

*'A.T. monitoring', cont. page 4.*

'website' from page 1

If you are interested in learning more about a particular park NETN monitors in, it is now easier than ever before to see what the status of monitoring and inventory programs are there by going to the website's new Park Pages section. There you will find a one-stop shopping experience that lays out all the pertinent information for the selected park. Overall NETN "goings-on" are also easy to keep tabs of now by following us through a variety of social networking sites including Flickr, Facebook, and Twitter - all accessible through the Social Media web page on the new site. Check them out and the "Like" us on Facebook to keep abreast of all the latest NETN happenings!

The inventories, monitoring, and education & outreach pages have all undergone some changes as well. While you're there, be sure to look at the latest Google Earth modules for your park if you haven't recently. Several updates have been applied including forest bird monitoring ecological integrity and species lists, forest monitoring plots photo viewer, and bathymetry maps for selected parks.<sup>TT</sup>

An example of the new-look website and one the park pages.

'bath' from page 1.

Knowing the bathymetric profile of these water bodies allows for volumetric calculations (helpful in some water quality monitoring measurements) and for estimates of changes in depth over time.

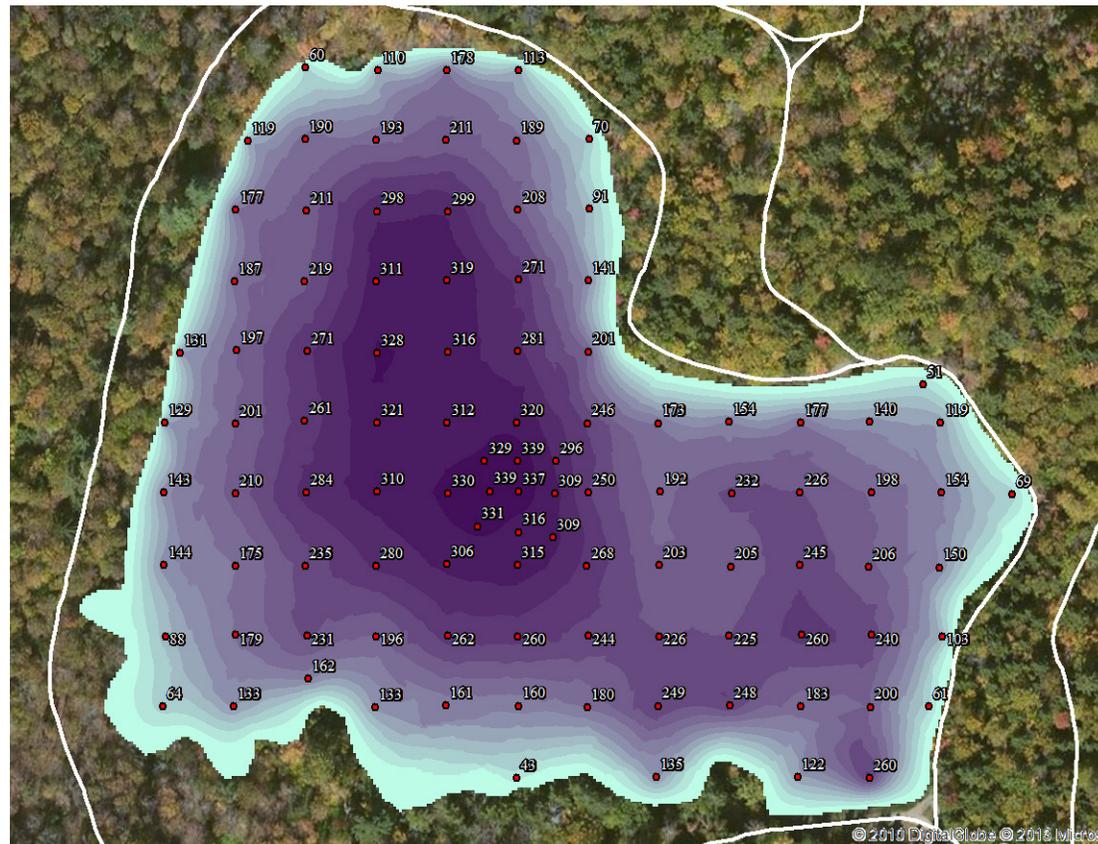
As it stands now, neither pond can claim to be very deep. A long-standing legend among local Woodstock, VT townfolk and many a park ranger at Marsh-Billings-Rockefeller NHP

has held that the roughly 14-acre Pogue pond is bottomless. Well - spoiler alert - though the measuring crew did not measure every single possible spot on the pond, they did manage to drill over 100 holes in the thick ice and can say with a fairly high degree of confidence that, alas, the Pogue indeed has a bottom. After narrowing down the deepest section of the pond, the farthest down that the measuring

tape would go was about 3.3 meters (just under 11 feet). Saint-Gaudens NHS Blown-Me-Down pond's deepest point came in at just over 6 feet.

Eventually, Weir Farm NHS's Weir Pond and selected water bodies at Acadia National Park will have bathymetric profiles completed. Hop on over to NETN's website to find links to some photos and videos of the bathymetric measuring process on Flickr and to view bathymetric maps of both the Pogue Pond and Blow-Me-Down Pond from each park's Google Earth Park Map module.<sup>TT</sup>

Pogue Pond as seen with the bathymetric profile map overlay turned on within Marsh-Billings-Rockefeller NHP's Google Earth park map. Units are in centimeters. Google Earth/Bing image.



## Water Quality Monitoring Crew Member Sails into the Sunset

With heavy hearts and best wishes, NETN said goodbye to a long-time member of the network and Acadia National Park's water and air quality monitoring team. Physical Science Technician Beth Arsenault set her sights westward and has moved on to Steamboat Springs, CO to pursue other life opportunities. She had been a member of the NETN and Acadia National Park team for more than six years.

Beth was responsible for much of the day-to-day implementation of water and air monitoring at Acadia, from sonde profiles of lakes to measuring stream flow and regularly traveling to MARS and back for air monitoring (insert bad pun based on the planet Mars here). In addition to her hard work in the field and lab, Beth made numerous other valuable contributions to the NETN water monitoring effort, from writing and revising monitoring procedures to assisting with annual reports. The whole NETN team will miss her positive attitude, ability to adjust to ever-changing circumstances, and her dedication to monitoring efforts. Beth will be sorely missed, but everyone is looking forward to crashing at her place during what are sure to be many forthcoming ski vacations!



Beth did much of the 'heavy lifting' for the NETN water quality monitoring program at Acadia National Park since its inception in 2006. Bill Gawley photo.

## Trail Cameras Reveal the A.T.'s Importance to Wildlife

The Appalachian National Scenic Trail (A.T.) is enjoyed by millions of hikers every year, but people are not the only animals that utilize this wilderness footpath. Many others rely on the protected forested land around the trail. Though the A.T. corridor itself is mostly forested and the upland Appalachian oak forest has experienced significant expansion in the past 100

years, at lower elevations it is surrounded by a patchwork of agricultural, residential, and industrial land where there has been significant habitat loss. Fragmentation and habitat loss can cause a variety of ecological impacts that trigger various responses in different mammal species. Many large mammals have experienced dramatic range contractions, while others have expanded following natural reforestation. Recent studies have shown that mammalian carnivore species presence and abundance are best predicted by forest fragment size and isolation. Although fragmentation is frequently detrimental to large carnivore populations, some ungulates (hoofed animals - e.g. white-tailed deer) and medium-sized predators (raccoons, skunks, foxes, etc.) thrive on the "edge habitat" created by fragmentation.

Large-scale studies can often be limited by monetary restrictions and a lack of appropriate personnel, but these problems can sometimes be overcome with the help of volunteers and by using new cost-effective, non-invasive techniques. This is just what William McShea of the Smithsonian Conservation Biology Institute (in collaboration with the University of Colorado) did by pairing together automatic trail cameras and dozens of "citizen scientist" volunteers from nearby the A.T. trail clubs. McShea recognized that so-called "camera traps" monitored by all those volunteers could provide greater amounts of objective data and cover a larger survey area than could any one team of scientists.

*'cameras' continued on page 6*

*'A.T. monitoring' from page 2*

Forest monitoring staff are not likely to be NPS employees or volunteers working directly for the A.T., NPS, or NETN. Rather, the people who collect data are more likely to be volunteers working for ATC or an affiliated trail club, or as part of a university, college or independent research project. While NETN currently lacks the funding and staff to implement this protocol, it is a rigorous and specific approach for quantifying forest health within the A.T. corridor. Data that can be obtained through this protocol as well as data from other sources including the U.S. Forest Service can be used to interpret and report the ecological integrity of A.T. forested systems. Ecological integrity can be assessed by comparing key elements or attributes of an ecosystem to a reference area or to historical measurements or modeling efforts.

For more details on both rare plant and forest health monitoring, see their appropriate monitoring program web pages on NETN's website.<sup>TT</sup>



An American black bear is "camera trapped" by one of the trail cameras placed along the trail during the study. Smithsonian photo.

# Monitoring Program Will Help Keep Acadia's Broom Crowberry From Being Swept Away

Acadia National Park lies within a transition zone of the Maine coastline that contains ecological communities typical of both southwestern and “downeast” coastal Maine. Eleven of these communities are rare within the state of Maine, and one is globally rare. Rare communities are of particular management and conservation interest for the park, precisely because they are rare and because they may be particularly sensitive to anthropogenic (human caused - i.e. climate change, trampling, etc.) impacts. A new monitoring program will help shed light on the status and trends of rare woodland and forest communities within Acadia.

Of the rare communities in the park, four terrestrial forest or woodland communities are currently recommended for long-term monitoring. Three of the communities are considered rare in Maine (Jack Pine Woodland, Pitch Pine Woodland, and the White Pine / Red Pine Forest) and the Pitch Pine / Broom Crowberry Woodland ranks as globally rare. Key stressors potentially impacting these rare woodland and forest communities include forest succession, coastal erosion, climate change, trampling, deer browsing, invasive species, and a lack of natural disturbance (such as fire).

Many of these species are at the edges of their range, and climatic changes in precipitation and temperature could drastically alter these communities. In other parts of their range where natural fires play a more prevalent role, jack pine, pitch pine, red pine and broom crowberry are all species that are fire-dependent, and will regenerate following fire disturbance. Although large fires are rare in the Northeast, analysis of a lake sediment core taken from The Bowl (near The Beehive on Mount Desert Island) did show some evidence of fire prior to European settlement, and many current forest and woodland stands in the park established after fires during the 19<sup>th</sup> and early-to-mid 20<sup>th</sup> century. However, fires caused by natural ignition sources (lightning strikes) are uncommon along coastal Maine and the cool, moist climate overall is not friendly to fire. It is more likely that for Acadia, harsh soil conditions and disturbance from salt spray helps to prevent trees from taking over areas where rare communities persist in the absence of fire. That said, research has indicated jack pine regeneration on Schoodic Peninsula has decreased in recent decades, while red spruce regeneration has increased. What this all means for Acadia is that despite the lack of a clear understanding of fire's natural role in the park, in the right circumstances prescribed fire could be a useful restoration



A pitch pine broom crowberry woodland monitoring station near the Wonderland Trail in Acadia National Park. Kate Miller photo.

tool, especially if monitoring shows that maintenance of these communities is threatened by tree incursion, or by regeneration failure of fire-dependent species.

The three rare woodland communities occur in close proximity to the coast, and thus may be threatened by coastal erosion and sea-level rise over the mid-to-long-term. Another concern is that because pitch pine is near its northern range limit and jack pine is near its southern range limit in Acadia, altered temperature, precipitation and other disturbances associated with climate change could substantially impact these communities.

Acadia National Park is a very popular tourist destination, receiving over two-million visitors annually, and trampling of sensitive communities could be an issue. Trampling is likely to be a bigger issue for the pine woodlands on Mount Desert Island, which attract more visitors than the relatively remote Schoodic Peninsula and Isle au Haut.

Monitoring will take place biennially in late July or August. A spatially balanced random sample within patches of each community identified on the Acadia Vegetation Map will be selected. This design will allow for sample size to be adjusted as needed even after sampling has begun without sacrificing spatial balance.

The monitoring program was designed primarily with the globally rare Pitch Pine/ Broom Crowberry Woodland (PPC) community in mind. It was hoped that since the

*'rare woodlands' cont. back page*

*'cameras' from page 4*

Large-scale studies looking at eastern mammal communities have been rare, but important in understanding the ecology of the region and the interplay between mammals with large home ranges and human development. Although secondary forests have reclaimed parts of the Appalachian region, many of these forests have been fragmented by roads and development. Being able to model this fragmentation and its effects on mammal distributions is a critical need for federal and state agencies.

Between 2007 and 2009, from May through November (when animals are most active), cameras were placed at 447 sites along 636 miles of trail that traversed from southern Pennsylvania to Tennessee. Using the A.T. as a kind-of "mega-transect", the three-year study looked at how forest cover, hunting, trail use and the presence of roads affected eight mammal species (white-tailed deer, raccoons, American black bears, Virginia opossum, coyotes, bobcats and red and gray foxes). The sites were surveyed by 50 volunteers recruited from hiking and nature clubs who helped to rack up over 18,800 "camera days" during the study. The citizen scientist volunteers handled camera placement and maintenance, file management, and recorded their own data that was then entered into a National Park Service website where the pictures could also be uploaded. Hundreds of the photographs they collected can still be viewed on the Smithsonian's SI Wild website.

Overall, 19 medium and large mammal species were detected and identified, along with five small mammal species. The study revealed the importance of available forest to six of the eight target species (opossums and coyotes were the two outliers). Hunting on adjoining lands was the second strongest predictor of occupancy for three mammal species, negatively influencing black bears and bobcats, while positively influencing raccoons. Study results, recently published in the scientific journal PLOS



**Bobcat presence was negatively impacted if hunting occurred near the study area. Smithsonian photo.**

One, also indicated an avoidance of high trail use areas by bears and a natural inclination towards high use areas by red fox. Roads had the lowest predictive power on species occupancy within the corridor and were only significant for deer.

Study organizers feel that protecting current forest habitat and encouraging continued reforestation and land acquisition would be extremely beneficial to a number of mammal species. For certain target species, hunting should be monitored closely and regulations should be adaptable in areas where occupancy might otherwise be low due to the effects of recreation and/or roads. Scientists and managers should consider these human impacts and their potential combined influence on wildlife persistence when assessing optimal habitat or considering management actions. For more information on the study, see the Appalachian National Scenic Trail's park page on NETN's website for links to the Smithsonian website and the scientific journal article.<sup>TT</sup>

*'rare woodlands' from page 5*

three other state rare communities in the park also happen to have similar species, disturbance dynamics, structure and potential stressors, that those habitats could also included in this monitoring program. However, since the protocol was originally developed NETN has had to scale it back to only monitoring plots in the PPC community because of limited staff availability and funding.

Condition of individual broom crowberry plants will be monitored within each vegetation quadrat. Up to nine individual plants per quad will be selected for monitoring. Height, live/dead branches, and evidence of reproduction will be recorded. To get a complete picture of this program, standard operating procedures, and monitoring methods, download the Rare Woodland & Forest Communities monitoring protocol from NETN's website.<sup>TT</sup>



**Northeast Temperate Network**  
54 Elm Street  
Woodstock, Vermont 05091  
802-457-3368  
<http://science.nature.nps.gov/im/units/netnl/>

