Northeast Temperate Network
Inventory & Monitoring Program

Northeast Region
National Park Service
U.S. Department of the Interior

Acadia NP • Appalachian NST • Boston Harbor Islands NRA • Marsh-Billings-Rockefeller NHP • Minute Man NHP
Morristown NHP • Roosevelt-Vanderbilt NHS • Saint-Gaudens NHS • Saugus Iron Works NHS • Saratoga NHP • Weir Farm NHS

The Temperate Times

Newsletter of the Northeast Temperate Network

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The Tale of the Trail - Appalachian Trail Forest Condition

NETN recently compiled a host of data from the US Forest Service and other sources to get an overall idea of the condition of the Network's Appalachian National Scenic Trail. Considered a treasured national icon, the Trail traverses the Appalachian uplands of the eastern United States for more than 2,180 miles as it wends its way from Georgia to Maine. Following is a brief summary of NETN's findings. A more comprehensive Resource Brief is available for download from NETN's website.

The Appalachian Trail region is predominantly forested but includes many open fields and exposed rocky areas that provide viewpoints for the greater Trail landscape. While the corridor itself is protected from development, land use change and habitat fragmentation continue to affect the forested land surrounding the corridor. Other key concerns for forests in this region include the impacts of invasive exotic species, atmospheric deposition and ozone pollution, climate change, and visitor impacts.

About two-thirds of the US Forest Service (USFS) managed land in the region was forested. This varied substantially by ecoregion, with the Northern Appalachian Piedmont showing the lowest percentage of forested plot area (less than one-third of measured land area) and mid-to-higher elevation ecoregions showing the highest (more than three-quarters of measured land area in the White Mountains, the New England Piedmont, the Green-Taconic-Berkshire Mountains, and the Blue Ridge Mountains).

The majority of forestland along the trail is in private ownership, though the USFS is an important owner of forestland in the Blue Ridge Mountains, Northern Ridge and Valley, Green-Taconic-Berkshire Mountains and the White Mountains.

Forest composition in the northeastern mountain ecoregions is dominated by northern hardwood forest species such as sugar maple, American beech and yellow

Trail Tale, cont. page 2.

Much of the A.T. that traverses NH's White Mountains is dominated by an Alpine landscape. Dennis Wilkinson photo.

Road Show's Roll Out

It is the time of the year again for NETN Science Communication Specialist Ed Sharron to make his annual excursions to each of NETN's parks to talk with park staff and the public about all the goings-on with natural resource monitoring.

This year Ed is offering a suite of choices for parks to pick from. There is the usual rundown of NETN monitoring activities and results from the 2011 field monitoring season. Topics such as breeding birds, forest health, and invasive species are all covered.

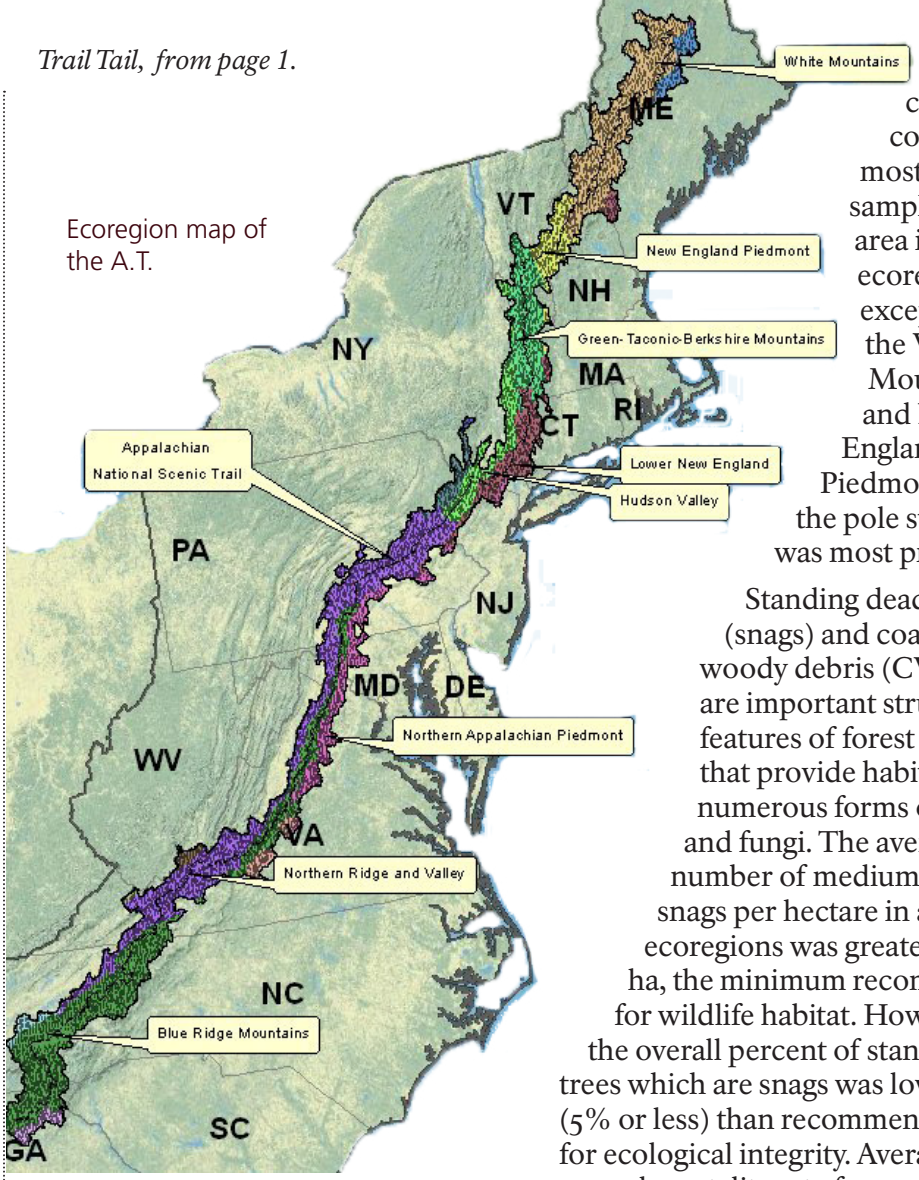
During Earth Week, Ed traveled to Saratoga National Historical Park to present a program about climate change to area residents and park staff. The program focused on historic and current causes and effects of climate change (both human-caused and natural), how NETN is monitoring some of its potential impacts, energy choices that influence climate changing elements, and what people can do in their everyday lives to help reduce personal greenhouse has creating activities. This talk is also available to other parks in the Network.

NETN's phenology monitoring program is still in the pilot stage, and any park within the network is welcome to join in and begin monitoring. Ed can give a presentation about phenology monitoring and how park staff/the public can use Nature's Notebook and the National Phenology Monitoring Network to create and track certain plots and plants in the park.

Lastly, early detection of invasive species is often the most effective way of controlling or eradicating them within park boundaries. Parks can learn about the NETN monitoring program and about the species that are on their "Most Wanted" list, including insects, plants, and trees. *TT*

Learning about invasive species is one of the topics Science Communication Specialist Ed Sharron can offer to parks this spring and summer.

Trail Tail, from page 1.



Ecoregion map of the A.T.

birch - with red spruce and balsam fir at higher elevations. The White Mountains are dominated by red maple-paper birch, and white pine is prominent in the New England Piedmont. Oak-hickory forest types predominate in the other five eco-regions, with chestnut oak / black oak / scarlet oak forest and white oak / red oak / hickory forest types common.

Northern hardwood species dominate in some parts of Lower New England and the Hudson Valley; while yellow poplar / oak forest is a component in both the Northern Appalachian-Piedmont and the Blue Ridge Mountains. Red maple lowlands occur in Lower New England.

Forest basal area averaged 24.8 – 30.4 m^2 / ha within these ecoregions. Mature and late structural stage classes comprised most of the sampled area in all ecoregions except the White Mountains and New England Piedmont, where the pole stage class was most prevalent.

Standing dead trees (snags) and coarse woody debris (CWD) are important structural features of forest stands that provide habitat for numerous forms of wildlife and fungi. The average number of medium-large snags per hectare in all eight ecoregions was greater than 5 / ha, the minimum recommended for wildlife habitat. However, the overall percent of standing trees which are snags was lower (5% or less) than recommended for ecological integrity. Average annual mortality rate for canopy trees was within desired levels for all ecoregions (<= 1.6%).

CWD volume was measured on a small subset of plots, and assessed by comparing CWD volume to live tree volume. Looking at median values, five of eight ecoregions show levels of CWD that warrant "Caution" ratings (based on targets for ecological integrity; median CWD/LTV between 5-15%). The White Mountains ecoregion showed high levels of CWD (25% median CWD/LTV). Average annual mortality rate for canopy trees is within desired levels for all sections (<= 1.6%), although further examination of species-specific morality rate may reveal problems for particular species.

Check in on NETN's website to download and read the entire A.T. forest condition brief. *TT*

NETN Water Quality Reports are Flooding in

Water quality monitoring reports are increasing from a trickle to a downright inundation. Reports from Marsh-Billings-Rockefeller NHP and Roosevelt-Vanderbilt NHS have recently been published, and they will soon be followed by reports from Saint-Gaudens NHS, Weir Farm NHS, Saugus Iron Works NHS, and most other Network parks.

The vital signs for freshwater bodies are water chemistry, nutrient enrichment, water quantity, and the detection of invasive plant species. At least one pond or stream from each park are sampled monthly from May through October, with Acadia having the most sites at 37 lakes and streams. Monthly sampling parameters include in-situ water quality measures (pH, specific conductance, temperature, and dissolved oxygen), transparency (ponds), weather, stream flow (discharge), and stream and pond stage (height). In 2011, cooperators from the University of Vermont or NETN hydrologic technician Brian Schuetz

Measuring pond stage (water level) at Weir Pond in July of 2011. Beth Arsenault photo.

measured physical and water chemistry parameters each month and periodically collected water samples for acid neutralizing capacity (ANC), color, and nutrients. The samples were analyzed at the University of Maine. In 2012, all monitoring activity is being conducted by Mr. Schuetz.

The recently published reports for Roosevelt-Vanderbilt NHS and Marsh-Billings-Rockefeller NHP (available from NETN's Monitoring/Lakes, Ponds, & Streams webpage) revealed that most water quality parameters within the parks were within state standards, and generally within the range of EPA criteria. The majority of values were within the ranges of the historic NETN monitoring data for both parks (although May apparent color levels at the Roosevelt sites and summer total nitrogen levels at Marsh-Billings-Rockefeller were the highest reported to date). ANC measurements showed that streams at both parks were very well-buffered against acidification and are unlikely to be affected by atmospheric acid deposition, however May ANC values at Roosevelt sites were the lowest in the NETN data history. Consideration of the ANC and color result sets suggests

Water, cont. page 6

Herpetological Chronicles at Saint-Gaudens NHS and Saratoga NHP

In mid-April, NETN Science Communication Specialist Ed Sharron and Saint-Gaudens National Historic Site Natural Resource Manager Steve Walasewicz went into the woods with a class from the Stevens High School (Claremont, NH) to search for salamanders under wooden coverboards throughout the park. The school plans on being a regular partner for the salamander monitoring program in the park.

Having been a relatively dry spring, and with virtually no snow pack to help keep the ground moist and to form vernal pools, the forests in many parts of New England were unusually dry this spring. As a result, the hopes of the group to find a lot of salamanders were not very high and,as expected, most coverboards that were lifted by the students only had some ants or other critters scurrying around underneath. But a few of them did reveal eastern red-backed salamanders that were seeking refuge below the protection of the boards. The data from this visit will add to the growing record of salamander monitoring for the park.

A report from a more comprehensive study of amphibians and reptiles in 2001 at Saratoga National Historical Park was published this spring. The study found 21 species, and two additional species (wood turtle and common musk turtle) were added subsequently. The total of 23 species consisted of five salamander, eight anuran (frog and toad), five turtle, and five snake species. They represent 59% of the 39 species present in the Hudson River Valley of Saratoga County, and 72% of Saratoga's 32 species "historic baseline". Based on numbers of adults and sites recorded in 2001, the most abundant and widespread species in each group were spring peeper and northern green frog, red-spotted newt and eastern red-backed salamander, painted turtle and snapping turtle, and common garter snake. Amphibians were numerically dominant: frogs and toads comprised 90.6%, salamanders 8.1%, turtles 0.4%, and snakes 0.9% of the total.

Herps, cont. page 4

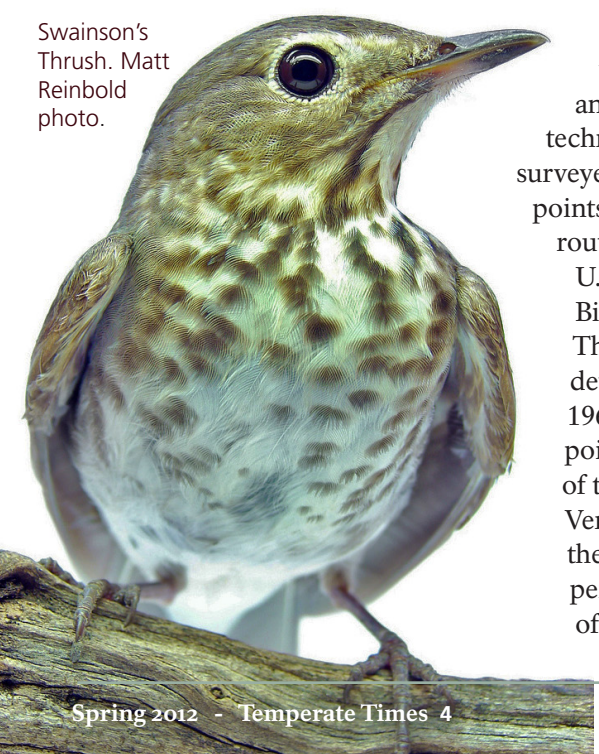
Students from Stevens High School collect and record salamander data in Saint-Gaudens NHS. NPS photo.

Mountain Birds & the Appalachian Trail

The high-elevation forests of the northeastern United States through which much of the Appalachian Trail passes provide important and rare habitat for a unique assemblage of breeding birds, several of which reach their southern range limit in these montane forests of spruce and fir. Most notably, mountain forests provide habitat for Bicknell's Thrush (*Catharus bicknelli*), the region's only endemic (native breeding) songbird. Because of the relative inaccessibility of these high-elevation forests, many montane avian breeders are not included in standardized state or federal bird monitoring programs, making even simple estimates of population trends or size a challenge. Mountain Birdwatch, a project of the Vermont Center for Ecostudies (VCE), was created to fill in some of these information gaps.

Mountain Birdwatch is a citizen science initiative designed to monitor the unique assemblage of montane songbirds in the Northeast. It was originally launched in Vermont in 2000 to establish long-term monitoring for Bicknell's Thrush and other high-elevation forest birds including Swainson's Thrush (*Catharus ustulatus*), Blackpoll Warbler (*Dendroica striata*), White-throated Sparrow (*Zonotrichia albicollis*), and Winter Wren (*Troglodytes troglodytes*). Over the past decade the program has greatly expanded its reach and now trains citizen scientists to conduct surveys in Massachusetts, New York, Vermont, New Hampshire, Maine, Québec, and the Canadian Maritimes.

The Appalachian Trial (A.T.) runs through the heart of much of the Bicknell's Thrush breeding habitat in the United States. Since monitoring routes lie along roads or trails in potential Bicknell's Thrush habitat, many of the project's routes are on or within 1 km of the A.T. In 2010, 22 routes were set that had at least one survey station within 1 km of the trail, and an additional seven routes were added within these boundaries in 2011. These are considered A.T. routes.



Swainson's Thrush. Matt Reinbold photo.

In 2011, volunteers and technicians surveyed 636 points along 118 routes in the U.S., and Bicknell's Thrush was detected at 196 of the points along 70 of the routes. Vermont had the lowest percentage of points with Bicknell's Thrush detections (23%), the Catskills had the highest detection rates of any region (58.1%), suggesting that the New York mountains provide important habitat for this vulnerable species.

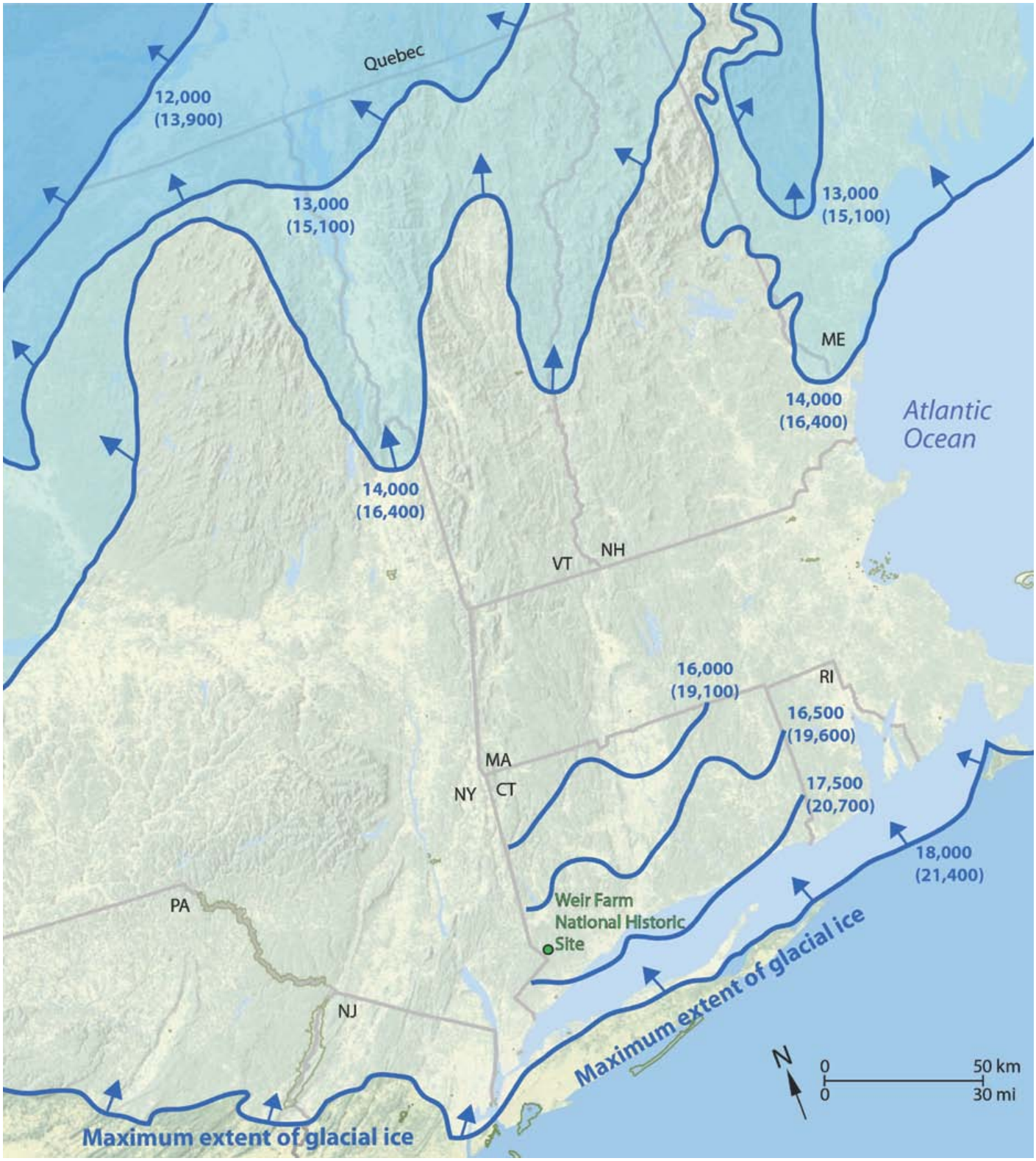
A total of 1,063 points were surveyed internationally. In Québec, 338 points along 58 routes were surveyed in 2011, with the bird detected at only 3% of the points. In the Maritimes, 88 points were surveyed along 15 routes, and Bicknell's Thrush was detected at seven of these points. All of the detections in the Maritimes occurred in New Brunswick, with no birds being detected in Nova Scotia. Overall, a 6% detection rate occurred at international survey stations. TT

Herps, from page 3

Numbers of smooth green snake appear to have declined at Saratoga since 1980. Squamatologist photo.

By habitat, the numbers of adults were greatest in wetlands (8,223), followed by streams/canals (1,381), and uplands (317). Of the 32 species "historic baseline", three species were considered abundant, nine common, seven uncommon, four rare, and nine went unrecorded. Although historic data are limited, 22 species appear stable since the 1980's, one (smooth green snake) has declined, and the trend for nine is unknown. Stressors associated with amphibian and reptile declines are present at Saratoga and include historic deforestation, agriculture, and development. Since the park's establishment, there has been significant forest recovery and the current landscape provides a relatively large patch of quality habitat.

Although most of the 23 species of amphibians and reptiles currently in the park are common in the Northeast, several have experienced regional declines. Saratoga provides important habitat for them and in many instances is part of a larger complex of linked habitat areas that collectively help support local populations and maintain species richness at the town or county level. Individually these sites would not be large enough. The wood turtle and eastern box turtle provide good examples. Both are species of "Special Concern" in New York State and have declined primarily due to development, habitat alteration, fragmentation and road kill. Individuals of both species are wide-ranging and large tracts of relatively natural landscapes are required to support viable populations. Both are very long-lived species with delayed sexual maturity, low reproductive output, and naturally low adult mortality. For a full discussion of the study results, download the report from NETN's Inventories/Herpetofauna web page. TT



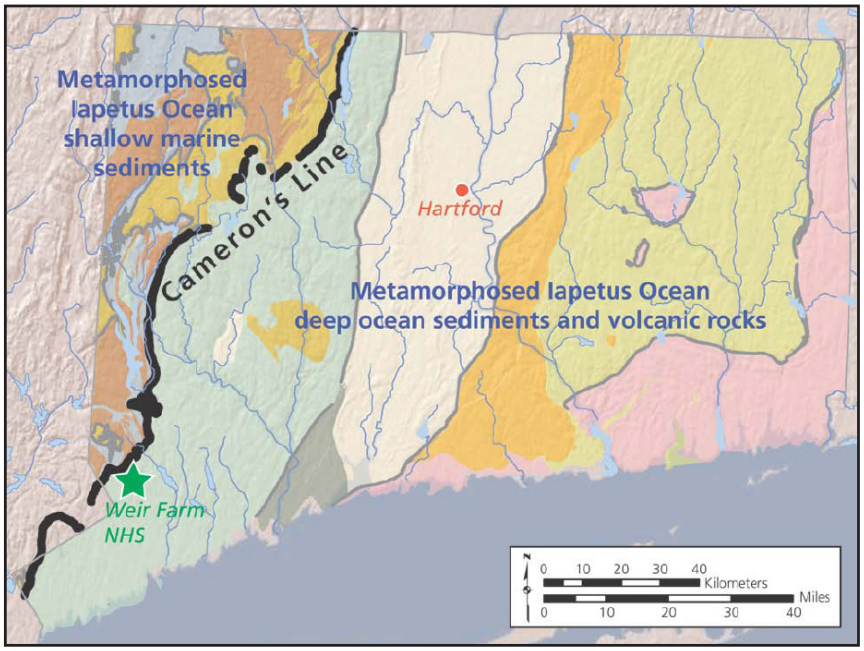
Weir Farm Geology - Explained

Geology is fundamental to the management of the scenic, natural, and cultural resources of national parks, and contributes to climate, natural hazards, hydrology, and topography. The Geologic Resources Inventory (GRI) team helps parks understand their geologic history and resources, and has completed another beautifully rendered report for a NETN park. Weir Farm National Historic Site's report is a companion document to the previously released digital geologic map data and can serve as an aid in its use for resource management, or benefit anyone interested in local geology. The complete, lavishly illustrated report can be downloaded at http://www.nature.nps.gov/geology/inventory/gre_publications.cfm, and by scrolling down to Weir Farm NHS.

The rock record at Weir Farm preserves many chapters of geologic history including episodes of Appalachian Mountain building and ocean basin formation along eastern North America.

Geology, cont. page 6

Geology, from page 5



Terranes, slices of rock bounded by faults, in Connecticut. Different colors represent different terranes that formed elsewhere and share a similar history of deformation and metamorphism. Rocks were originally sediments deposited in the Iapetus Ocean and shoved onto North America during Appalachian Mountain building. Thick gray lines represent significant faults that form the boundary between terranes. Cameron's Line is a major thrust fault that separates rocks that were originally part of deep Iapetus Ocean or volcanic rocks from rocks representing shallower ocean deposits. Compiled by Jason Kenworthy (NPS Geologic Resources Division) from Connecticut Geologic Survey data and ESRI Arc Image Service USA Basemap and World Shaded Relief layers.

Geologic features such as hills, valleys, bedrock outcrops, and glacial erratics figured prominently in Julian Alden Weir's paintings at his Branchville Farm. Painting outdoors (*en plein air*), Weir was inspired by the rolling, forested hills separated by fields, meadows, small lakes and shallow stream valleys that characterize the landscape of southwest Connecticut. The park's geologic history is responsible for this inspiring landscape.

The report discusses geologic issues facing resource managers at the park, distinctive geologic features and processes within the park, and the geologic history leading to the park's present-day landscape. A geologic time scale shows the chronologic arrangement of major geologic events.

Situated in the Connecticut towns of Ridgefield and Wilton, Weir Farm NHS preserves a significant portion of open space in the Southwest Hills Ecoregion. This area is part of the New England Upland section of the New England Province in the larger Appalachian Highlands. The region is characterized by north-south trending bands of rock reflecting a long history of Appalachian mountain building and ice age glaciation. The oldest rocks exposed west of the park are Proterozoic gneisses (metamorphic rocks) of the highlands. The western uplands area of western Connecticut contains Cameron's Line, a large regional thrust fault that separates continental shelf and slope materials from deep ocean basin sediments and is located about 2 miles northwest of Weir Farm. East of Cameron's Line, including the park itself, there are metamorphosed rocks with exotic sounding names like micaceous schist, and hornblende gneiss intricately folded with amphibolite gneiss, and occasional gabbro and serpentinite. These rocks display a higher degree of deformation and metamorphism than the continental shelf and slope deposits located west of Cameron's Line because of the effects of successive Paleozoic mountain-building episodes.

During the Pleistocene ice ages of the past 2 million years, glacial ice scoured and reworked the preexisting landscape of New England. At the last glacial maximum, approximately 19,000 to 26,000 years ago, the Hudson-Champlain ice lobe completely covered Connecticut, obscuring evidence of earlier glacial events and depositing vast amounts of glacial sediments atop much older bedrock units. In the extended Weir Farm National Historic Site area, ice age deposits include well sorted outwash gravels and deltaic deposits, layered lacustrine silts and clays, and at least two distinct, unsorted, clay-rich tills (only till is mapped in the park's immediate vicinity). More recent surficial deposits— alluvium and swamp deposits—are associated with modern processes within the highlands of the Norwalk River watershed. TT

Water, from page 3

that there may have been a substantial precipitation and runoff event preceding the May sample visit, contributing acidity and sediment to the stream water. Fortunately, the naturally high ANC of the park's streams provided sufficient buffering to avoid becoming too acidic.

At Marsh-Billings-Rockefeller, nutrient levels were low (nitrogen) to low-moderate (phosphorus) but could be susceptible to increased loading from runoff. There were no indications that any significant nutrient enrichment took place during the 2011 season. The implementation of more sensitive measures of water clarity and turbidity during this monitoring season will provide additional information on the water clarity and trophic characteristics of the Pogue and Pogue Stream.

Recent years of monitoring are providing critical baseline information on the chemical and physical status of water bodies at both parks. As more data are collected, the ability to detect changes outside the natural range of variability will increase, which in turn will more clearly indicate the status of the vital signs of water quality, nutrient enrichment, water quantity, and the detection of invasive plant species. TT