



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

# Forest Monitoring Branches into Second Cycle

## Results of 2010 Forest Health Survey at Minute Man

### Background

Forests of the northeastern U.S. have a long history of change, resiliency, and recovery. Ice ages, weather events, large scale clearing, and introduction of pests and invasive species have all played significant roles in shaping the forest communities we have around us today. Long-term health of the forests of Northeast Temperate Network (NETN) parks is a high-priority for the network.

Though still in the very early stages of a long-term monitoring program, the 2010 field season marked a milestone for NETN in that it was the first year that forest plots in several parks, including Minute Man, were resurveyed. The goals of the forest monitoring program are to assess status and trends in the composition, structure, and function of forested ecosystems, and to interpret and report the condition of forest systems in a way that effectively informs park managers and other stakeholders.

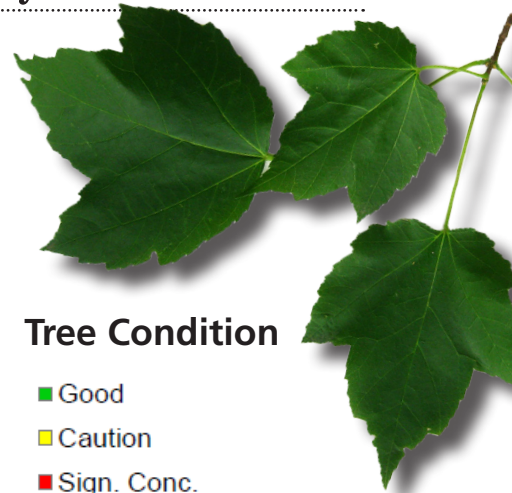
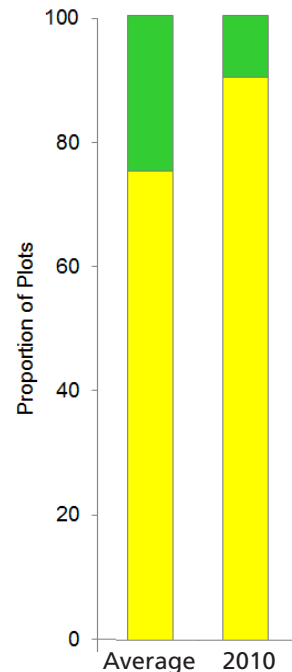
### Purpose and Scope

One way the Network does this is through the use of an Ecological Integrity (EI) Scorecard to interpret the condition of forested ecosystems by assessing an array of ecological measurements and comparing them to their natural or historical range of variation. NETN recognizes that “ecological integrity” may not be the primary goal of park resource management, particularly at historical parks and historic sites where cultural resource management may take precedence. Even at these sites it is valuable to be able to compare the condition of park resources to ecological benchmarks because it provides a deeper understanding of park condition, as well as a consistent baseline for assessment of management goals. The Network is willing to work with parks individually to develop scorecards that track progress towards park management goals that differ from the benchmarks, in addition to reporting ecological integrity.

EI is ranked in one of three categories: Good, Caution and Significant Concern. “Good” represents acceptable or expected conditions; “Caution” indicates a problem may exist; and “Significant Concern” indicates undesired conditions that may need management action.

### Results and Findings

Results for some selected forest health indicators at Minute Man NHP are presented here. For the complete report, visit NETN’s website.



### Tree Condition

- Good
- Caution
- Sign. Conc.

Proportion of plots receiving “Good”, “Caution” and “Significant Concern” ratings for tree condition at Minute Man NHP in 2010. Average bars include 2008 & 2010 data.

Dead wood, in the form of standing dead trees (snags) and fallen coarse woody debris (CWD), is an important element of forests that provides habitat for many plants and animals. Density of snags and volume of CWD in mature and late-successional forest stands vary substantially across ecosystems and with site conditions. Positive relationships between live and dead tree density can be used to indicate expected snag levels, and positive relationships between live tree volume and volume of CWD can be used to indicate expected CWD levels. Minute Man rated “Significant Concern” for both CWD and snag abundance, indicating that dead wood is considerably lacking in this park.

Tree regeneration assesses the quantity and composition of advance tree regeneration in the forest understory, which impacts future canopy structure and composition. Regeneration can be affected by a variety of factors, including invasive species, climate change, and sustained, selective browsing by a historically high population of white-tailed deer in parts of the northeast U.S. The 2010 report indicates that tree regeneration appears to be adequate in the park.

Of all network parks, Minute Man had the greatest proportion of plots receiving a “Caution” rating for tree condition due to moderate foliage problems. The foliage condition that was the most often reported was holes in leaves. Alarming, hemlock woolly adelgid was detected by the forest crew in the park, though not on a monitoring plot. This pest has been suspected within park boundaries for a while, but this may be the first positive identification of the pest. It was found on a hemlock about halfway between North Great Road and Virginia Road on Bedford Lane. Hemlock woolly adelgid is one of several pests



The Asian longhorned beetle was spotted nibbling around the edges of Minute Man in Worcester, MA in 2008.

that are of particular concern in NETN parks, and that have been recently detected or are expanding within the geographic region of our network. Emerald ash borer and Asian longhorned beetle complete the “unholy triumvirate”

of pests that are also expanding into the NETN region. Early detection and rapid response efforts

are vital to minimize impacts of these pests in NETN parks. *NOTE: the published 2007-2010 forest health report contains a graph that erroneously flipped the “2010” and “average” representations in the bar graph. The bar graph as it should appear is included in this brief.*

Invasive exotic species have the potential to impact the structure, composition, and function of forested ecosystems, and are one of the leading threats to biodiversity and ecological integrity of ecosystems worldwide. Early detection of invasive exotic plants is a NETN vital sign that has been incorporated into several long-term monitoring protocols. Status and trends of invasive species are monitored on NETN forest plots, and the Eastern Rivers and Mountains Network (ERMN) and NETN are implementing a separate protocol for early detection of invasive species and forest pests. Averaging 4.30 indicator invasive species per plot, Minute Man received a “Significant Concern” rating for invasive plant species. The most prolific invasive was glossy buckthorn (found in 18 out of 20 total park plots), followed by multiflora rose (14/20), and oriental bittersweet (13/24).

NETN monitors soil chemistry to understand the effects of atmospheric deposition on the health of forest vegetation. Atmospheric deposition is a special concern for forests in the northeast on thin soils where soil buffering capacity is generally low. Atmospheric deposition alters forest soil chemistry by depleting soil nutrients and has dramatically increased inputs of nitrogen in soils of the northeast. Feedback from soil scientists has led NETN to realize that it needs to revise the way it measure and interprets soil chemistry to reflect the complexity of acid deposition and stress in forest soils. For what it’s worth, 2010 measurements showed that all parks but Acadia (“Good”)

ranked “Significant Concern” for the Carbon-to-Nitrogen ratio, indicating that excess nitrogen may be an issue in Minute Man. Data indicated that soil acidification may be an issue in the park.

Forest patches in the park were highly dissected by roads, residential development, and maintained open fields (many of which are historic battlefields). Over 60% of the forest patch area in the park was rated “Caution” (i.e., were part of patches between 10 and < 50 hectares), and another 25% of forest patch area was rated “Significant Concern” (were part of patches between 0.5 and less than 10 ha).

The park rated “Caution” for adjacent anthropogenic land use (ALU). ALU was most abundant and closest to the boundary northeast of the park where the Hanscom Air Force Base is located.

The high abundance and diversity of invasive species in the park are at least partially a result of the high fragmentation and intense development surrounding Minute Man. Land use history and past disturbance are also likely factors in the spread of invasive species. Minimizing further fragmentation of the larger patches is advisable.

## Conclusions

Invasive species, particularly thickets of exotic shrubs, are negatively impacting forest condition in Minute Man. Without management efforts, these exotic shrub thickets are expected to persist and spread into new areas.

An emerging threat to forest health in the park is the Asian longhorned beetle (ALB). With a range of hardwood host species and its ability to reproduce rapidly, the ALB is a huge threat to the northern hardwood forest. An extensive infestation of ALB was discovered in 2008 not far from park boundaries in Worcester, MA. The quarantine area continues to expand as ALB is detected by search teams further from the original infestation. Early detection and rapid response of ALB is important not just for the health of the parks forests, but for the entire northern hardwood forest.

## More Information

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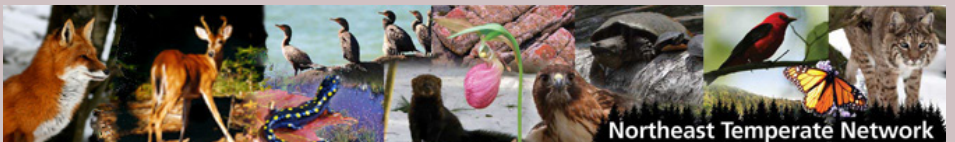
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Full Report online at:  
<http://science.nature.nps.gov/im/units/NETN/index.cfm>



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