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Forest Vegetation in Eastern Parks 2

Vegetation Classification and Mapping 4

Short-Term Volunteers Battle Invasive Plants 6

Early Detection of Invasives 8

Mapping Changes outside the Park 9

Two Insect Threats to Forests 10

Sound science is the foundation for good resource management decisions. The National Park Service invests in science programs to responsibly protect and manage the precious resources entrusted to our care. The power of this research is multiplied when the information is shared. This new semi-annual publication, *Science and Management*, is brought to you from the Northeast Region's Natural Resources and Science Division. Its goal is to share with park staff, scientists, and the public, the innovative resource management work being done throughout the region.

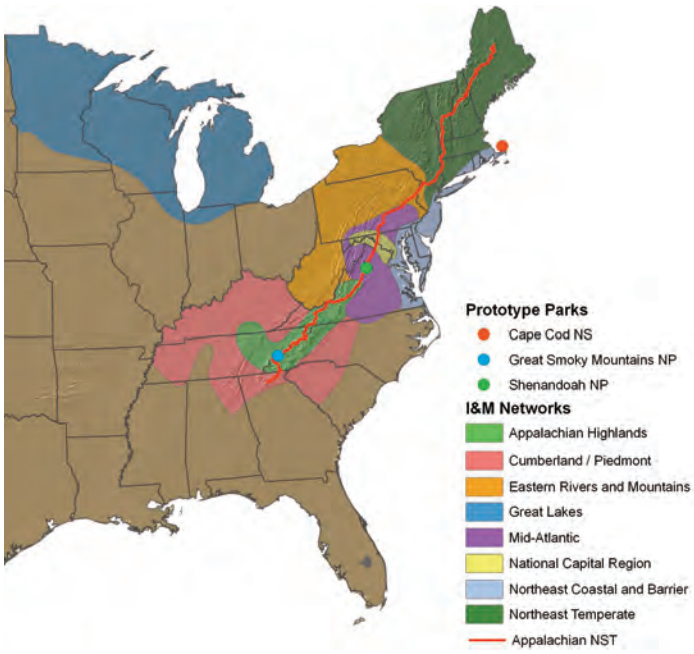
Dennis Reidenbach, Regional Director

Forest Vegetation Monitoring in Eastern Parks

By James A.Comiskey, Coordinator Mid-Atlantic Network

With forests being the dominant ecosystem of many national parks in the Northeast Region (NER), activities that promote forest health are an important focus for park managers. A variety of stressors affect our forests ranging from atmospheric deposition and climate change, to deer browse and invasion by exotic plants, pests, and pathogens. The NER Inventory and Monitoring (I&M) Program has joined forces with networks in the National Capital, Southeast, and Midwest Regions to coordinate an eastern forest monitoring program that will include 65 national park units (23% of the I&M parks across the country). Three prototype parks (Cape Cod National Seashore [CACO], Great Smoky Mountains National Park, and Shenandoah National Park [SHEN]) are participants in this program.

The forest monitoring program's goal is to provide a framework for monitoring long-term change over broad spatial scales of the eastern deciduous and northern hardwood forests. Each I&M network has been developing protocols that meet its specific monitoring objectives, but the networks have worked closely together to ensure a standardized approach is adopted on what is measured and how. By 2010, the regional forest monitoring program will be largely implemented, including eight networks in four national park regions covering 18 states. Sixty-five parks will have comparable data from more than 2,000 plots. Parks as far apart as Voyageurs NP in Minnesota to Great Smoky Mountains NP in Tennessee and North Carolina to Acadia NP in Maine are now monitoring forest vegetation in a comparable way. Information derived from this network is compatible with data collected by the Forest Service's FIA Program and a variety of other state and federal programs that share similar monitoring approaches.



The forest monitoring program is developing standardized approaches for reporting results. The goal is to ensure that data collected by the parks and networks reach resource managers and decision makers in a timely and useable fashion. Currently, two similar approaches are being adopted. The Northeast Temperate Network (NETN) is testing ecological integrity metrics and the National Capital Region Network (NCRN) is developing integrated assessment scores. Both assessment methods measure the composition, structure, and function of an ecosystem compared to the system's natural or historical range of variation. Threshold values for each metric are defined, and ratings assigned (e.g., good or significant concern) based on the deviation from the threshold value. Defining these threshold values for each metric must be supported by sound science to ensure credible reporting. The range of ecological systems and conditions observed across networks means that the threshold values will likely vary throughout the region. Nevertheless, reporting the same metrics provides a measuring stick for assessing impacts by natural or man-made agents of change as well as the effectiveness of management.

A strength of this initiative is our ability to share information across such a wide geographic area, facilitating evaluation of trends in a variety of forest health and condition metrics. Though the program is still being implemented, and for the most part data on the status and trends of forest resources are limited,

some preliminary analyses are possible. As an illustrative example, 808 plots in 40 parks belonging to five networks (Eastern Mountains and Rivers (ERMN), Great Lakes Network (GLKN), Mid-Atlantic Network (MIDN), NCRN, and NETN) and two prototypes (CACO and SHEN) were combined to evaluate the distribution and extent of exotic plant species. We registered 1,557 observations of 136 exotic invasive plant species, representing an average of 1.9 exotic plant species per plot. All parks had plots with exotic plants except Allegheny Portage Railroad NHS, largely due to chance and the low number of plots currently present in the park. The majority of parks had exotic species in over half of their plots. On average, there were 10.9 exotic plant species found per park. Just fewer than half the plots did not have any exotic plant species (47%), while one plot had 18 species. The most common exotic plant species were *Alliaria petiolata* (garlic mustard) found on 159 plots in 20 parks, *Lonicera* spp. (honeysuckle) on 166 plots in 30 parks, *Microstegium vimineum* (Japanese stiltgrass) on 130 plots in 20 parks, and *Rosa multiflora* (multiflora rose) on 105 plots in 22 parks.

Monitoring in the National Capital Region

Long-term data on the condition of forest resources are allowing managers to determine appropriate courses of action. For example, at Valley Forge National Historical Park the vegetation monitoring plots will form an important part of the deer management plan by supplementing existing deer exclosure monitoring. Over the years, the forest monitoring will provide valuable information on plant regeneration that will enable the park to determine the consequences of their management actions. As another example, monitoring may indicate an increasing or decreasing distribution and abundance of invasive exotic plant species. This provides important information on invasive exotic species, but does not measure how effective management efforts are; tactical monitoring aimed at evaluating management effectiveness still needs to be implemented by park staff. However, the vital signs forest vegetation monitoring will augment management-based monitoring that the parks are conducting.

Acadia National Park
Photos and graphic courtesy of the author

For monitoring to be successful, the programs need to be sustainable over the long-term. We are now employing a variety of resource sharing options that reduce costs and increase monitoring efficiencies. One such example is a combined field team that operates in three networks (MIDN, NETN, and NCBN) to implement the forest monitoring plots from Maine to southern Virginia. The combined team further promotes standardized monitoring approaches across the networks and increases opportunities for data sharing. This collaborative effort creates a model that can be used for developing, implementing, and sharing data from other monitoring protocols. Several participating networks are now exploring other protocols that will benefit from collaborative development. ■

Vegetation Classification and Mapping

Accurate and up-to-date vegetation maps are now either completed or underway for a majority of the Inventory and Monitoring (I&M) parks in Northeast Region, and mapping of the Appalachian Trail will begin in 2009. This program has provided a host of new information and products for the parks.

This summer (2008) the seven-park classification and mapping project in Virginia was completed. The beauty of the Virginia project was that the parks' vegetative communities were all classified and mapped at the same time and overseen by the same person, Karen Patterson, of the Virginia Department of Conservation and Recreation. Thus the parks were able to share plot survey information as well as pre-existing data from throughout the Mid-Atlantic Piedmont and Coastal Plain, providing a much larger sample than would have been possible from a single park. Beth Johnson, Coordinator for the Northeast Region's I&M program, oversaw this effort for the seven parks in 2001, lining up the many cooperators and contractors who assembled previous data, obtained the aerial photography, created photomosaics, conducted the field work, generated the statistics, and conducted all the other parts of the project. The resulting classification was a regional one that will be useful beyond park boundaries.

The standard for vegetation classification in the national parks is the United States National Vegetation Classification (USNVC), a subset of the International Vegetation Classification (IVC). This system, maintained by NatureServe, uses a hierarchy of seven levels to identify a vegetation unit. The highest level is the class, which describes the growth form of the vegetation (e.g., Forest), and the finest level is the association, which names the dominant or diagnostic species (e.g., Northern Red Oak/Umbrella Magnolia-Eastern Redbud/Black Cohosh-Heartleaf Foamflower Forest). (For more information on the USNVC, go to http://biology.usgs.gov/npsveg/classification/indexdoc.html)

For purposes of conservation, identifying an association offers a "coarse filter." The vegetation association identified on a map represents the plants as well as all the life forms that live among that vegetation and are part of that community.

part of that community. By protecting that community, managers are protecting a whole suite of biota, perhaps even species as yet unknown to science.

The IVC classification is not a reference tool that is set in stone. Especially at the association level, the classification is dynamic. As more plot survey work is done, sample size increases and the variations among units in a previously defined association become clearer, requiring decisions as to lumping or splitting characteristics to redefine the association and refine the classification.

The parks in the Virginia study were Appomattox Court House National Historical Park, Booker T. Washington National Monument, Colonial National Historical Park, Fredericksburg and Spotsylvania National Military Park, George Washington Birthplace National Monument, Petersburg National Battlefield, and Richmond National Battlefield. (The vegetation classification and mapping reports of these and other parks can be found at http://www.nps.gov/nero/science/FINAL/revised_final_reps/veg_class&map.htm)

These parks are within the Northeast Coastal and Barrier Network and the Mid-Atlantic Network. Cooperators were The Virginia Department of Conservation and Recreation, Division of Natural Heritage; NatureServe; and North Carolina State University's Center for Earth Observation. Data from the Virginia project will be used by parks in the National Capital Region currently completing their vegetation inventories, and the Appalachian Trail, where mapping is to be completed in 2015.

The photo at right and the one behind the article title were taken at New River Gorge NR in areas mapped as Eastern Red Cedar-Virginia Pine Flatrock Woodland. Photos courtesy of Jim Vanderhorst, WVDNR.

A new association was described and mapped at New River Gorge National River. The “Eastern Red-Cedar Virginia Pine Flatrock Woodland” occurs in small patches along the New River. In previous reports, such sites had been split into a woodland type and a sparsely-vegetated type. Reclassifying these patches along the river did not happen casually. Several sophisticated statistical tools were employed to analyze the similarities and differences between various dimensions of similar communities. Ultimately the consensus of a committee of experts determined whether or not a new community should be added to the system. The outcome: an association newly defined at New River Gorge National River has been entered into the USNVC by NatureServe. Since this community (also known as “Appalachian / Northern Piedmont Riverside Outcrop Woodland”) was first described in the USNVC, it has been broadened in scope to apply to similar communities along the Potomac River near Great Falls.

NatureServe rates associations as to rarity, which can be judged globally or locally. A community that is common in one part of the world may be rare in another, or it may be rare globally. Rarity determines conservation priority and is therefore an important measure for managers, but the rating has not been determined with certainty for many associations. For this reason, the Eastern Rivers and Mountains Network has funded NatureServe to determine global and state rarity status for 13 communities found in its nine parks. The network will use this information when determining monitoring priorities. For parks, the rarity rating will guide conservation efforts.

Once the classification and mapping is done, park managers put this information to use. The maps for the Virginia parks have just been produced, but park vegetation maps completed earlier have already been useful, particularly for identifying various monitoring sites. At Cape Cod National Seashore, for example, vegetation polygons (mapping units) will be used for four restoration projects as a baseline for monitoring habitat changes resulting from the reintroduction of salt water into the estuary. The maps are also guiding the development of the park’s fire and mowing treatments. And across the region, among parks that have communities classified alike, natural resource staff can share insights and experience in managing them. ■

Volunteers Enhance the Work
of the Exotic Plant Management Team
at Shenandoah and the Appalachian Trail

By James Akerson, Director of the Mid-Atlantic Exotic Plant Management Team

Summer campers with Friends of the National Zoo help control mile-a-minute vine along the Appalachian Trail.

Statistics: Shenandoah NP and Appalachian Scenic Trail combined

Volunteers per event: 16.6 (range of 1 to 128)

Hours per volunteer: 2.0 (range of 1.0 to 6.5)

Area benefited per event: 1.2 acres (0.03 to 2.1)

Volunteers required to treat an acre: 14 (average)

Student Participation (18 years or younger): 55%

Invasive species controlled: garlic mustard, Oriental lady's thumb, yellow rocket, Japanese stiltgrass, autumn olive, privets, bush honeysuckle, mile-a-minute vine, Oriental bittersweet, and tree of heaven.

Some come from distant metropolitan areas like Washington, DC to an event at Shenandoah NP.

The Mid-Atlantic Exotic Plant Management Team's experience in setting up volunteer programs at Shenandoah National Park and the Appalachian National Scenic Trail demonstrates that volunteer activities are not only a powerful way to accomplish work, but also grow a citizen base of support and advocacy. At volunteer events, park staff and volunteer leaders teach volunteers plant identification, discuss implications of exotic species invasions, and respond to volunteers' questions. Volunteers thus become informed citizens who can speak out on the hazards of invasive plants in our forests and fields.

The Mid-Atlantic Team wrote a successful grant proposal to the National Park Foundation and Tauck Foundation to increase volunteerism at Shenandoah National Park. The grant enabled creation of the Short-term Volunteer Program, purchasing initial field supplies and equipment, and retaining student program planners. The planners helped draft a strategic plan and outreach materials. They also filled a database of potential sponsors and volunteers, focusing on the counties surrounding the park. Subsequent efforts expanded the database in ever-widening circles.

Once Shenandoah was convinced that the short-term volunteer program was effective and sustainable, the park took over the program administration from the Team (2008). That freed the Team to begin establishing a similar program for the Appalachian National Scenic Trail. Many public relations and outreach tools were borrowed from the Shenandoah program, making initial establishment very quick.

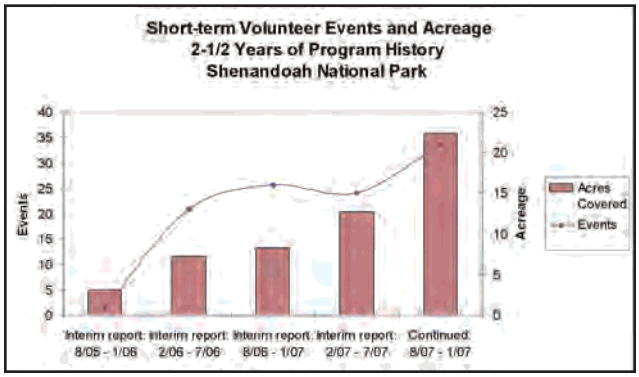
The Appalachian Trail has a proud history of volunteer programs. The vast majority of trail upkeep and inventory is performed by volunteer groups who contribute thousands of hours in maintaining the tread path and keeping vegetation from obscuring the way. Managing the Trail to control invasive exotics is a new aspect that the short-term volunteer program can aid.

The short-term volunteer programs at Shenandoah National Park and the Appalachian National Scenic Trail have contributed thousands of hours of field work by hundreds of volunteers. That labor contributes to real accomplishment on the ground. Invasive plants are controlled. Areas are restored to native and natural conditions. Threatened species and rare habitats are being protected.

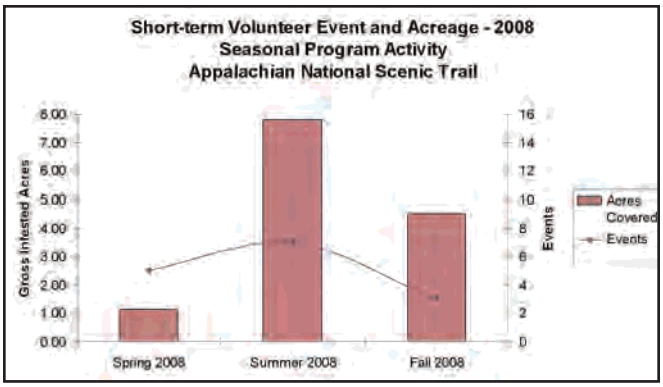
A majority of volunteer events are set up during the year by contacting groups found in the volunteer database and reminding them of opportunities for public service and service-learning. Word-of-mouth is an important source of new volunteers. A growing number of events are initiated by groups and individuals who heard about the program from other volunteers. A positive public image among volunteers is therefore essential to keep the program vibrant and growing. Each event must be run well and be led by staff and volunteer leaders who appreciate the contributions of volunteers. For youngsters, short-term volunteer programs help instill an association of fun with the importance of their service-learning field trips. In an era of decreasing time outside in nature, the short-term volunteer programs offer a way to "leave no child inside."

This group from Eastern Mennonite High School helped treat an acre of Oriental bittersweet at Shenandoah NP.

Recruiting and grooming volunteer leaders is an ongoing challenge. Volunteer leaders most often come from the ranks of senior citizens, though others come from high schools and universities. The benefits these leaders bring in energy and enthusiasm are a tremendous boon to volunteer programs. Their invovement helps to create a sustainable long-term future for operations, as they naturally take on increasing ownership for the overall health of the lands they help manage. They can become the best champions for resource protection and program development because of their first-hand knowledge of the challenges they have experienced.



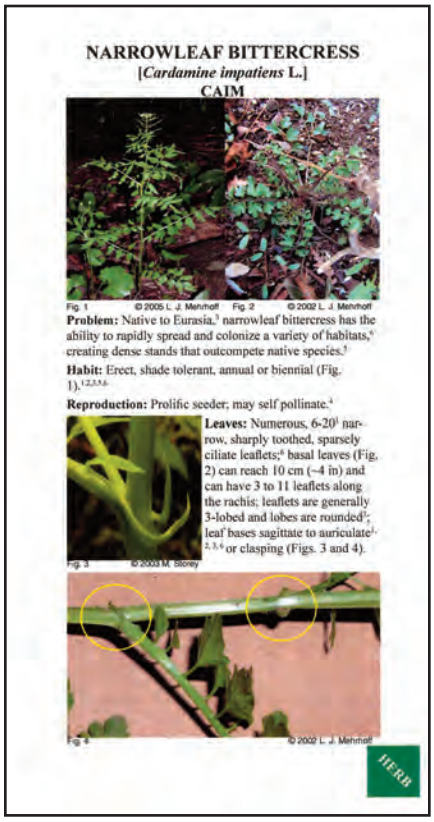
The benefits of working with volunteers go far beyond accomplishing work in the field. Volunteers and volunteer organizations are proving to be an excellent pipeline for reaching the public with information. As volunteers participate in field programs and experience the biological challenges of invasives, they are becoming informed and interested in preservation issues. They are also becoming the single best source for early detection intelligence and rapid response treatments. As a result of their volunteer experiences in the field, many volunteers are turning into articulate public advocates for prevention efforts that can reduce the onslaught of future exotic plant invaders.



Photos and graphics courtesy of the author

In a 2-1/2 year period of fieldwork, Fall 2005 – Spring 2008, **Shenandoah** benefited from the labor of 1,179 volunteers who contributed over 2,500 hours of field work. They treated over 97 gross infested acres once containing highly invasive exotics such as garlic mustard, Oriental lady's thumb, mile-a-minute vine, and Oriental bittersweet vine. The fall season typically has the greatest volunteer turn-out. Spring is most subject to weather cancellations.

Earth Day, April 22, 2008, was the **Appalachian Trail's** first short-term volunteer event. Through the end of 2008 (3/4-year) 377 volunteers contributed 675 hours in the field. Their work benefited 13.5 acres that were once infested with highly invasive exotics such as garlic mustard, mile-a-minute vine, mullein, multiflora rose, and autumn olive. The equivalent value of volunteer efforts to control invasive vegetation along the Appalachian National Scenic Trail equaled $16,644 in the first eight months of operations.



NARROWLEAF BITTERCRESS
[*Cardamine impatiens* L.]
CAIM

Fig. 1 © 2005 L. J. Mehrhoff Fig. 2 © 2002 L. J. Mehrhoff

Problem: Native to Eurasia,[3] narrowleaf bittercress has the ability to rapidly spread and colonize a variety of habitats,[6] creating dense stands that outcompete native species.[3]

Habit: Erect, shade tolerant, annual or biennial (Fig. 1).[1,2,3,5,6]

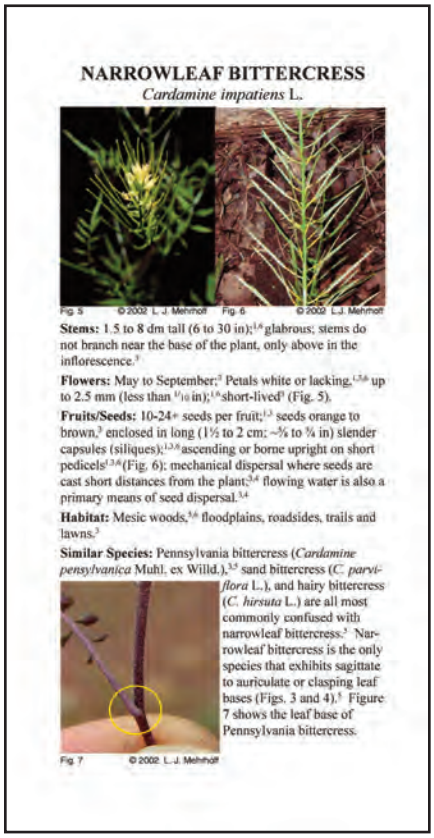
Reproduction: Prolific seeder; may self pollinate.[4]

Leaves: Numerous, 6-20[1] narrow, sharply toothed, sparsely ciliate leaflets;[6] basal leaves (Fig. 2) can reach 10 cm (~4 in) and can have 3 to 11 leaflets along the rachis; leaflets are generally 3-lobed and lobes are rounded[1]; leaf bases sagittate to auriculate[1,2,3,6] or clasping (Figs. 3 and 4).

Fig. 3 © 2003 M. Storey

Fig. 4 © 2002 L. J. Mehrhoff

HERB



NARROWLEAF BITTERCRESS
Cardamine impatiens L.

Fig. 5 © 2002 L. J. Mehrhoff Fig. 6 © 2002 L.J. Mehrhoff

Stems: 1.5 to 8 dm tall (6 to 30 in);[1,6] glabrous; stems do not branch near the base of the plant, only above in the inflorescence.[3]

Flowers: May to September;[3] Petals white or lacking,[1,5,6] up to 2.5 mm (less than 1/10 in);[1,6] short-lived[3] (Fig. 5).

Fruits/Seeds: 10-24+ seeds per fruit;[1,3] seeds orange to brown,[3] enclosed in long (1½ to 2 cm; ~⅝ to ¾ in) slender capsules (siliques);[1,3,6] ascending or borne upright on short pedicels[1,3,6] (Fig. 6); mechanical dispersal where seeds are cast short distances from the plant;[3,4] flowing water is also a primary means of seed dispersal.[3,4]

Habitat: Mesic woods,[3,6] floodplains, roadsides, trails and lawns.[3]

Similar Species: Pennsylvania bittercress (*Cardamine pensylvanica* Muhl. ex Willd.),[3,5] sand bittercress (*C. parviflora* L.), and hairy bittercress (*C. hirsuta* L.) are all most commonly confused with narrowleaf bittercress.[3] Narrowleaf bittercress is the only species that exhibits sagittate to auriculate or clasping leaf bases (Figs. 3 and 4).[5] Figure 7 shows the leaf base of Pennsylvania bittercress.

Fig. 7 © 2002 L. J. Mehrhoff

Two sides of a card to be carried into the field. Another card not shown cites all sources of text and photos.

A Handy Method for

Early Detection of Invasive Species

While writing an Early Detection of Invasive Species protocol, Jennifer Stingelin Keefer, NPS cooperator at Penn State, decided to improve and streamline a common method of enabling field crews to easily identify invasive species before they become established. She is developing sturdy waterproof cards that picture and describe invasive species suspected of potentially invading parks in the NPS Northeast Region's Eastern Rivers and Mountains (ERMN) and Northeast Temperate Networks (NETN). The cards describe, for plants, characteristics such as leaves, flowers, and fruits, and for insects, color pattern and signs of presence. The cards are based on ones developed by the U.S.D.A. Forest Service, but are modified to focus on the identifying features of the species, its habitat, and non-invasive look-alikes, features that will assist field crews and other park personnel to recognize the invader or symptoms of its presence.

Each park has its own lists of target species for early detection, one list for terrestrial and riparian species, and another for riparian and aquatic species. The monitoring crews carry into the field only the cards they need. Jennifer reviews available data from parks, works with each park Natural Resource Manager and other park personnel, and searches several databases (such as the Invasive Plant Atlas of New England [IPANE] and USDA PLANTS database) for distributional information to determine which cards should be used in each park. She also looks at biological characteristics such as how a species reproduces and how easily a species is controlled in established environments.

When crews in the field think they have found a new invader, they take a photo and complete a form (on write-in-the-rain paper) indicating GPS coordinates and other information which they can then submit online via the ERMN website, or deliver directly to a predetermined park contact. When Jennifer and the park contact see the report, they may re-visit the specific field site to verify the species identification. It was in this way that narrowleaf bittercress (*Cardamine impatiens* L.) was first discovered at Delaware Water Gap National Recreation Area in June 2008, and privet (*Ligustrum* sp.) was first discovered at Friendship Hill National Historic Site in July 2008. If an infestation is small (thanks to early detection), it can be quickly eradicated before a park needs to undertake expensive efforts to control it.

This project is still in development. More lists are being created for additional parks in the NETN, cards already in use are being perfected, and new cards will be developed for additional invasive aquatic and terrestrial species. ■

For more information, go to http://science.nature.nps.gov/im/units/ermn/monitoring/EarlyDetection.cfm

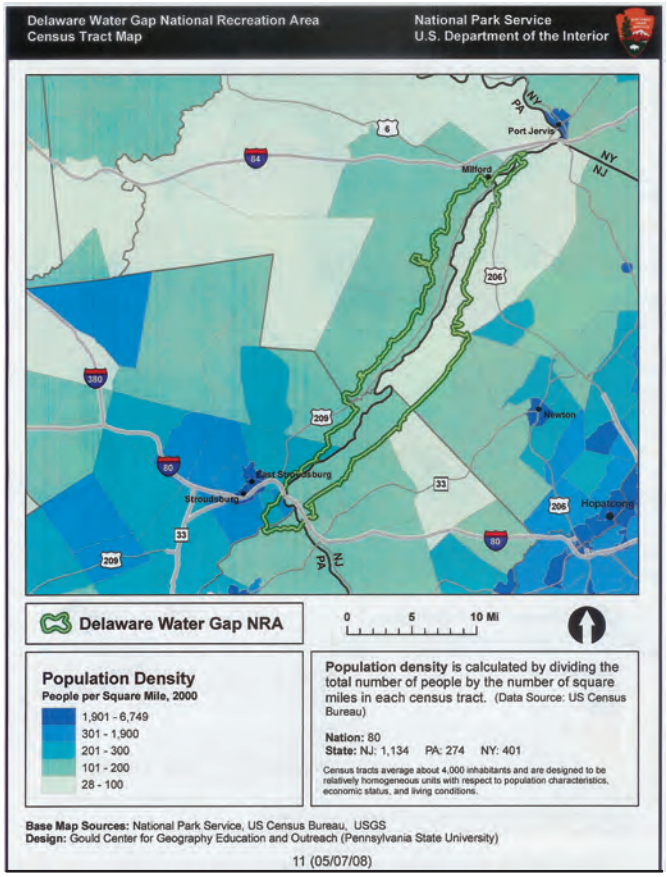
Mapping Socioeconomic Indicators
That Impact the Landscape

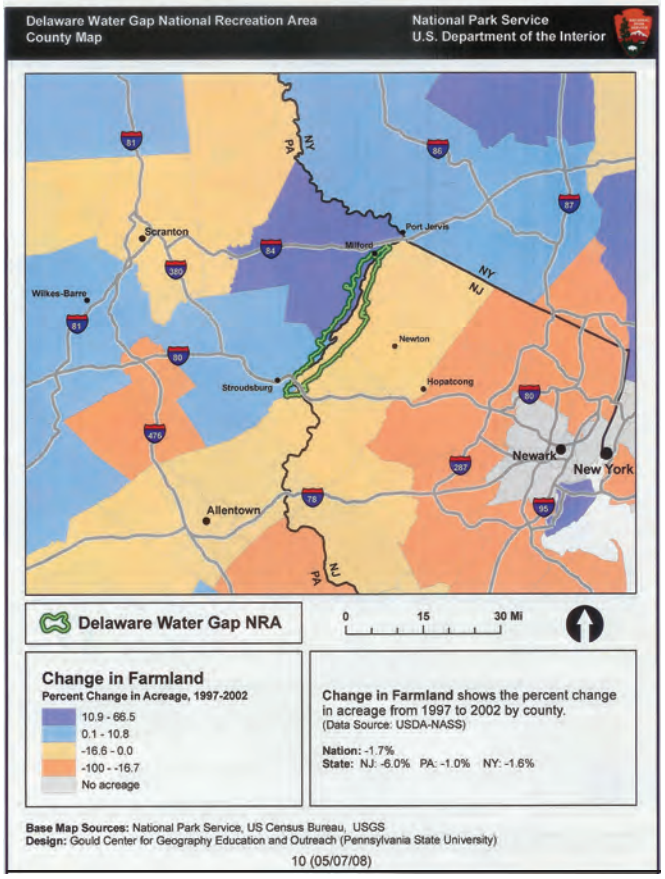
The Eastern Rivers and Mountains Network (ERMN) has developed a mapping procedure to acquire and display a suite of socioeconomic indicators as part of its “Landscape Dynamics“ vital sign. The maps display the local and regional status and pattern of factors such as population density and growth, urbanization, and employment. The protocol satisfies one of the network’s monitoring objectives: “Document local, regional and national trends in population characteristics and human behaviors as represented by a suite of socio-economic indicators.”

The maps allow park managers to see where on the park’s boundaries changes are taking place and are projected to occur. For example, the area to the southwest of Delaware Water Gap is being rapidly developed. This means that streams that originate in that area are at risk of pollution, habitat is being fragmented and lost, and noise and light pollution are being introduced. The maps alert managers to monitor these potential impacts and then they can take action as the situation permits.

The ERMN has selected 17 socioeconomic ”indicators” from a list of 67 used in a similar effort lead by Dr. Jean McKendry, University of Idaho, in 2004. The procedure for mapping these indicators was developed by Erin Greb, Cartographer at Penn State; Nathan Piekielek, former ERMN Data Manager; Matt Marshall, ERMN Coordinator; and Cynthia Brewer, Professor of Geography at Penn State. A set of 17 maps of these socioeconomic indicators constitutes an “atlas” of a park. The maps utilize GIS, census, and other data, most of which can be downloaded from the internet according to instructions in the mapping procedure. Creating a new set of maps of the same indicators at five-year intervals will reveal the changes and trends in these indicators that have the potential to influence park resources.

The standard mapping procedure for producing these maps is available on the network web site (http://science.nature.nps.gov/im/units/ermn/monitoring/LandscapeDynamics/SIM_StandardMappingProcedure.pdf) and is written so clearly and completely that other networks and parks can readily use it. ■





The Emerald Ash Borer and the Asian Longhorned Beetle

Emerald ash borer

Gallery made by emerald ash borer larvae feeding under bark.

Forests in the Northeast Region (NER) are under siege. What will they look like a hundred years from now? We've lost the chestnut tree to its blight, the elms to Dutch elm disease, and today the hemlocks are dying from hemlock wooly adelgid and the oaks are succumbing to gypsy moth. What will be next? Two insect threats that are currently altering the species composition of the forest are the emerald ash borer and the Asian longhorn beetle, says Wayne Millington, Integrated Pest Management Specialist for the Northeast Region. For both of these insects, there is as yet no chemical treatment proven to control them on a large scale.

The emerald ash borer (*Agrilus planipennis*) has spread from Asia to ash forests in Michigan, Ohio, Illinois, Indiana, Missouri, Pennsylvania, Virginia, and Maryland. So far, it has not been detected in any of the NER parks. However, monitoring efforts have detected populations of the ash borer near the boundaries of New River Gorge, Shenandoah, and the parks of western Pennsylvania. It will not be long before this insect will be detected throughout the northeastern U.S. To this point, it has been most destructive in the Midwest where ash occurs in large stands. The infestation spreads rapidly, killing the trees. The traditional management practice for this kind of problem has been to remove the infected trees and create a buffer around them. This is occurring with stands in Michigan and Ohio. In the Northeast, however, ash is found in mixed stands, and removing infested trees here and there in a mixed forest is not feasible without doing much damage to the healthy trees. Current research efforts to develop chemical management options for the ash borer are still on-going, but at this point, results have been mixed. Efforts are also being made to determine what natural control organisms exist for the ash borer in areas where it is native. This work is slow and will take several years to complete. Until then, the NPS, in cooperation with APHIS (Animal and Plant Health Inspection Service) and the U.S. Forest Service, are monitoring ash populations in parks for the ash borer in an attempt to detect early invaders and prevent establishment.

Signs of the emerald ash borer are D-shaped holes only 1/8 inch in diameter. The brilliantly colored flying bugs start their infestation at the top of the tree so it may not be detected for several years. The tree, however, begins to show symptoms of disease as dieback at the top. The canopy appears to be thinning, a condition that can be detected early in the infestation of a stand.

Top: Photo by Howard Russell, Michigan State University; Center: U.S.D.A. Forest Service; Bottom: WDNR photo by Shane Lishawa; Opposite Top: Asian longhorned beetle, PADCNR, Bugwood.org;
Center: www.cals.ncsu.edu/Asian longhorned beetle.jpg; Bottom: Photo by Julie Twardowsky, USDA.

The Asian longhorned beetle (*Anoplophora glabripennis*) is a large wood borer that was introduced into the United States in wooden shipping pallets. Because of the size of this beetle (0.75-1.25 inches long), dispersal of the insect has occurred mostly through the movement of infested wood by humans. The beetle makes a hole the size of a nickel in a tree, in which it lays its egg. The larva then carves tunnels throughout the phloem and cambium layers under the bark, cutting off the movement of nutrients, eventually causing the tree to die. Affected trees have many holes, sawdust sprinkles, and dying leaves. The beetle does not fly far, so it disperses slowly, and unlike the emerald ash borer, may attack anywhere on the tree. It prefers maples but will attack a broad range of hardwood species.

Asian longhorned beetle

This particular non-native longhorned beetle was first thought to be a pest only around ports (New York City, New Jersey, Chicago), but a very large infestation was recently detected in several thousand trees in and around Worcester, Massachusetts. This infestation is at least ten years old and the Forest Service expects that it will eventually infect 10,000 to 15,000 trees, becoming probably the largest infestation outside of China, according to a communication from Sheila Colwell, NER Senior Natural Resource Program Manager. The Forest Service is surveying the infestation painstakingly by climbing the trees to inspect for damage. Scientists still believe that this insect can be eradicated from North America and recommend managing it by removing and disposing of all infested wood. This method is not popular with homeowners but is the best available control option at the current time.

Beetle on stump showing tunnels

When an infestation of either of these pests is suspected, the authorities (APHIS, U.S.D.A Forest Service, and state forest agencies) should be notified. Removing infected trees when the infestation is small can prevent its spread. In the next few years, it will be extremely important that we do a better job of detecting new forest pests as early as possible to prevent infestations from occurring elsewhere. ■

Branch infested by Asian longhorned beetle

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U.S. Department of the Interior

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This is the first edition of
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Please let us know of projects and practices at your park or network that might be useful to colleagues elsewhere. Contact the editor at bmb4@psu.edu.