Forest Matters

The stewardship newsletter

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Bringing Forest Certification to Private Forest Landowners

by Roger Monthey

Forest certification for nonindustrial private forest (NIPF) landowners is an issue receiving much attention across the country. Many States are addressing this issue in innovative ways.[1] Forest certification usually involves (1) a landowner or land manager who requests that their land be "certified," (2) an established certification system, and (3) an independent auditor who is hired to compare the actual forest management with the system's requirements through documentation and on-the-ground inspection. Certification offers a variety of benefits to NIPF landowners: it provides independent assurance to landowners that their land, including both timber and nontimber values, is being managed sustainably; it often reveals ways to improve forest management overall regardless of the outcome of the audit; and it may result in preference for their forest products and offers the future potential for a price premium.

> ***"Certification has been a significant force for improving forest management in Maine."***
>
> ***—Governor John Baldacci***

Maine serves as an example of a State that recognizes the advantages of certification and is taking bold steps to increase certified forest land within its borders. Governor John Baldacci launched an initiative in July 2003 to increase forest certification as a way to help expand the State's forest industry by distinguishing Maine products in the marketplace, and to improve forest management and long-term forest resource sustainability. The State established a specific target for certified forest lands—10 million acres by 2007. Certified wood volume, which also includes wood harvested by certified logging companies, is being tracked as an arguably more meaningful measure of the impact of certification.

The State of Maine encourages certification by all credible standards accepted by the market, including the Forest Stewardship Council (FSC), Sustainable Forestry Initiative (SFI), and American Tree Farm (ATFS) systems.[2] Each standard is different, so forest landowners can select the system best suited to their individual needs. Third-party audits verify conformance with these nationally or internationally recognized certification standards.

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Woodland owner groups offer an excellent way to expedite certification for NIPF landowners and help attain statewide goals for certified acres. In Maine, for example, the Small Woodland Owners Association of Maine (SWOAM) was selected to administer a pilot group certification program in 2003.[3] In early 2004, a private, third-party auditing firm conducted an audit of the participating landowners and recommended SWOAM's certification to the American Tree Farm System.[4] The ATFS standards call for participating forest landowners to (1) comply with the ATFS standards as verified by trained inspectors, (2) comply with all relevant Federal, State, and local regulations, (3) develop and implement a long-term forest management plan, (4) provide timely restocking of desirable species of trees, (5) maintain or enhance the environment, including air, water, soil, and site quality, (6) contribute to the conservation of biodiversity and maintain or enhance animal and plant habitats, (7) minimize negative visual impacts of forest activities, (8) manage special sites in a way that recognizes their unique characteristics, and (9) conduct harvests in accordance with the management plan and with sensitivity to other forest values.[5] Successful completion of the review enabled SWOAM to group participating forest landowners under a single certificate.

SWOAM, representing more than 2,750 members, continues to offer certification to NIPF landowners on a voluntary basis at a nominal cost. As of July 2005, SWOAM had certified 66 family forests representing 30,917 acres, the largest group of "green" certified small woodlands in Maine.[6] Additional landowners are awaiting certification, and SWOAM expects that the program will become even more popular as landowners become familiar with the certification process.

While SWOAM is hoping that landowners will eventually receive a price premium for wood from certified lands, the primary benefit from certification at this time is to help forest landowners retain their foothold in the market. For example, large-volume buyers of forest products, such as magazine publishers, are increasingly looking for products from certified sources, which in turn means that Maine pulpmills will be looking to increase their sources of certified wood. An additional benefit of certification: many small woodland owners value the personal pride and assurance that comes from knowing their lands are being managed sustainably for the long term.

SWOAM forester Paul Miller finalizes a landowner's acceptance into the group certification program.

A common issue among landowners interested in enrolling in SWOAM's program is the need to modify their management plans to meet the standards; however, most existing plans can be easily amended to meet the standards at minimal cost. SWOAM helps those landowners without plans find a professional forester to prepare a plan and discuss what cost-share assistance and/or tax credits may be available. Plans cost-shared by the State under the WoodsWISE program are designed to meet certification standards.

A basic building block of the program has been to make it affordable to small landowners. Costs of operating SWOAM's certification program include reviewing plans, field assessments, record keeping, working with interested landowners, and ensuring group members continue to meet the program standards. To date, many of these costs have been underwritten by corporate sponsors, the American Tree Farm System, and the Maine Forest Service. Participant fees, which only partially cover operating costs, were initially $50 per year (including SWOAM membership dues), but SWOAM has since established a sliding scale based on property size. SWOAM aims to have its certification program self funding by 2009.

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Forest Matters: the stewardship newsletter is published semiannually by the USDA Forest Service Northeastern Area Forest Stewardship Program. Its goal is to bring the stewardship message to natural resource professionals, consultant foresters, and private forest landowners in the Northeast and Midwest. If you have any questions, or would like to be added to the hard copy or electronic mailing list, please contact Helen Thompson, USDA Forest Service, P.O. Box 640, Durham, NH 03824, phone: 603-868-7701, fax: 603-868-7604, e-mail: hthompson@fs.fed.us.

Stewardship News

Ask a Forester: *How can I find a good forester or logger and what should I expect?*

by Peter Smallidge, Cornell Cooperative Extension

Finding a forester and logger are important events that help a forest landowner accomplish more on their land than they might be able to do alone. A good forester and logger have the technical ability to do the job that needs to be done. You as a landowner will need to work with your forester and logger to define what those jobs involve.

Foresters have been educated to understand how the different parts of a forest (the trees, wildlife, soils, water, etc.) interact. They also know how to manipulate the forest, especially the vegetation, to make the forest meet your needs. A forester should be familiar with local laws, know where markets exist for different forest products, and be able to work with you to negotiate a contract for services such as timber harvesting, road construction, or boundary line surveys. A forester may also be knowledgeable about tax implications from timber revenue and how to satisfy any local harvesting ordinances.

A logger will be able to work with you and your forester to harvest the trees marked by the forester and skid those logs to a landing. Loggers should have experience in directional felling, or dropping a tree to avoid damage to other trees. Some States have courses and training programs to help foresters and loggers learn the latest techniques.

Most States employ service or county foresters within their forestry department or cooperative extension service. These professionals are a good initial point of contact for landowners and can provide unbiased advice, a list of private sector foresters, and a variety of other types of assistance.

When selecting a forester, proceed as though you were hiring an employee, although the legal relationship will typically be contractual. Consult a number of sources, such as lists from service foresters and professional forester associations, and recommendations from local forest landowner associations, to compile a list of potential candidates. Then contact several foresters on the list to obtain résumés, names of recent clients, educational backgrounds, job-specific training, and pricing information. Finally, interview several foresters and select one who meets your needs.

Once you have selected a forester, he or she can help you decide whether a harvest is appropriate. Your forester will be familiar with local loggers and can help you select one who has a good reputation for quality work, has equipment that is compatible with the topography and soils on your property, and is available to work within the timeframe you set. Depending on the specifics of your harvest, a sawmill or pulpmill may buy the trees and then provide a logger to conduct the harvest. You and your forester can work with the mill to ensure the harvest meets your expectations. Your State forestry agency, State extension specialist, or forester will have a sample contract that you can review with your attorney to cover the details of the harvest.

Visit the Web sites below for articles and other links on hiring and working with foresters and loggers. Look for information in your State on the following:

- State forestry agency and extension specialists
- State service or county foresters
- Forest landowner associations
- Lists of foresters and loggers
- Sample contracts for foresters and loggers

- National Association of State Foresters (for State agency links): www.stateforesters.org/SFlinks.html
- Society of American Foresters: www.safnet.org/
- Association of Consulting Foresters: www.acf-foresters.org/
- Forest Landowners Guide to Internet Resources: na.fs.fed.us/pubs/misc/flg/

Articles on working with foresters:

- forestry.msu.edu/extension/extdocs/consultfor/FMD6-1.pdf
- forest.wisc.edu/extension/publications/75.pdf
- www.dnr.cornell.edu/ext/Stewardship/articles_and_publications_on_stewardship/Stewardshipmanual/10Working%20%With%20Foresters.pdf

Articles on working with loggers:

- ceinfo.unh.edu/Forestry/proflog.htm
- www.dnr.cornell.edu/ext/Stewardship/articles_and_publications_on_stewardship/Stewardshipmanual/11Working%20%With%20Loggers.pdf
- www.maine.gov/doc/mfs/woodswise/logger.html
- www.ecfla.org/articles/logger.htm

Sample harvesting contracts:

- www.safnet.org/archive/contract701.cfm
- www.dnr.cornell.edu/ext/forestrypage/tax/contract.pdf
- ohioline.osu.edu/for-fact/0038.html
- www.dsisd.k12.mi.us/mff/Products/Contracts.htm
- www.dnr.state.wi.us/org/land/forestry/certification/pdf/Sample_Timber_Sale_Contract_Dec_11_2002.pdf
- www.extension.iastate.edu/Publications/PM413AB.pdf

Keeping Forests in the Family

Thom McEvoy of the University of Vermont has embarked on a project to tell the stories of families who have developed long-range plans to pass forest lands intact from generation to generation. His goal is to assemble and publish a set of case studies from around the country that will help woodland-owning families initiate difficult discussions about long-term forest planning.

"An essential prerequisite to good planning is candid discussions between spouses—and between parents and children—about the importance of keeping forest lands intact," observes McEvoy. The case studies will attempt to feature a wide variety of successful methods—from limited liability companies and family partnerships to corporations and trusts. "Hopefully the book will tell the stories of families who have done this type of planning in such a way that the prospects of initiating such discussions will not appear as daunting," says McEvoy. Over the past year, he has obtained more than 40 hours of interviews with owners of forests representing every major timber type in the United States.

Historically, only a relative few woodland owners have developed estate plans that provide for long-term woodland management after the current owners pass away. In the absence of adequate planning, the fate of forests is often in question as family members divide assets and pay transfer costs, including estate taxes. Families may be faced with exorbitant transfer costs when parents pass away without having given consideration to estate planning matters. This situation can prompt executors to liquidate forest holdings, often to the highest bidder, who may not have long-term, sustainable forest benefits in mind.

Unplanned land transfers can lead to parcelization of holdings and fragmentation of purpose, leaving forest ecosystems more apt to become housing developments rather than remain productive woodlands and vital habitats. Loss of habitat is the most significant factor for threatened and endangered species in the United States, and fragmentation can lead to the demise of local forest product industries.

So far, Professor McEvoy has interviewed 16 woodland owners from 13 States; he is still looking for an additional 5 to 10 case studies, primarily in the East. Forest owners who have developed intergenerational strategies to pass forest lands intact and are willing to share their story with others can contact him at 802-656-2913 or tmcevoy@uvm.edu.

The case studies will be published in a book entitled *Planning the Future Forest,* expected in print by fall 2007. For additional information, look to McEvoy's previous work, *Owning and Managing Forests—A Guide to Legal, Financial, and Practical Matters* (2005 Island Press).

Hot off the Press!

Diameter-Limit Cutting and Silviculture in Northeastern Forests: A Primer for Landowners, Practitioners, and Policymakers—Though research on diameter-limit cutting is limited, more and more experiments are being conducted and their results published. The authors have compiled existing data into a guidebook for on-the-ground application. Research consistently concludes that although diameter-limit cutting produces higher timber income in early harvests, it degrades the overall quality of a stand, resulting in sharply declining income in later harvests. Silvicultural methods, on the other hand, provide more consistent, sustained income while enhancing a stand's health, vigor, and regeneration. Contact Helen Thompson at (603) 868-7701 or hthompson@fs.fed.us for copies. (Kenefic, Laura S.; Nyland, Ralph D. 2005. NA–TP–02–05. Newtown Square, PA: U.S. Department of Agriculture, Forest Service, Northeastern Area State and Private Forestry. 18 p. [http://www.na.fs.fed.us/].)

Stewardship Handbook for Family Forest Ownerships—This handbook, distributed by the National Association of State Foresters (NASF), contains tools and guidelines to implement landowner objectives in the pursuit of forest stewardship. Seven stewardship principles are discussed so that landowners can consider how their own goals would fit into the NASF Principles and Guides for a Well-Managed Forest. The handbook also contains guides for landowners to organize their stewardship plans, contacts, regulations, and other important items in one package. Contact your State forestry agency for copies or visit http://www.stateforesters.org/pubs/p&ghandbook.pdf.

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Keep the Home Fires Burning

As temperatures drop and experts predict record energy costs this winter, many homeowners may turn to wood as an alternate fuel source. Whether you've burned wood for years or are a relative novice, there are a wealth of resources on choosing wood- burning units, selecting firewood, and comparing costs to ensure the best use of resources. The following references are a great starting point for help in making wise decisions about the use of this renewable energy source.

General characteristics of common firewood species (source: Johnson 1997)

Species	Relative amount of heat	Ease of burning	Ease of splitting	Production of heavy smoke	Production of sparks	General rating
ash, beech, birch, hard maple, hickory, red oak, white oak	high	high	high	low	low	excellent
black cherry, soft maple	medium	high	high	low	low	good
elm, sweetgum	medium	medium	low	medium	low	fair
basswood, yellow-poplar	low	high	high	medium	low	fair
white pine	medium	high	high	medium	high	fair
spruce	low	high	high	medium	high	poor

Huhnke, Raymond, L.; Craighead, Max R. Heating the home with wood. F–9441. Stillwater, OK: Oklahoma Cooperative Extension Service. 4 p. [http://pods.dasnr.okstate.edu/docushare/dsweb/Get/Document-2503/F–9441web.pdf].

Johnson, James E. 1997. Firewood for home heating. Publication 420–003. Blacksburg, VA: Virginia Cooperative Extension, Forestry. 6 p. [http://www.ext.vt.edu/pubs/forestry/420-003/420-003.html].

Shelton, James W.; Shapiro, Andrew W. 1976. The woodburners encyclopedia. Waitsfield, VT: Vermont Crossroads Press. 155 p. [Out of print, but available at libraries and on-line].

Hot off the Press! *Continued from page 4*

Development of a Repeatable Regional Protocol for Performance-Based Monitoring of Forestry Best Management Practices—States take various approaches to monitoring the implementation and effectiveness of best management practices (BMPs) for forest operations, resulting in inconsistencies in data collection and how information is reported. To improve data reporting by States to the Environmental Protection Agency, a BMP monitoring protocol was developed that focuses on the principles that guide the design and applicability of BMPs. This publication discusses the development process and the pilot testing of a consistent, repeatable BMP monitoring protocol for timber harvest activities adjacent to water bodies. Contact (740) 368-0152 or ne_pubs@fs.fed.us for copies. (Ryder, Roger; Edwards, Pamela J. 2005. Gen. Tech. Rep. NE–335. Newtown Square, PA: U.S. Department of Agriculture, Forest Service, Northeastern Research Station. 15 p. [http://treesearch.fs.fed.us/pubs/20797].)

Urban Watershed Forestry Manual—The first two manuals of this three-part series on using trees to protect and restore urban watersheds are now available on-line. ***Part 1: Methods for Increasing Forest Cover in a Watershed*** introduces the emerging topic of urban watershed forestry and presents new methods for systematically measuring watershed forest cover and techniques for maintaining or increasing this cover. ***Part 2: Conserving and Planting Trees at Development Sites*** presents specific ways to incorporate more trees into a development site, focusing on protecting existing trees, planting trees in stormwater treatment practices, and planting trees in other pervious areas. Contact the Center for Watershed Protection at (410) 461-8323 or http://www.cwp.org for more information. (Cappiella, Karen; Schueler, Tom; Wright, Tiffany. 2005. Newtown Square, PA: U.S. Department of Agriculture, Forest Service, Northeastern Area State and Private Forestry.)

Landowner Spotlight

New Markets Can Result in Good Silviculture

(Adapted from an article by Arlyn Perkey in *Forest Management Update*, Issue No. 18 (August 1997), Northeastern Area State and Private Forestry)

How many times have you heard foresters say, "If we only had markets for small, low-value products we could really practice some good silviculture and improve these woods." Then the long-awaited day finally arrives and the markets for low-value products are available. Sometimes when the dream comes true, the result is not what you would expect—that forest landowners would want to remove poor-quality trees with little potential for increase in value and release desirable timber crop trees that have the characteristics to produce some financial benefit. Instead, often the result is to lower the diameter limit of trees to be removed and keep on cutting regardless of the future potential value of trees. There are many reasons why this happens, and the practice is certainly within the rights of the landowner. However, it frequently is not in the landowner's best long-term interest, and it doesn't always have to be that way.

Mark Bozic views his recently released yellow-poplar crop trees. He received income from the harvest of the competitor trees and looks forward to harvesting the crop trees in about 20 years.

In north-central West Virginia, Mark Bozic, a Weyerhaeuser procurement forester, and Eugene Cogar, a contract logger, share a sincere interest in the future condition of our forest resources. They recognize that their future and that of the next generation depend on how they do their jobs today.

Mark read *Crop Tree Management in Eastern Hardwoods*[1] and visited the Crop Tree Demonstration Areas at West Virginia University Forest and Coopers Rock State Forest. After touring these areas, he decided to try a commercial harvest similar to the heavy crop tree release treatment at Coopers Rock. Mark had the perfect place to try his hand at managing to produce timber income—his own woodlot. The key would be finding the right logger to do the harvesting with the care required to avoid damaging the residual crop trees.

Eugene Cogar fit the bill. He had recently acquired a Timbco feller buncher and needed a place to see what it could do. Mark's challenging harvest offered the opportunity to show this equipment could fell and bunch on West Virginia's steep terrain with minimal damage to residual trees. Mark designated the crop trees with a band of marking paint so Eugene could see them from any direction. All unmarked trees were harvested, leaving only marked crop trees. The high visibility of the painted crop trees permitted Eugene to plan his travel route for the feller buncher so he could avoid damage to residual trees and place the bunches of cut trees so they could be efficiently removed by a skidder with a grapple.

Mark's stand consisted of 47-year-old yellow-poplar and red maple that had seeded in on an abandoned agricultural field. He marked 32 trees per acre to leave as crop trees, finding it difficult to identify the 50 trees per acre he wanted. Many trees did not have the crown and bole characteristics needed to make good quality timber crop trees, not unusual for a stand of that age on abandoned agricultural land in the area.

Fortunately, Mark's trees were tall enough that the harvest volume of wood per acre made it feasible for Eugene to bring in his equipment and do the treatment. Of the 50 tons of wood per acre removed, some was used as sawlogs, some as peelers (to make laminated beams), and some as pulpwood (to make oriented strand board). Not only did the treatment release Mark's high-quality timber crop trees, it covered the costs of the commercial operation and provided some current income.

Even more important than what was removed, however, is what is left. Mark has a residual stand of 32 crop trees per acre that average 13.3 inches d.b.h. If they grow at a rate of 3.5 inches in diameter per decade, in 20 years he will have 20-inch diameter high-quality trees that will be a valuable income source for him and his family. Mark will have more than 50 tons per acre to remove at that time, and it will be worth much more than the 50 tons per acre he removed in this harvest.

Mark and Eugene are two people with a passion for managing forest resources to benefit this generation while providing the opportunity for the next generation to also prosper. They set the example for how it can be done. Hopefully their conservation prototype for harvesting in immature stands will be adopted by many like-minded landowners.

[1]Perkey, Arlyn W.; Wilkins, Brenda L.; Smith, H. Clay. 1994. Crop tree management in eastern hardwoods. NA–TP–19–93. Morgantown, WV: U.S. Department of Agriculture, Forest Service, Northeastern Area State and Private Forestry. 58 p. + app. [http://www.fs.fed.us/na/morgantown/frm/perkey/ctm/ctm_index.html].

The Timbco feller buncher gives new meaning to the term directional felling. It grasps the tree, cuts it off, and places it in a bunch for skidding.

Bringing Forest Certification to Private Forest Landowners *Continued from page 2*

While SWOAM chose to use the American Tree Farm System's group certification program, there are other options available to private landowners. For example, the FSC-accredited certification bodies Smartwood (http://www.rainforest-alliance.org/programs/forestry/smartwood/certification/forest-management.html) and Scientific Certification Systems (http://www.scs1.com) have group certification models. In addition, NIPF landowners can hire consulting foresters or firms whose management programs have been independently certified by an FSC-accredited body (http://www.fscus.org). These certified consultants or firms operate a Certified Group as a Certified Resource Manager, and can offer landowners the option of becoming a member of a certified group. Another option is a logger certification program such as Maine's Master Logger Certification Program (http://masterloggercertification.com/). Visit the Web sites provided for more information on these programs. For further information on the SWOAM certification program, call 207-626-0005 or e-mail info@swoam.com. We welcome input on certification efforts in your State; please contact Helen Thompson at 603-868-7701 or hthompson@fs.fed.us.

[1]Wilent, Steve. 2005. Wisconsin completes group certification. The Forestry Source. 10(9). http://www.safnet.org/archive/Wisconsin.pdf. (14 December 2005).

[2]Maine Department of Conservation. [n.d.]. The Maine forest certification initiative: forest products for the 21st century. [Augusta, ME]: Maine Forest Service. 2 p.

[3]Small Woodland Owners Association of Maine. 2003. SWOAM adds a new position. SWOAM News. 28(6): 1,4.

[4]Small Woodland Owners Association of Maine. 2004. SWOAM passes certification audit. SWOAM News. 29(2): 1.

[5]American Tree Farm System. 2004. Standards for forest sustainability for forest certification. http://65.109.144.60/cms/test/26_34.html. (1 December 2005).

[6]Small Woodland Owners Association of Maine. 2005. How SWOAM certifies woodland. SWOAM News. 30(7): 1, 4.

Research

The Invasion of the Earthworms

by Michael Majeski

Have you walked in a hardwood forest and noticed that the forest floor is firm underfoot, bare ground and fine roots are visible, and very few understory plants are present? Ecologists with the University of Minnesota Department of Forest Resources have recently begun comparing forests with these characteristics to those with thick forest floors and abundant ground vegetation. What they found is that the culprits—European earthworms—are changing forest ecosystems.

Background

Glaciers eliminated native earthworms from most of Canada and the northern portion of the continental United States.[1] Earthworm-free ecosystems developed when the glaciers receded, among them the North American deciduous forests.

Earthworms spread about 5 meters a year. At that pace, native earthworms would have covered only 40 miles in 14,000 years. That leaves little doubt that the earthworms found in northern forests today are European imports, most arriving in the soil of potted plants. Others are introduced as fishing bait and on vehicle tires. Because of their mode of introduction, they are often found near roads, trails, lakes, streams, cabins, boat landings, and campsites.[1]

There are four general European earthworm ecological groups: epigeic, epi-endogeic, endogeic, and anecic. The rate and magnitude of ecosystem change depend on which earthworm species invade a site. Impacts are greatest when species from each group are present.[2]

Large populations of earthworms are more likely to be found in loamy soils with moderately high soil moisture, and high quantity and quality litter inputs.

Impact

After glaciation, the North American deciduous forest ecosystems dominated by broad-leaved trees such as maple (*Acer*), oak (*Quercus*), birch (*Betula*), and poplar (*Populus*) developed without earthworms and adapted to the slow bacteria and fungi decomposition of tons of leaf litter. The slow decomposition releases ample nutrients for plant growth. The combination of high productivity and slow decomposition results in the development of a thick forest floor, which is the centerpiece of the hardwood forest ecosystem. It is where most of the nutrient cycling takes place and where all the plants germinate and grow.[1]

The introduction of earthworms causes profound effects that cascade throughout the ecosystem, altering its soil, forest floor, understory plants, and, possibly, tree productivity and succession.

Soil and Forest Floor—The first effect a large, multispecies earthworm invasion has on a forest is to remove its forest floor (O horizon). In 3 to 5 years, earthworms can consume the entire litter layer and the organisms that live within it.[1]

The soil (A horizon) is very thin (1 cm) before earthworms invade. Afterwards, it can become up to 25 cm thick. Its bulk density also increases because the organic matter and native soil-dwelling invertebrates are reduced, and soil particles are cemented together during earthworm burrowing and casting activities.[2] The removal of the forest floor and the increase in soil density slows the movement of precipitation into the soil, resulting in runoff and erosion. Loss of the forest floor also reduces shelter, exposing seeds and seedlings to freezing, desiccation, and predation.

Understory—The shrubs and herbaceous plants native to deciduous forests are not adapted to the dense soil left behind by earthworms, resulting in high mortality. Understory plants that grow in thick forest floors generally have larger seeds and more complex seed dormancy and germination strategies than plants common to thin forest floor environments.[2]

Deer feeding and earthworm invasion appear to have a negative synergistic effect on plant communities. Increased plant mortality leads to an increased deer/plant ratio, so that deer consume a much larger proportion of plants than they would in the absence of earthworms. This can lead to the complete elimination of some understory plant species.[2]

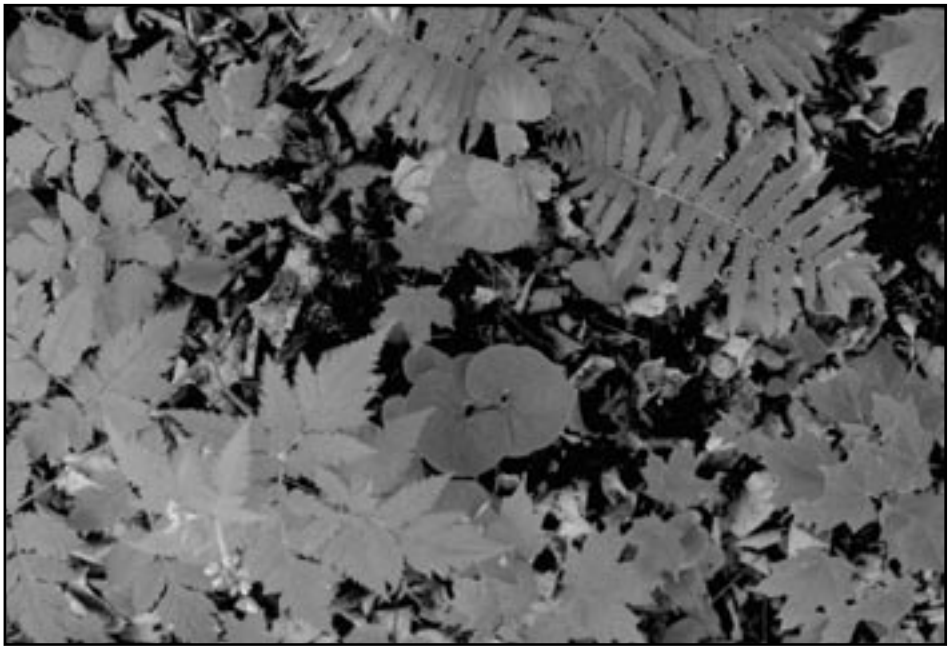
Trees—The tree canopy and subcanopy do not change much immediately after the earthworms invade. Tree seed production does not appear to be affected, although seedling density clearly declines.

Because canopy trees are not killed when earthworms first invade, changes in successional direction and productivity may take decades or longer to detect. Changes in the tree seedling community suggest that the composition of the tree layer will ultimately be altered as well.[2]

Looking Ahead

Changes in forest composition after earthworm invasion will be complex, and will interact with other agents of global change, such as increasing climatic temperatures. It is possible that warmer temperatures, deer, and earthworms will work synergistically to change temperate forest ecosystems much faster than any one of these factors alone.

The cumulative impact of an earthworm invasion on many native plant species is substantial and results in significant changes in community composition. At the same time, exotic plants preferring mineral soil seed beds, such as European buckthorn (*Rhamnus cathartica*) and garlic mustard (*Alliaria petiolata*), may be better adapted to the earthworm-worked soil conditions. Therefore, the spread of these exotic plant species may actually be facilitated by earthworm invasions.[2]



The understory in a forest invaded by earthworms (above) differs significantly from that in an earthworm-free environment (below). (photo credit: University of Minnesota, www.nrri.umn.edu)

References

[1]University of Minnesota. 2005. Minnesota Worm Watch. http://www.nrri.umn.edu/worms/. (10 October 2005).

[2]Frelich, Lee F.; Hale, Cindy M.; Scheu, Stefan; Holdsworth, Andrew R.; Heneghan, Liam; Bohlen, Patrick J.; Reich, Peter B. [In press]. Earthworm invasion into previously earthworm-free temperate and boreal forests. Biological Invasions.

Visit http://www.nrri.umn.edu/worms/publications.html for additional resources.

State Roundup

Delaware recently hosted a training session for **best management practices** (BMP) monitoring. Delaware is one of nearly 10 States served by the Northeastern Area that have taken part in a pilot project or beta testing for monitoring water quality during and after timber harvesting. The monitoring protocol focuses on areas that are of potentially high risk to water quality, such as water crossings and riparian areas. Delaware service foresters will collect data at haul road and skid trail water crossings, haul roads in riparian buffers, and temporary water crossings to determine if the crossing structures are in compliance with guidelines established in the Clean Water Act. Hazardous material disposal and social influences on BMP implementation will also be investigated. For more information on the BMP monitoring protocol, contact David Welsch at (603) 868-7616 or dwelsch@fs.fed.us.

The Small Woodland Owners Association of Maine (SWOAM) has just released the second edition of its ***Small Woodland Owner's Handbook—A Guide to Owning & Managing Woodland in Maine***. This 36-page guide covers such topics as small woodlot planning and management, tax aspects of woodlot management, how to choose a logger, tips for managing wildlife, a checklist to help develop landowner objectives, and tips for a successful timber harvest. While it is written with Maine small woodland owners in mind, the principles addressed are applicable elsewhere. Visit http://www.swoam.com or contact SWOAM at (207) 626-0005 to order.

Ohio continues to develop strategies to prevent the **emerald ash borer** (EAB) from spreading beyond an established quarantine area in the northeastern corner of the State. Foresters are contacting woodland owners within the quarantine zone to educate them about EAB and assist with the removal of ash trees on nonindustrial private forest lands. Silvicultural guidelines will be developed to assist landowners with making management decisions on their lands. For more information on EAB, contact Bob Acciavatti at (304) 285-1547 or racciavatti@fs.fed.us.

An **invasive plants workshop** entitled *Forests Out of Balance: The Impact of Invasive Plant Species* was conducted at the National Conservation Training Center in Shepherdstown, WV, in August. The **West Virginia** Division of Forestry hosted the workshop, which drew over 170 attendees from 12 States. Service, extension, industry, and consultant foresters joined with other natural resource managers to learn how to identify and control these exotic species. Attendees recommended additional workshops to learn how to restore and maintain sites once invasives have been controlled. The speakers' PowerPoint presentations can be found at http://na.fs.fed.us/fhp/invasive_plants.

The Forest Service's Northeastern Research Station will offer a weeklong training course entitled **SILVAH: Oak** in Elkins, **West Virginia**, June 12–16, 2006, and Brookville, **Pennsylvania**, September 11–15, 2006. In these annual sessions, participants improve their knowledge of oak ecology and management through the use of SILVAH, a computer tool for making expert silvicultural decisions. Nearly half the session is conducted in the field, where participants can apply SILVAH techniques, mark stands for crop tree release, and view examples of regeneration and overstory management techniques. For more information, contact Barbara McGuinness at 814-563-1040 or bmcguinness@fs.fed.us, or visit http://www.fs.fed.us/ne/warren/upcoming.htm.

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Naturalist's Corner

Tigers of Northeastern Woodlands

by Roger Monthey

Although we don't have tigers in the Northeast, we do have tiger beetles, which are an extremely fascinating element of arthropod fauna. According to experts C. Barry Knisley and Tom D. Schultz,[1] tiger beetles are very popular because of their variety, their beauty, their visibility, and their speed. Tiger beetles are incredibly fast, making them a real challenge to catch! Perhaps because of their popularity, they are one of the best studied non-pest insect groups.

Tiger beetles are found all across North America, in habitats ranging from dense woodlands to open beaches. The largest concentration of species is found in the Southwest. While fewer species are found in northern latitudes, they still play an important role as predator in the ecosystems they inhabit.

After hatching, tiger beetle larvae typically construct vertical burrows 30 to 55 cm deep in sand, clay, or loam. Larvae hunt from their burrows, where their heads plug the burrow openings while they wait for prey, primarily ants. In contrast, adults hunt a wider variety of small to medium-sized arthropods, but seem to relish ants and soft-bodied larvae. They also feed on vertebrate carrion, dead arthropods, and fruit.

Adult tiger beetles are aggressive hunters, scoping out moving prey and rapidly pursuing them in brief bursts of activity. Although adult tiger beetles have large mandibles, they are fluid feeders. They macerate their prey with their mandibles and roll the tissue into a ball of food (bolus) with their mouthparts. Then they secrete midgut enzymes onto the bolus while rotating it with their mouthparts. Finally, they ingest the prey fluids.

Tiger beetles are very heat tolerant, permitting them to exploit and kill less heat-tolerant insects. Tiger beetles vary their behavior to regulate heat exchange between their bodies and the environment by changing their posture or position. They gain heat from the soil surface (conduction) and from the air (convection). They often bask to absorb heat and then walk with an erect posture to forage or seek a mate. When they get too hot, they extend their legs and raise their bodies off the ground to cool off.

The dorsal and ventral sides of *Cicindela sexguttata* are metallic green or blue-green with six white spots. This species lives on the forest floor of New England woodlands and in open areas adjacent to them. (photo credit: Kenneth R. Dudzik, USDA Forest Service)

Tiger beetles' popularity raises concerns about over-collecting. Additional threats include habitat loss and degradation, and pesticide and chemical effects. New England is home to two Federally listed threatened species. The puritan tiger beetle (*Cicindela puritana*) is found only along the Connecticut River up into northern New England. The northeastern beach tiger beetle (*Cicindela dorsalis*) is found on the southern part of Cape Cod, which is the furthest north this species has been recorded.

[1]Knisley, C. Barry; Schultz, Tom D. 1997. The biology of tiger beetles and a guide to the species of the South Atlantic States. Martinsville, VA: Virginia Museum of Natural History. 236 p.

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