



# Forest Matters

*The stewardship newsletter*

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**Note:** This is the last hard copy issue of the Forest Matters Newsletter. If you want to receive an electronic version, please contact Victoria Evans ([vevans@fs.fed.us](mailto:vevans@fs.fed.us)) or Sandy Clark ([sclark03@fs.fed.us](mailto:sclark03@fs.fed.us)).

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## Moving Forward With Landscape Stewardship

Mike Huneke, Northeastern Area State and Private Forestry, U.S. Forest Service

United States  
Department of Agriculture  
Forest Service

Northeastern Area  
State and Private Forestry



The direction of the Forest Stewardship Program in Northeastern Area State and Private Forestry (NA S&PF) is changing. States are encouraged to develop Landscape Stewardship Plans and landscape-scale approaches to stewardship.



Landscape Stewardship Display

This direction is one of the outcomes of the Stewardship Project,

a 2-year effort to expand the reach and effectiveness of the Forest Stewardship Program in the region served by NA S&PF. Many partners were involved with NA S&PF: the Northeastern Area Association of State Foresters (NAASF), numerous universities and Cooperative Extension offices, the Natural Resources Conservation Service, U.S. Forest Service Region 9, nongovernmental organizations, and others.

**Northeastern Area Forest Stewardship Web site and Forest Matters online:**

<http://www.na.fs.fed.us/stewardship>

Together, we produced and released a final draft of a Landscape Stewardship Guide and Web site ([www.landscapestewardship.org](http://www.landscapestewardship.org)) at the NAASF Summer Meeting in July. Landscape Stewardship approaches have often been described as the logical next steps in implementing the Statewide Assessments and Strategies (now called Forest Action Plans) that all States recently developed.

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## ***Moving Forward With Landscape Stewardship***

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Traditionally, the Forest Stewardship Program has been delivered via one-to-one relationships between landowners and service foresters or private forestry consultants. Foresters developed individual Forest Stewardship Plans to provide technical assistance to meet the private landowner's needs. Landscape stewardship takes a broader view. It involves working at the community level to address societal needs and public benefits expressed in each State's Forest Action Plan.

Working with individual landowners will remain an important, and in many cases required, part of delivering the Forest Stewardship Program. However, having a complementary Landscape Stewardship Plan

means that individual landowner plans can be written within the context of a landscape-scale plan, where appropriate. This will help individual landowners become aware of larger landscape-level issues as they make decisions on their property. Ideally, both individual landowner and community objectives will converge across the landscape.

As we move into FY2012, training will be offered to help service providers become familiar with landscape stewardship concepts and to share success stories and lessons learned as we move forward.

For more information about the Stewardship Project or landscape stewardship in NA S&PF, please contact Mike Huneke, Forest Stewardship Program Manager, Northeastern Area State and Private Forestry, U.S. Forest Service, at [mhuneke@fs.fed.us](mailto:mhuneke@fs.fed.us).

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# **Stewardship News**

## **Good Forestry in the Granite State Now Available**

Karen Bennett, UNH Cooperative Extension Forestry Specialist/Professor

After more than 2 years and many hours of discussion, writing, and revision by hundreds of landowners, foresters, loggers, conservation activists, and average citizens, the second edition of *Good Forestry in the Granite State - Recommended Voluntary Forest Management Practices for New Hampshire* is ready. *Good Forestry* was originally published in 1997. This revision incorporates advances in knowledge and changes in forestry markets, practices, and State laws. A 24-member steering committee representing conservation organizations, State agencies, and the forest industry led the revision.

The guide gives landowners, and the professionals who work with them, practical recommendations to care for their woodlots. New Hampshire takes a different approach than many other heavily forested States to ensure a healthy forest. Most forestry practices and standards aren't mandated by State law. Instead, New Hampshire law directs the State Forester to develop educational tools to manage "ecologically sensitive and unique natural features of forest land." *Good Forestry* is the tool the State Forester developed for landowners, foresters, and loggers to use.

New topics include setting objectives, management plans, estate planning and land protection, staying safe in the woods, choosing the right timber harvesting system, stream crossings, invasive plants, wildlife species of greatest conservation need, steep slopes, forest products, maple sugaring, and ecosystem services markets. Topics already in the book were expanded, notably those related to silviculture (the art and science of growing trees), vernal pools, and riparian forests (forests along rivers). Knowledge gained from the New Hampshire Wildlife Action Plan was incorporated into the wildlife-related chapters.

Tim Fleury, Merrimack County Forest Resources educator with UNH Cooperative Extension, is excited about the new version. "*Good Forestry in the Granite State* starts out encouraging landowners to think about what they want for their land and encourages them to develop some objectives and a plan and to work with professionals. *Good Forestry* isn't a cookbook for woodlot management. It says the actions of a landowner can be based on landowner interests, getting help, and looking at the land."

*Good Forestry* is a 225-page guide in a three-ring binder format, and each copy comes with a CD. An online version is available free at [www.goodforestry.org](http://www.goodforestry.org). You can purchase a copy of *Good Forestry* online, through the mail, or by calling 800-444-8978. The cost is \$25.00.

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## Bur Oak Blight Pest Alert

A serious leaf blight disease on bur oak has been recognized in several Midwestern States since the 1990s with Iowa reporting its first occurrence of this disease 6 or 7 years ago. A common leafspot fungus, *Tubakia dryina*, was initially thought to be the cause of the blight on bur oak, but closer examination revealed a different story. Researchers in Iowa confirmed that this disease is caused by a new, and yet unnamed, species of *Tubakia*. The disease was named bur oak blight, or BOB for short.

There are now five known species of *Tubakia* that can infect bur oak in Iowa, but only one species causes dramatic leaf symptoms and tree mortality characteristic of BOB. To learn more about BOB, go to this Pest Alert on the Internet: [http://na.fs.fed.us/pubs/palerts/bur\\_oak\\_blight/bob\\_screen.pdf](http://na.fs.fed.us/pubs/palerts/bur_oak_blight/bob_screen.pdf).



Dark veins and large, wedge-shaped lesions develop on leaves infected by bur oak blight.

## NAASF CFM Committee Meets in Rhode Island

The Cooperative Forest Management (CFM) Committee of the Northeastern Area Association of State Foresters held its annual meeting in Newport, RI, on May 17-19. Two panels of speakers shared presentations on the theme “Forest Conversion—New England’s Changing Landscape.”

The meeting included a full-day field tour of coastal Rhode Island. Stops were made at a family forest that practices integrated management, including ecotourism; shellfish farm; working historical farming operation; and the famous American painter Gilbert Stuart’s historical birthplace and mill.

The business portion of the meeting included updates from the National Stewardship Program, NAASF, Northeastern Area State and Private Forestry, NRCS, and the Stewardship Project. Stewardship Program current events were shared, including a suite of new proposed metrics presented by New Hampshire’s Karen Bennett of the Stewardship Project’s Measures and Metrics Workgroup. Potential workshop topics were also shared for future landscape stewardship training. The 2011 CFM Forester of the Year Award was presented to Jon Bouton from the Vermont Department of Forests, Parks and Recreation (see article in the State Roundup).

The 2012 CFM Meeting is tentatively scheduled for May 15-17 in New Jersey.



CFM meeting attendees (and one dog) gather for a photo.

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## Woodland Stewardship: An Online Woodland Management Resource

Dennis McDougall, Northeastern Area State and Private Forestry, U.S. Forest Service

Since 1993, private forest woodland owners in Minnesota and other Midwestern States have relied on the guidance of *Woodland Stewardship*, a University of Minnesota Extension Service publication, to help them understand and implement sustainable forestry on their woodlands. Now, thanks in part to a grant from Northeastern Area State and Private Forestry, that familiar guidebook has been updated, expanded, and brought to an even wider audience by being published on the Internet. Tech-savvy woodland owners can now access all the content of the original book and more at the click of a mouse. New woodland owners will find a wealth of information to get them started off on the right foot, while more experienced woodland owners will find discussions of more advanced topics to help them achieve their woodland goals. Visit <http://woodlandstewardship.org>.

## Effect of Tax Policies on Forest Landowner Behavior

Jake Hewes, Research Coordinator, Family Forest Research Center, University of Massachusetts Amherst

The Family Forest Research Center worked with a number of partners to study how tax policies impact forest landowner behavior. They especially focused on how tax policies contribute to critical landowner decisions: “Do I keep my land in forest cover? Should I manage my land? If so, how? Should I retain ownership of my holdings or sell all or part of them?”

Researchers found that in general, tax policies, in and of themselves, are not causing forest owners to sell their land. These policies are not generally responsible for owners cutting more timber, managing more actively, or taking other actions they would not have otherwise planned independently. However, when tax policies, especially property tax policies, are combined with other factors, this resulted in some land sales and other unplanned actions.

Property taxes are the tax issue of greatest concern to the greatest number of family forest owners because these taxes are due on an annual basis regardless of income generated. Most family forest owners do not harvest trees on a regular basis, so income tax issues are not a major concern. While estate taxes are

not a major concern of most family forest owners, inheritance issues are.

Researchers suggested that policy reform efforts should be concentrated at the State, county, and local level. Preferential property tax assessments exist across the United States, but confusion, misinformation, and a lack of awareness are inhibiting these programs from reaching their full potential. Researchers offered the following suggestions:

- Develop programs that meet the diversity of needs and situations of landowners.
- Develop programs that are flexible enough to address the relevant, local issues.
- Have programs that are simple enough to be quickly and easily grasped.
- Create informational materials that are simple and readily available.
- Create informational materials specifically for accountants, estate planners, foresters, and other professionals with whom forest owners interact.
- Allow for basis calculation using a generalized “safe harbor” schedule.
- Implement a sliding scale capital gains tax rate that decreases the longer an asset is held.
- Increase the estate exemption amount and decrease the tax rate (for family forest owners).
- Develop subsidies, including cost-share and tax credits, for the creation and updating of estate plans, especially those that incorporate appraisals of forest land.
- Simplify the requirement and raise the cap on special use valuation [and] estate tax valuation.
- Extend right of survivorship to land being passed to any family member.
- Expand tax policies to further incentivize conservation easements:
  - ◇ Enhance income tax deductions for donated easements.
  - ◇ Reduce or eliminate property taxes on eased land.
  - ◇ Incentivize payments for ecosystem services:
  - ◇ Allow for deductions of related expenses, such as specialized inventories.
  - ◇ Reduce or eliminate income taxes due on revenue generated.

Some of these recommendations can be implemented relatively easily, others will require broad coalitions. For more information and to see the full project report, visit: <http://familyforestresearchcenter.org/projects/taxes.html>.

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## White-nose Syndrome in Bats

Roger Monthey, Northeastern Area State and Private Forestry, U.S. Forest Service

The U.S. Fish and Wildlife Service released a national plan to address white-nose syndrome (WNS) on May 17, 2011 ([http://www.fws.gov/northeast/white\\_nose.html](http://www.fws.gov/northeast/white_nose.html)). WNS has killed more than a million hibernating bats in Eastern North America since its discovery near Albany, NY, in 2006. NA S&PF States in the affected region are Connecticut, Delaware, Indiana, Maryland, Massachusetts, New Hampshire, New Jersey, New York, Ohio, Pennsylvania, Vermont, and West Virginia.

The disease is caused by a white, cold-loving (40-55° F) fungus, *Geomyces destructans*. So far, it is known to affect these species: little brown bat (*Myotis lucifugus*), Indiana bat (*M. sodalis*), northern long-eared bat (*M. septentrionalis*), eastern small-footed bat (*M. leibii*), tricolored bat (*Perimyotis subflavus*), and big brown bat (*Eptesicus fuscus*). Three other bat species [gray bat (*M. grisescens*), cave myotis (*M. velifer*), and southeastern myotis (*M. austroriparius*)] have tested positively for *G. destructans* but not with the pathological invasion of the skin that is characteristic of the disease. These species were found in Missouri, Oklahoma, and Virginia, respectively; their discovery could portend the spread of WNS into the Southeastern and Western United States and beyond soon.

The disease most notably affects the “cave bats” during long bouts of torpor characteristic of winter hibernation. More than half of the 45 species of bats in the United States rely on hibernation as their main strategy for surviving the winter when insects are not available, including three endangered species and subspecies [Indiana, gray, and Virginia big-eared bat (*Corynorhinus townsendii virginianus*)] within the affected area. A fourth endangered subspecies [Ozark big-eared bat (*C.T. ingens*)] will likely be at risk soon.

“.....the impact of WNS on bat populations has the potential to greatly impact ecosystem function. Considerable and abrupt reductions in predation pressure on insect populations, for example, could lead to increased numbers of insect pests, resulting in **damage to forests** and agriculture, higher loads of environmental pesticides, and/or potential public health risks associated with zoonotic disease or chemical contact.”

– A National Plan for Assisting States, Federal Agencies, and Tribes in Managing White-Nose Syndrome in Bats

## Landowner Summit in Vermont Promotes Long-Term Planning for Woodlands

Jamey Fidel, Forest and Biodiversity Program Director, Vermont Natural Resources Council

A summit—*Keeping Forests for the Future: Planning a Legacy for Your Woodlands*—was convened in late April by the Vermont Natural Resources Council; Vermont Coverts: Woodlands for Wildlife; and the Vermont Department of Forests, Parks and Recreation with cosponsors and funding from Northeastern Area State and Private Forestry through a competitive grant. The overarching goal of the summit was to share information about supporting intergenerational transfer of land and methods for keeping forest land intact. Approximately 100 landowners attended.

According to national financial analysts, there will be a large intergenerational transfer of wealth in the United States between now and 2052. Land is one of the assets that will change hands. If landowners don't plan for the transfer of their land, the likelihood of land fragmentation and the development of working forests increases dramatically. Fortunately, proactive planning for the transfer of land between generations can offer families a range of options, such as creating easements with a local land trust or forming a limited liability corporation or a landowner cooperative. However, most families do not know how to begin this process.

In exit surveys, landowners strongly indicated that they anticipate keeping their forest land intact. Participants also shared their greatest concerns with passing along land, which included navigating family dynamics, fairness to heirs, and wanting to conserve their land.

## Foresters for the Birds

Kristen Sharpless, Conservation Biologist, Audubon Vermont

The *Foresters for the Birds* project is a partnership between the Vermont Department of Forests, Parks and Recreation and Audubon Vermont that was launched through a competitive Redesign grant awarded in FY2009. Over the past 2 years, Audubon biologists and over 100 foresters in Vermont and the surrounding region have begun working together to help landowners integrate timber and songbird habitat management. The results of the tools, trainings, and relationships that have stemmed from the project have been overwhelmingly positive.

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**Foresters for the Birds** (continued from page 5)

Participating foresters have attended at least one of three training sessions on bird identification and approaches to silviculture that keep birds in mind. Participants then partnered with an Audubon biologist to assess forest bird habitat on a property that they manage, providing technical assistance to over 50 private landowners in the region.

Foresters attending a final training session in June received three innovative documents to help them identify birds of conservation priority in the woods, assess the condition of songbird habitat during forest inventory, and choose silvicultural treatments for a variety of common forest conditions that have the potential to enhance songbird habitat.

Participating foresters report that they now identify birds more often in the woods, assess bird habitat during forest inventories, talk with landowners about birds and habitat management, and apply silvicultural treatments that keep birds in mind. They have also become better able to communicate with and assist a variety of landowners, especially those who are skeptical of traditional forest management but who have a strong interest in and compassion for birds and wildlife.



Project participants watch as a wood thrush is held by an instructor.

**Key findings of the Stewardship Project Communications Study Grant**

Robert “Fitz” Fitzhenry, Northeastern Area State and Private Forestry, U.S. Forest Service

A new approach to stewardship is beginning in Northeastern Area State and Private Forestry. The new approach grew from the Stewardship Project, a cooperative effort of the Forest Service and the Northeastern Area Association of State Foresters (NAASF).

While many of the changes from the Project will take time to implement and bear fruit, one aspect can be used right away. That aspect is refining the way we talk about, message, and brand forest stewardship.

The Stewardship Project sub-team on communications managed a contract with Responsive Management to help the Forest Service and NAASF understand the public’s perception of forest stewardship and its attitudes toward the role of forest owners. Three primary research components made up this study:

- Four focus groups conducted with residents of Ohio, New York, New Hampshire, and Wisconsin, four States served by NA S&PF.
- A Web-based survey of State Foresters and Cooperative Forest Management Committee Members.
- A telephone survey of NA S&PF residents.

Here are a few teasers from the report:

- Clean air, clean water, fish, and wildlife habitat— these ecological messages resonate with the public
- “Healthy forests” resonates better than “productive forests”
- “Forest stewardship” has a positive connotation, though 26% don’t know what it means
- “Private forests” sounds smarmy; “privately owned” or “family forest” is better
- Economic messages don’t do well
- Government sources have high credibility

The full summary report holds all 30 key findings, with more depth and advice on successful messaging. View it at <http://www.landscapestewardship.org>.

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# Landowner Spotlight

## Popoviches Preserve Their Land for Posterity

[From the May 2011 issue of *Partners News*, issued by the Partners in Forestry Landowner Cooperative, Conover, WI]

Last December, Lee and Margo Popovich established a conservation easement that commits their 58.69-acre parcel in Land O Lakes, on the Michigan border, to remain unspoiled forever. The Popoviches live in a charming log cabin built last year on their heavily forested land. The property borders the Sylvania Wilderness Area, a pristine forest in Michigan that is part of the Ottawa National Forest.

Lee and Margo's lifelong love of the outdoors drew them to the North Woods. They were concerned that natural land, as a commodity, was being consumed by rampant development. After hearing Lee and Margo talk about preserving their land for the future, someone suggested a conservation easement and introduced them to Bryan Pierce of Northwoods Land Trust.

Setting up the trust was easy and went quickly with Bryan's help. Under the trust agreement, the land cannot be subdivided, or developed in any way, not even for agriculture or raising animals, and it must remain forested. The land will remain as habitat for the wild animals that they have become used to seeing: deer, bears, coyotes, foxes, eagles and wolves (their tracks, at least). They have had a forest management plan prepared and are beginning to put it into effect.

The land and cabin are serving their purpose. When Lee gets back from a long 4-day work week in Illinois on Thursday evening, relaxation immediately sets in and he is mentally restored and regenerated. Lee says that in fact the Northwoods, by providing him relaxation, contributed greatly to his success in the concrete business.

The Partners in Forestry (PIF) Landowner Cooperative has been influential and helpful to the Popoviches. They provided them with knowledge and information. The meetings and seminars have been educational. They have met people who have provided knowledge of birds, trees, invasive species, and forest management.



The Popovich property in winter.

Practically all the wood used to build their cabin came from forests in Vilas County that were harvested sustainably by Nordine Land Management (a PIF member). The cabin's framing was certified under the Local Lumber Use Law, a law that PIF was instrumental in pushing through the State legislature. The lumber was cut or milled to size at Hovel's Conover sawmill, including white and red pine logs as well as cedar, spruce, and fir, all local native species. Thus the cabin gave a significant boost to the local economy.

Lee and Margo look forward to periodic visits from their four grandchildren so that they can experience the woods. Margo said it is important for children to understand what the great natural environment looks like. Lee, citing a fond memory of his granddaughter picking wild raspberries, said that children won't know what they are missing unless it is saved. "This land is staying this way."

For the full story, go to <http://www.partnersinforesry.com/News%20Letters/05-2011%20PIF%20Newsletter.pdf>.

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# State Roundup

## Jonathan Bouton Named 2011 CFM Forester of the Year

The Cooperative Forest Management (CFM) Committee of the Northeastern Area Association of State Foresters selected **Jonathan Bouton** of Vermont as the 2011 CFM Forester of the Year. The award was presented to Jonathan at the committee's meeting in Newport, RI, in May.

Jonathan has worked for the Vermont Department of Forests, Parks and Recreation as a service forester since 1973. He is currently the Windsor County Forester where he serves as the State agency's primary contact with private forest landowners for delivering the Forest Stewardship Program. Bouton enjoys meeting landowners and working with them to establish their goals. With an eye to publicly held values, Jonathan helps landowners learn about their forest's potential to ensure that they make informed decisions about their land. Jonathan also works with others to guide the development, forest management, and educational use of the Marsh-Billings-Rockefeller National Historical Park, the first national park dedicated to conservation history and the evolving nature of land stewardship in America. Congratulations, Jonathan!



Jon Bouton (left) receives his award from Jon Klischies, New Jersey CFM Coordinator and CFM Committee Chair. (Photo by Bruce Payton, Rhode Island Division of Forest Environment)

## Wisconsin Welcomes New CFM Forester

**Carol Nielsen** has joined the Wisconsin Department of Natural Resources as its new CFM Forester. She earned a B.S. in Forest management from the University of Wisconsin–Stevens Point in 1982.

Carol's career has spanned the State from north to south and from the field to the central office. Her field experience included serving as the private forester in both Sawyer County and Iowa County. In the office, she worked in the Managed Forest Law program before transferring into the Private Forestry Specialist position. Carol is excited about the recent addition of the Stewardship Coordinator role to her position. She is looking forward to working with existing partners and cultivating new partnerships that can help reach even more woodland owners in Wisconsin.

Carol is married to fellow forester John Nielsen. Carol and John like to practice what they preach on their forest land in southern Wisconsin. Welcome, Carol!



Carol (right) is joined (from left to right) by daughter Kristina, husband John, and son Matt.

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# Research

## Diameter-limit Cutting in Northeastern Forests

Diameter-limit cutting removes all merchantable trees larger than a specific diameter at breast height. This type of cutting has been used for centuries in northeastern forests. Historically, timber harvests from the 1620s to the 1950s removed any or all trees that were in demand or could be transported easily. Diameter-limit cutting in some form was used in nearly all of these harvests, but the minimum diameter and the desired species were so variable that the harvests ranged from light partial cuts to nearly complete clearcuts (Kelty and D'Amato 2006).

Widespread clearcutting was used from 1850 to 1920 to support the industrialization of the Northeastern United States. However, opposition to this practice shifted harvesting to some type of partial cutting. This is when selection cutting (which was often diameter-limit cutting) became the practice promoted by forest managers and silvicultural researchers for most forests in the early 20th century (Kelty and D'Amato 2006).

Some foresters raised concerns about diameter-limit cutting as early as the 1900s (Kenefic and Nyland 2006). More recently, Nyland (1992) concluded that diameter-limit cutting has left many forests with poor-quality trees, less valuable species, and variable stocking and crown cover as a result. Irland (1999) also concluded that diameter-limit cutting was generally depleting stand quality and value more than improving it. Here are some research highlights about diameter-limit cutting in northeastern forests:

- Fajvan and others (1998) sampled 99 West Virginia forests cut in 1993-1994 to assess the impact of harvesting practices on the forest's potential to produce high-quality sawlogs and wood fiber in the next 10-15 years. Findings:
  - ◊ Most (83%) of the harvested forests were owned by nonindustrial private landowners.
  - ◊ Timber harvests focused on extracting sawtimber-size trees that were the most commercially desirable (especially oak and yellow-poplar).
  - ◊ Diameter-limit cutting was used in 80% of the harvests (excluding clearcuts).
  - ◊ Selective removal of a specific species (>80% of its basal area removed) was common in one-third of the forests sampled. This has
- important implications for future timber supply, stand productivity, and economic returns for landowners.
  - ◊ Most stands were severely understocked after harvest.
  - ◊ Roughly one-quarter of the forests lost their quality potential for sawlogs.

*Conclusion:* Because most of West Virginia's forests are NIPF ownerships, more landowners need to become informed about silvicultural practices and the advantages of marketing a diversity of products from their woodlands. Educated landowners may need to abandon diameter-limit sales in favor of more productive, managed forests.

- Fajvan (2006) looked at the quality of residual trees in even-aged forests in New York, Pennsylvania, and West Virginia. She found:
  - ◊ Diameter-limit cutting was used on about half of the NY and PA harvests and on about 80 percent of the WV harvests.
  - ◊ Only 20-27 percent of the NY and WV harvests had desirable residual conditions; about half of the PA harvests had desirable conditions.
  - ◊ In WV, shade-intolerant, high-value species were favored in cuts and shade-tolerant maples and beech dominated residual stands. Shade-intolerant yellow-poplar was the tallest regeneration species 4-5 years after harvest, but red maple density was three times greater.
- Kenefic and Nyland (2005) concluded that diameter-limit cutting fails as a long-term strategy for sustainable forestry. It neither improves the quality and value of trees nor controls the stocking needed for optimum long-term production of sawtimber and other values. It does not provide consistency in long-term yields or deliberately enhance hydrologic or other ecological conditions. Future forests do not benefit from diameter-limit cutting and will not optimize long-term value for landowners. Silvicultural management is the main means of sustainable forests and values for landowners. Good planning and advice from a professional forester will avoid the long-term pitfalls of diameter-limit harvesting. *Note: This publication is available online. A limited number of hard copies are also available at the Forest Service St. Paul Field Office. Contact Doreen Deutsch ([ddeutsch@fs.fed.us](mailto:ddeutsch@fs.fed.us)) for hard copy information.*

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# Naturalist's Corner

## North American Tree Squirrels in Your Woods

[Much of the information presented below is from Michael Steele and John Koprowski's **North American Tree Squirrels** [published in 2001] and 1994 studies by Koprowski.]

Tree squirrels, such as gray squirrels (*Sciurus carolinensis*) and fox squirrels (*Sciurus niger*), are animals we may take for granted because of their relative familiarity to us and how common they are in our surroundings. They are very important to forest managers because of their impact on plant reproduction and forest regeneration as both seed predators and dispersal agents.

Gray squirrels have a strong predilection for seeds and fruits of a few trees, especially oaks. They also eat 97 species of plants, many species of fungi, insects, bone, baby birds, and rarely even other squirrels.<sup>1</sup> (See text box for a more complete list.) Fox squirrels have a similar diet, although they also eat dead fish and some additional species of plants, fungi, and insects.<sup>2</sup>



This bone has gnawing marks from squirrels. (Photograph by Roger Monthey)

Forest fragmentation is a major problem for gray squirrels. They do not do well in isolated patches of forests surrounded by croplands or suburbia. Fox squirrels, however, fare better because they are more terrestrial than gray squirrels and move readily between isolated forest patches. Although many studies have indicated that gray squirrels generally use thicker forested patches with dense understory when compared to fox squirrels, who use more open forests with little understory, studies in North Carolina indicate extensive overlap in habitat use between the two species.

The seasonal availability of acorns is a major constraint on tree squirrel populations. Tree squirrels cache acorns (store them as food for later use) during the tree dormant season. These caches, usually consisting of just one or a few food items, are stored just below the ground surface in many (sometimes hundreds) widely dispersed locations. Steele and Koprowski point out

some interesting and puzzling questions about the biology of tree squirrels: Can tree squirrels such as the gray squirrel select sound acorns over those infested with weevils for caching? If so, how do they know the difference between sound acorns and infested acorns?

This is critical because the food in sound acorns will last longer in caches than the food in infested acorns. According to Steele and Koprowski, the literature indicates a “bewildering” array of conclusions: some authors reported that squirrels could not distinguish infested from sound acorns, whereas others reported the opposite.

Steele and Koprowski hypothesized that tree squirrels do select sound acorns for caching. Data from several of their studies statistically indicated that gray squirrels could detect the difference between infested and sound acorns. However, the story line seems to be evolving.

Steele and Koprowski related that gray squirrels can detect dormant acorns (red oak acorns that have delayed germination) from those that are not dormant (white oak, which germinates in the fall soon after seed drop). Red oak acorns are primarily stored in the fall and eaten in winter, and white oak acorns are primarily eaten in the fall after they fall to the ground. This probably explains why it appears that red oaks are more widely dispersed than white oaks, which are more clumped near their parents. This dispersal of red oak acorns by gray squirrels is an important factor in the regeneration of red oak trees. Research on DNA fingerprinting of parent trees and their seedlings may provide more conclusive information about seedling dispersal (Steele and Koprowski 2001).

How do tree squirrels know how to relocate their food caches? The typical answer is that squirrels use their memory to return to the general location, then use their sense of smell to hone in on the cache. But Steele and Koprowski pointed out that little is really known about how this is done. According to the authors, “We suggest that...gray squirrels do not simply stick their nuts in the ground and forget about them. Instead, they engage in a range of complex behaviors, moving and managing caches, much the same way as a financier will manipulate investments to maximize long-term returns. The tree squirrels, we may someday learn, are nature's ultimate bankers.”

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<sup>1</sup> Koprowski, J. 1994. *Sciurus carolinensis*. Mammalian Species. 480: 1-9.

<sup>2</sup> Koprowski, J. 1994. *Sciurus niger*. Mammalian Species. 479: 1-9.

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### **Some Important Food Items of Gray Squirrels**

- Nuts, flowers, and buds of 24 oak species (*Quercus*)
- 10 species of hickory and pecan, walnuts, and beech (*Fagus grandifolia*)
- Fruits, seeds, buds, or flowers of maples (*Acer*)
- Mulberry (*Morus*)
- Hop hornbeam (*Ostrya virginiana*)
- Seeds and catkins of gymnosperms – Juniper (*Juniperus*), hemlock (*Tsuga*), pine (*Pinus*), Spruce (*Picea*)
- Insects – may be important food of juveniles
- Bird eggs and nestlings
- Bones
- Hackberry (*Celtis*)
- Elms (*Ulmus*)
- Buckeye and horse chestnuts (*Aesculus*)
- Wild cherries (*Prunus*)
- Dogwoods (*Cornus*)
- Hawthorn (*Craetegus*)
- Black gum (*Nyssa sylvatica*)
- Hazelnut (*Corylus americana*)
- Variety of herbaceous species
- Fungi

### **References** (continued from page 9)

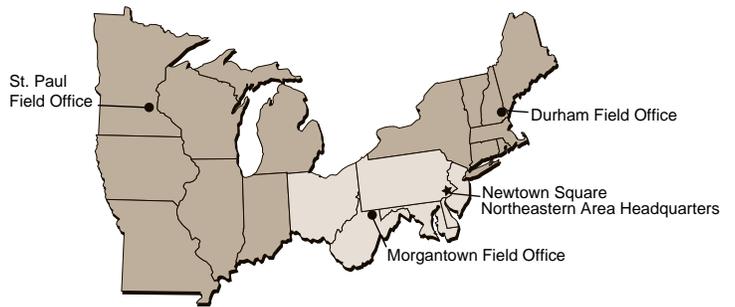
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