

June 2006



Project Leader's Report

Ecology and Silviculture of Northern Great Lakes Forests



NC 4101: Ecology and Silviculture of Northern Great Lakes Forests
USDA Forest Service,
North Central Research Station,
Grand Rapids, MN 55744

Project Leader Update

Many of you are aware that big changes are coming for the North Central Research Station. In October 2006, we will officially become the Northern Research Station! This new Station is being built through an integration of the current North Central and Northeastern Research Stations.

The Northern Research Station (NRS) includes 20 states, ranging from Minnesota to Maine and Maryland to Missouri. Headquarters for the NRS are in Newtown Square Pennsylvania, with additional administrative offices in St. Paul, MN and Delaware, OH.

The scientific horsepower of the Northern Station is



impressive, including 165 scientists, 18 research labs, and 22 experimental forests. The NRS is the largest entity within the Forest Service research branch and one of the largest natural resource research organization in the world!

Change is always accompanied by feelings of uncertainty. Those of us involved with developing the Northern Research Station have experienced some uncertainty. I can say enthusiastically that great things will come out of the Northern Research



Forestry Sciences Lab, Grand Rapids MN

Station and those of us at the Forestry Science Lab in Grand Rapids MN will contribute to this success.

Within this issue, I will update you on our recent activities and in doing so give you a sense of our role within the new Northern Research Station.

Thank you,
Brian Palik, Project Leader

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Hot Topics/Coming Events

A revised managers handbook for red pine in the North Central Region (GTR NC 264): Updated version of the classic with more ecology and forest health information. (www.ncrs.fs.fed.us/pubs/)

Managing forests for ecological complexity II. October 9-10, 2006. A second

installment of our popular two-day workshop teaching the concepts of natural disturbance and stand development-based management, sponsored by the Conservation Forestry Network. Drs. Jerry Franklin & Brian Palik will instruct. (http://www.osiny.org/conservationforestry/ga_forestry.htm)

North Central Region Forest Management Guides On the Web!—Both general and specific information on forest management for a variety of objectives, with detailed ecological, forest health, and economics information. (<http://www.ncrs.fs.fed.us/fmg/nfmg/>).

Research Focus: Research Themes of the Northern Research Station

The science program of the Northern Research Station builds on the diverse strengths of the North Central and Northeastern Stations. Research efforts will be organized into four theme areas. The Themes include:

Managing with Disturbance
— Research to understand and develop tools to protect people and forests from undesirable disturbances. Research topics will include: invasive species, fire and fuels,

climate change, and fragmentation and landuse.

Urban Natural Resources Stewardship

—Research to understand and develop tools that improve quality of life in urban areas. Research topics will include: loss of open space, neighborhood quality of life, and sustainability of urban natural resources.

Sustaining Forests

—Research to understand and develop tools that main-

tain and enhance forest productivity and benefits.

Research topics will include: forest productivity and wood quality, wildlife habitat and biodiversity, and ecosystem restoration.

Providing Clean Air and Water

—Research to develop tools that increase clean air and water. Topics will include: estimation of carbon stocks, tools to enhance carbon sequestration, bio-

energy, and tools to ensure production of clean water.

The home base for the Ecology and Silviculture Research Unit in Grand Rapids will be in the *Sustaining Forest* theme, although we will contribute to all themes in some way. Our strengths in long-term silviculture research, ecosystem management experiments, and riparian ecology and management all focus directly on issues of forest sustainability.

Program Delivery and Technology Transfer

—Ecological Forestry In Practice—In Sept. 2005, we organized the first Lake States workshop on Ecological Forestry. Collaborators included the Conservation Forestry Network, the Chippewa Natl. Forest, the MN Dept. of Natural Resources, UPM Blandin Forestry, and the Univ. of Minnesota, and featured instruction by Dr. Jerry Franklin. The workshop attracted 100 participants from 5 states and 20 organizations. A second workshop is planned for Oct. 2006.

—On-line Manager's guides—Working with USFS State and Private Forestry, the University of Minnesota, and contributors from around the region, we have developed web delivered forest management guides for the upper Mid-West. The guides include a range of landowner objectives, forest health information, and an economics component. The general forest management guide and one specific for red pine are now available (<http://www.ncrs.fs.fed.us/fmg/nfmg/>).

—Border Lakes Partnership—Doug Shinneman, Nature Con-

servancy-Forest Service post-doctoral scientist, is leading our efforts at cross-ownership and multi-national partnership building related to fuels and fire risk in the five million acre Border Lakes region of northern MN and southern Ontario. Doug is modeling future forest and fuels conditions and fire risk, based on individual and integrated management plans of the partnership members.

—Cooperative Management Experiments—We continue to use a variety of operational-scale silvicultural experi-

ments as tools for technology transfer. Most recently, we hosted 30 managers from the Chippewa National Forest, program leaders in ecology, silviculture, and soils from Region 9 of the Forest Service, and Northern Research Station Assistant Directors, at our annual field day to update results of red pine silvicultural experiments. These field days include presentations by both researchers and collaborating managers on science, implementation, and application.

Recent Outreach, Education, and Partnership Building Highlights

Feb 06: Christel Kern presented results from the "Buckman" long-term prescribed fire study to the Wisconsin Prescribed Fire Council.

Feb 06: Brian Palik presented an update on on-line manager's guides at the Minnesota Research Review.

March 06: Brian Palik gave a seminar and met with gradu-

ate students at the University of Missouri

April 06: Christel Kern organized a two-day "Forest Service immersion experience" for students from the Red Lake Tribal College.

April 06: Brian Palik represented the FS lab at the Regional Forester's Review of the Chippewa National Forest.

May 06: Christel Kern presented a research update to the Chippewa NF leadership team.

May 06: Rick Voldseth and John Elioff hosted the Lake States Long-term Soil Productivity meeting.

May 06: Brian Palik and Christel Kern hosted the 1st meeting of the Silviculture Working Group for the North-

ern Research Station. The group charted near and long-term goals for silviculture research in the new Station.

June 06: Brian Palik will present on ecological silviculture at a Forest Guild Workshop on "Well-managed forests for Community well-being".

Publications and Funding

Recent Publications

—Gilmore, D., and **Palik, B.** 2006. *A revised managers handbook for red pine in the north central region.* GTR NC-264. (www.ncrs.fs.fed.us/pubs/).

—Page-Dumroese, D. S., **et al.** 2006. *Soil physical property changes at the North American LTSP study sites.* CJFR 36: 551-564.

—Page-Dumroese, D. S., **et al.** 2006. *Effects of organic matter removal, soil compaction, and vegetation control on 5-year seedling performance (LTSP)* CJFR 36: 529-550.

—Morris, A., Goebel, C., Williams, L., **Palik B.** 2006. *Influence of landscape geomorphology on large wood jams and*

salmonids in an old-growth river of Upper Michigan. Hydrobiologia 556:149-161.

—Lugo, A. **et al.** 2006. *Long-term research at the USDA FS Experimental Forests and Ranges.* BioScience 56: 39-48.

—Powers, R., Scott, D. A., Sanchez, F., **Voldseth, R.**, **et al.** 2005. *The North American long-term soil productivity experiment: findings form the first decade.* For. Ecol. Manage. 220: 31-50.

—**Palik, B., Kern, C.**, Mitchell, R., Pecot, S. 2005. *Using Spatially variable Overstory Retention to restore structural and compositional complexity in Pine Ecosystems.* USDA Forest Service Gen. Tech. Report PNW-GTR-635.

—**Palik, B.**, Batzer, D., **Kern, C.** 2006. *Upland forest linkages to seasonal wetlands: coarse particulate organic matter flux, litter processing, and food quality.* Ecosystems 9: 142-151.

Recent Funding Developments

Brian Palik, Rebecca Montgomery, Peter Reich (Univ. of MN) received \$400,000 from the USDA Competitive Grants program to study productivity, resource availability, & regeneration in pine forests managed for complex structure.

Brian Palik, Mike Ostry and Rob Venette (NC 4502); \$40,000 from the FS Forest Health Monitoring Program for continued study of black ash decline in the Lake States.

Palik received supplemental

National Fire Plan funding of \$210,000 in '06 to continue work on *Optimizing fuel reductions in time and space* as part of the Border Lakes Project.

Palik and Rick Voldseth received \$84,000 from FS Region 9 for monitoring of long-term forest productivity studies.

Palik, Randy Kolka (NC 4351), and Univ. of MN cooperators, received \$35,000 from NCASI to resample and evaluate 10 year results from the Pokegama Creek riparian management experiment.

Palik, Kolka, and cooperators from the Univ. of MN were awarded \$333,000 from the Legislative Commission on Minnesota Resources to

Professional Meetings

Brian Palik will give an invited presentation at the '06 National SAF convention.

Palik participated in the Lakes States NCSSF Old-Growth and Extended Rotation workshop in Woodruff Wisconsin (May 06).

Palik is co-organizer and presenter at the National Forestry Guild annual meeting in Woodruff WI. (Sept. 06)

Rick Voldseth and **John Elioff**

attended the International LTSP meeting in Washington State (April 06).

Doug Shinneman and **Doug Kastendick** presented at the MN State SAF meeting (Feb

Personnel News

Welcome to **Doug Shinneman** and **Doug Kastendick**. Doug S. is a TNC-FS post-doctoral scientist (the first in the Nation!) heading up the Border Lakes fire and fuels project. Doug K. is a recent M.S. graduate from

the Univ. of MN who has joined us as a Forester.

Welcome to **John Bradford**, who has accepted a position of research landscape and ecosystem ecologist in our program. John, who is currently an employee with the Rocky Mountain Station, will join us in July.

Christel Kern, forester/ecologist in our Unit, will begin her Ph.D. program at the University of MN in Sept. as part of the of the Forest Service's

Scientist Recruitment Program. Christel will remain employed by us during her schooling, eventually returning as a research scientist in our Unit, to fill the position Terry Strong left upon his retirement last year.

Welcome to our summer students workers including Gentry Carlson, Trish Hakala, Paul Kessler, Josh Krecklau, Michelle Martin, Lynn Swanson, and Randy Topper.

News from our Cooperators

Mechanisms of shrub competition in forests.

Submitted by Rebecca Montgomery, Assistant Professor, University of Minnesota.

In forest ecosystems, established shrubs often interact with tree seedlings to deter regeneration. Thus, the removal of a shrub layer is a common management prac-

tice. My current project is designed to increase our knowledge about the mechanisms by which shrubs interact with tree seedlings. Working with Grand Rapids scientists, I have planted seedlings of *Pinus resinosa*, *P. banksiana*, *P. strobus*, *Acer rubrum*, *Quercus rubra* & *Betula papyrifera* within the "Red Pine Retention

Experiment". In these plantings, I have manipulated above- and belowground competition from shrubs. The treatments are implemented in closed canopy forest and in large gaps. Early results suggest shrubs decouple seedlings from the overstory. For example, *P. banksiana* survival decreased by 28% in gaps with

shrubs compared to those without shrubs. The decline is similar to that occurring in closed forest. In other words, in gaps, competition appears stronger for belowground resources, while in the understory, light is a more important factor. I am also measuring seedling growth & resource availability in each manipulation.



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Forestry Sciences Lab
1831 Hwy 169 E
Grand Rapids MN 55744

Phone: 218-326-7116
Fax: 218-326-7123
Email: bpalik@fs.fed.us

Our Mission: To develop knowledge and tools
that balance ecological and economic
objectives in the Nation's forests.

We're On The Web!
www.ncrs.fs.fed.us/4101/

Unit History Factoid: Evaluating Season and Frequency of Burning: The "Buckman" Red Pine Burning Study.

The red pine burning study was installed in 1959 on the Cutfoot Experimental Forest in north central Minnesota by Bob Buckman, former Forest Service Deputy Chief for Research. The objectives of the study were to examine the effects of prescribed fire on tree and shrub mortality, soil physical and chemical properties, and pine regeneration. There was little experience at the time in Minnesota in use of prescribed fire. The study altered the season (dormant, growing) and frequency (annual, biannual, periodic) of surface fire. Within these treatments, the prescriptions called for minimizing overstory mortality, preparing mineral seedbeds, reducing shrub competition, and burning the entire one acre plot of each treatment. In total, 11 annual, 5 bi-annual, and 2 periodic burns in both growing and dormant seasons were accomplished. We re-sampled this experiment in 2005, 46 years after study initiation. Results demonstrate a strong legacy of annual, growing season fire. In this treatment, hazel density is significantly reduced and eastern white pine regeneration is increased, even 35 years after the last fire!



Our Research Portfolio

Fire and Fuels

- The Border Lakes Project: Evaluating the cumulative impacts of forest management at landscape scales
- Developing a decision support system for management of fuels and fire at the landscape scale

Invasive Species/Forest Health

- Patterns and causes of black ash decline
- Invasibility and restoration of oak ecosystems in the Midwest

Watersheds and Riparian

- Testing the efficacy of buffers for protecting seasonal ponds, amphibians, and forest songbirds in northern Minnesota
- Evaluating riparian timber harvesting guidelines

Restoration/Ecological Forestry

- Using spatially variable overstory retention to restore structural and compositional complexity in pine ecosystems
- Productivity and plant diversity in extended rotation red pine stands
- Managing for old-growth characteristics in northern hardwood forests

Forest Productivity

- Aspen Long-term Soil Productivity (LTSP)
- Linking Soil Productivity To Intensity Of Silviculture
- Identifying opportunities for enhancing forest and economic productivity of red pine stands

Long-term Silviculture Studies

- Northern Hardwood Cutting Methods (2nd growth: Argonne EF)
- Northern Hardwoods Cutting Methods/Growing Stock (old-growth: Dukes EF)
- Red pine Growing Stock Levels (Cutfoot EF)
- Long-term prescribed fire research (Cutfoot and Pike Bay Exp. Forests)
- Aspen-Birch -Conifer (ABC) study (Pike Bay EF, Cloquet, Ottawa NF)

Research Work Unit Staff & Students

John Bradford –Research Ecologist
Ebrahim Abdela –GIS/Remote Sensing Specialist
John Elioff –Forestry Technician
Doug Kastendick –Forester
Christel Kern –Forester/Ecologist/Scientist Trainee
Jacque Kuykendall –Support Services Specialist
Doris Nelson –Physical Sciences Technician
Brian Palik-Project Leader, Research Ecologist
Doug Shinneman –TNC-FS Post-doctoral Ecologist
Eric Troumbly –Facilities Operation Specialist
Rick Voldseth –Post-doctoral Research Ecologist
John Zasada –Research Forester, Retired
Gentry Carlson-Student Worker
Trishsa Hakala-Student Worker
Paul Kessler-Student Worker
Josh Krecklau-Student Worker
Lynne Swanson-Student Worker
Randy Topper-Student Worker

Graduate Students (Advising and/or Supporting)

Corey Halpin - Univ. of Wisc.
Jake Hanson - Univ. of Wisc.
Tricia Knoot – Iowa State University
Michelle Martin - Univ. of MN
Erik Mottl - Iowa State University
Stacey Olszewski – Univ. of MN
Matt Powers - Michigan Tech. Univ.
Rachael Tarpey – Michigan Tech. Univ.