USDA United States Department of Agriculture

Forest Service

Penobscot Experimental Forest

NORTHERN RESEARCH STATION EXPERIMENTAL FOREST NETWORK

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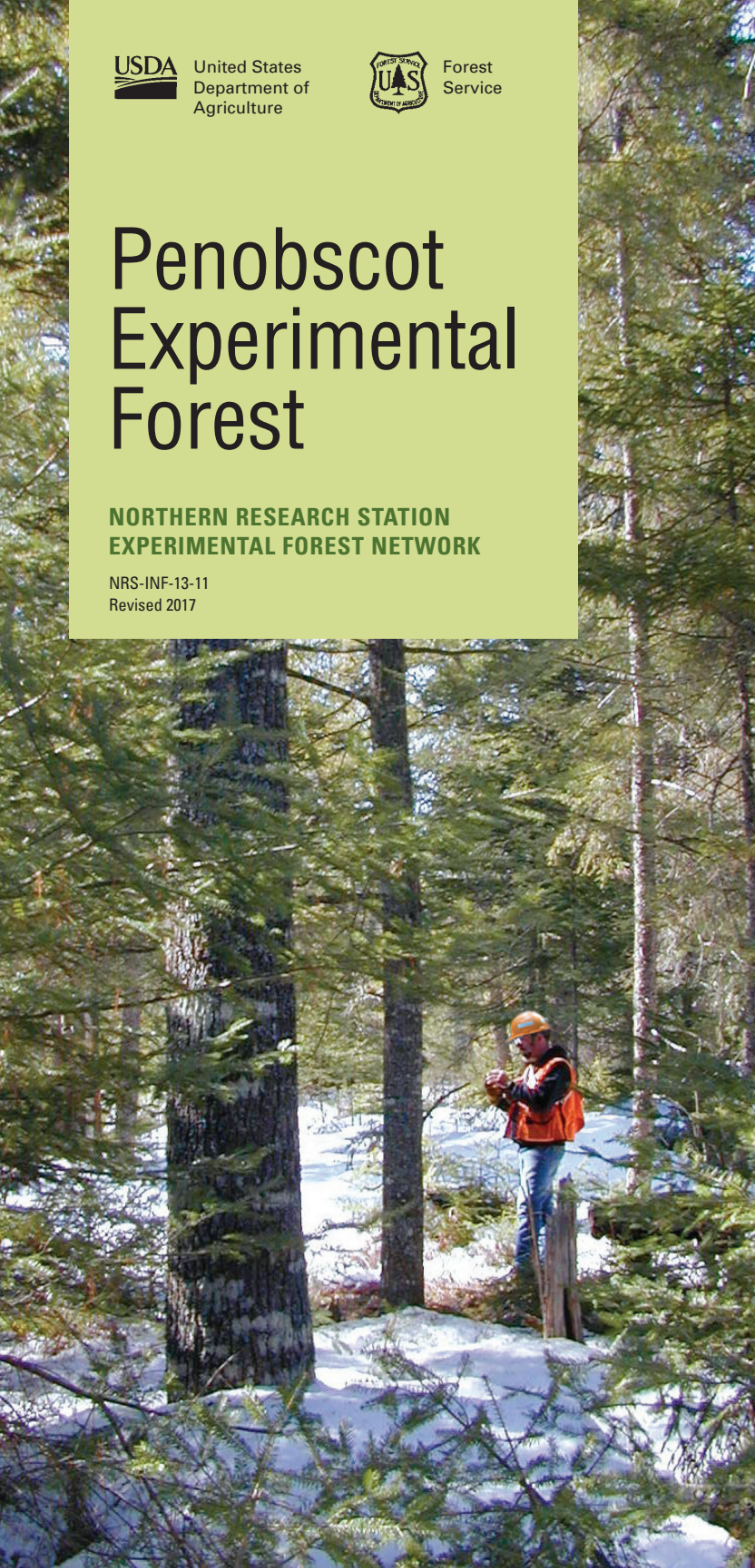

Penobscot Experimental Forest

The Penobscot Experimental Forest (PEF) is located in Bradley and Eddington, about 10 miles north of Bangor, Maine. This approximately 3,800-acre forest was established in 1950 as a site for U.S. Forest Service research. For more than 60 years, Forest Service scientists have been maintaining a large-scale, long-term silvicultural experiment on the PEF, and have been studying the ecology and management of northern conifer forests. Numerous partnerships have developed over the years, most notably with the University of Maine. Though originally owned by forest industry, the property was donated to the University of Maine Foundation in 1994 and serves as a premier example of research collaboration. Findings have long informed regional management and policy decisions and have become increasingly relevant to national and international concerns.

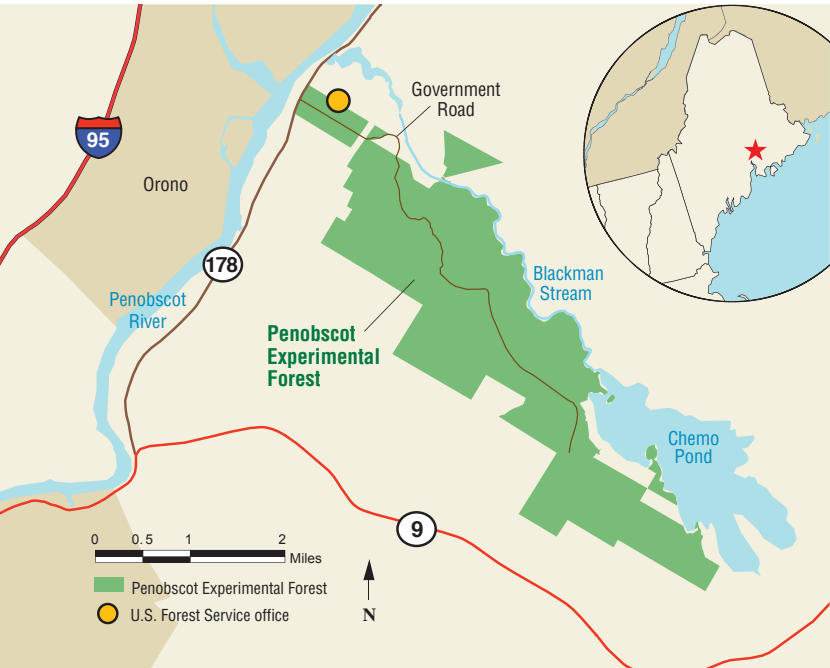

Photo by U.S. Forest Service.

Features

Soils on the PEF are the result of glacial processes and the principal parent material is glacial till derived from fine-grained sedimentary rock. Low till ridges consist of well drained soils including loams, stony loams, and sandy loams, while flat areas between ridges are poorly and very poorly drained loams and silt loams. Low areas are underlain by lake and marine sediments: poorly drained silt and silty clay loams. The climate is cool and humid. Mean annual temperature is 44.2 °F, with January the coldest (17.4 °F) and July the warmest (68.6 °F). Mean annual precipitation is 40 inches, with 42 percent falling during the 156-day growing season between May and October.

- **The PEF is in the Acadian Forest between the eastern broadleaf and boreal forests in the northeastern United States and adjacent Canada.**
- **Common trees include red spruce, balsam fir, eastern hemlock, eastern white pine, northern white-cedar, and hardwoods such as maples, birches, and aspens.**
- **Stand-replacing natural disturbances are rare and dominant tree species are long-lived and shade-tolerant.**
- **The forest is naturally multi-aged with high structural diversity.**

Map by U.S. Forest Service.

Research

The longest-running study on the PEF is an experiment covering more than 400 acres. This study consists of a dozen treatments representing a range of even- and uneven-aged silvicultural and exploitive cutting practices applied to replicated stand-level management units (MUs). Each MU contains sample plots on which data have been collected at intervals since the 1950s. The Forest Service and its cooperators have initiated hundreds of other studies, many within the long-term experiment, to determine the effects of disturbance on the forest ecosystem.

Science Delivery

Though research on the PEF was initiated in cooperation with forest industry, users of findings have long included forestry practitioners, researchers, students, landowners, policy makers, and the public. Research results are communicated through forest tours, demonstration areas, presentations, and publications. Visitors from as far away as Russia regularly travel to the PEF to see side-by-side comparisons of outcomes of management alternatives. More than 300 scientific publications have been produced so far, and much of the Forest Service's data are electronically available to researchers and students.

Photo by U.S. Forest Service.

Outcomes

Though studies spanning decades are long-term from a human perspective, they represent a small fraction of the lifespan of the dominant tree species on the PEF. The verdict is still out on which treatments are the most productive or sustainable over the long term, but we already know that some treatments have undesirable results.

- **The principal finding of Forest Service research on the PEF is that *silviculture matters*.**
- **To maintain composition and productivity in stands of shade-tolerant conifers, managers must retain those species and establish regeneration in partial shade.**
- **If shade-tolerant trees are harvested without considering the residual stand or new cohort, conversion to shade-intolerant, low-quality trees is likely.**

Partners

Collaboration with the University of Maine is the cornerstone of the Forest Service's research program on the PEF. The University Forests Office is responsible for management of areas not currently in research, and for overseeing administration of the forest. A Research Operations Team consisting of Forest Service scientists and University faculty coordinates activities and reviews proposals for new research installations. In addition, many scientists from other agencies and institutions in the U.S. and Canada commonly use the PEF for their work.

Facilities

The Forest Service maintains an office and meteorological station on the PEF.

U.S. Forest Service Experimental Forest and Range Network

Forest Service Research and Development (R&D) works at the forefront of science to improve the health and use of our nation's forests and grasslands. Research has been part of the Forest Service mission since the agency's inception. Today, Forest Service researchers work in a range of biological, physical, and social science fields; their research covers all 50 states, U.S. territories, and commonwealths. The Northern Research Station is one of six in R&D, and includes 20 states in the north-central and northeastern U.S., comprising both the most densely populated and most heavily forested portions of the country.

The Experimental Forest and Range (EFR) network contributes importantly to R&D's research infrastructure and is increasingly viewed as one of its most valued assets. There are currently 22 official experimental forests in the Northern Research Station, and 80 EFRs nationwide. Taken together, these sites provide a record of forests and forest change that dates back more than 100 years. Though initially focused on local and regional topics, EFRs are becoming increasingly networked to address issues of national and international concern such as climate change, carbon sequestration, air and water quality, and invasive plants and animals.

For more information about the Penobscot Experimental Forest

Websites:

http://nrs.fs.fed.us/ef/locations/me/penobscot/

http://forest.umaine.edu/penobscot-experimental-forest/

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