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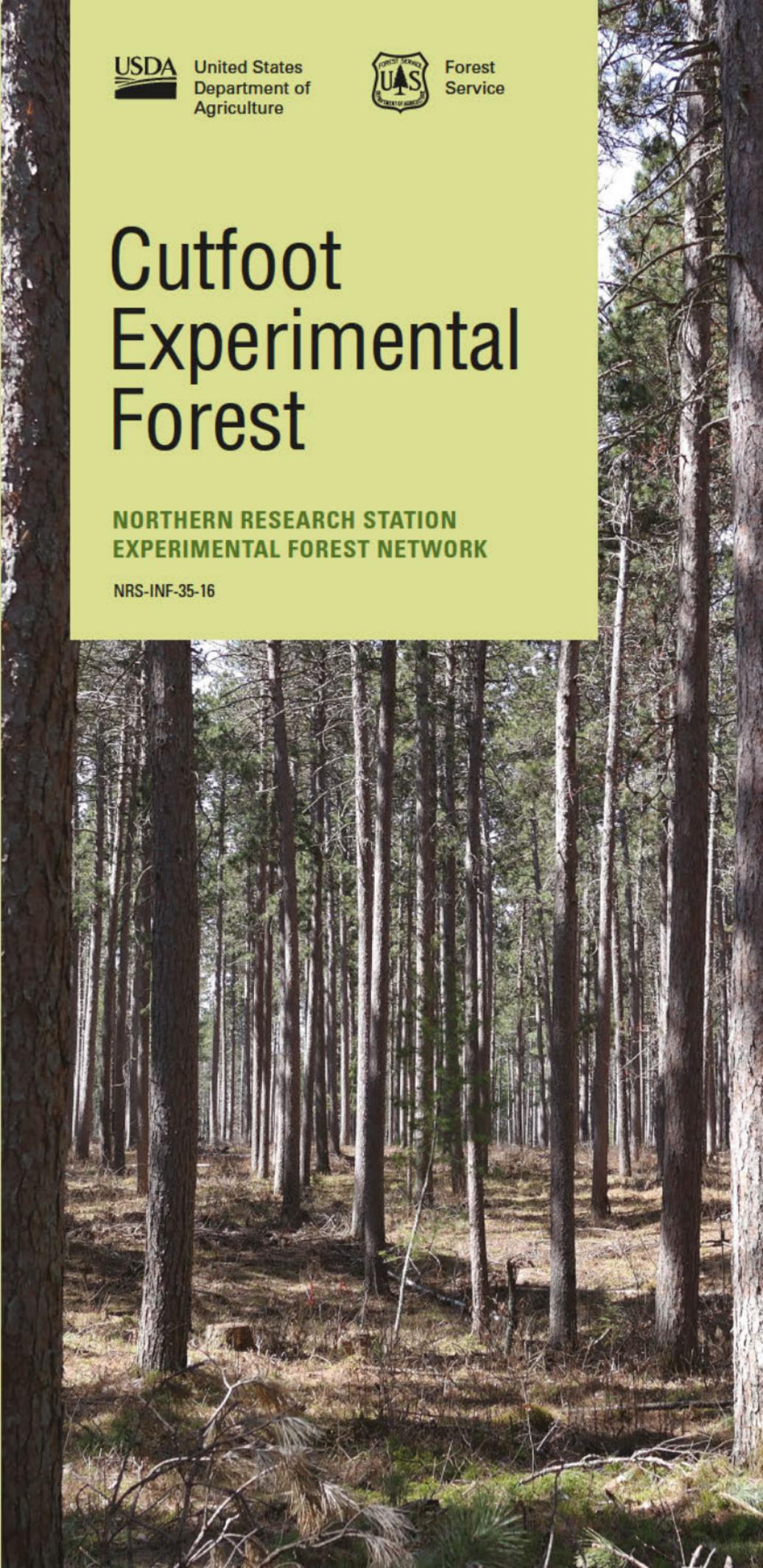


Forest  
Service

# Cutfoot Experimental Forest

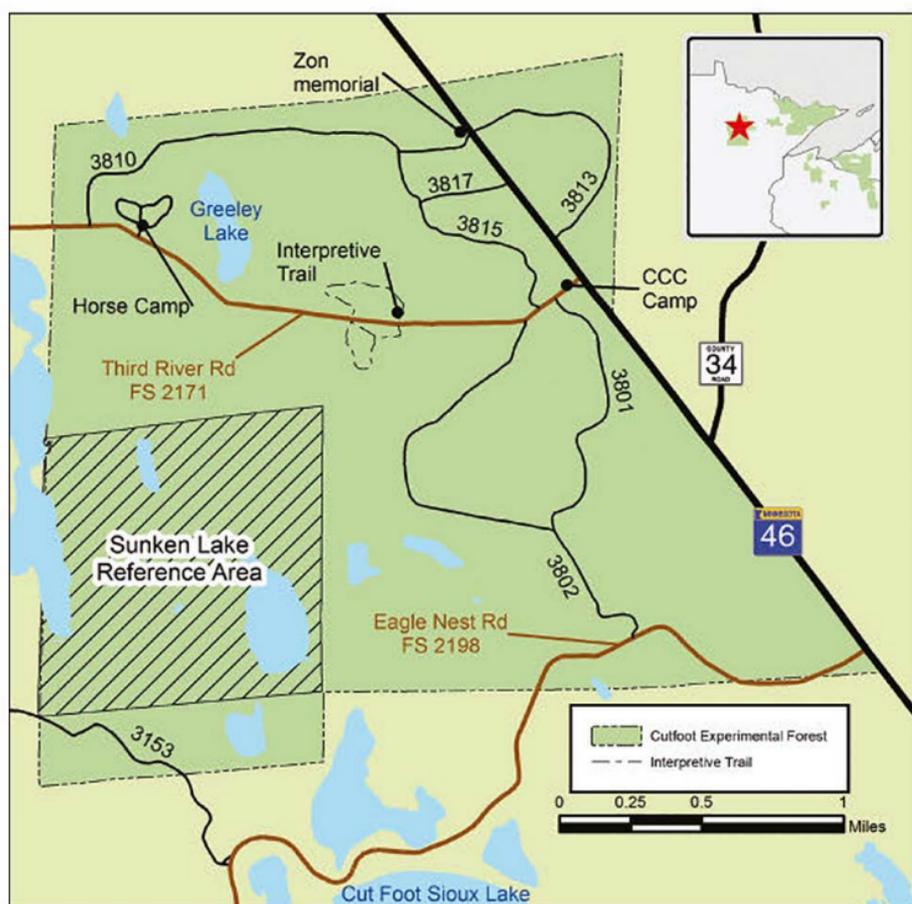
**NORTHERN RESEARCH STATION  
EXPERIMENTAL FOREST NETWORK**

NRS-INF-35-16



# Cutfoot Experimental Forest

The 3,100 acre Cutfoot Experimental Forest is located in north-central Minnesota, 20 miles north of the town of Deer River. The Cutfoot EF was established in 1932, with research dating back to 1923. The Cutfoot EF is home to over 100 studies on thinning, harvesting, growth, prescribed fire, and reforestation in red pine forests. The portion of Minnesota Highway 46 passing through the Cutfoot EF is known as the Avenue of Pines. The Avenue is well known for its scenic beauty and outstanding pine forests, many of which have been managed as part of the research program at the Cutfoot EF. Results of the studies conducted on the Cutfoot EF have been influential in shaping today's red pine management practices across the Lake States.



Map by U.S. Forest Service.



Above: Variable retention harvesting experiment (est. 2002) to restore complex woodland structure.  
Right: Original permanent tree tag from a 1924 study.  
Photos by D. Kastendick, U.S. Forest Service.



## Features

Most of the Cutfoot EF is fire-dependent dry-mesic woodland, dominated by red pine. Additional species include jack and eastern white pines, paper birch, balsam fir, quaking aspen, and red oak. Most of the forest is natural fire origin, with pines establishing after fires in 1870 and 1918. Average fire interval ranged from 8 to 15 years before European settlement. Cutfoot EF includes a small number of plantations, as well as the 640-acre Sunken Lake Reference Area. The EF contains a memorial commemorating Dr. Rafael Zon, who was instrumental in establishing the research branch of the Forest Service and designating the first experimental forests. After his death, his ashes were scattered near the memorial.

- **Site index for red pine is 55 feet at 50 years**
- **Native plant community: fire-dependent, northern dry-mesic mixed woodland**
- **Cool continental climate with average summer temperature of 60 °F and average winter temperature of 6 °F.**
- **Average annual precipitation is 20 to 25 inches**
- **Level to rolling well-drained medium to fine sand on glacial outwash parent materials**



Adaptive silviculture for climate change experiment (est. 2014); transition treatment, in which tree species better suited to a warmer, dryer growing season are being established. Photo by D. Kastendick, U.S. Forest Service.

## Research

Early research focused on methods of thinning and intermediate cutting to control growth and yield of the red pine forest type. There have also been studies on jack pine thinning, as well as prescribed burning for site preparation and understory competition control. Newer studies include a variable retention harvesting and mixed-conifer regeneration experiment (est. 2002), a variable density thinning experiment in red pine plantations (est. 2011), the adaptive silviculture for climate change experiment (est. 2014), and dendrochronological assessment of red pine growth response to drought.

## Science Delivery

Results of long-term and contemporary studies are used by foresters, researchers, graduate students, forest owners, and policy makers. Results and recommendations are delivered through tours, workshops, presentations, and publications. Ten to fifteen tours and workshops are conducted annually on Cutfoot EF studies. Numerous scientific publications document results and recommendations from long-term studies and newer experiments. The Cutfoot EF includes a 1.1-mile self-guided walking trail that traverses and highlights a variety of red pine silviculture research and demonstration areas.

## Outcomes

Results from thinning studies guide timber management of red pine across the Lake States. Dendroecological studies demonstrate that thinned stands have sustained growth during drought. Prescribed burning experiments demonstrate the lasting effect of fire on reducing shrub (hazel) competitors. Structural restoration and climate adaptation experiments demonstrate approaches for enhancing resilience of forests to climate change.

**Red pine basal area around 100 ft<sup>2</sup> per acre is optimal for timber production and growth during drought**

**Density of hazel is reduced for decades after several growing seasons of prescribed fires**

**Resilience of red pine forests to future climate can be enhanced with restoration of structure and composition**

## Partners

The Chippewa National Forest is an essential partner for administration of timber sales, application of treatments, and road maintenance on the EF. Partnerships with university collaborators are welcome and has been key for identifying research questions, collecting data, and dissemination of results. Researchers, graduate students, and post-doctoral scientists have come from the University of Minnesota, Michigan Technological University, U.S. Geologic Survey, the University of Vermont, the University of Maine, Michigan State University, Colorado State University, Iowa State University, and the University of Missouri.

## Facilities

There is no on-site housing, but the EF includes the Cutfoot Horse Camp that offers 34 seasonal camping sites for visitors with and without horses. Resorts in the area also provide opportunities for short-term rentals. Nearest communities are Squaw Lake and Deer River; Grand Rapids, MN, is about a 45-minute drive.

## 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 United States, 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. Collectively, 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

### Websites:

<http://www.nrs.fs.fed.us/ef/locations/mn/cutfoot/>

<http://www.nrs.fs.fed.us/units/crec/>

### Contacts:

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Cover photo: Cutting methods study—thinning from below; est. 1956. Photo by D. Kastendick, U.S. Forest Service.