



MARCELL EXPERIMENTAL FOREST

Grand Rapids, Minnesota



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Located in northern Minnesota, the 2,820 acre (1,140 ha) Marcell Experimental Forest (MEF) was established in 1960 to study forest management and hydrology in both peatlands and uplands. The MEF includes two parcels owned by federal, state, and local entities. Meteorological variables, streamflow, groundwater levels, snow water content, soil frost, soil temperatures, and water chemistry are routinely measured on the MEF with some records dating back nearly 50 years. The MEF is part of the National Atmospheric Deposition Program / National Trends Network, the Mercury Deposition Network, the Long-Term Soil Productivity Project, and the Climate and Hydrology Database Projects (CLIMDB/HYDRODB). With sensors deployed to measure water, carbon gas, and solute fluxes, the MEF is poised for studies of climate change effects on northern forests and other emerging issues in the ecosystem sciences.



Assets:

Scientists: 2 Northern Research Station scientists are conducting research on the MEF.

Scientific support: 5 technicians and/or professionals, including a full-time data manager, a site manager, and a chemist, provide support for this work.

Cooperators: University of Minnesota Twin Cities, Minnesota Division of Natural Resources, MN Pollution Control Agency, Science Museum of Minnesota, St. Croix Watershed Research Station, University of Toronto-Mississauga, Gustavus Adolphus College, U.S. Geological Survey, Southern Research Station, Rocky Mountain Research Station.

Needs:

Annual operating costs: \$327,307

Critical needs:

- Update sensors and chart recorders to electronic data-logging systems with capacity to remotely monitor streamflow via phone or satellite access - ~\$125,000
- Extend power lines 1 mile to a bog site where an eddy covariance system measures carbon dioxide and methane fluxes - ~\$15,000
- Provide LAN /wireless access to scientists and collaborators working at the Marcell

The Marcell Experimental Forest is administered by the:

U.S. Forest Service, Northern Research Station
1831 Highway 169 East, Grand Rapids, MN 55744
218-326-3152

Key Contact: Randy Kolka, 218-326-7115, email rkolka@fs.fed.us

Address of the MEF:

Marcell Research Center
43122 Wilderness Trail

Long-term needs:

- Update lab space, address structural deficiencies at the Grand Rapids Chemistry Lab (\$650,000 approved for 2010)
- Data management support to put written records into digital database - \$6,500/yr

More About the Marcell Experimental Forest

Location: Lat. 47°32' N, long. 93°28' W

The MEF is located about 25 miles (40 km) north of the city of Grand Rapids, MN.



Vegetation: In the MEF, sandy outwash soils in the uplands support red and jack pine in fire-origin stands or in plantations, along with mixed stands of aspen, white birch, balsam fir, and white spruce. Sandy loam till soils in the uplands support mainly aspen, birch and northern hardwood stands. Forested bogs contain black spruce and tamarack. Both forested and open bogs are dominated by sphagnum mosses and ericaceous shrubs. Forested fens contain similar species as the bogs but also include northern white cedar and black ash. Open, poor fens are dominated by sedges and a variety of mosses.

Climate: The climate at the MEF is continental, with moist warm summers and relatively dry, cold, and sunny winters. Mean annual precipitation is 31 inches (780 mm) with about one-third occurring as snow. The mean annual temperature is 38 °F (3.3 °C) with mean monthly temperatures are between 61 and 66 °F (16 and 19 °C) in June, July, and August and between 5 and 12 °F (-11 and -15 °C) in December, January, and February.

Research—past and present: Early studies in the 6 calibrated watersheds quantified water and energy budgets, characterized the physical properties of peat, and measured hydrological responses to silvicultural treatments in uplands and wetlands. In recent decades, Forest Service scientists and collaborators have studied nutrient and metal biogeochemistry, atmospheric pollutants, trace gas emissions from wetlands, carbon cycling, and the effects of mercury pollution. Information from the site has been used to understand peatland functions in northern ecosystems, develop hydrologic models, implement best management practices in forested ecosystems, and evaluate techniques that have later been incorporated into national research programs.

Research opportunities: The comprehensive long-term water, soil, atmosphere, and vegetation databases at the MEF afford graduate students and collaborative scientists a unique opportunity to study watershed and landscape aspects of upland and peatland systems in the northern Lake States. In addition to the experimental watersheds, other research areas and demonstration sites are available for study.

Facilities: The new Marcell Research Center was dedicated in October 2006. The facility has sleeping quarters, laboratory space, a conference room, full kitchen and dining areas, and a washer/dryer. The Marcell Research Center is available to host meetings, classes, and small conferences, as well as house our collaborators.

More information can be found at: <http://www.nrs.fs.fed.us/ef/locations/mn/marcell/>