

UNITED STATES DEPARTMENT OF AGRICULTURE
FOREST SERVICE

ESTABLISHMENT REPORT

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for

SCHROEDER RESEARCH NATURAL AREA

WITHIN THE

SUPERIOR NATIONAL FOREST

Cook County,

Minnesota



North Central Forest Experiment Station

St. Paul, Minnesota

Schroeder / Superior

DESIGNATION ORDER

By virtue of the authority vested in me by the Secretary of Agriculture under Title 36, Section 251.23 of the Code of Federal Regulations, I hereby designate as the Schroeder Research Natural Area, the lands described in the preceding report by Lewis F. Ohmann, dated March 28, 1973; Said lands shall hereafter be administered as a research natural area subject to the said regulations and instructions thereunder.

July 2, 1973
(Date)

John R. McGuire
Chief

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Principal Distinguishing Features

The Research Natural Area comprises 146 hectares (360 acres) just within the southern boundary of the Superior National Forest near Schroeder, Minnesota (fig. 1). The Area is being established to protect 16 hectares (40 acres) of virgin northern hardwoods. This 16-hectare plant community is a remnant of what was once a significant belt of northern hardwoods paralleling the north shore of Lake Superior. This community is typical of the more extensive areas formerly present in that the sugar maple (Acer saccharum Marsh.) is of poor quality from a growth, yield, and utilization point-of-view. The poor growth form of sugar maple along this belt is considered indicative of its precarious presence along this north and west fringe of its range. More specifically it is representative of the northern section of the belt where basswood (Tilia americana L.), one of the usual components of Minnesota northern hardwoods communities, is missing (Flaccus 1965).

Flaccus, E. F., 1965. Distribution in Minnesota of Acer saccharum, Tilia americana, and Betula lutea. J. Minn. Acad. Sci. 32(2): 95-97.

The remaining 130 hectares (320 acres) are included primarily as a buffer for protection of the central 16 hectares. The buffer acres contain more variety in forest type including northern hardwoods and swamp conifers. All of these communities have been directly disturbed by man, specifically by removal of yellow birch (Betula lutea Michx.), paper birch (Betula papyrifera Marsh.), white spruce (Picea glauca (Moench) Voss), and white-cedar (Thuja occidentalis L.).

The Area contains no rivers or lakes, but is located within five kilometers (3 miles) of Lake Superior. Mean elevation at the Lake is about 183 meters (600 feet) and the topography rises at about 50 m/km to about 472 meters (1,550 feet) a few kilometers west of the Research Natural Area. The relationship of the northern hardwoods belt to Lake Superior is not well known but has been speculated on by Flaccus and Ohmann (1964), Grigal (1968), and more recently by Grigal and Arneman (1970). Grigal and Arneman hypothesize that a backflow of air from the lake to the surrounding uplands during the critical frost season in spring is the determining factor which allows sugar maple to compete on the southeast facing slopes of the uplands near Lake Superior.

Flaccus, E. F., and L. F. Ohmann. 1964. Old-growth northern hardwood forests in northeastern Minnesota. *Ecol.* 45(3): 448-459.

Grigal, D. F. 1968. The relationship between plant communities and soils in northeastern Minnesota. Ph.D. Thesis, Univ. Minn. (Diss. Abstr. 29:2260B).

Grigal, D. F., and H. F. Arneman. 1970. Quantitative relationships among vegetation and soil classifications from northeastern Minnesota. *Can. J. Bot.* 48(3): 555-566.

Two abandoned logging roads penetrate the buffer area from the south and an old shack remains within the buffer zone north of the virgin acres.

Location

The proposed Research Natural Area is about 5 kilometers (3 miles) west of Schroeder, Minnesota. The southern boundary coincides with the Superior National Forest boundary where it abuts Lake Superior along the south line of Township 59 North. The other three boundaries are comprised of portions of sections 33 and 34 within Township 59 North, Range 5 West. The entire Research Natural Area is in federal ownership.

The Area's legal description is:

Township 59 North, Range 5 West.

Section	Subdivision
33	SE 1/4, SW 1/4 NE 1/4, SE 1/4 NE 1/4
34	SW 1/4 NW 1/4, NW 1/4 SW 1/4, SW 1/4 SW 1/4

The area can be reached by foot over an old logging road that accesses from an abandoned portion of County Road No. 1 west of Schroeder, Minnesota.

Area by cover types

A timber type map is available at the scale of 5 cm per 1.6 km (2 inches per mile) based on 1948 aerial photography (fig. 1). A more recent compartment timber type diagram is available based on 1961 aerial photography (series DKG) (fig. 2). Approximate acreage by cover type is:

<u>TYPE</u>	<u>DESCRIPTION</u>	<u>ACRES</u>
M8 2 (22)	Maple-birch; adequately stocked sawtimber with adequately stocked seedlings and saplings	199
M7 F5 (23) M7 F5 (21)	Maple-birch; inadequately stocked sawtimber with adequately stocked spruce and fir poles	27
M8 (15)	Maple-birch; adequately stocked sawtimber	52
Q8 (5) Q8 (14)	Mixed swamp conifers; adequately stocked sawtimber	47
Q7 (6)	Mixed swamp conifers; inadequately stocked sawtimber	30
PR2 F2 (8)	Red pine plantation	<u>5</u>
TOTAL		360

The northern hardwood type is dominated by sugar maple (SAF type 27 - sugar maple). The mixed swamp conifer type is dominated by white-cedar (SAF type 34 - white-cedar).

Within the central 16 hectares sugar maple volume is estimated to be about 1,000 board feet per acre, birch at 200 board feet, and spruce and cedar about 700 board feet with sugar maple cull as high as 70 percent. The high cull reflects the poor growth form of the sugar maple referred to previously.

Physical and Climatic Conditions

The Area is located within the "coastal hills" physiographic division of Grout, Sharp, and Schwartz (1959). Elevation increases from the southeast to the northwest corner of the Area as a consequence of the general increase in land elevation away from Lake Superior. The Area's elevation is about 381 m. (1,250 ft.) in the southeast corner increasing rather gradually about 30 m. (100 ft.) then abruptly decreasing to about 390 m. (1,280 ft.) in a white-cedar swamp. This topographic low forms a trough running northeast-southwest through the southeast part of the Area. From the swamp the topography increases sharply for a short distance and then more gradually to about 457 m. (1,500 ft.) in the northwest corner of the Area (fig. 3).

The nearest major climate recording station is Grand Marais, Minnesota, also located on the lakeshore about 48 km. (30 miles) northeast of Schroeder. The region has moderately cool summers and cold winters. Mean annual precipitation is about 66 cm. (26 in.) at Grand Marais. Precipitation is higher in summer than in the winter. Annual snowfall averages over 178 cm. (70 in.) in the Area. Mean frost-free season is about 129 days at Grand Marais. Mean minimum January temperatures are about -14° C. (6° F.) along most of the lakeshore but they average lower (down to -21° C. (-6° F.)) inland. Mean maximum July temperatures are about 21° C. (70° F.) at Grand Marais.

Grout, F. F., R. P. Sharp, and G. M. Schwartz. 1959. The geology of Cook County, Minnesota. Univ. Minn. Press, Minneapolis. 163 pp.

Lake Superior undoubtedly affects the climate impinging on the Area (for instance, the influence of the lake in regard to spring frosts mentioned earlier); however, many effects are minimized by prevailing westerly winds and the steepness of the uplands bordering the lake (Baker and Strub 1965).

Description of Values

1. Flora.

The plant community descriptions and dynamics discussed by Flaccus and Ohmann (1964) are applicable to the Research Natural Area. The central 16 hectares is an undisturbed example of the plant community type described by these authors; in fact, three of the communities detailed in their report are from Township 59N., Range 5W., one of them (Two Island River stand) is located in Section 28 adjacent to the Area. These stands were studied and described before logging.

The contiguous buffer zone appears adequate to maintain the ecological integrity of the central area. The plant communities of the buffer acres are examples of secondary succession following varying degrees of logging disturbance and are, therefore, also of considerable ecological interest. For example, part of the buffer acreage is a northern hardwoods type that has been selectively logged for yellow and paper birch, white spruce, and white-cedar, while the sugar maple component was very little disturbed. This condition will provide an especially interesting ecological contrast to the virgin area.

Baker, D. G., and J. H. Strub, Jr. 1965. Climate of Minnesota. Part III. Temperature and its applications. Agric. Exp. Stn. Tech. Bull. 248, 63 pp.

2. Fauna.

The proposed Research Natural Area offers best opportunity for the study of animals and birds with limited home ranges because of the limited size and consequent lack of habitat variety within the 16 hectares. The contrast in fauna present in the virgin area versus the surrounding non-northern hardwood plant communities should be of great ecological interest.

3. Geology.

The bedrock along Lake Superior is basic igneous rock ranging from the coarser Duluth gabbro inland to finer-ground flows and intrusives bordering the lake. The Area also includes lavas ranging in composition from olivine basalt to rhyolite. There are also some interbeds of conglomerate and related sedimentary rocks. The Township's bedrock is predominantly basalt flow (some ophitic or porphyritic) of middle Keweenaw volcanics. An outcropping of basalt is recorded in the NW 1/4 SW 1/4 of Section 34 within the Area (Grout, Sharp, and Schwartz 1959).

The Township has an extensive cover of glacial drift although there are a few small exposures of flows, sills, and dikes. Sharp (1953) shows that the drift cover is mostly in drumloid belts.

Sharp, R. P. 1953. Glacial features of Cook County, Minnesota.
Am. J. Sci. 251: 109-139.

Soils of the Area are derived from the reddish tills of the Superior and Rainey lobes of the Cary, the Superior lobe of the Mankato, and the Superior lobe of the Valders substages of Pleistocene glaciation. Flaccus and Ohmann (1964) described the soils of three northern hardwoods communities located in Township 59N. as well-drained loams and sandy loams tentatively classed as brown podsolics with podsolization only weakly evident. Grigal (1968) describes the soil of a sugar maple stand just south of the Area as a sandy Aquentic Haplorthod. However, on the basis of this and two other stands of northern hardwoods studied, he states that the soils are not as important to the maintenance of these sugar maple stands as is the spring frost suppression effect of Lake Superior. The soils of the general area are classed by the Planning Division of the Superior National Forest as belonging to the Warba-Chisholm soil association.

4. Minerals.

Economic bodies of ore are not known to exist within the Area. Future mineral exploitation in the immediate vicinity is not considered likely. Present known interest in minerals of the region is confined to the base of the Duluth gabbro intrusion west of the Area.

Mineral reservations are outstanding on all descriptions except NW 1/4, SE 1/4, Sec. 33, T59N, R5W.

5. Recreation.

No intensive recreational use or research is expected or planned for this Area. It is situated near enough to a county road and an old logging road to expect occasional use by hunters and by hikers especially during the fall season. The autumn color of the northern hardwoods vegetation along the north shore of Lake Superior attracts many visitors, but most of this activity consists of auto-touring and viewing from vantage points rather than hiking. There appears to be no present need for management designed to limit recreational use of the Area.

6. Water.

The Area is located within the drainage basin of Lake Superior. No natural streams or lakes occur within the Area, and no problems of water regulation, diversion, or pollution are anticipated. No indirect effects from water use or discharge on other portions of the watershed are known or expected.

Recommendation

The proposed Research Natural Area contains a small virgin remnant of the unique northern hardwood vegetation that grows along the north shore of Lake Superior. The Area represents a plant community type that has had some basic ecological research which should serve as a foundation to future valuable scientific and educational use of the Area. The reserve is large enough to provide essentially undisturbed conditions within the natural portion to maintain the ecological integrity of the community that is necessary for long-term ecological studies. It is recommended that the Area described in this report be established and designated as the "SCHROEDER RESEARCH NATURAL AREA."

28 March 1973
Date

Louis J. Ohmann
Reporting Officer

April 4, 1973
Date

[Signature]
Director
North Central Forest Experiment Station

5-7-73
Date

Harold E. Guderson
Supervisor, Superior National Forest

5/21/73
Date

John H. Cravens
Regional Forester