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# A Survey of the Vascular Plants of Norway Dunes

JANET BOE\*

**ABSTRACT** — Norway Dunes, a 320-acre preserve located in Kittson County, Minnesota, and owned by The Nature Conservancy, is named for the parabolic sand dunes found within its boundaries. These dunes are covered with oak sand savanna, a natural community that is threatened in Minnesota. This oak sand savanna harbors four plant species that are also threatened or of special concern in the state. A deciduous forest and four types of wetlands are other natural communities on the preserve. During a vascular plant survey of the tract, 207 species were collected. Some of these species represent range extensions within the state.

## Introduction

Norway Dunes, a 320-acre natural area located in Kittson County in the extreme northwestern corner of Minnesota, was acquired for preservation in 1982 by The Nature Conservancy. To provide information for management decisions, inventories were conducted in 1983 to determine the species of mammals, birds and vascular plants present on the preserve. The vascular flora of Norway Dunes is the major focus of this paper.

The tract consists of the eastern half of section 10 in Norway Township and includes about 100 acres of oak sand savanna on parabolic sand dunes (Figure 1) formed by the accumulation of windblown sand from the shore of Glacial Lake Agassiz (1). This savanna is listed as a threatened natural community in Minnesota by the Natural Heritage Program of the Department of Natural Resources (2). The remaining 220 acres include an ash-elm swamp, an emergent marsh, a shrub swamp dominated by several species of willow (*Salix* spp.) and a wet meadow, as well as a deciduous forest composed predominantly of trembling aspen (*Populus tremuloides*).

Most of the oak sand savanna appears to be relatively unchanged from its presettlement structure and composition despite past grazing attempts (3). A few introduced species were found near the southern boundary where the land is nearly flat, suggesting that cultivation might have been attempted. Other past human disturbances include use of the area as a rifle range in the 1920s and 1930s, trails worn on the sand dunes by recreational vehicle users, and a stand of jack pine (*Pinus banksiana*) planted by previous owners near the southern edge of the dunes.

A major drainage ditch runs diagonally through the eastern quarter of the preserve, adjacent to the wet meadow and through the deciduous forest. The ditch grade harbors a dense growth of red raspberry (*Rubus idaeus*) and other shrubs as well as trembling aspen and balsam poplar (*Populus balsamifera*).

No active blowouts exist on the sand dunes, but pocket gopher (*Geomys bursarius*) mounds merge to form open spots and recreational vehicles have eroded plant cover from the dunes in some areas.

An occasional charred aspen was encountered on the preserve indicating that fire was a factor affecting the vegetation in the past. In 1984 The Nature Conservancy instituted a program of prescribed burning on the oak sand savanna.

Norway Dunes has long been of interest to botanists, and several have collected plants there in the past. Moore (4) recorded a number of plants from the area in his compilation of the flora of Kittson County. In addition, Smith (5) and Morley (6) collected plants on the oak sand savanna in July, 1982; their collections included lesser spiked sedge (*Carex obtusata*), reflexed rockcress (*Arabis holboellii* var. *retrofracta*), clustered broomrape (*Orobanche fasciculata*), and Louisiana broomrape (*Orobanche ludoviciana*). All these plants are threatened or of special concern in Minnesota (7) and were first recorded in Kittson County by Moore (4).

## Materials and Methods

The different plant communities present on the preserve were identified by viewing aerial photos and by reconnaissance on foot. These communities were systematically searched, and new plants were recorded as they were encountered. Data recorded for each collection included a description of the area in which the plant was found, a subjective determination of abundance, a list of associated species, and the exact location on the preserve. Each collection site was recorded on a Mylar aerial photo overlay.

All of the collections were made during 12 trips to Norway Dunes from May through August of 1983 with the exception of one plant collected incidentally on an October trip in 1984. Because of the importance of the oak sand savanna, the dunes were searched on each visit to the preserve. Each of the wetlands and the deciduous forest were searched at one- to two-month intervals during the field season.

Nomenclature follows Fernald (8) except where otherwise noted. Information regarding range extensions was gathered from the Minnesota plant distribution files at the University of Minnesota herbarium in St. Paul (9), unless otherwise indicated. Original collection records and a list of vascular plants collected on Norway Dunes (10) are on file at the offices of

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Figure 1. Oak sand savanna on parabolic sand dunes at Norway Dunes

the Minnesota Chapter of The Nature Conservancy in Minneapolis. Specimens have been deposited in the herbarium of the University of Minnesota in St. Paul.

## Results and Discussion

### Oak Sand Savanna

The sand dunes, located in the southwest corner of the preserve (Figure 2), project a terraced effect, increasing to a height of about 30 ft in the north. Dry to dry-mesic prairie covers the dunes, and scattered about the prairie are gnarled bur oaks (*Quercus macrocarpa*), 5 to 15 ft in height. A large clone of trembling aspen is invading the oak sand savanna from the west, and a few smaller clones occur on the dunes proper. Colonies of American hazel (*Corylus americana*) have a scattered distribution in the hollows formed by the dunes. Bog birch (*Betula pumila* var. *glandulifera*), a shrub usually found in wetlands, is found here growing among dry prairie plants. The dwarfed form of prairie willow (*Salix humilis* var. *microphylla*) is a common low shrub, and sand cherry (*Prunus pumila*) and rough alder (*Alnus rugosa*) are other common woody plants on the dunes. The landscape, however, is dominated by native prairie grasses, including little bluestem (*Andropogon scoparius*), blue grama (*Boutelous gracilis*), reed grass (*Calamovilfa longifolia*), June grass (*Koeleria cristata*), needle grass (*Stipa comata*), and porcupine grass (*Stipa spartea*). Rock spikemoss (*Selaginella rupestris*), creeping juniper (*Juniperus horizontalis*), and bearberry (*Actostaphylos uva-ursi*) provide most of the ground cover.

Other dry or dry-mesic prairie species found on the oak sand savanna include false heather (*Hudsonia tomentosa*), silky prairie clover (*Petalostemum villosum*), pasqueflower (*Anemone patens*), narrow-leaved puccoon (*Lithospermum incisum*), prairie violet (*Viola pedatifida*), prairie gentian (*Gentiana puberula*), and Drummond's campion (*Lychnis drummondii*).

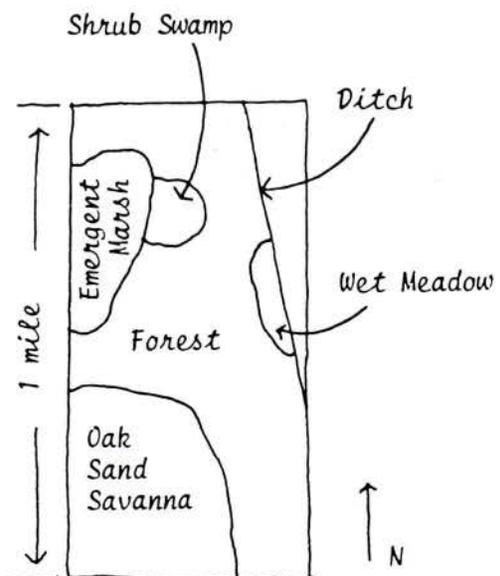


Figure 2. The plant communities of Norway Dunes.

The two broomrapes (clustered and Louisiana) found on Norway Dunes are root parasites, occur on sand dunes or dry prairies throughout their range (11), and are threatened species in the state. Clustered broomrape is common on the western half of the sand dunes; however, because of its lack of green color, it is difficult to locate except when in bloom in mid-June. Louisiana broomrape also blends well with the sandy substrate except when blooming in mid-July. This species had a scattered distribution throughout the sand dunes and was less common than clustered broomrape.

Reflexed rockcress, a species of special concern in the state, has been collected only in Kittson and Cook counties in Minnesota (11). The plant is common at Norway Dunes except in the northeast corner. Its reflexed fruits are easily observed after early July.

Lesser spiked sedge, another species of special concern, seems to prefer the western half of the sand dunes and appears to be uncommon there. This plant blooms in early May, and in 1983 dark brown, shiny perigynia were still present during the last week of May.

#### *Ash-Elm Swamp*

A foot of standing water was present in the ash-elm swamp the last week of May; by late July only moist soil remained. The canopy consists principally of American elm (*Ulmus americana*), green ash (*Fraxinus pensylvanica*), and box elder (*Acer negundo*). The dense shrub layer includes pussy willow (*Salix discolor*), red osier (*Cornus stolonifera*), and wild black currant, (*Ribes americanum*). Starflower (*Trientalis borealis*), nodding trillium (*Trillium cernuum*), and the sedges *Carex gracillima*, *C. rosea* and *C. peckii* were among the herbs collected in the swamp.

#### *Wet Meadow*

Vegetation in the wet meadow was dominated by sedges and grasses. This wetland held several inches of standing water in early June but dried out as the season progressed. Yellow stargrass (*Hypoxis hirsuta*) and sundrops (*Oenothera perennis*) were recorded from the wet meadow during the first weeks of June. Other early summer collections included scarlet Indian paintbrush (*Castilleja coccinea*) and its yellow form (*C.c. forma lutescens*), blue-eyed grass (*Sisyrinchium mucronatum*), and dwarf groundsel (*Senecio pauperculus*). Ladies' tresses (*Spiranthes cernua*), Flodman's thistle (*Cirsium flodmani*), fringed gentian (*Gentiana procera*), and Andrew's gentian (*Gentiana andrewsii*) were collected later in the season.

#### *Shrub Swamp*

The shrub swamp consisted of park-like *Salix* spp. with a graminoid herb layer. Willows were chiefly *Salix discolor* and *S. candida*. Graminoids included manna grass (*Glyceria striata*), rigid meadow sedge (*Carex tetanica*), and cottongrass (*Eriophorum angustifolium*).

#### *Marsh*

Several feet of standing water were present in the marsh in late May, but by August it was a mudflat with plant stems poking through. Tall emergents included hardstem bulrush (*Scirpus acutus*), wide-leaved cattail (*Typha latifolia*), bog reed grass (*Calamagrostis inexpectata*) and prairie cord grass (*Spartina pectinata*). Pondweed (*Potamogeton natans*) and bladderwort (*Utricularia intermedia*) were also collected in the marsh.

#### *Deciduous Forest*

The deciduous forest on Norway Dunes consists of mixed stands that are predominantly trembling aspen but include bur oak, American elm, green ash, and balsam poplar. Herbs collected in the forest included New England Aster (*Aster novae-angliae*) and yellow lady's slipper (*Cypripedium calceolus* var. *parviflorum*).

#### *Range Extensions*

During this study, 207 species in 56 families were collected. An additional 30 species were collected by Smith (5) and Morley (6). A few of these collections represent noteworthy range extensions within the state. The record of false heather from Kittson County represents a northwestern range extension for this plant in the state, and the collection of three-toothed cinquefoil (*Potentilla tridentata*) at this location extends its range to the west (6).

Most collection sites for *Spiranthes cernua* in Minnesota occur in eastern and east-central counties, with only three collections from the westernmost counties. The Kittson County collection is an extension of this range to the northwest. The sundrops collections (4, 10) represent disjunct northwestern occurrences for this plant, which is otherwise found in eastern and northeastern parts of the state.

In addition to these range extensions, two of the seven records of Drummond's campion in the state are from Kittson County, four are from counties in the central part of the state, and the seventh is from a southeastern county (9, 12).

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