PLANTS

SMOOTH GOOSEFOOT REDISCOVERED IN MANITOBA

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Introduction

Smooth Goosefoot (*Chenopodium subglabrum* (S. Wats.) A. Nels.), is a nationally rare annual plant that typically grows in active to semi-stabilized sand dunes and blowouts, and along eroding, sandy river banks and coulees.[2, 5, 8, 10] B. Boivin and E. Laisley collected one specimen of Smooth Goosefoot in the Oak Lake Sand Hills of Manitoba in 1959. Despite periodic searches over several decades by botanists at the Manitoba Conservation Data Centre (MCDC), The Manitoba Museum and University of Manitoba, no other plants have been found. As 45 years had passed since this species was first found, the MCDC was considering changing the status of this plant from S1 (very rare throughout its range or in the province) to SH (historically known) or SX (believed to be extirpated provincially).[6] The rediscovery of Smooth Goosefoot in Manitoba in the summer of 2004 ensures that it will retain its S1 status and possibly be legally protected under Manitoba's *Endangered Species Act, 1990*.

Manitoba has six major areas of sand hills in the southwestern corner of the province: Brandon, Lauder, Oak Lake, Routledge, Souris and St. Lazare.[3] The Brandon Sand Hills (also known as Assiniboine Delta and Carberry Sand Hills) are the largest, covering 964 km^2; part of this area lies within the borders of Spruce Woods Provincial Park. The Souris, Oak Lake, Lauder and Routledge Sand Hills west of Brandon, are adjacent to each other and together cover about 198 km^2. The St. Lazare Sand Hills, covering only 62 km^2, occur along the Assiniboine River near the Saskatchewan border.

Active sand dunes are dynamic habitats so their exact location changes over time. Elizabeth Punter (pers. comm.) noted that open sand dunes are shown about 6.4 km north of Oak Lake on the 1959 edition of the 62F/15 1:50 000 provincial topographic map. However, her impression of that area now is that it is "treed or scrub, grazed, or had houses built on it, and possibly may have been disturbed (for sand and gravel) when the highway was rebuilt." If this was the area where Smooth Goosefoot was first found, it is likely no longer suitable habitat, as this species requires some active sand. Only the Brandon Sand Hills contain actively moving sand dunes; the other sand hills in Manitoba contain some bare sand in the form of sand plains, semi-stabilized dune ridges and/or exposed blowouts. [11]

Unlike the sand hills in Alberta and Saskatchewan, Manitoba's sand hills contain significant cover of woody species such as alder (*Alnus* spp.), American Elm (*Ulmus americana*), Balsam Poplar (*Populus balsamifera*), birch (*Betula* spp.), Bur Oak (*Quercus macrocarpa*), Chokecherry (*Prunus virginiana*) and Manitoba Maple (*Acer negundo*). This is largely because Manitoba's sand hills occur in the moister and more fertile Aspen Parkland ecoregion

Figure 1. Smooth Goosefoot (centre) growing in the Routledge Sand Hills, August 23, 2004 ***Diana Robson***

rather than the Moist Mixed Grassland and Mixed Grassland ecoregions where the major Alberta and Saskatchewan sand hills occur. [1]

Field Observations in 2004

While conducting Smooth Goosefoot surveys we found this species in the Routledge Sand Hills of Manitoba on August 23, 2004 (Figure 1). Rather than visiting the Oak Lake Sand Hills where the first population was found, we decided to visit a nearby dune ridge in the Routledge Sand Hills that contained a population of the nationally rare Western Spiderwort (*Tradescantia occidentalis*). The bare sand at this site was thought to be appropriate habitat for Smooth Goosefoot.

At this site, Smooth Goosefoot plants were growing on an eroding dune ridge that had partly stabilized (Figure 2). Two plants were growing about 2 m apart on a west-facing slope, and a second group of 17 plants was spread over a 36 m^2 area on a south-facing slope approximately 20 m away. All plants observed were in flower or in seed. The areas where the Smooth Goosefoot was growing had about 40% vegetation cover. Associated species included Narrowleaf Goosefoot (*Chenopodium pratericola*), Nuttall's Sunflower (*Helianthus nuttallii*), Hairy Golden Aster (*Heterotheca villosa*), Creeping Juniper (*Juniperus horizontalis*) and wild roses (*Rosa* spp.). Six provincially rare plants also occurred in the same area: Sand Bluestem (*Andropogon hallii*), Sand Nut-grass (*Cyperus schweinitzii*), Ball Cactus (*Escobaria vivipara*), Annual Skeletonweed (*Lygodesmia rostrata*), Louisiana Broom-rape (*Orobanche ludoviciana*) and Indian Rice Grass (*Achnatherum hymenoides*).[6] The Louisiana Broom-rape had never been recorded on this dune ridge before. Voucher specimens and digital photographs of Smooth Goosefoot and Louisiana Broom-rape were taken and are filed at The Manitoba Museum.

Figure 2. The partly stabilized dune ridge habitat of Smooth Goosefoot in the Routledge Sand Hills, August 23, 2004 ***Diana Robson***

On August 25, 2004 Smooth Goosefoot was searched for in the Brandon Sand Hills along Spirit Sands Trail in Spruce Woods Provincial Park but only Narrowleaf Goosefoot was observed. Nonetheless, the species may still be present, since this area is large and not all of it was searched. None of the other sand hills in Manitoba was searched.

Discussion

There are several possible reasons why Smooth Goosefoot was not found growing at this site in previous years. One is that botanists visiting the sand hills did not see this inconspicuous plant. Smooth Goosefoot is often less than 10 cm tall and, if hidden amongst taller vegetation, would not be detected easily, especially if the population is small. Furthermore, Smooth Goosefoot closely resembles Narrowleaf Goosefoot, which occurs in the same habitat (Table 1).[7] Since detecting most of the distinguishing characters requires close examination, anyone not inspecting each *Chenopodium* plant in the area could overlook Smooth Goosefoot.

The second possible reason for the lack of detection in the past relates to the annual nature of Smooth Goosefoot. Annual plants in dry environments, like sand hills, go dormant and germinate, grow and produce seeds rapidly when moisture is temporarily available.[4] Lamont and Gerry asserted that dry weather could limit the persistence or spread of Smooth Goosefoot.[5] The dramatic increase in the number of individuals observed by the first author at most sites in Saskatchewan in 2004, coupled with the observation that the summer of 2004 was unusually wet and cool, suggests that maximum seed germination occurs under moist conditions. This means that Smooth Goosefoot seeds are likely capable of remaining dormant for many years, possibly even decades, only germinating under appropriate conditions. If the sand hills were visited in dry years, or more specifically in

Table 1. Key taxonomic differences between Smooth and Narrowleaf Goosefoot. [7]

Character	Smooth Goosefoot	Narrowleaf Goosefoot
No. leaf veins	One	Three
Seed size	~1.5 mm	0.9-1.2 mm
Leaf vestiture	Glabrous to very sparsely farinose	Moderately to densely farinose
Leaf shape	Linear	Linear to lanceolate or oblong-elliptic
Leaf margin	Entire	Entire or toothed

years when rainfall did not occur in late summer, Smooth Goosefoot may have been present only in the seed bank.

The Manitoba population of Smooth Goosefoot is disjunct from the species' main range. The closest known population in Canada is about 550 km to the northwest in the Pelican Lake Sand Hills near Caron, Saskatchewan, and the closest known population in the United States is about 350 km to the southwest in the Little Missouri National Grassland of North Dakota.[9] The Manitoba population may be unique genetically due to its isolation. Additional field work in other sand hills of Manitoba is required to determine the health and true extent of this rare, outlying population.

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"In the nineteenth century orchids were collected by the ton. Once, four thousand trees were cut down for the orchids growing on them. One collector alone was said to have sent one hundred thousand orchids to England, many of which died.
Wilhelm Micholitz sent home an orchid growing in a human skull, which was auctioned for a hugh sum complete with container."

Diana Wells, *100 Flowers and How They Got Their Names*, p. 157