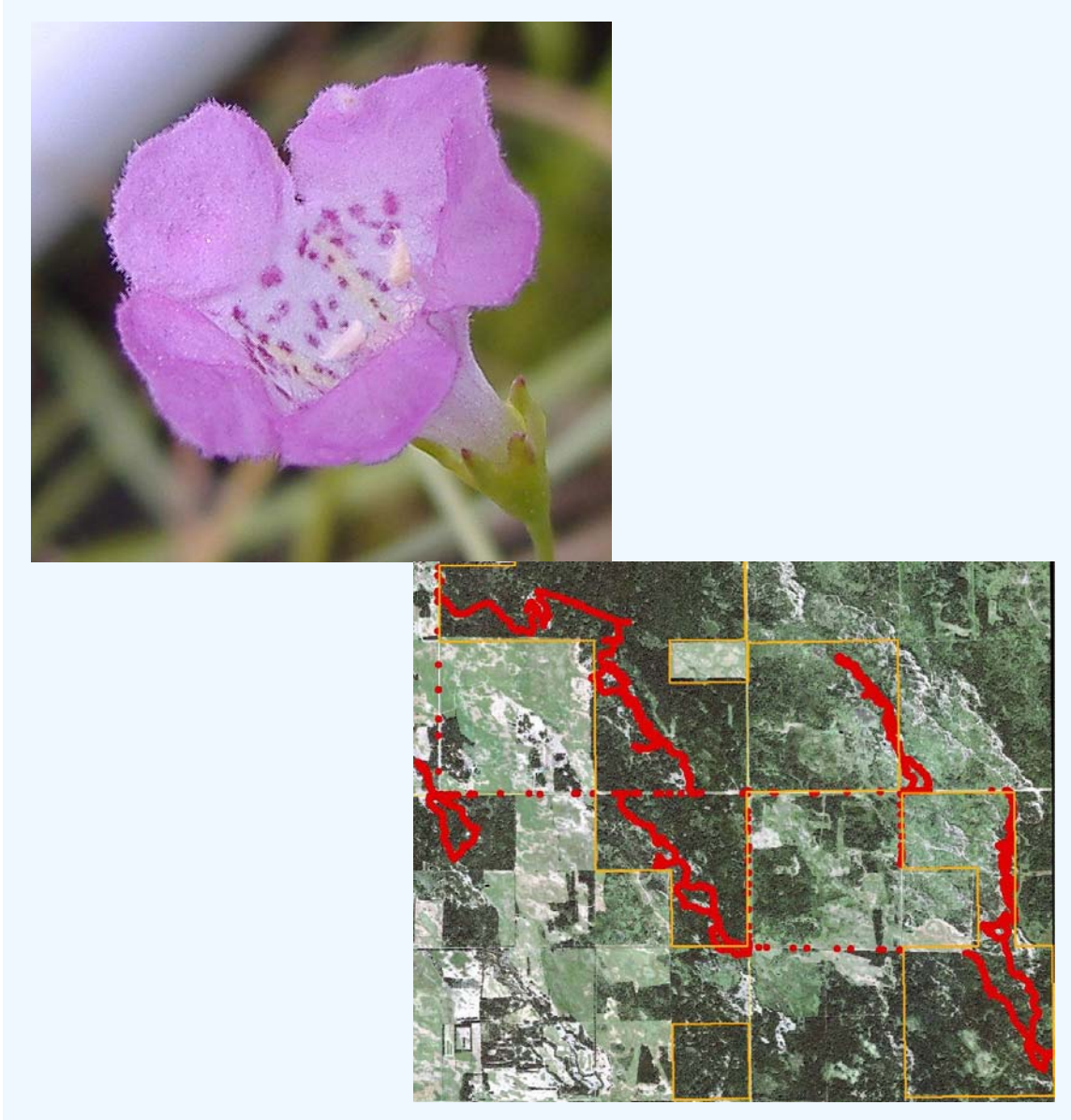


Rare Plant Surveys and Stewardship Activities by the Manitoba Conservation Data Centre, 2007



Manitoba Conservation Data Centre MS Report 08-01
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Cover images: Gattinger's agalinis (*Agalinis gattingeri*) by Sara Bryson; GPS tracklogs of search effort for sandhill species at Portage Sandhills.

Executive Summary

In 2007, the Manitoba Conservation Data Centre (CDC) documented information on 53 rare and uncommon plants species. Data was gathered in the field by CDC staff and from reports submitted to the CDC by other sources. As a Habitat Stewardship program project, field surveys conducted by CDC staff were focused on Canadian Species at Risk in Manitoba. Provincially rare species were also surveyed as time permitted. The following eight species were targeted in 2007.

Round-lobed Hepatica (*Anemone americana*)

Bloodroot (*Sanguinaria canadensis*)

Small White Lady's-slipper (*Cypripedium candidum*)

Buffalograss (*Buchloë dactyloides*)

Western Spiderwort (*Tradescantia occidentalis*)

Hairy Prairie-clover (*Dalea villosa*)

Smooth Goosefoot (*Chenopodium subglabrum*)

Rough Agalinis (*Agalinis aspera*)

A total of 127 sites were surveyed by the CDC, 59 of which were privately owned. Data on a total of 53 rare and uncommon plant occurrences was collected in the field by the CDC: 25 previously recorded occurrences were monitored and 28 were new discoveries. Data from an additional 64 sites was also gathered from reports submitted to the CDC from other sources.

Highlights include the discovery of a new Small White Lady's-slipper occurrence, discovery of two new Rough Agalinis occurrences, and discovery of Buffalograss on 15 privately owned quarter sections resulting in an increase in the known area of occupancy of about 25%. In addition, one population previously identified as Rough Agalinis was determined to be a different species, Gattinger's Agalinis (*Agalinis gattingeri*). Gattinger's Agalinis is listed as Endangered under Canada's *Species at Risk Act*.

In addition to Gattinger's Agalinis, other plant species added to the CDC's list of Manitoba's vascular plants include Swedish Bunchberry (*Cornus suecica*), Curly Blue Grass (*Poa secunda*), One-flowered Broomrape (*Orobanche uniflora*) and 11 fern and fern allies. Of the 53 plant species for which data was gathered in 2007, 23 are considered rare or uncommon nationally.

In recent years the CDC has taken a more active role in communication and outreach. The CDC's data and stewardship activities have improved as a result of two-way information sharing between the CDC and landowners or managers, rural municipalities, and associates such as the Tall Grass Prairie Preserve, Mixed-grass Prairie Inventory and Grazing projects, researchers from universities, and the Manitoba Museum.

Acknowledgements

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Introduction and Methods

This report summarizes rare plant surveys and stewardship activities conducted by the Manitoba Conservation Data Centre (CDC) in 2007. As a Habitat Stewardship Program project, priority was given to species designated by the Committee on the Status of Endangered Wildlife in Canada (COSEWIC) as nationally "at risk" (COSEWIC 2007, Environment Canada 2007). Information on provincially rare species was collected in the field as time permitted. Much of the information on provincially rare species was also gathered from data submitted to the CDC from other sources.

CDC surveys were focused on searches for new Element Occurrences (EOs) of eight plant species (see Table 1 for species and EO definition). Searches were conducted in appropriate habitat from southwestern Manitoba to the southern Interlake, from May to September 2007. Rare plant populations at some previously documented EOs were monitored as well.

Information on previously documented rare plant EOs and geospatial data such as satellite imagery, aerial photographs, land use, water, elevation and land tenure were used to determine potential survey sites. Landowners were contacted prior to surveys where required. Data collected includes location (mapped with a GPS), plant abundance, habitat characteristics (substrate, aspect, slope, associated taxa, landscape context), threats, photographs and specimens when necessary to confirm identification. For species tracked in the CDC's database, data gathered in the field and from other sources were entered into the GIS and associated database (Biotics 4.03) using NatureServe's standard methodology (NatureServe 2007a). Data gathered on uncommon plants that are not tracked in the CDC's database are kept on file. Information on negative search results was entered into a separate GIS theme in Arcview 3.2a. Landowners and managers were contacted for additional information about land management practices, and were provided with information on survey results, management issues, and conservation options.

Results

The results of surveys for the eight rare plant species targeted by CDC are summarized in Table 1. Table 2 lists other rare and uncommon plant species that were surveyed by the CDC, or for which data was submitted to the CDC from other sources such as the Tall Grass Prairie Preserve, Mixed-grass Prairie Inventory, Manitoba Habitat Heritage Corporation, researchers from universities, staff of the Forestry Branch, Manitoba Conservation, Native Orchid Conservation Inc., private consultants, and other citizens of Manitoba.

A total of 127 sites were surveyed by the CDC, 59 of which were privately owned. CDC observations of rare and uncommon plants that are currently tracked in the CDC database were mapped using NatureServe methodology. This resulted in the delineation of 28 new EOs. In addition, 25 previously documented EOs were monitored and updated by the CDC.

Data was also gathered, from reports submitted to the CDC, for an additional 64 sites that support rare or uncommon species. The combined efforts of the CDC and others who submitted reports in 2007 resulted in the documentation of observations of 53 rare and uncommon plant species from 191 sites.

Information on the targeted species, and associated rare and uncommon species surveyed by the CDC, is summarized below. The CDC's stewardship activities and recommendations follow. Conservation status ranks are defined in Appendix 1. Scientific and common names follow Flora of North America Editorial Committee, eds. (1993+) and Canadian Endangered Species Conservation Council (2006). Additional information about many of the species surveyed in 2007 can be found in earlier reports published on the CDC website at <http://web2.gov.mb.ca/conservation/cdc/requests/newsletters.php>.

Table 1. Summary of survey results for rare plant species targeted by the CDC, 2007.

Common Name	Scientific Name	Conservation Status*	Sites Surveyed**	Private Sites Surveyed	Known Element Occurrences Monitored***	New Element Occurrences Documented
Round-lobed Hepatica	<i>Anemone americana</i>	S1	10	10	0	0
Bloodroot	<i>Sanguinaria canadensis</i>	S2	10	10	2	1
Small White Lady's-slipper	<i>Cypripedium candidum</i>	Endangered (SARA & MESA)	17	11	2	1
Buffalograss	<i>Buchloe dactyloides</i>	Threatened (SARA, MESA)	22	21	2	0
Western Spiderwort	<i>Tradescantia occidentalis</i>	Threatened (SARA, MESA)	16	15	1	0
Hairy Prairie-clover	<i>Dalea villosa</i>	Threatened (SARA, MESA)	22	17	5	1
Smooth Goosefoot	<i>Chenopodium subglabrum</i>	Threatened (SARA)	22	17	0	0
Rough Agalinis	<i>Agalinis aspera</i>	Endangered (SARA)	56	0	6	2
Totals			127	59	18	5

* Conservation Status Rank definitions - Appendix 1. SARA - Listed under Canada's Species at Risk Act. MESA - Listed under Manitoba's Endangered Species Act.

** Sites are defined as discrete survey locations and range from several metres along roadsides to multiple quarter sections on crown land. For privately owned sites a single quarter-section was considered one site, unless fragmented by multiple ownership. Some sites were surveyed for more than one of the targetted species at risk. Duplicate sites are excluded in the total number of sites surveyed.

*** An Element Occurrence (EO) is "an area of land and/or water in which a species or natural community is, or was present." The default separation distance between plant EOs is 1 km, therefore sites less than 1 km apart may be considered the same EO. Where stable, apparently suitable habitat occurs between sites, a separation distance of 2 km may be used. In dynamic landscape mosaics, a separation distance of 3 km may be used unless there is a gap of persistently unsuitable habitat more than 1 km wide (NatureServe 2004).

Table 2. Summary of other rare and uncommon species surveyed by the CDC and associates, 2007.

Common Name	Scientific Name	Conservation Status	Sites Documented
Gattinger's Agalinis	<i>Agalinis gattingeri</i>	S1	1
Sand Bluestem	<i>Andropogon hallii</i>	S2	1
Arethusa	<i>Arethusa bulbosa</i>	S2	2
Purple Three-awned Grass	<i>Aristida pupurea</i> var. <i>longiseta</i>	S1	2
Hoary Wormwood	<i>Artemisia cana</i>	S2	1
Canadian Wild Ginger	<i>Asarum canadense</i>	S3?	9
Whorled Milkweed	<i>Asclepias verticillata</i>	S2	2
Green Comet Milkweed	<i>Asclepias viridiflora</i>	S3	2
Three-leaved Milk-vetch	<i>Astragalus gilviflorus</i>	S1	2
Leathery Moonwort	<i>Botrychium multifidum</i>	S3	1
Side-oats Grama	<i>Bouteloua curtipendula</i>	S2	7
Geyer's Spurge	<i>Chamaesyce geyeri</i>	S1	1
White Turtlehead	<i>Chelone glabra</i>	S2S3	2
Rocky Mountain Beeplant	<i>Cleome serrulata</i>	S3	3
Bugseed	<i>Corispermum</i> sp.	S2?	1
Swedish Bunchberry	<i>Cornus suecica</i>	SU	1
Pincushion Cactus	<i>Coryphantha vivipara</i>	S2	8
Schweinitz's Flatsedge	<i>Cyperus schweinitzii</i>	S2	6
Ram's-head Lady's-slipper	<i>Cypripedium arietinum</i>	S2?	2
Timber Oat Grass	<i>Danthonia intermedia</i>	S2?	1
Showy Tick-trefoil	<i>Desmodium canadense</i>	S2	4
Pretty Shooting Star	<i>Dodecatheon pulchellum</i>	S3	2
Narrow-leaved Purple Coneflower	<i>Echinacea angustifolia</i>	S3	1
Yellow Buckwheat	<i>Eriogonum flavum</i>	S3	1
Checkered Rattlesnake-plantain	<i>Goodyera tessalata</i>	S2	1
Limestone Oak Fern	<i>Gymnocarpium robertianum</i>	S1	1
Woolly Beach-heath	<i>Hudsonia tomentosa</i>	S3	2
Yellow Stargrass	<i>Hypoxis hirsuta</i>	S3	5
Two-flowered Dwarf Dandelion	<i>Krigia biflora</i>	S2	1
Grooved Yellow Flax	<i>Linum sulcatum</i>	S3	1
Narrow-leaved Puccoon	<i>Lithospermum incisum</i>	S3	2
Bird's-foot Trefoil	<i>Lotus unifoliolatus</i>	S2S3	3
Northern Evening Primrose	<i>Oenothera parviflora</i>	S3	3
Northern Adder's-tongue	<i>Ophioglossum pusillum</i>	S1	1
Louisiana Broomrape	<i>Orobanche ludoviciana</i>	S2	1
One-flowered Broomrape	<i>Orobanche uniflora</i>	SU	1
Ironwood	<i>Ostrya virginiana</i>	S2	1
Woolly Plantain	<i>Plantago patagonica</i>	SU	1
Curly Blue Grass	<i>Poa secunda</i>	SU	2
Whorled Milkwort	<i>Polygala verticillata</i> var. <i>isocycla</i>	S2	18
Annual Skeletonweed	<i>Shimmersoseris rostrata</i>	S1S2	1
Riddell's Goldenrod	<i>Solidago riddellii</i>	S2	2
Golden Bean	<i>Thermopsis rhombifolia</i>	S2	1
Sessile-leaved Bellwort	<i>Uvularia sessilifolia</i>	S2	3
Alpine Cliff Fern	<i>Woodsia alpina</i>	S1	5
Total			119

Early Spring Bloomers

Round-lobed Hepatica (*Anemone americana*) S1
Bloodroot (*Sanguinaria canadensis*) S2
Sessile-leaved Bellwort (*Uvularia sessilifolia*) S2
Canada Wild Ginger (*Asarum canadense*) S3?

In the early spring of 2007, CDC surveys were conducted for early blooming provincially rare plants adapted to rich deciduous woods. On May 2 and 15, searches were conducted for Round-lobed Hepatica in the vicinity of Notre Dame de Lourdes, the only area where this species has been confirmed to occur in Manitoba (Fig. 1 on pg. 9). It was last seen in the area in 1960. Ten sites were searched but no Round-lobed Hepatica was found.

Although Round-lobed Hepatica was not found, Bloodroot was rediscovered in the vicinity of Notre Dame de Lourdes, where it had last been recorded in 1943 (Photos 1 and 2). It was found growing along wooded edges of a ravine surrounded by agriculture. The area was estimated to support well over 10 000 plants, possibly nearing 20 000, the single largest population on record for Manitoba. Over 2 km of the ravine were surveyed but the full extent of the population has yet to be determined.

The CDC also received information on two other Bloodroot occurrences in 2007. One report resulted in the expansion of a previously known EO along the Whitemouth River. The other report resulted in the delineation of a new EO north of Notre Dame de Lourdes. The property is permanently protected under a Conservation Agreement with the Manitoba Habitat Heritage Corporation. In Manitoba, Bloodroot is currently known to occur only within 30 km of Notre Dame de Lourdes, and at two locations along the Whitemouth River (Fig. 1). Additional information on Bloodroot can be found in Foster and Hamel (2006).



Photo 1. Bloodroot emerging (May 2)



Photo 2. Bloodroot in fruit (May 15)

On May 15, a new EO of Sessile-leaved Bellwort was found along an old creek bed on a small woodlot surrounded by agriculture (Photo 3). Three patches were found, totalling over 100 plants. Another new EO of Sessile-leaved Bellwort was also reported to the CDC from along the Whitemouth River in 2007. Sessile-leaved Bellwort also occurs at the newly documented Bloodroot site reported from north of Notre Dame de Lourdes. The currently known distribution of Sessile-leaved Bellwort in Manitoba is shown in Figure 1.

Canada Wild Ginger, a relatively uncommon plant in Manitoba, was also observed at the Bloodroot and Sessile-leaved Bellwort sites visited by the CDC, in addition to six other sites that were surveyed on May 2 and 15.



Photo 3. Sessile-leaved Bellwort

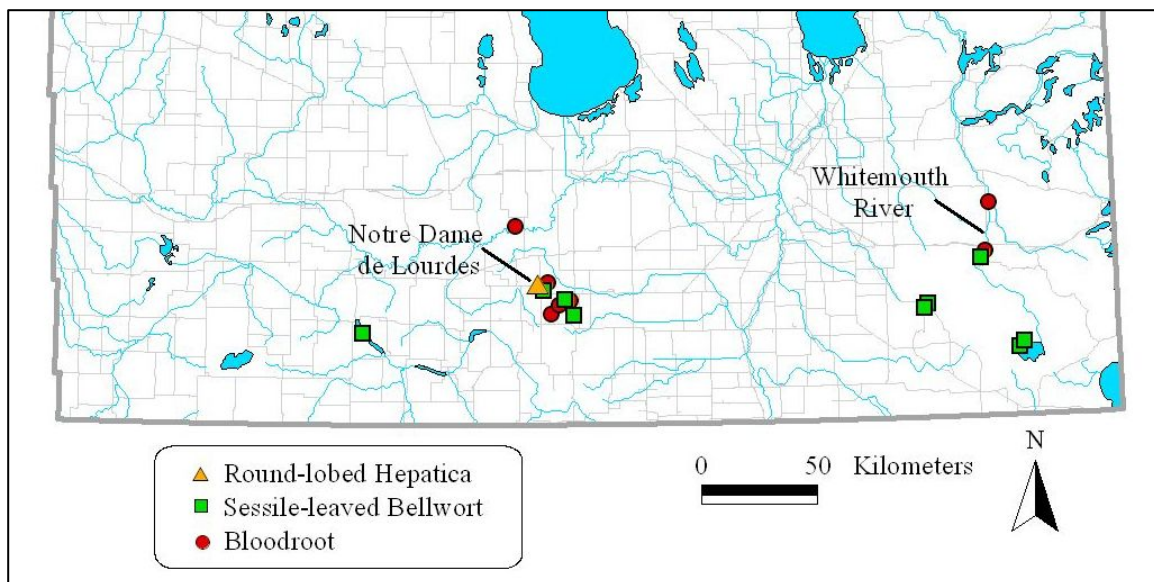


Figure 1. Currently known distributions of Round-lobed Hepatica, Sessile-leaved Bellwort and Bloodroot in Manitoba.

Small White Lady's-slipper (*Cypripedium candidum*)

Canada's *Species at Risk Act*: Endangered
Manitoba's *Endangered Species Act*: Endangered

Small White Lady's-slipper is one of the most Endangered plant species in Manitoba (Photo 4). It is currently known from three areas of the province: south of Winnipeg near the US border, south of Brandon, and north of Winnipeg in the southern Interlake. Detailed descriptions, habitat preferences, past survey efforts, threats, and management issues are discussed in Foster and Reimer (2007), Foster and Hamel (2006), and Hamel and Foster (2005).

In 2007, surveys were focused on the southern Interlake region. Several private landowners have given reliable reports of past Small White Lady's-slipper sightings in the southern Interlake but none report having seen them in recent years (Photo 4). In 2005, over 20 hours were spent searching in the southern Interlake and one new site was found (Foster and Hamel 2006). In 2007, from June 5 to 15, over 30 hours were spent searching at 13 sites in the southern Interlake. No new Small White Lady's-slipper sites were found (see Fig. 2 for sites searched in 2005 and 2007).

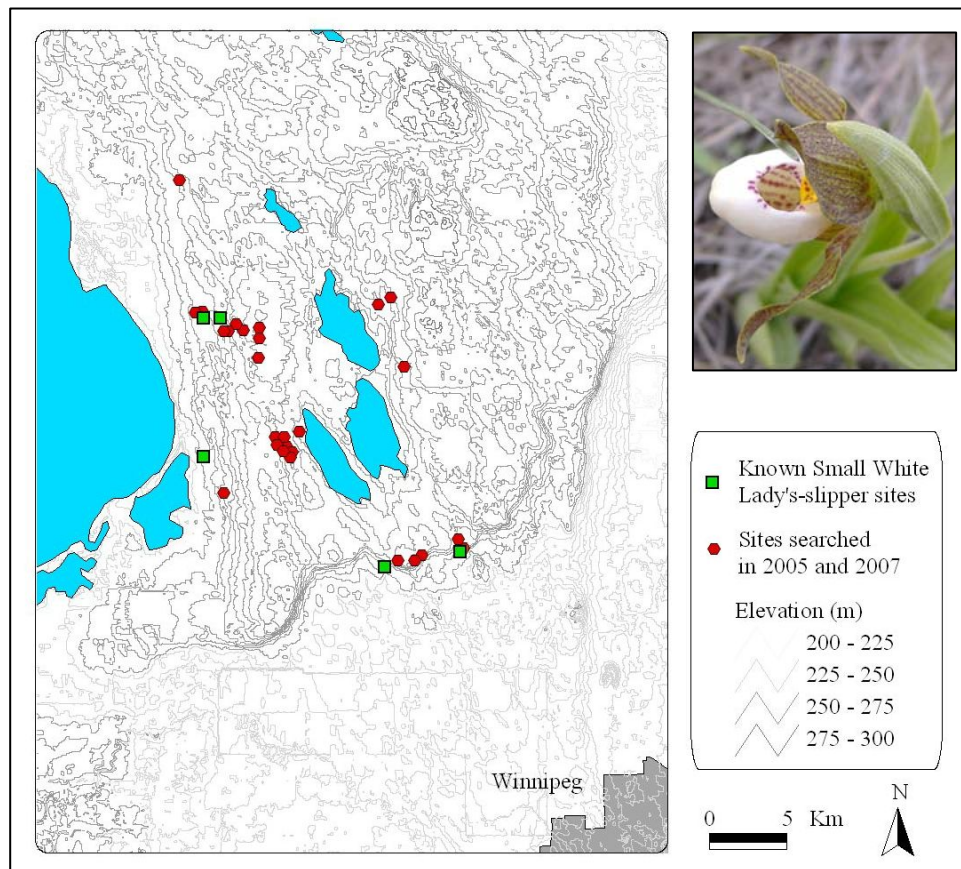


Figure 2. Known Small White Lady's-slipper sites, and sites searched in 2005 and 2007, in the southern Interlake region of Manitoba. Known sites occur between 250 and 265 m above sea level. (Photo 4. Small White Lady's-slipper)

Small White Lady's-slipper populations naturally fluctuate with climatic conditions, as well as responding to different management regimes. On June 22 and 23, two known occurrences, within 35 km north of Winnipeg, were surveyed with the aim of initiating detailed annual monitoring of population fluctuations. Detailed mapping of plants at these two sites was last conducted by the CDC in 2005. Although the observed distribution of Small White Lady's-slipper patches was similar in 2007, the number of stems counted had decreased at both sites. The counts for one population, located along a trail, were approximately 80% lower than in 2005. The counts for the other population, located along a regularly mowed roadside ditch, were approximately 20% lower than in 2005. Regular mowing at the roadside site may be benefiting Small White Lady's-slippers by preventing shrubs from encroaching, although thatch build-up could potentially be an issue. Competition and shading from increasing shrub encroachment may be negatively affecting Small White Lady's-slippers at the trail site (Photos 5 and 6). In October of 2007, the rural municipality did some mowing and pruning adjacent to the trail (Dave Proctor pers. comm.). However, the majority of Small White-lady's Slippers grow further from the trail. Management recommendations for the rural municipality are being prepared by the CDC. Regular mowing and woody vegetation removal in the fall, when the orchids are not actively growing and reproducing, will be recommended.

In addition to the decrease in Small White Lady's-slippers at these sites, the abundance of hybrids between Small White Lady's-slippers and Yellow Lady's-slippers (*Cypripedium parviflorum*) appeared to have greatly increased, although separating pure Small White Lady's-slippers from hybrids can be very subjective. A hole in the ground was observed where one plant had been observed in 2005, suggesting that the plant had been illegally collected.



2005



2007

Photos 5 and 6. Shrub encroachment at a Small White Lady's-slipper site.

On June 4, 2007 a new roadside occurrence was discovered southeast of the Brandon Hills and was reported to the CDC. On June 7, CDC staff surveyed the new occurrence. Over 250 lady's-slipper stems were counted along a 125 m stretch. More than half appeared to be hybrids. Small White Lady's-slippers were also observed on adjacent private land but were not surveyed, as permission to access the land had not been obtained. One other site near Brandon was surveyed based on an "endangered plant" report at a proposed quarry site but none were found and the habitat was inappropriate for Small White Lady's-slipper.

Hybridization of Small White Lady's-slippers and Yellow Lady's-slippers is a threat to the relatively small, fragmented populations of Small White Lady's-slipper in Manitoba. Hybrid plants have been observed at all known Small White Lady's-slipper occurrences in Manitoba. Data from recent years suggest that hybrid abundance may be increasing. As in previous years, CDC staff noted that hybrid plants appeared to be more vigorous with a greater proportion of flowering stems than Small White Lady's-slipper plants. Differentiating between pure Small White Lady's-slipper plants and hybrid plants can be very subjective without genetic testing, making it difficult to detect population trends. In 2007, CDC staff provided assistance for a genetic study being conducted at the University of Manitoba that is aimed at determining the levels of hybridization occurring in several of Manitoba's Small White Lady's-slipper populations.

Other rare or uncommon species encountered while searching for Small White Lady's-slipper in 2007 include Two-flowered Dwarf Dandelion (*Krigia biflora*), Pretty Shooting Star (*Dodecatheon pulchellum*), and Yellow Stargrass (*Hypoxis hirsuta*) (see Table 2 for conservation status ranks).

Buffalograss (*Buchloë dactyloides*)

Canada's *Species at Risk Act*: Threatened
Manitoba's *Endangered Species Act*: Threatened

Buffalograss was listed as Threatened under Manitoba's *Endangered Species Act* in 2007 and has been listed as Threatened under Canada's *Species at Risk Act* since 2003 (Photo 7). In Manitoba it is only known to occur south of Melita along the Souris and Blind River valleys. It occurs on privately owned pastures and is adapted to moderate to intense grazing. One occurrence is located in a park and was verified extant in 2007. As of 2006 Buffalograss was known to occur on portions of approximately 43 quarter sections. Further information on Buffalograss from recent years can be found in Foster & Reimer (2007) and Foster and Hamel (2006). Surveys in 2007 were focused on delineating its extent of occurrence. Properties near known Buffalograss sites, which appeared to be suitable based on satellite imagery and aerial photos, were surveyed from June 26 to 28 (see Fig. 3). The closest Buffalograss location south of the border is 50 to 100 km away (Environment Canada In prep.)

Buffalograss was found on 15 of the 21 quarter sections searched in 2007. It generally occupied habitats similar to previously surveyed sites. It was most commonly found along lower slopes of hills and ridges. It was also found on relatively flat low areas, on mid-slope benches, and in upland habitat. One site was particularly notable for its widespread and abundant Buffalograss in a very wet, saline area adjacent to the Souris River.

The landowner interview process initiated in 2006 (Foster and Reimer 2007) continued in 2007. It generated interest and requests for more information on Manitoba Habitat Heritage Corporation's Conservation Agreements program, and Twice-over Grazing System. Over half of the Buffalograss landowners interviewed employ some type of rotational grazing. Stocking densities ranged from approximately 0.14 to 0.26 cows per acre.

Two of the properties surveyed in 2007 supported more abundant, widespread Buffalograss populations than the others. On both properties the area occupied by Buffalograss was greater than 100 m² per acre (247 m² per hectare) with stocking densities of approximately 0.17 and 0.23 cows per acre (.57 cows per hectare). The owners of one of the above properties own another pasture in the area with similar topography and grazing regime, but it only supports a few small patches of Buffalograss. On the less densely occupied pasture, the ridge above the patches of Buffalograss was seeded and fertilized several years ago. Runoff may have influenced the species composition below, leading to an increase in non-native or weedy species at the expense of Buffalograss. In addition, livestock may selectively graze the fertilized portion of a pasture (Alberta Agriculture, Food and Rural Development 2003). Lower grazing intensity in the area occupied by buffalograss also may have influenced the species composition.

Several landowners reported that small amounts of Leafy Spurge (*Euphorbia esula*) have been found and sprayed on their properties. Leafy Spurge was only observed on 1 of the 15 quarter sections surveyed in 2007. Two other rare species were observed while surveying Buffalograss: Curly Blue Grass (*Poa secunda*) and Woolly Plantain (*Plantago patagonica*) (Table 2).



Figure 3. Satellite imagery used to assess habitat suitability for Buffalograss surveys in 2007. In Manitoba, Buffalograss is only known to occur within the region outlined in red. It stretches 25 km from the US border to about 5 km south of Melita. Within this region it is restricted to native pastures near the Souris and Blind Rivers (brown). (Modified from Google Earth 2007). (Photo 7. Buffalograss)

Sandhill Species

Hairy Prairie-clover (*Dalea villosa*)

Canada's *Species at Risk Act*: Threatened

Manitoba's *Endangered Species Act*: Threatened

Western Spiderwort (*Tradescantia occidentalis*)

Canada's *Species at Risk Act*: Threatened

Manitoba's *Endangered Species Act*: Threatened

Smooth Goosefoot (*Chenopodium subglabrum*)

Canada's *Species at Risk Act*: Threatened



Photo 8. Hairy Prairie-clover



Photo 9. Western Spiderwort



Photo 10. Smooth Goosefoot

Three plant species restricted to sandhill regions have been listed under provincial and/or federal legislation: Hairy Prairie-clover, Western Spiderwort, and Smooth Goosefoot (Photos 8, 9 and 10). Encroachment by woody and weedy vegetation into open sand is a threat to habitat that supports these species. In 2007, sandhill species surveys were focused on searching for new occurrences. In addition, surveys in the Portage Sandhills Wildlife Management Area (WMA) were focused on determining the extent to which Hairy Prairie-clover occurs in the WMA. Hairy Prairie-clover data collected at Canadian Forces Base Shilo were also submitted to the CDC in 2007 (Carmen McNabb pers. comm., Darcy Henderson pers. comm.). Descriptions, past surveys and management issues related to these species are discussed in Foster and Reimer (2007), Foster and Hamel (2006), Hamel and Foster 2005, and Reimer and Hamel (2003). Currently known distributions of the above three species in Manitoba are shown in Figure 4 (pg. 18).

Southwestern Manitoba

On July 17 and 18, searches for all three listed sandhill species were conducted at 16 sites at Routledge, Lauder and Oak Lake Sandhills in southwestern Manitoba. Western Spiderwort and Hairy Prairie-clover occurrences were updated at one site owned by the Manitoba Habitat Heritage Corporation. Previously recorded Hairy Prairie-clover occurrences were also monitored at two privately owned sites. At both sites, sandhills supporting hairy prairie-clover were being affected by encroachment of woody species, and by increased abundance of weedy species. According to landowners Leafy Spurge is a major problem, and one site that had been pasture is no longer grazed, increasing opportunities for vegetation encroachment. No new occurrences of any of the three listed sandhill species were found. Very little open sand is remaining in this region. All sites searched were being invaded or encroached by vegetation such as Leafy Spurge (*Euphorbia esula*), Trembling Aspen (*Populus tremuloides*), Creeping Juniper (*Juniperus horizontalis*), Wolf Willow (*Eleagnus commutata*), and Pasture Sagebrush (*Artemisia frigida*).

Occurrences of several other rare and uncommon species were documented including Pincushion Cactus (*Coryphantha vivipara*), Schweinitz's Flatsedge (*Cyperus schweinitzii*), Sand Bluestem (*Andropogon hallii*), Green Milkweed (*Asclepias viridiflora*), Evening Primrose (*Oenothera parviflora*), and Rocky Mountain Beeplant (*Cleome serrulata*) (Photo 11) (Table 2).



Photo 11. Rocky Mountain Beeplant

Portage Sandhills, Southcentral Manitoba

On August 1 and 2, appropriate habitat at Portage Sandhills WMA, and nearby private land, was searched for Hairy Prairie-clover and Smooth Goosefoot. Hairy Prairie-clover was first reported to occur within the WMA at two sites in 1999 and 2000. Several transects in the vicinity of both locations where we now know Hairy Prairie-clover to occur were surveyed in 1993 but none was observed at that time (Parsons and Buck 1994). The extent of occurrence and search effort since its initial discovery has not been well documented. In 2007, satellite imagery downloaded to handheld computers equipped with a GPS was used in the field to direct search effort towards sandy areas within the WMA (see cover image).

Compared to the sandhills of southwestern Manitoba, the Portage Sandhills tend to be less diverse and support smaller populations of Hairy Prairie-clover. Hairy Prairie-clover was not found in any areas in which it had not been previously recorded in the WMA. Other areas in Portage Sandhills WMA appeared appropriate but no other Hairy Prairie-clover was found in any of the 15 quarter sections searched.

At both known locations, Hairy Prairie-clover plants occur in the vicinity of recreational vehicle trails. Moderate disturbance from recreational vehicles can prevent vegetation from encroaching onto sandhills, keeping open sand habitat available for Hairy Prairie-clover. However, destruction of individual Hairy Prairie-clover plants by recreational vehicles is an associated threat. Recreational vehicle use, from March 1 to November 30, has been prohibited within Portage Sandhills WMA since 1995. In 2006 the regulation was revised to prohibit all vehicles within the WMA from March 1 to November 30. Illegal use of recreational vehicles has been widespread, particularly in the southeast portion, but has decreased somewhat over the past 10 years (Gord Dengate pers. comm.). In 2007, backhoes were used to dig up portions of trails in an attempt to discourage recreational vehicle traffic. This was ineffective. Holes have been refilled and signs prohibiting the use of vehicles within the WMA have disappeared.

The spread of Leafy Spurge into the WMA is also a concern, particularly in the southern and western portions (Gord Dengate pers. comm.). Its appearance is relatively recent. In surveys conducted in 1993, no Leafy Spurge was observed (Parsons and Buck 1994). In 1999 and 2001, Leafy Spurge was reported to occur at one of the Hairy Prairie-clover occurrences within the WMA. No Leafy Spurge was observed at that occurrence in 2007. Some spot spraying of Leafy Spurge was done in the WMA before vehicles were banned up to approximately 0.75 km south of the above site (Terry McIntyre pers. comm.).

Two additional private lands were surveyed to the west of Portage Sandhills WMA. One small Hairy Prairie-clover occurrence of approximately 200 plants was discovered on property currently used by horses.

Other rare and uncommon plant species observed in the Portage Sandhills include Schweinitz's flatsedge (*Cyperus schweinetzii*), Annual Skeletonweed (*Shinnersoseris rostrata*), Woolly Beach-heath (*Hudsonia tomentosa*), Geyer's Sandmat (*Chamaesyce geyeri*), and Bugseed (*Corispermum* sp.). Although Bugseed was too immature to positively identify to species, all four *Corispermum* species found in Manitoba are provincially rare, and rare or uncommon nationally.

Smooth goosefoot was not observed at any of the sites searched by the CDC in 2007. A similar but more common species, Narrow-leaved Goosefoot (*Chenopodium pratericola*), was found at the majority of the sandhill sites surveyed in 2007. Numerous specimens of Sandmat (*Chamaesyce* sp.) and Bluestem (*Andropogon* sp.) were also examined. Except for the one Sand Bluestem (*Andropogon hallii*) occurrence noted on from southwestern Manitoba (pg. 16), all *Andropogon* specimens collected were keyed out to the more common Big Bluestem (*Andropogon gerardii*) or possible hybrids between the two (see Flora of North America Editorial Committee 2003 for descriptions). The fairly common Ridge-seeded Spurge (*Chamaesyce glyptosperma*) was present at the majority of sandhill sites surveyed in 2007. Of the specimens of *Chamaesyce* that were examined, only those from one location in Portage Sandhills WMA were determined to be the rare Geyer's Sandmat (*Chamaesyce geyeri*).

Shilo, South-central Manitoba

Rare plant survey data gathered in recent years at Canadian Forces Base Shilo was submitted to the Manitoba Conservation Data Centre in 2007. As a result of data gathered in 2006 and 2007, four new EOs have been added to the CDC database, in addition to the two previously recorded EOs at Shilo. Between 2004 and 2007 approximately 2000 Hairy Prairie-clover plants were observed at the six separate EOs. Only a small portion of potentially appropriate habitat at Shilo has been surveyed and complete abundance estimates have not been carried out at any of the 6 EOs.

Additional surveys will likely document many more Hairy Prairie-clover plants at Shilo. If additional plants are found between the known sites, the number of documented EOs may decrease as they are merged into EOs that cover larger areas. The largest known EO at Shilo currently encompasses eight sites over an area of approximately 8.5 km². Surveys are also needed to document the response of Hairy Prairie-clover to military training activities, fire, or any other influences not present at other Hairy Prairie-clover populations in Manitoba.

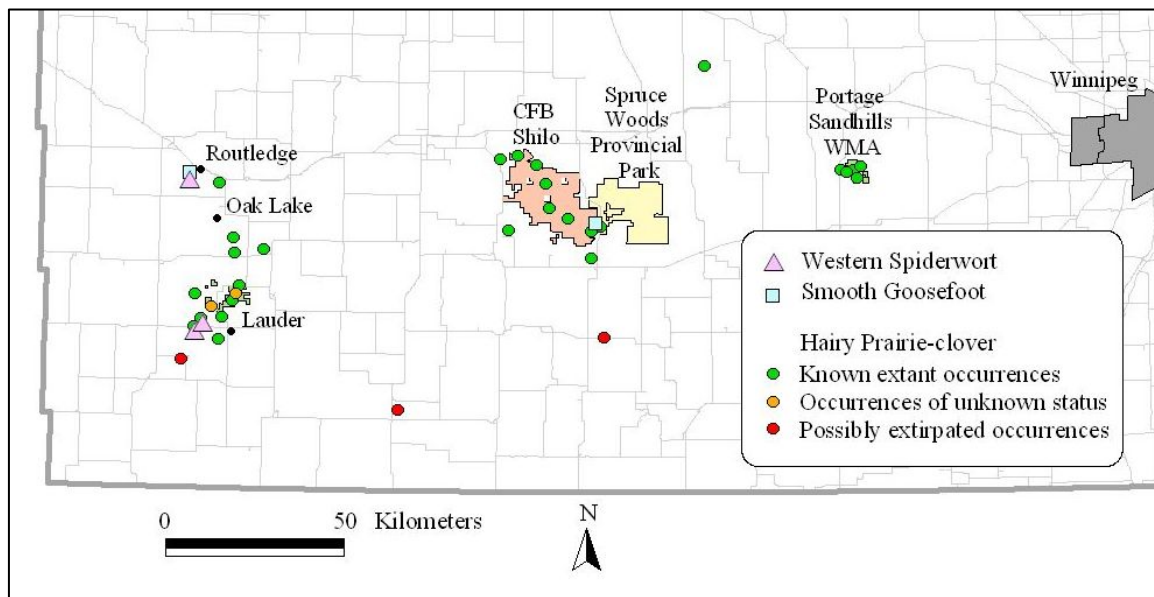


Figure 4. Currently known distributions of sandhill Species at Risk in Manitoba.

Endangered False Fox-gloves

Rough Agalinis (*Agalinis aspera*)

Canada's *Species at Risk Act*: Endangered

Gattinger's Agalinis (*Agalinis gattingeri*)

Canada's *Species at Risk Act*: Endangered

Conservation Status

There are about 60 species of *Agalinis*, also known as the False Fox-gloves. Of the 33 North American *Agalinis* species, 30 are tracked as Extirpated, Imperiled or Vulnerable in one or more states or provinces (NatureServe 2007c). Eight species of *Agalinis* are known to occur in Canada. Five are considered At Risk or May Be At Risk by the Canadian Endangered Species Conservation Council (2006). Rough Agalinis (*Agalinis aspera*) was listed as an Endangered species under Canada's *Species at Risk Act* in 2006. In Canada it is only known to occur in Manitoba. It ranges from Manitoba, south to Texas, USA and is considered secure globally (NatureServe 2007c). Two other species of *Agalinis* are listed under Canada's *Species at Risk Act*: Gattinger's Agalinis (*Agalinis gattingeri*) and Skinner's Agalinis (*Agalinis skinneriana*). Both are Endangered and in Canada were only known to occur in Ontario (Environment Canada 2008). However, upon closer inspection, one Manitoba population previously identified as Rough Agalinis in 2004 (COSEWIC 2006), was discovered to be Gattinger's Agalinis in 2007.

Historical reports and specimens of Rough Agalinis are known from Red River, Portage La Prairie, Emerson, Stony Mountain and Morden (Scoggan 1978; Scoggan 1957). More recently, it was collected from two locations in the southern Interlake in the 1980s. In 2004, searches were conducted in conjunction with the preparation of the COSEWIC (Committee on the Status of Endangered Wildlife in Canada) status report (COSEWIC 2006). Eleven sites were reported, constituting eight extant populations (EOs). Seven EOs are located in the southern Interlake and one is located south of Brandon. The majority are located along road allowances. One of the EOs recorded in the 1980's is presumed extirpated due to road realignment and upgrading (COSEWIC 2006). That area was searched in 2007, along with the original collector, but no Rough Agalinis was found.

No reports or specimens of Gattinger's Agalinis in Manitoba were known prior to 2007. Only one population is currently known from Manitoba.

Descriptions

The False Fox-gloves (*Agalinis*), once considered members of the family Scrophulariaceae, are now considered members of the parasitic family Orobanchaceae. Four species of *Agalinis* have been found in Manitoba. All four species are inconspicuous, annual, hemi-parasitic plants that obtain some nutrients from other plants through root associations. The classification of the genus *Agalinis* is complex and many works regarding identification of its species have errors (Judith Canne-Hilliker pers.

comm., NatureServe 2007b). North American species of *Agalinis* can be difficult to distinguish and often require detailed examination under magnification. *Agalinis* species occurring in the same region, or in northern regions, can be particularly difficult to separate and identify (Judith Canne-Hilliker pers. comm., NatureServe 2007b). As such, there is a relatively high percentage of misidentifications (Hays 1998). *Agalinis* plants can vary depending on developmental stage or environment. Living *Agalinis* plants can appear quite different from pressed plants. Identification of some species may require examination of both fresh and dried material (Hays 1998, Pennell 1929). The following descriptions follow Judith Canne-Hilliker (pers. comm.), Hays (1998), Canne-Hilliker and Kampny (1991), Pennell (1929), COSEWIC (2006), and personal observations.

Rough Agalinis (*Agalinis aspera*)



Photo 12. Rough Agalinis

Rough Agalinis is a relatively small herbaceous plant (Photo 12). The plants observed in Manitoba are under 40 cm tall; usually less than 20 cm. In Manitoba, the slender stems are usually simple although plants with well developed multiple branches have been observed. Stems are angular with prominent ribs, becoming rounder below. The leaves are arranged oppositely along the stem and bear stiff hairs making them very rough. Leaves are very narrowly linear (usually < 1mm wide) and thick, with a prominent mid-vein.

Flowers are held on slender stalks (pedicels) that may grow up to about 16-18 mm long. Plants in Manitoba have been observed to produce up to 55 flowers but flower production is usually much lower. Corollas are funnel-shaped with two upper lobes and three lower lobes (Photos 12, 13 and 14).

The flowers are typically light pink and can grow up to about 25 mm long but are usually smaller in Manitoba. The corolla interiors typically have dark purple spots and two yellow lines radiating from the centre (Photo 13). However, corolla interiors lacking purple spots have been observed in Manitoba (Photo 14). Mature seed capsules are longer than wide, becoming purple then brown with age (Photo 15).



Photos 13 and 14. Variation in Rough Agalinis flowers



Photo 15. Rough Agalinis seed capsule

Gattinger's Agalinis (*Agalinis gattingeri*)

Gattinger's Agalinis is very similar to Rough Agalinis. Compared to Rough Agalinis, the Manitoba population of Gattinger's Agalinis was noted to consist of smaller, more slender plants. The flowers were slightly smaller and dried to a darker bluish pink whereas those of Rough Agalinis remained pale pink. The interiors of Gattinger's Agalinis flowers were white rather than pink, with dark purple spots and two yellow lines radiating from the centre (Photos 16 and 17). The seed capsules were also noted to be rounder rather than oblong. Other characteristics used to distinguish Gattinger's Agalinis include longer floral branches (up to 25-30 mm), exterior hairs on the surfaces of the three lower corolla lobes (middle lobe particularly densely hairy), and a band of long pink hairs across the interior bases of the two upper lobes.



Photos 16 and 17.
Gattinger's Agalinis

Two other species of *Agalinis* are known from Manitoba: Slender Agalinis (*Agalinis tenuifolia* var. *parviflora*) and Small-flowered Agalinis (*Agalinis paupercula* var. *borealis*). Slender Agalinis is relatively uncommon in Manitoba. It typically occurs east of the Red River but has been collected from west of the Red River in Winnipeg, and near Rough Agalinis populations in the southern Interlake. Slender Agalinis is very similar to Gattinger's Agalinis but is typically smoother, with wider leaves. In addition, the upper corolla throat is shorter than the lower throat, and there is no band of hairs across the interior bases of the upper lobes.

The fourth species, Small-flowered Agalinis, has not been collected in Manitoba since 1946. Unlike the other *Agalinis* species found in Manitoba, its flowers are borne on stalks that are shorter than the mature seed capsules.

Survey Results

Rough Agalinis

In 2007 from August 8-24, 56 roadside locations were searched for Rough Agalinis in the southern Interlake. All known EOs in this region were monitored by the CDC, except one on privately owned property. Two occurrences that were extant in 2004 were not relocated (Table 3). Notable increases in abundance were observed at two previously documented populations, but most populations showed decreases in abundance. Plant patches were mapped in the field with a GPS resulting in more accurate delineation of the area occupied by Rough Agalinis. Currently, the total known area occupied by Rough Agalinis in Manitoba is less than 1 km² with individual EOs ranging in areal extent from 1 m² to 200 m².

Other sites searched were based on Dakota Skipper (*Hesperia dacotae*) records. Dakota Skipper is an Endangered butterfly that has been recorded at one other Rough Agalinis occurrence along with Small White Lady's-slipper. Dakota Skipper typically occurs on higher ground in calcareous or alkaline Big Bluestem (*Andropogon gerardii*) and Little Bluestem (*Schizachyrium scoparium*)-dominated prairie with slight ridge and swale topography (COSEWIC 2003). Three new Rough Agalinis sites were found along roadsides, comprising two EOs (Fig. 5 on pg. 25). Potentially suitable habitat from Stony Mountain to Grosse Isle, and from Grosse Isle to Argyle, were also searched but no *Agalinis* species were found. Several other Small White Lady's-slipper sites have also been searched without success (Foster and Reimer 2007; COSEWIC 2006).

The majority of Rough Agalinis sites visited in 2007 occur over dolomite. The most abundant populations were found in open sun along dry, gravelly, rocky upper slopes of ditches with a high proportion of bare ground. Plants were most abundant along the far sides of ditches, adjacent to fencelines. They were often associated with Big Bluestem and Little Bluestem hummocks with woody vegetation up-slope and bare ground down-slope. Plants were found on south-, west-, east- and north-facing slopes. One of the larger occurrences, newly documented near Lundar, was associated with silty, calcareous muck in the ditch below. Adjacent prairie in this area appeared appropriate for Small White Lady's-slipper as well. In general, smaller or declining populations of Rough Agalinis were more often associated with denser or taller vegetation, on flatter ground.

Gattinger's Agalinis

While monitoring previously recorded Rough Agalinis sites in 2007, one roadside population appeared to be slightly different. Specimens were collected and examined using various floras. Several characteristics were more typical of Slender Agalinis (*A. tenuifolia*) than Rough Agalinis. In Ontario, some collections of Gattinger's Agalinis were originally mis-identified as Slender Agalinis (Canne-Hilliker In Press). Descriptions, pictures and scans of specimens were sent to Judith Canne-Hilliker, author of the COSEWIC status report for Gattinger's Agalinis and of the upcoming Flora of North America treatment for *Agalinis*. They were tentatively identified as Gattinger's Agalinis and after sending the pressed specimens their identity was confirmed (Judith Canne Hilliker pers. comm.).

In 2004, this population consisted of only 18-20 plants, less than 7-16 cm tall, with tiny flowers and little development of capsules evident (Marjorie Hughes, unpublished data). In 2007, over 59 plants were in bloom. The 13 x 5 m area occupied by Gattinger's Agalinis was estimated to support over 100 plants. The habitat was similar to that observed at some of the smaller Rough Agalinis populations observed in 2007. The ground was fairly flat with a relatively small proportion of bare ground. In 2004 an additional site, less than 4 km to the north, was identified as supporting Rough Agalinis. It consisted of only one 10 cm plant with one tiny flower and two finished flowers (Marjorie Hughes, unpublished data). No *Agalinis* plants were found at that site in 2007. It is conceivable that the plant observed there in 2004 was Gattinger's Agalinis.

Table 3. Summary of Rough Agalinis and Gattinger's Agalinis populations in Manitoba. Where applicable, population names and numbers correspond to the Rough Agalinis status report (COSEWIC 2006).

Extant Populations (EOs)	Number of plants in 2004	Number of plants in 2007	Comments
ROUGH AGALINIS			
Grosse Isle - Population 1	8	0	Remnant prairie. Searched twice in 2007 and once in 2006. Population known to fluctuate greatly in area and abundance (Elizabeth Punter, pers. comm.). May remain extant in the seed bed or failed to find.
Warren - Population 2	20	16	Right-of-way with vehicle tracks.
Woodlands - Population 3	27	5	Mowed town site.
St. Laurent - Population 4	30-50	N/A	Private property - not visited in 2007.
Poplar Point - Populations 5-7			Amalgamated into 1 EO based on NatureServe standards.
Population 5	13	10	Roadside.
Population 6	7	10	Roadside.
Population 7-1	10	95	Roadside.
Population 7-2	15	N/A	PFRA Community Pasture - not visited in 2007.
Population 7-3	23	172	Roadside.
Poplar Point - Population 8	1	0	Roadside. May remain extant in the seed bed, or failed to find. Identification needs to be confirmed - in relatively close proximity to Gattinger's Agalinis.
Poplar Point - Population 10	28	2	Roadside.
Brandon - Population 11	7	N/A	Roadside - not visited in 2007.
St. Laurent roadside	N/A	30	New record.
Lundar roadside	N/A	>100	New record.
GATTINGER'S AGALINIS			
Poplar Point	18	>59	Population 9 in Rough Agalinis COSEWIC report, but plants at this site were confirmed to be Gattinger's Agalinis in 2007.

Future Survey, Monitoring and Management Needs

Additional surveys for Rough Agalinis and Gattinger's Agalinis are needed in Manitoba. Other roadsides in the southern Interlake that appear to be appropriate for Rough Agalinis or Gattinger's Agalinis have yet to be searched. Adjacent land that appears to be suitable should also be searched. Annual monitoring of known sites is needed to document the extreme population fluctuations that are known to occur (Elizabeth Punter, pers. comm.). Absence of *Agalinis* plants does not necessarily indicate extirpation, as it may remain extant in the seed bed for years. Surveys should be carried out during the peak blooming period in August. Morning surveys are also recommended as corollas tend to fall later in the day. In 2007, plants were most readily seen between August 8 and 16. Plants were more difficult to locate during repeat visits to sites on August 24. In 2004, the peak flowering period was between August 10 and September 10 (COSEWIC 2006).

Specimens of *Agalinis* should be collected where population sizes allow, and pictures and careful notes should be taken in the field. In Manitoba, Rough *Agalinis* and Gattinger's *Agalinis* occur in drier areas, west of the Red River. Slender *Agalinis* tends to occur in wetter areas, east of the Red R. One specimen of Slender *Agalinis* that had been collected from the southern Interlake in the same region where Rough *Agalinis* and Gattinger's *Agalinis* are found was re-examined in 2008 and was confirmed to be Slender *Agalinis* (Diana Bizecki Robson pers. comm.). One other Slender *Agalinis* specimen collected from a drier area east of the Red R. was also re-examined and confirmed to be Slender *Agalinis* (Judith Canne-Hilliker pers. comm.).

Agalinis is a genus of hemi-parasitic species obtaining some nutrients from other plants. Little is known about preferred host plants. In 2007, some of the species noted to be commonly associated with Rough *Agalinis*, or associated with particularly large Rough *Agalinis* plants, were Big Bluestem (*Andropogon gerardii*), Little Bluestem (*Schizachyrium scoparium*), Shrubby Quincefoil (*Dasiphora fruticosa* ssp. *floribunda*), Rose (*Rosa* spp.), Trembling Aspen (*Populus tremuloides*), and legumes such as White Sweet Clover (*Melilotus albus*). More information regarding pollinators is also needed. Potential pollinators of Skinner's *Agalinis* (*Agalinis skinneriana*), which is very similar to Gattinger's *Agalinis*, include small bees, sulphur butterflies, and small wasps (NatureServe 2007b). Some populations of Skinner's *Agalinis* were reported by Dieringer (1999) to be primarily self pollinated. A small wasp was observed on the flower of a Gattinger's *Agalinis* plant in 2007. Other insects observed at Rough *Agalinis* sites in 2007 include bees, and butterflies such as the Viceroy (*Limenitis archippus*), Ringlet (*Coenonympha tullia*), American Painted Lady (*Vanessa virginiensis*), and Fritillary (*Speyeria* sp.). Dieringer (1999) noted that Rough *Agalinis* studied by him is self pollinated.

Agalinis species tend to be tolerant of disturbance and may require soil disturbance for germination (Canne-Hilliker In Press, NatureServe 2007b). More information is needed on habitat associations and the response of Rough *Agalinis* and Gattinger's *Agalinis* to various types of disturbance in Manitoba. Both *Agalinis* species appear to be adapted to somewhat disturbed edges or transitional habitat characterized by nearby woody vegetation or marsh. Potential encroachment of marsh or overtopping vegetation is a concern. In Ontario, increasing soil moisture, resulting in invasion by competing plants, has been responsible for the loss or decline of Gattinger's *Agalinis* at some sites (Canne-Hilliker In Press).

The most serious threat to Gattinger's *Agalinis* in Ontario is loss of habitat from human actions, including road and ditch improvements (Canne-Hilliker In Press). In Manitoba, populations growing along roadsides may also be affected by late season mowing while plants are reproducing. In 2004, seed capsules of some Rough *Agalinis* plants at one population were destroyed during late season mowing (COSEWIC 2006). Twenty-seven plants were observed at this site in 2004. In 2006 and 2007 less than five plants were found. Management recommendations for sites potentially affected by late season

mowing are being prepared by the CDC for road maintenance personnel. Avoiding mowing during peak blooming and seed set periods will be recommended.

Other rare or uncommon species observed while searching for Rough Agalinis include Whorled Milkwort (*Polygala verticillata* var. *isocycla*), Grooved Yellow Flax (*Linum sulcatum*), and Side-oats Grama (*Bouteloua curtipendula*) (Table. 2).

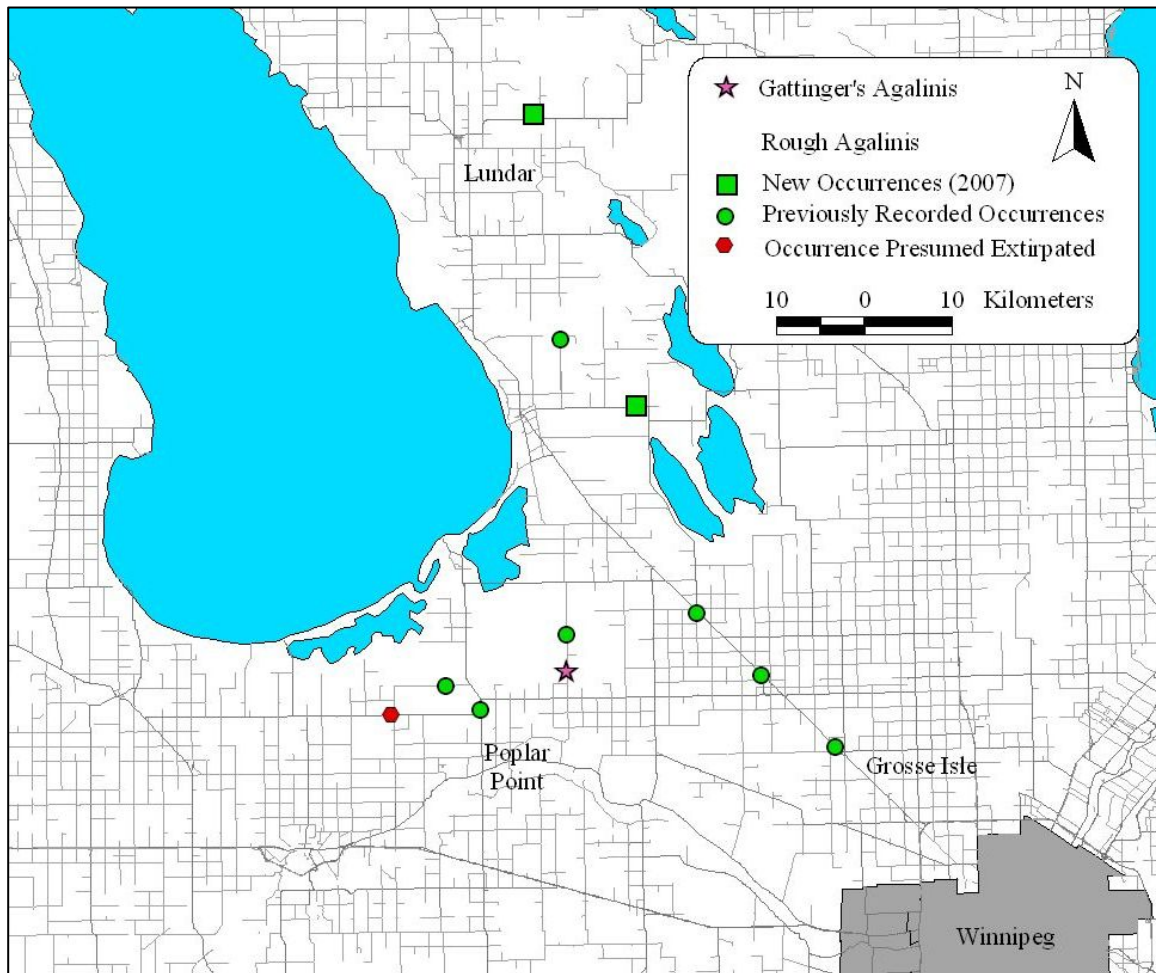


Figure 5. Currently known distributions of Rough Agalinis and Gattinger's Agalinis in the southern Interlake region of Manitoba.

Stewardship Activities and Recommendations

Information Sharing

Most populations of Manitoba's plant Species at Risk occur on private land or land that is managed by rural municipalities (RMs). In recent years the CDC has taken a more active role in communication and outreach. Currently, all landowners or managers with populations of legally listed plant species surveyed by the CDC are informed of their presence, known management issues, and conservation options. In addition, landowners and managers are contacted to discuss and gather feedback on various management issues such as grazing, mowing, and weed control. In 2007, information on conservation agreements, twice-over rotational grazing systems, control of invasive species, and management of rare species in road allowances was provided to private landowners and managers, rural municipalities, local weed supervisors, government personnel.

Information sharing among the CDC and associates has also improved, resulting in an increase in reports of rare plant observations forwarded to the CDC. Associates have been provided with updated lists of Manitoba's plant species along with their conservation status ranks. The CDC has not only received reports of rare plant occurrences but has also received updated information from universities and herbaria regarding presence or absence of plant species occurring in Manitoba. Highlights include additions to the CDC's list of plants present in Manitoba including Swedish Bunchberry (*Cornus suecica*), Curly Blue Grass (*Poa secunda*), One-flowered Broomrape (*Orobanche uniflora*), Gattinger's Agalinis (*Agalinis gattingeri*), and 11 fern and fern allies. Species recorded by the CDC or reported to the CDC that are rare or uncommon across Canada include: Annual Skeletonweed, Sand Bluestem, Bugseed, Yellow Stargrass, Schweinitz's Flatsedge, Grooved Yellow Flax, Side-oats Grama, Ram's-head Lady's-slipper, Bird's-foot Trefoil, Geyer's Spurge, Riddell's Goldenrod, Narrow-leaved Purple Coneflower, Two-flowered Dwarf Dandelion, Whorled milkweed, Alpine Cliff Fern, Limestone Oak Fern, and Gattinger's Agalinis (CESCC 2006).

Inventory and Monitoring

In addition to improved communication between the CDC and landowners/managers, more inventory and monitoring is needed to determine what types of management practices are most beneficial to each Species at Risk. At the national level, beneficial management practices are being developed for some Species at Risk with input from the provincial CDCs but documented responses of Species at Risk to various management practices is lacking. Monitoring of plant species at sites with different management regimes may assist with the development of beneficial management practices. In particular, annual monitoring of species that are known to fluctuate in population number and area is needed. Small White Lady's-slipper and Agalinis should be priorities for annual monitoring. Both are known to fluctuate in abundance and both occur as small

populations in road allowances where appropriate management is an important consideration.

National Recovery Strategies for Species at Risk are also incorporating information from the provincial CDCs. The development of standardized guidelines for enumerating or estimating population abundance, and area occupied by each species, is a priority that will enable comparison of populations and trends across jurisdictions. With the increasing use of GPS and mapping software in the field, an important component of standardizing methods, will be to develop guidelines for mapping plant patches in the field. This is particularly important for plant species for which population counts are impractical, such as Buffalograss, or for species that occur in large populations, such as Hairy Prairie-clover. The Critical Habitat required for effective protection has yet to be identified for most plant Species at Risk that occur in Manitoba. Improved understanding and documentation of spatial growth patterns and the area occupied by Species at Risk may assist with the designation of Critical Habitat for some species.

Managing Species at Risk in Road Allowances

A relatively high number of plant Species at Risk occur in remnant native prairie along road allowances in Manitoba. These populations are often surrounded by cultivation or other land uses that are inappropriate for the survival of Species at Risk. Roadside weed control and mowing to reduce encroachment of woody plants may help maintain native prairie for Species at Risk populations in some situations. However, some of these populations have been, or could become, at risk of disappearing as a result of maintenance activities such as ditch widening/deepening, utility line installations, herbicide spraying and regular mowing while plants are reproducing.

Departments of Transportation in some states including Minnesota, Wisconsin, Iowa, Missouri, Oregon, Colorado, Delaware, Massachusetts, North Carolina, New York State, Utah, California, and Texas have begun to consider rare plants, butterflies, birds and other wildlife when managing road allowances (Centre for Environmental Excellence by AASHTO 2008). Typically these initiatives involve obtaining maps from Natural Heritage Programs or Conservation Data Centres, designating Special Management Areas, educating maintenance staff regarding special management needs, and monitoring species. Management prescriptions include modifications to mowing, herbicide spraying, planting, fertilizing, and maintaining local hydrology during road work. Mowing modifications include altered timing, frequency, height, and cut-back distance.

Roadsides are typically mowed for safety reasons. Tall, dense vegetation reduces visibility adjacent to roads, and reduces sight distance to oncoming traffic and road way geometry. Additional roadside vegetation maintenance considerations include environmental laws, snow accumulation, invasive species control, fire prevention, adjacent land uses, aesthetics, and other community concerns (Centre for Environmental Excellence by AASHTO 2008, Massachusetts Highway Department 2006, California Department of Transportation 2007, Oregon Department of Transportation). In some

cases mowing of roadsides that support rare species has been deemed necessary for safety or visibility. In these cases plants may be staked out each year so mowing crews can lift their blades and avoid cutting them. In some jurisdictions double sided signs are posted along roadsides that support rare plant populations. Signs post various messages including 'Do Not Mow', 'Wildlife Research Area', 'Do Not Spray', and may include dates for no mow periods. GPS connection to maintenance vehicles for automatic activation and deactivation is also being explored.

To address potential threats to rare plant populations in Manitoba's road allowances, the CDC began to produce maps of road allowances that support Species at Risk in 2005. The main goals were two-fold: to increase awareness about the importance of road allowances for Species at Risk, and to provide information so that Species at Risk populations could be considered when planning maintenance activities. General maps were intended for maintenance personnel, as well as the general public. They were provided to the RM of Franklin for use in 2006, and to the RM of Stuartburn for use in 2007. These RMs were chosen because some of the last and best remaining native tall-grass prairie habitat, able to support a high proportion of Species at Risk, occurs in these regions. Each RM was provided with one type of map. The maps indicated which road allowances support plant Species at Risk, and when the plants typically reproduce and are most vulnerable to disturbance. Pictures of each species, and text explaining the significance of road allowances for these species, was also included on the maps. Detailed locations of specific species were not provided due to the threat of poaching of Endangered orchids, which has been reported in the past.

The CDC gathered feedback over the summer of 2007 and met with road maintenance, weed control, RM and government personnel in 2008 to gather further feedback on the use of the maps that were provided. Based on feedback and discussions with road maintenance and weed control personnel, the maps are being improved to provide more detailed information and to make them more user friendly. They are intended for use by those responsible for maintenance activities such as drainage projects, utility line installations, weed control, and mowing. Large scale maps will be provided for each Species at Risk. Locations of Species at Risk will be mapped on RM landowner maps, which maintenance personnel are accustomed to using. Peak blooming and seed production periods will be indicated to mitigate mowing so that Species at Risk may have the opportunity to flower and disperse seed. In accordance with the preferences of regional road maintenance personnel, mowing modifications will be based on timing rather than blade height or cut-back distance. The locations indicated on these maps can also be consulted by weed control personnel, and when major works such as utility line installations or drainage projects are proposed. In addition, in response to the preferences of regional weed control staff (Robert Budey pers. comm.), and weed supervisors in other jurisdictions, laminated pictures and descriptions of each Species at Risk will be provided to help spot sprayers identify Species at Risk in the field. Raising awareness among the general public about the significance of Species at Risk in road allowances should be pursued through the use of tools other than maps, such as fact sheets, news articles, and volunteer programs.

In 2008, the CDC also discussed management issues with road allowance managers from the RM of Woodlands. Small White Lady's-slipper, Rough Agalinis, and Gattinger's Agalinis all occur in road allowances in the RM of Woodlands. Encroachment of woody vegetation and mowing before seeds are mature, are issues that need to be addressed at some locations. Management recommendations and maps will be provided to this RM as well. In addition, site visits to deal with the annual, fluctuating nature of Agalinis populations may be needed in order to determine sensitive locations to be avoided during peak blooming and seed set periods. One Rough Agalinis population occupies a small portion of mowed lawn within a town site. The area is mowed approximately every 2 weeks, down to 2 inches, during summer months. Marking plant populations with stakes is an option in such areas.

In addition to protecting rare species, cooperation between the CDC and maintenance staff may provide other benefits such as increased knowledge and mapping of rare and invasive species, reduced encroachment into native roadside prairie by woody and weedy species, and lower maintenance costs. Any changes to current management practices should be closely monitored. Regular communication between the CDC and those responsible for land management is recommended so that issues and updates can be addressed as they arise.

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Appendix 1: Definitions of Conservation Status Ranks

Adapted from Manitoba Conservation Data Centre (2001) and NatureServe (2007).

Species are evaluated and ranked at the range-wide (global - G), nation-wide (national – N), and province-wide (subnational - S) level based on a standardized procedure used by all Conservation Data Centres and Natural Heritage Programs. These ranks are used to determine protection and data collection priorities and are revised as new information becomes available. The Manitoba Conservation Data Centre is responsible for determining provincial (subnational) ranks for Manitoba.

For each level of distribution—global, national, and provincial—species are assigned a numeric rank ranging from 1 (very rare) to 5 (secure). This reflects the species' relative endangerment and is based primarily on the number of occurrences of that species globally, nationally, or within the province. Other information such as date of observation, degree of habitat threat, geographic distribution patterns and population size and trends, is considered when assigning a rank. The numbers of occurrences listed below are suggestions, not absolute criteria.

Basic Ranks

Rank	Definition
1	Very rare/Critically Imperilled - Critically imperilled because of extreme rarity (often 5 or fewer occurrences) or because of some factor(s) such as very steep declines making it especially vulnerable to extirpation or extinction.
2	Rare/Imperilled - Imperilled because of rarity due to very restricted range, very few populations (often 20 or fewer), steep declines, or other factors making it very vulnerable to extirpation or extinction.
3	Uncommon/Vulnerable - Vulnerable due to a restricted range, relatively few populations (often 80 or fewer), recent and widespread declines, or other factors making it vulnerable to extirpation or extinction.
4	Apparently Secure - Uncommon but not rare; some cause for long-term concern due to declines or other factors.
5	Secure—Common, widespread, and abundant.
H	Historical/Possibly Extirpated - Species occurred historically, and there is some possibility that it may be rediscovered.
X	Presumed Extirpated - Species is believed to be extirpated. Not located despite intensive searches of historical sites and other appropriate habitat, and virtually no likelihood that it will be rediscovered.
U	Unrankable - Currently unrankable due to lack of information or due to substantially conflicting information about status or trends.
NR	Unranked - Conservation status not yet assessed.

Other Heritage Codes

Code	Definition
G#G# N#N# S#S#	Range Rank - A numeric range rank (e.g., S2S3) is used to indicate any range of uncertainty about the status of the species. Ranges cannot skip more than one rank (e.g., SU is used rather than S1S4).
?	Inexact or Uncertain - Denotes inexact or uncertain numeric rank. (The ? qualifies the character immediately preceding it in the S-rank.)
T#	Intraspecific Taxon - The status of intraspecific taxa (subspecies or varieties) are indicated by a "T-rank" following the species' global rank (e.g. G4T3).