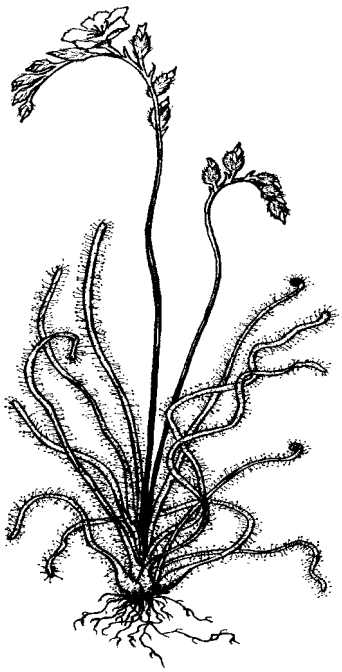
COSEWIC
Assessment and Update Status Report

on the

Thread-leaved Sundew
Drosera filiformis

in Canada



ENDANGERED
2001

COSEWIC
COMMITTEE ON THE STATUS OF
ENDANGERED WILDLIFE
IN CANADA

COSEPAC
COMITÉ SUR LA SITUATION DES
ESPÈCES EN PÉRIL
AU CANADA

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COSEWIC
Assessment Summary

Assessment Summary – May 2001

Common name
Thread-leaved Sundew

Scientific name
Drosera filiformis

Status
Endangered

Reason for designation
Peat bog species occurring in only a few sites highly disjunct from the main range of the species along the Atlantic seaboard and subject to ongoing risks of peat extraction.

Occurrence
Nova Scotia

Status history
Designated Endangered in April 1991. Status re-examined and confirmed in May 2001.

COSEWIC
Executive Summary

Thread-leaved Sundew
Drosera filiformis

Species information

Thread-leaved sundew is a small, rare carnivorous wildflower that only grows in bogs. It produces up to 15 purplish flowers with yellow centers on the elongate, leafless flowering stalk that often forms a broad crook at its tip. It is an herbaceous perennial that grows long, erect, thread-like leaves each summer from a whitish tuber. Numerous reddish-purple, sticky, hair-like glands cover the leaves and trap small arthropods (insects and spiders). Enzymes in the droplets digest the trapped victims that serve as an additional source of nutrients.

Distribution

The Canadian range of thread-leaved sundew is restricted to only five bogs in a small area of extreme southwestern Nova Scotia. It also occurs in the eastern United States, ranging from a few populations in coastal New England to more abundant ones on the Gulf Coast of Florida and Louisiana.

Habitat

In Nova Scotia, thread-leaved sundew only occurs in raised (or plateau) bogs. These are infertile, acidic, domes, open wetlands dominated by peat mosses, heath shrubs, and short sedges and grasses.

Biology

Thread-leaved sundew is a perennial, low-growing, herbaceous plant. It is capable of photosynthesis. However, it is also a “carnivore” that captures small invertebrates on its sticky leaves, digests them, and absorbs some of the nutrients.

Population sizes and trends

The total population of the thread-leaved Sundew amounts to tens of thousands of plants, but it only occurs in five known populations.

Limiting factors and threats

One of the largest populations of the thread-leaved sundew is threatened by a proposal to develop a peat mine, which would destroy or degrade its habitat. The other four known populations are also potentially threatened by proposals to develop peat mines or cranberry farms.

Special significance of the species

Like other carnivorous plants, thread-leaved sundew holds a fascination for many people. Other species of sundews have had minor use in herbal medicine, but such use is not known for thread-leaved sundew.

COSEWIC MANDATE

The Committee on the Status of Endangered Wildlife in Canada (COSEWIC) determines the national status of wild species, subspecies, varieties, and nationally significant populations that are considered to be at risk in Canada. Designations are made on all native species for the following taxonomic groups: mammals, birds, reptiles, amphibians, fish, lepidopterans, molluscs, vascular plants, lichens, and mosses.

COSEWIC MEMBERSHIP

COSEWIC comprises representatives from each provincial and territorial government wildlife agency, four federal agencies (Canadian Wildlife Service, Parks Canada Agency, Department of Fisheries and Oceans, and the Federal Biosystematic Partnership), three nonjurisdictional members and the co-chairs of the species specialist groups. The committee meets to consider status reports on candidate species.

DEFINITIONS

Species	Any indigenous species, subspecies, variety, or geographically defined population of wild fauna and flora.
Extinct (X)	A species that no longer exists.
Extirpated (XT)	A species no longer existing in the wild in Canada, but occurring elsewhere.
Endangered (E)	A species facing imminent extirpation or extinction.
Threatened (T)	A species likely to become endangered if limiting factors are not reversed.
Special Concern (SC)*	A species of special concern because of characteristics that make it particularly sensitive to human activities or natural events.
Not at Risk (NAR)**	A species that has been evaluated and found to be not at risk.
Data Deficient (DD)***	A species for which there is insufficient scientific information to support status designation.

* Formerly described as “Vulnerable” from 1990 to 1999, or “Rare” prior to 1990.
** Formerly described as “Not In Any Category”, or “No Designation Required.”
*** Formerly described as “Indeterminate” from 1994 to 1999 or “ISIBD” (insufficient scientific information on which to base a designation) prior to 1994.

The Committee on the Status of Endangered Wildlife in Canada (COSEWIC) was created in 1977 as a result of a recommendation at the Federal-Provincial Wildlife Conference held in 1976. It arose from the need for a single, official, scientifically sound, national listing of wildlife species at risk. In 1978, COSEWIC designated its first species and produced its first list of Canadian species at risk. Species designated at meetings of the full committee are added to the list.

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Canada

The Canadian Wildlife Service, Environment Canada, provides full administrative and financial support to the COSEWIC Secretariat.

Update
COSEWIC Status Report

on the

Thread-leaved Sundew
Drosera filiformis

in Canada

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2001

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SPECIES INFORMATION

Name and classification

Scientific name: *Drosera filiformis* Raf.
Common name: Thread-leaved Sundew
Family: Droseraceae
Major plant group: Dicotyledoneae

Description

Thread-leaved sundew is a perennial, herbaceous plant (Fernald, 1950; Gleason, 1952; Gleason and Cronquist, 1963; Zinck, 1991; Freedman *et al*., 1992*)*. It has long, erect, filiform (thread-like) leaves that arise as a rosette from a roughly spherical, starchy, whitish tuber (Figure 1). There are typically 3-5 leaves per plant, each up to 11 cm long (these data are for Nova Scotia; the species grows taller in more southern parts of its range in the eastern United States). The leaves lack a distinct petiole and are covered throughout with hair-like glands that exude a sticky, colourless fluid. The glandular hairs are red-purple in colour and give the plant an overall reddish hue. The tuber is up to 5 mm wide and grows at or just under the surface of the peat substrate. The elongate, leafless flowering scape is up to 22 cm long, often with a broad crook at the apical end. The scape supports as many as 12-15 flowers, which mature sequentially from lower down on the stem to upwards. Each flower is about 1 cm in diameter and is showy with five purple petals with yellow at the base. The seeds are black, elliptic, and 0.5-0.8 mm long.

DISTRIBUTION

Global Range

The global range of thread-leaved sundew extends from the Gulf Coast of Louisiana and Florida, and along the coastal plain of the eastern United States to as far north as extreme southwestern Nova Scotia (Fernald, 1918; Wynne, 1944; Gleason, 1952; Maher *et al*., 1978; Juniper *et al*., 1989; Zinck, 1991; Freedman *et al*., 1992). Populations in the northern part of the range are scattered and disjunct (Figure 2).

Note that some taxonomists consider the populations of the coastal plain of the eastern U.S. and Nova Scotia to be *Drosera filiformis*, and those of the U.S. Gulf Coast to be *Drosera tracyi* (Sorrie, 1998).

Canadian Range

In Canada, thread-leaved sundew is only known from five discrete bogs in Shelburne County in extreme southwestern Nova Scotia. The specific sites are known as: (1) Swaines Road (or Barrington) Bog, (2) Port La Tour Bog (this site is probably hydrologically

connected to the Swaines Road Bog), (3) West Baccaro Bog; (4) Quinns Meadow; and (5) Villagedale Bog. The first discovery of thread-leaved sundew in Canada was made in the Swaines Road Bog in 1977, and the most recent in the Villagedale Bog in 1999. Extensive surveys have been made of more than 20 other raised bogs in southwestern Nova Scotia having apparently suitable habitat, without finding the rare sundew. Nevertheless, continued surveys of remote bogs may yet discover additional sites.

The disjunct populations of thread-leaved sundew in southwestern Nova Scotia are part of a coastal-plain floristic element involving various species that are rare or unknown elsewhere in Canada (Fernald 1918; Roland and Smith 1969; Wisheu *et al*. 1994). The populations of these coastal-plain plants are considered relicts of a once more-widely distributed flora that ranged along the exposed continental shelf during periods of lower sea level during the Quaternary. During this time, a land-bridge may have extended from Cape Cod to southwestern Nova Scotia, and as recently as 5,000 years ago there was a substantial remnant archipelago of that landform (Bousfield and Thomas 1975; Roland 1982). Post-glacial rise in sea level isolated the coastal-plain species in Nova Scotia from more broadly distributed communities of this type in the eastern U.S. Many species within the Coastal Plain Flora of Nova Scotia are rare and endangered (Maher *et al*. 1978; Keddy 1979, 1985; Keddy and Wisheu 1989; Wisheu *et al*. 1994).

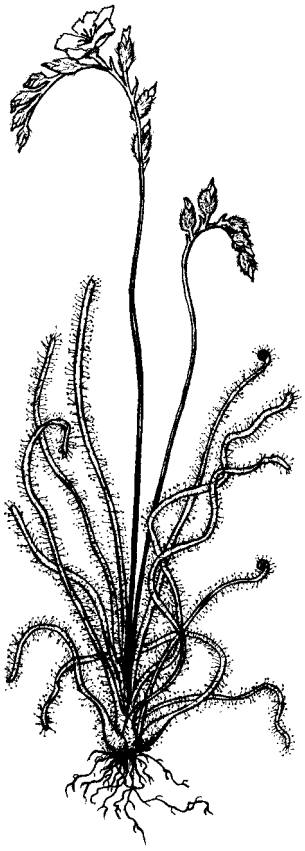

Figure 1. Thread-leaved sundew (illustrated by Annette Luttermann).

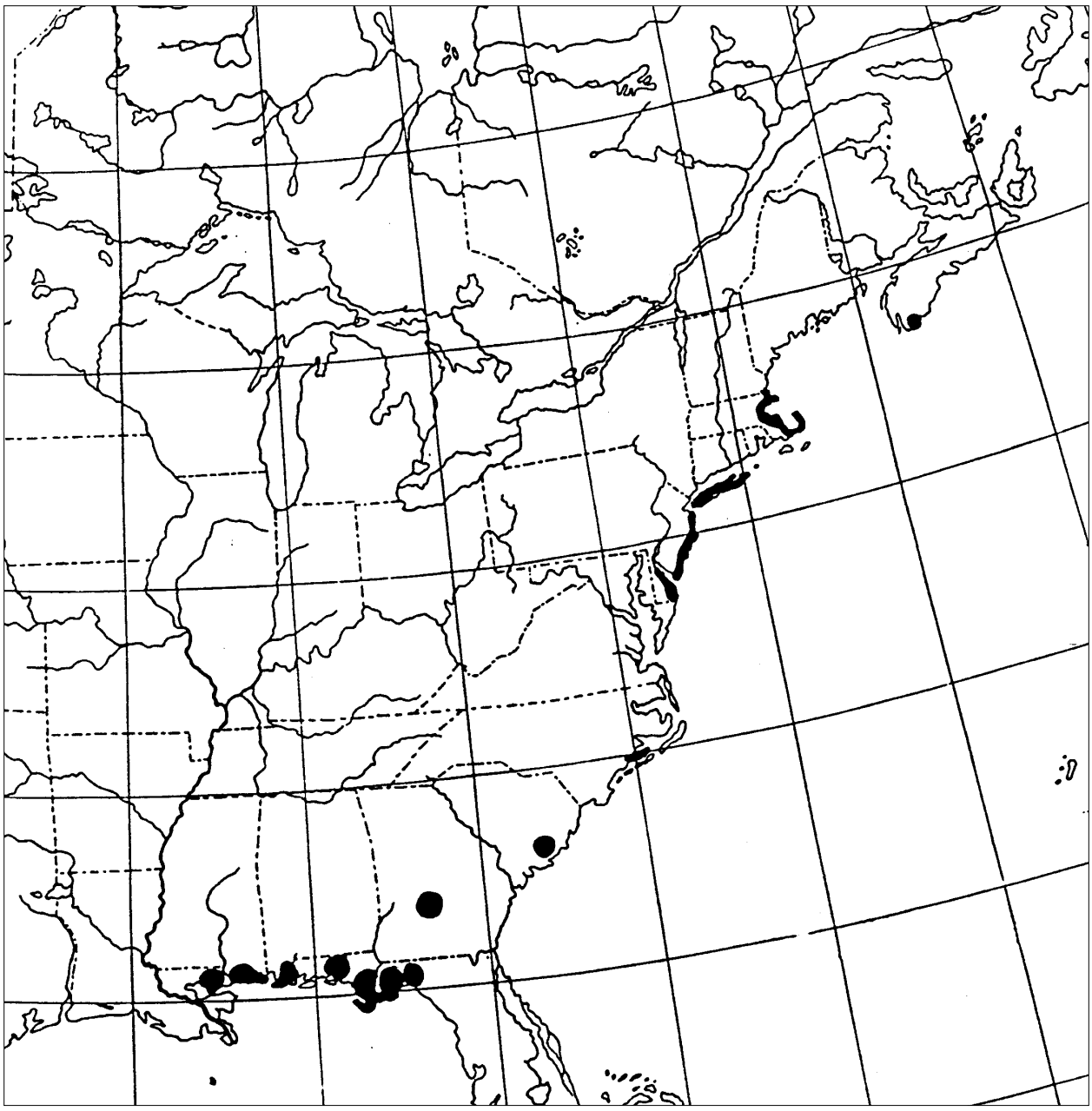

Figure 2. The range of thread-leaved sundew in North America. The distributional information is from Wynne (1944), except for the later-discovered populations in extreme southwestern Nova Scotia.

HABITAT

Habitat Requirements

The Canadian habitats of thread-leaved sundew are all raised (or plateau) bogs (Zinck, 1991; Freedman *et al*., 1992). These are domed, ombrotrophic, highly infertile wetlands that have developed on relatively low, flat sites under the influence of a moist, mild, maritime-temperate climatic regime. The bogs have a hummock – hollow surface

microtopography. The hollows are relatively moist, while the tops of the hummocks are drier. Interstitial water is highly acidic, with a pH of 3.1 to 3.3 (Freedman *et al*., 1992). The acidity is due to the ombrotrophic character of the raised bogs and the large concentrations of fulvic acids that give a dark-brown stain to the interstitial water (Freedman *et al.* 1989). The calcium concentration in interstitial water is 0.4-1.3 mg/L and similar to oligotrophic lakewaters in southwestern Nova Scotia (Freedman *et al.* 1989). Magnesium concentration is 0.8-2.0 mg/L, about twice as large as in those lakes. Depending on the time of year and recent rains, water may be present at the surface or somewhat lower in the peat.

The vegetation of the bogs is dominated by species of peat mosses (*Sphagnum* spp.) and low-growing shrubs. The habitat is well vegetated but open, consistent with the need of the rare sundew for weakly competitive conditions (Juniper *et al*., 1989; Freedman *et al*., 1992). The most consistently prominent indicator of the habitat of thread-leaved sundew is the short-statured, clumped deer-grass, *Scirpus caespitosus* (Freedman *et al*., 1992). On relatively drier and shrubbier microsites, the lichens *Cladina mitis, C. terrae-novae,* and *Cladonia cervicornis* are relatively prominent, as are the shrubs *Aronia prunifolia, Gaylussacia baccata, G. dumosa, Juniperus communis,* and *Kalmia angustifolia*. On relatively wetter microsites with frequent exposures of poorly vegetated peat substrate, the peatmoss *Sphagnum tenellum* is prominent, as are *Carex exilis, Rhynchospora alba,* and various species of mosses and liverworts. The raised bogs are discontinuously surrounded by a moat (or lagg) of standing or slowly flowing water, with an inside band of taller heaths and other shrubs. Within these vegetation zones is a more extensive open area of shorter plants that provides habitat for the rare sundew.

TRENDS

The extent of critical habitat for the thread-leaved sundew in southwestern Nova Scotia is not declining appreciably. Some of the sites suffer minor levels of disturbance by trampling by all-terrain vehicles and digging of small amounts of horticultural peat by individual persons. Overall, however, these are local disturbances and are not a significant threat to the survival of the rare sundew. In fact, small plants and seedlings are frequently noted in these sorts of anthropogenic microdisturbances, and also in deer trails.

However, a site supporting one of the largest populations of the thread-leaved Sundew in Canada at the Swaine's Road Bog has been repeatedly proposed for development as a peat mine. If such a development were to occur, it would destroy or degrade the habitat of the rare plant. This damage could be caused by the direct harvesting of peat from places where the rare sundew is growing, or through indirect effects of hydrological changes associated with peat mining within a nearby contiguous wetland. In 1991, the Nova Scotia Minister of the Environment refused to allow a proposed mine to proceed at this site. The stated rationale for this decision was the risks posed to the survival of thread-leaved sundew in Nova Scotia and Canada. This

was a rare example in which consideration for the survival of an endangered species of plant has halted a proposed resource development in Canada or elsewhere. Nevertheless, because this site has relatively deep peat and easy access, there are continuing proposals to develop a peat mine there. Moreover, all of the habitats of the thread-leaved sundew are potentially threatened by such developments (although only the Swaine's Road site has so far been specifically targeted). This is because of the increasing resource value associated with the use of peat as a source of energy or for horticultural purposes, as well as the possibility of converting such sites for the commercial cultivation of cranberries.

Protection/Ownership

None of the known critical habitats of thread-leaved sundew is in an officially protected area. Most of the Swaine's Road Bog is owned by the Municipality of Barrington, but some areas are privately owned. The other sites are mostly privately owned, but parts are provincial crown land.

The Nova Scotia Department of Natural Resources is preparing a management plan for coastal plain species and their habitats in the province. Although thread-leaved sundew does not cohabit with other coastal plain species (most of which occur on the shorelines of certain lakes and rivers), it will be included in the management plan.

BIOLOGY

General

Thread-leaved sundew is a perennial, low-growing, herbaceous plant. It is an autotrophic plant, but it supplements its nutrition by carnivory (see below). It has a patchy microdistribution within its Nova Scotia habitat of raised bogs.

Reproduction

Thread-leaved sundew has insect-pollinated flowers. Anthesis begins in late July and occurs through August. There are typically about 8 capsules per flowering plant, and 70 seeds per capsule (Zinck, 1991). The seeds are probably dispersed locally by flowing water, and new plants are established as seedlings. Seedling establishment appears to be most prolific in disturbed microhabitats with bare, exposed peat. The species can also be readily transplanted as intact plants or tubers, and can be propagated vegetatively by cuttings (Lloyd 1942; Schwartz 1975; Swenson 1977; Juniper *et al.* 1989; Lecoufle 1991).

Survival

Thread-leaved sundew is a perennial plant, but its longevity is unknown. Most of 12 individuals transplanted to suitable coastal habitat in Halifax County, Nova Scotia, were still alive after 15 years (Wolfgang Maass, personal communication).

Movements/Dispersal

Seeds of thread-leaved sundew may be dispersed locally by flowing water.

Nutrition and Interspecific Interactions

Thread-leaved sundew is a photoautotroph that produces its own nutrition through photosynthesis. In addition, like other sundews, pitcher plants, and some other species, it is a so-called “carnivorous” plant that traps small arthropods and digests them as a source of nutrients. Thread-leaved sundew traps small animals on the sticky glands on the surface of its leaves. The animals are secured by inrolling of the leaf and digested by extracellular enzymes excreted by the sundew, and serve mainly as a source of inorganic nitrogen and phosphate (Darwin, 1875; Krafft and Handel, 1991). Because the sundew grows in an extremely oligotrophic habitat, the nutrients obtained through carnivory are important to its survival.

POPULATION SIZES AND TRENDS

Studies of the Swaines Road Bog, Port La Tour Bog, West Baccaro Bog, and Quinns Meadow in 1991 found average densities of the thread-leaved sundew of 12-40/m^2 and up to 90/m^2 (Freedman *et al*., 1991). Studies of the Villagedale Bog in 1999 found a density of up to 50/m^2 (flowering plants only; J. Jotcham, unpublished data).

Accurate measurements have not been made of the sizes of the populations of thread-leaved sundew at its five known critical habitats in Nova Scotia. However, there appear to be tens of thousands of plants in each of the Swaines Road Bog, Port La Tour Bog, and Villagedale Bog, and additional thousands more in the West Baccaro Bog and Quinns Meadow (Freedman *et al*., 1991; J. Jotcham, unpublished data).

The populations of thread-leaved sundew have not been monitored at any of its known sites. During at least the past decade, however, the habitat appears to have been stable, and so likely have been the populations of the rare sundew.

LIMITING FACTORS AND THREATS

Environmental factors limiting the abundance and range of thread-leaved sundew in Nova Scotia are not known. However, there are extensive areas of potentially suitable bog habitat elsewhere in southwestern Nova Scotia, and it is possible that the rare sundew might thrive if transplanted to those places. Twelve plants were, indeed, transplanted to a coastal bog in Halifax County, located about 200 km NE of the natural range of the rare plant (W. Maass, pers. comm.). This introduced population has persisted and increased in size, and the growth form of the plants is similar to that of thread-leaved sundew in its natural range in Nova Scotia. These are, however, relatively, short-term observations and may not indicate the longer-term persistence or viability of the introduced population.

SPECIAL SIGNIFICANCE OF THE SPECIES

Thread-leaved sundew is an attractive wildflower. Like other carnivorous plants, it holds a special fascination for many people. Other species of sundews have had minor use in herbal medicine, but such use is not known for thread-leaved sundew.

EVALUATION AND PROPOSED STATUS

Existing Protection or Other Status

Thread-leaved sundew was listed as “endangered” in Canada by COSEWIC in 1991 (Zinck, 1991). In 2000 it was listed as endangered by the government of Nova Scotia. The U.S. Fish and Wildlife Service does not list thread-leaved sundew as being at risk on a national basis. However, some eastern states consider it to be at risk (to varying degrees in Connecticut, Florida, Georgia, Maine, Massachusetts, New York, North Carolina, Rhode Island, Vermont, West Virginia).

Assessment of Status and Authors' Recommendation

Thread-leaved sundew appears to be well established at all of its five known critical habitats in Nova Scotia, albeit at varying population levels. Its populations are most vigorous and reproducing best at the Swaines Road Bog, Port La Tour Bog, and Villagedale Bog. Because the Thread-leaved Sundew is known from only five sites, and all are actually or potentially threatened by destruction or degradation by peat mining or conversion to cranberry farming, it is recommended that the status of “endangered” be retained.

TECHNICAL SUMMARY

Drosera filiformis
Thread-leaved Sundew Rossolis filiforme
Range of Occurrence in Canada: NS

Extent and Area information

• *extent of occurrence (km²)*	ca. 77 km ^{2} (NS, DNR)
• *specify trend (decline, stable, increasing, unknown)*	stable
• *are there extreme fluctuations in extent of occurrence (> 1 order of magnitude)?*	no
• *area of occupancy (km²)*	ca. 11.5 km ^{2} (NS, DNR)
• *specify trend (decline, stable, increasing, unknown)*	stable
• *are there extreme fluctuations in area of occurrence (> 1 order magnitude)?*	no
• *number of extant locations*	5
• *specify trend in # locations (decline, stable, increasing, unknown)*	stable
• *are there extreme fluctuations in # locations (>1 order of magnitude)?*	no
• *habitat trend: specify declining, stable, increasing or unknown trend in area, extent or quality of habitat*	stable

Population information

• *generation time (average age of parents in the population) (indicate years, months, days, etc.)*	likely >5 years
• *number of mature individuals (capable of reproduction) in the Canadian population (or, specify a range of plausible values)*	thousands
• *total population trend: specify declining, stable, increasing or unknown trend in number of mature individuals*	stable
• *if decline, % decline over the last/next 10 years or 3 generations, whichever is greater (or specify if for shorter time period)*	
• *are there extreme fluctuations in number of mature individuals (> 1 order of magnitude)?*	no
• *is the total population severely fragmented (most individuals found within small and relatively isolated (geographically or otherwise) populations between which there is little exchange, i.e., ≤ 1 successful migrant / year)?*	yes
• *list each population and the number of mature individuals in each*	numbers in the thousands for each
• *Specify trend in number of populations (decline, stable, increasing, unknown)*	stable
• *are there extreme fluctuations in number of populations (>1 order of magnitude)?*	no

Threats (actual or imminent threats to populations or habitats)

- Imminent threat of peat harvesting

Rescue Effect (immigration from an outside source)

• *does species exist elsewhere (in Canada or outside)?*	yes
• *status of the outside population(s)?*	abundant
• *is immigration known or possible?*	not likely due to disjunction
• *would immigrants be adapted to survive here?*	yes
• *is there sufficient habitat for immigrants here?*	limited

Quantitative Analysis

[Erich Haber, May 2001]

ACKNOWLEDGEMENTS

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