Environment Canada Environnement Canada

Consultation on Amending the List of Species under the *Species at Risk Act*

Terrestrial Species

November 2011

Canada

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Please submit your comments by

February 8, 2012, for terrestrial species undergoing **normal** consultations

and by

November 8, 2012, for terrestrial species undergoing **extended** consultations.

For a description of the consultation paths these species will undergo, please see
www.registrelep-sararegistry.gc.ca/sar/listing/tab_1211_e.cfm

Please email your comments to the Species at Risk Public Registry at:
sararegistry@ec.gc.ca

Comments may also be mailed to:
Director General
Canadian Wildlife Service
Environment Canada
Ottawa ON K1A 0H3

For more information on the *Species at Risk Act*, please visit the Species at Risk Public Registry at:
www.sararegistry.gc.ca

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ADDITION OF SPECIES TO THE *SPECIES AT RISK ACT*

The *Species at Risk Act* and the List of Wildlife Species at Risk

The Government of Canada is committed to preventing the disappearance of wildlife species at risk from our lands. As part of its strategy for realizing that commitment, on June 5, 2003, the Government of Canada proclaimed the *Species at Risk Act* (SARA). Attached to the Act is Schedule 1, the list of the species provided for under SARA, also called the List of Wildlife Species at Risk. Endangered or Threatened species on Schedule 1 benefit from the protection of prohibitions and recovery planning under SARA. Special Concern species benefit from its management planning. Schedule 1 has grown from the original 233 to 493 wildlife species at risk.

The complete list of species currently on Schedule 1 can be viewed at:
www.sararegistry.gc.ca/species/schedules_e.cfm?id=1

Species become eligible for addition to Schedule 1 once they have been assessed as being at risk by the Committee on the Status of Endangered Wildlife in Canada (COSEWIC). The decision to add a species to Schedule 1 is made by the Governor in Council following a recommendation from the Minister of the Environment. The Governor in Council is the formal executive body that gives legal effect to decisions that are to have the force of law.

COSEWIC and the assessment process for identifying species at risk

COSEWIC is recognized under SARA as the authority for assessing the status of wildlife species at risk. COSEWIC comprises experts on wildlife species at risk. Its members have backgrounds in the fields of biology, ecology, genetics, Aboriginal traditional knowledge and other relevant fields. They come from various communities, including academia, Aboriginal organizations, government and non-governmental organizations.

COSEWIC gives priority to those species more likely to become extinct, and then commissions a status report for the evaluation of the species' status. To be accepted, status reports must be peer-reviewed and approved by a subcommittee of species specialists. In special circumstances, assessments can be done on an emergency basis. When the status report is complete, COSEWIC meets to examine it and discuss the species. COSEWIC then determines whether the species is at risk, and if so, then assesses the level of risk and assigns a conservation status.

Terms used to define the degree of risk to a species

The conservation status defines the degree of risk to a species. The terms used under SARA are Extirpated, Endangered, Threatened and Special Concern. Extirpated species are wildlife species that no longer occur in the wild in Canada but still exist elsewhere. Endangered species are wildlife species that are likely to soon become extirpated or extinct. Threatened species are likely to become endangered if nothing is done to reverse the factors leading to their extirpation or extinction. The term Special Concern is used for wildlife species that may become threatened or endangered due to a combination of biological characteristics and threats. Once COSEWIC has assessed a species as Extirpated, Endangered, Threatened or Special Concern, it is eligible for inclusion on Schedule 1.

For more information on COSEWIC, visit:
www.cosewic.gc.ca

On September 8, 2011, COSEWIC sent to the Minister of the Environment its newest assessments of species at risk. Environment Canada is now consulting on changes to Schedule 1 to reflect these new designations for these terrestrial species. To see the list of the terrestrial species and their status, please refer to tables 1 and 2.

Terrestrial and aquatic species eligible for Schedule 1 amendments

The Minister of Fisheries and Oceans is conducting separate consultations for the aquatic species. For more information on the consultations for aquatic

species, visit the Fisheries and Oceans Canada website at:
www.dfo-mpo.gc.ca

The Minister of the Environment is conducting the consultations for all other species at risk.

Approximately 35% of the recently assessed terrestrial species at risk also occur in national parks or other lands administered by Parks Canada; Parks Canada shares responsibility for these species with Environment Canada.

Public comments solicited on the proposed amendment of Schedule 1

The conservation of wildlife is a joint legal responsibility: one that is shared among the governments of Canada. But biodiversity will not be conserved by governments that act alone. The best way to secure the survival of species at risk and their habitats is through the active participation of all those concerned. SARA recognizes this, and that all Aboriginal peoples and Canadians have a role to play in preventing the disappearance of wildlife species from our lands. The Government of Canada is inviting and encouraging you to become involved. One way you can do so is by sharing your comments concerning the addition or reclassification of these terrestrial species.

Your comments are considered in relation to the potential impacts of listing, and they are then used to draft the Minister's proposed listing recommendations for each of these species. To ensure that your comments are considered in time, they should be submitted before the following deadlines.

For terrestrial species undergoing normal consultations, comments should be submitted by **February 8, 2012**.

For terrestrial species undergoing extended consultations, comments should be submitted by **November 8, 2012**.

To find out which consultation paths these species will undergo (extended or normal), please see:
www.registrelep-sararegistry.gc.ca/sar/listing/tab_2011_e.cfm

Comments received by these deadlines will be considered in the development of the listing proposal.

Please email your comments to the Species at Risk Public Registry at:
sararegistry@ec.gc.ca

By regular mail, please address your comments to:
Director General
Canadian Wildlife Service
Environment Canada
Ottawa ON K1A 0H3

The *Species at Risk Act* Listing Process and Consultation

The addition of a wildlife species at risk to Schedule 1 of SARA strengthens and enhances the federal government's capacity to provide for its protection and conservation. To be effective, the listing process must be transparent and open. The species listing process under SARA is summarized in Figure 1.

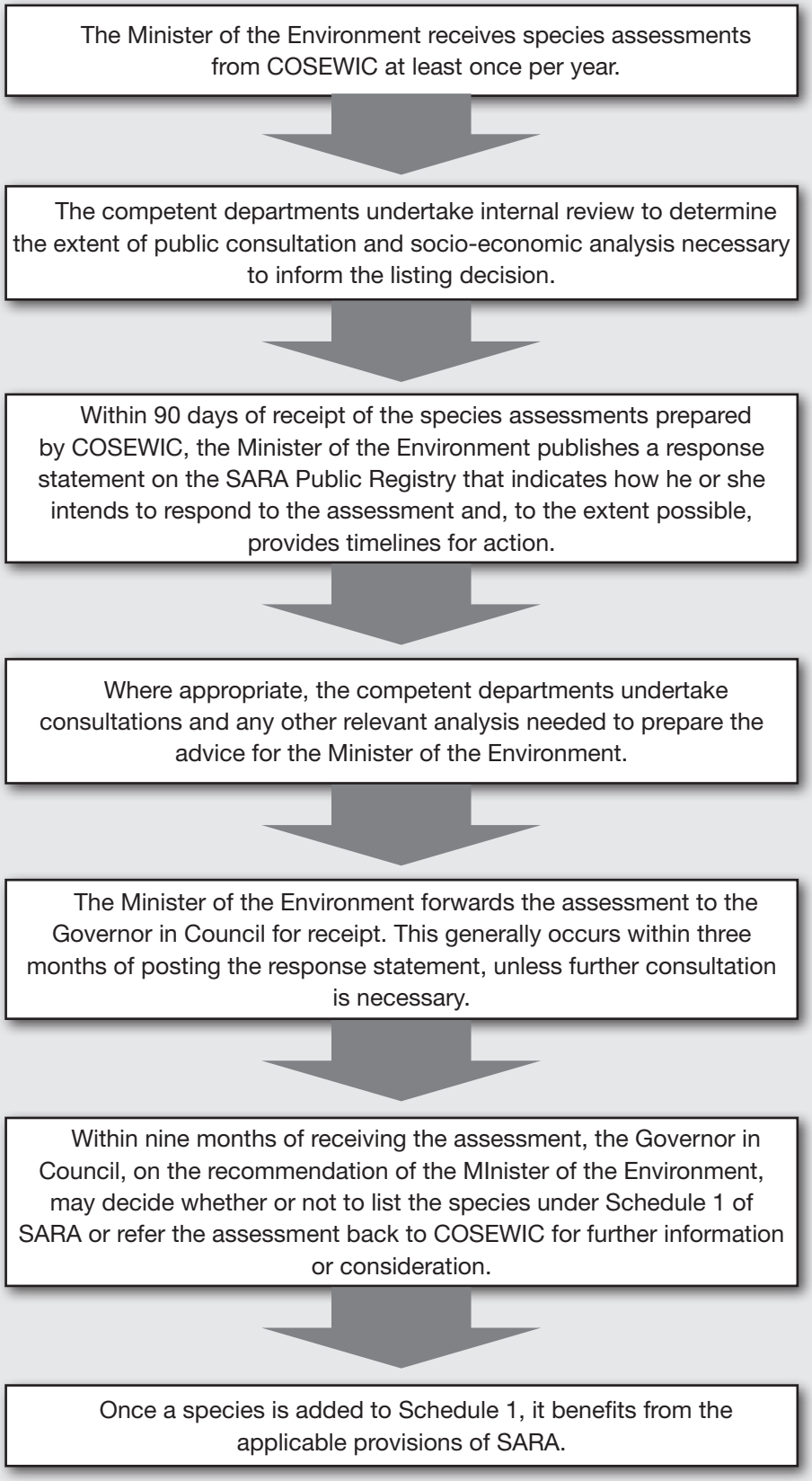
The purpose of consultations on amendments to the List

When COSEWIC assesses a wildlife species, it does so solely on the basis of the best available information relevant to the biological status of the species. COSEWIC then submits the assessment to the Minister of the Environment, who considers it when making the listing recommendation to the Governor in Council. These consultations are to provide the Minister with a better understanding of the potential social and economic impacts of the proposed change to the List of Wildlife Species at Risk, and of the value that is placed on biodiversity.

Legislative context of the consultations: the Minister's recommendation to the Governor in Council

The comments collected during the consultations are used to inform the Minister's recommendations to the Governor in Council for listing species at risk. The Minister must recommend one of three courses of action. These are for the Governor in Council: to

Figure 1: The species listing process under SARA



accept the species assessment and modify Schedule 1 accordingly; not to add the species to Schedule 1; or to refer the species assessment back to COSEWIC for its further consideration (Figure 1).

The Minister of the Environment's response to the COSEWIC assessment: the response statement

After COSEWIC has completed its assessment of a species, it provides it to the Minister of the Environment. The Minister of the Environment then has 90 days to post a response on the Species at Risk Public Registry, providing information on the scope of any consultations and the timelines for action, to the extent possible. This is known as the response statement. It identifies how long the consultations will be (whether they are "normal" or "extended") by stating when the Minister will forward the assessment to the Governor in Council. Consultations for a group of species are launched with the posting of their response statements.

Normal and extended consultation periods

Normal consultations meet the consultation needs for the listing of most species at risk. They take about three months to complete, while extended consultations usually take 15 months.

The extent of consultations needs to be proportional both to the expected impact of a listing decision or the time that may be required to consult appropriately. Under some circumstances, the Schedule 1 listing of a species could have significant and widespread impacts on the activities of some groups of people. It is essential that such stakeholders be informed of the pending decision and, to the extent possible, its potential consequences. They also need to have the opportunity to provide information on the potential impacts of listing and share ideas on how best to approach threats to the species. A longer period may also be required to consult appropriately with some groups. For example, consultations can take longer for groups that meet infrequently but that must be engaged on several occasions. For such reasons, extended consultations may be undertaken.

For both normal and extended consultations, once they are complete, the Minister of the Environment forwards the species assessments to the Governor in Council for the government's formal receipt of the assessment. The Governor in Council then has nine months to come to a listing decision. Thus, listing decisions for species in normal consultations are usually made about one year after the publication of their response statements. Listing decisions for species in extended consultations are usually made about two years after the response statements are published.

The consultation paths (normal or extended) for the terrestrial species listed in Table 1 will be announced when the Minister publishes the response statements. These will be posted by December 8, 2011, on the Species at Risk Public Registry at:

www.registrelep-sararegistry.gc.ca/sar/listing/tab_2011_e.cfm

No consultations will be undertaken for species listed in Table 2, as no change is being proposed for these species.

Who is consulted and how

It is most important to consult with those who would be most affected by the proposed changes. There is protection that is immediately in place when a species that is Extirpated, Endangered or Threatened is added to Schedule 1. It prohibits killing or harming the species or destroying a residence. For terrestrial species this applies to migratory birds protected by the *Migratory Birds Convention Act, 1994* (which already provides similar protection for the migratory birds and their nests). The immediate protection also applies to other terrestrial species where they are on federal land (for more details, see below, "Protection for listed Extirpated, Endangered and Threatened species"). This immediate protection does not apply to species of Special Concern. Therefore, Environment Canada considers the type of species, its conservation status and where the species is found. Those who may be affected by the impacts of the automatic protections are contacted directly; others are encouraged to contribute through a variety of approaches.

Aboriginal peoples known to have species at risk on their lands, for which changes to Schedule 1 are being considered, will be contacted. Their engagement is of particular significance, acknowledging their role in the management of the extensive traditional territories and the reserve and settlement lands.

A Wildlife Management Board is a group that has been established under a land claims agreement and is authorized by the agreement to perform functions in respect of wildlife species. Some eligible species at risk are found on lands where existing land claims agreements apply that give specific authority to a Wildlife Management Board. In such cases, the Minister of the Environment will consult with the relevant Board.

To encourage others to contribute and make the necessary information readily available, this document is distributed to known stakeholders and posted on the Species at Risk Public Registry. More extensive consultations may also be done through regional or community meetings or through a more targeted approach.

Environment Canada also sends notice of this consultation to identified concerned groups and individuals who have made their interests known. These include, but are not limited to, industries, resource users, landowners and environmental non-governmental organizations.

In most cases, Environment Canada is not in a position to examine the potential impacts of recovery actions when species are being considered for listing. The reason is that recovery actions for terrestrial species are not usually automatic upon listing; in fact, usually these actions are not yet defined, so their impact cannot be fully understood. Once they are defined, efforts are made to minimize adverse social and economic impacts of listing and to maximize the benefits. SARA requires that recovery measures be prepared in consultation with those considered to be directly affected by them.

In addition to the public, Environment Canada consults on listing with the governments of the provinces and territories responsible for the conservation and management of these wildlife species. Environment Canada also consults with other federal departments and agencies.

Role and impact of public consultations in the listing process

The results of the public consultations are of great significance to the process of listing species at risk. Environment Canada carefully reviews the comments it receives to gain a better understanding of the benefits and costs of changing the List.

The comments are then used to inform the Regulatory Impact Analysis Statement (RIAS). The RIAS is a report that summarizes the impact of a proposed regulatory change. It includes a description of the proposed change and an analysis of its expected impact, which incorporates the results from the public consultations. In developing the RIAS, the Government of Canada recognizes that Canada's natural heritage is an integral part of our national identity and history and that wildlife in all its forms has value in and of itself. The Government of Canada also recognizes that the absence of full scientific certainty is not a reason to postpone decisions to protect the environment.

A draft Order (see Glossary) is then prepared, providing notice that a decision is being taken by the Governor in Council. The draft Order proposing to list all or some of the species under consideration is then published, along with the RIAS, in the *Canada Gazette*, Part I, for a comment period of 30 days.

The Minister of the Environment will take into consideration comments and any additional information received following publication of the draft Order and the RIAS in the *Canada Gazette*, Part I. The Minister then makes a listing recommendation for each species to the Governor in Council. The Governor in Council next decides either to accept the species assessment and amend Schedule 1 accordingly; or not to add the species to Schedule 1; or to refer the species assessment back to COSEWIC for further information or consideration. The final decision is published in the *Canada Gazette*, Part II, and on the Species at Risk Public Registry. If the Governor in Council decides to list a species, it is at this point that it becomes legally included on Schedule 1.

Significance of the Addition of a Species to Schedule 1

The protection that comes into effect following the addition of a species to Schedule 1 depends upon a number of factors. These include the species' status under SARA, the type of species and where it occurs.

Protection for listed Extirpated, Endangered and Threatened species

Responsibility for the conservation of wildlife is shared among the governments of Canada. SARA establishes legal protection of individuals and their residences as soon as a species is listed as Threatened, Endangered or Extirpated, if they are considered federal species or if they are found on federal land.

Federal species include migratory birds, as defined by the *Migratory Birds Convention Act, 1994*, and aquatic species covered by the *Fisheries Act*. Federal land means land that belongs to the federal government and the internal waters and territorial sea of Canada. It also means land set apart for the use and benefit of a band under the *Indian Act* (such as reserves). In the territories, the protection for species at risk on federal lands applies only where they are on lands under the authority of the Minister of the Environment or the Parks Canada Agency.

Migratory birds are protected by the *Migratory Birds Regulations*, under the *Migratory Birds Convention Act, 1994*, which strictly prohibits the harming of migratory birds and the disturbance or destruction of their nests and eggs.

Protection under SARA makes it an offence to kill, harm, harass, capture or take an individual of a species listed as Extirpated, Endangered or Threatened. It is also an offence to damage or destroy the residence of one or more individuals of an Endangered or Threatened species or an Extirpated species whose reintroduction has been recommended by a recovery strategy. The Act also makes it an offence to possess, collect, buy, sell or trade an individual of a species that is Extirpated, Endangered or Threatened.

Species at risk that are neither aquatic nor protected under the *Migratory Birds Convention Act, 1994*, nor on federal lands, do not receive immediate protection upon listing under SARA. Instead, in most cases, the protection of terrestrial species on non-federal lands is the responsibility of the provinces and territories where they are found. The application of protections under SARA to a species at risk on non-federal lands requires that the Governor in Council make an order defining those lands. This can only occur when the Minister is of the opinion that the laws of the province or territory do not effectively protect the species. To put such an order in place, the Minister would then need to recommend the order be made to the Governor in Council. If the Governor in Council agreed to make the order, the prohibitions of SARA would then apply to the provincial or territorial lands specified by the order. The federal government would consult with the province or territory concerned before making such an order.

The Minister of the Environment or the Minister of Fisheries and Oceans may authorize exceptions to the prohibitions under SARA. These ministers can enter into agreements or issue permits only for one of three reasons: for research, for conservation activities or if the effects to the species are incidental to the activity. Research must relate to the conservation of a species and be conducted by qualified scientists. Conservation activities must benefit a listed species or be required to enhance its chances of survival. All activities, including those that incidentally affect a listed species, must also meet certain conditions. First, it must be established that all reasonable alternatives have been considered and the best solution has been adopted. It must also be established that all feasible measures will be taken to minimize the impact of the activity, and finally that the survival or recovery of the species will not be jeopardized. Having issued a permit or agreement, the Minister of the Environment or the Minister of Fisheries and Oceans must then include an explanation of why it was issued on the Species at Risk Public Registry.

Recovery strategies and action plans for Extirpated, Endangered and Threatened species

Recovery planning results in the development of recovery strategies and action plans for Extirpated, Endangered or Threatened species. It involves the different levels of government responsible for the management of the species, depending on what type of species it is and where it occurs. These include federal, provincial and territorial governments as well as Wildlife Management Boards. Recovery strategies and action plans are also prepared in cooperation with directly affected Aboriginal organizations. Landowners and other stakeholders directly affected by the recovery strategy are consulted.

Recovery strategies must be prepared for all Extirpated, Endangered and Threatened species. They include measures to mitigate the known threats to the species and its habitat and set the population and distribution objectives. Other objectives can be included, such as stewardship (to establish protection for an existing population) or education (to increase public awareness). Recovery strategies must include a statement of the time frame for the development of one or more action plans. To the extent possible, recovery strategies must also identify the critical habitat of the species. If there is not enough information available to identify critical habitat, the recovery strategy includes a schedule of studies required for its identification. This schedule outlines what must be done to obtain the necessary information and by when it needs to be done. In such cases critical habitat is identified in a subsequent action plan.

Proposed recovery strategies for newly listed species are posted on the Species at Risk Public Registry to provide for public review and comment. For Endangered species, proposed recovery strategies are posted within one year of their addition to Schedule 1, and for Threatened or Extirpated species within two years.

Action plans state the measures necessary to implement the recovery strategy. These include measures to address threats and achieve the population and distribution objectives. Action plans also complete the identification of the critical habitat where necessary, and to the extent possible state measures that are proposed to protect it.

Protection for listed species of Special Concern

While immediate protection under SARA for species listed as Extirpated, Endangered and Threatened do not apply to species listed as Special Concern, any existing protections and prohibitions, such as those provided by the *Migratory Birds Convention Act, 1994* or the *Canada National Parks Act*, continue to be in force.

Management plans for species of Special Concern

For species of Special Concern, management plans are to be prepared and made available on the Species at Risk Public Registry within three years of species' addition to Schedule 1, allowing for public review and comment. Management plans include appropriate conservation measures for the species and for its habitat. They are prepared in cooperation with the jurisdictions responsible for the management of the species, including directly affected Wildlife Management Boards and Aboriginal organizations. Landowners, lessees and others directly affected by a management plan will also be consulted.

THE LIST OF SPECIES PROPOSED FOR INCLUSION OR RECLASSIFICATION ON SCHEDULE 1

Status of the recently assessed species and consultation paths

In September 2011, COSEWIC submitted 36 assessments of species at risk to the Minister of the Environment for species that are newly eligible to be added to Schedule 1 of SARA. Thirteen of these are terrestrial species. COSEWIC also reviewed the classification of species already on Schedule 1, in some cases changing their status. Five terrestrial species are now being considered for down-listing on SARA (to a lower risk status), and six terrestrial species are now being considered for up-listing on SARA (to a higher risk status). In all, there are 24 terrestrial species that are eligible to be added to Schedule 1 or to have their current status on Schedule 1 changed (Table 1).

COSEWIC also submitted the reviews of species already on Schedule 1, confirming their classification. Twenty-five of these reviews were for terrestrial species. These species are not included in the consultations because there is no regulatory change being proposed (Table 2).

For more information on the consultations for aquatic species, visit the Fisheries and Oceans Canada website at:
www.dfo-mpo.gc.ca

Providing comments

The involvement of Canadians is integral to the process, as it is to the ultimate protection of Canadian wildlife. Your comments matter and are given serious consideration. Environment Canada reviews all comments it receives by the deadlines provided below.

Comments for terrestrial species undergoing normal consultations must be received by **February 8, 2012**.

Comments for terrestrial species undergoing extended consultations must be received by **November 8, 2012**.

Most species will be undergoing normal consultations. For the final consultation paths, please see:
www.registrelep-sararegistry.gc.ca/sar/listing/tab_2011_e.cfm

after December 8, 2011.

For more details on submitting comments, see page 3, “Public comments solicited on the proposed amendment of Schedule 1.”

Table 1: Terrestrial species recently assessed by COSEWIC eligible for addition to Schedule 1 or reclassification

Taxon	Species	Scientific Name	Range
Newly Assessed Species (13)			
Endangered (7)			
Lichens	Batwing Vinyl Lichen	*Leptogium platynum*	BC
Mosses	Roell's Brotherella Moss	*Brotherella roellii*	BC
Arthropods	Hine's Emerald	*Somatochlora hineana*	ON
Arthropods	Hungerford's Crawling Water Beetle	*Brychius hungerfordi*	ON
Arthropods	Macropis Cuckoo Bee	*Epeoloides pilosulus*	NS
Arthropods	Olive Clubtail	*Stylurus olivaceus*	BC
Arthropods	Skillet Clubtail	*Gomphus ventricosus*	NB
Threatened (3)			
Lichens	Crumpled Tarpaper Lichen	*Collema coniophilum*	BC
Birds	Barn Swallow	*Hirundo rustica*	YT NT BC AB SK MB ON QC NB PE NS NL
Birds	Eastern Meadowlark	*Sturnella magna*	ON QC NB NS
Special Concern (3)			
Lichens	Blue Felt Lichen	*Degelia plumbea*	NB NS NL
Lichens	Peacock Vinyl Lichen	*Leptogium polycarpum*	BC
Arthropods	Dune Tachinid Fly	*Germaria angustata*	YT
Up-lists (6)			
From Special Concern to Extirpated (1)			
Amphibians	Spring Salamander (Carolinian population)[1]	*Gyrinophilus porphyriticus*	ON
From Special Concern to Endangered (1)			
Birds	Cerulean Warbler	*Dendroica cerulea*	ON QC
From Special Concern to Threatened (2)			
Amphibians	Spring Salamander (Adirondack / Appalachian population)[1]	*Gyrinophilus porphyriticus*	QC
Birds	Barn Owl (Western population)	*Tyto alba*	BC
From Threatened to Endangered (2)			
Amphibians	Jefferson Salamander	*Ambystoma jeffersonianum*	ON
Reptiles	Butler's Gartersnake	*Thamnophis butleri*	ON
Down-lists (5)			
From Endangered to Special Concern (1)			
Vascular Plants	Pitcher's Thistle	*Cirsium pitcheri*	ON
From Threatened to Special Concern (2)			
Vascular Plants	Dwarf Lake Iris	*Iris lacustris*	ON
Vascular Plants	Lyall's Mariposa Lily	*Calochortus lyallii*	BC
From Endangered to Threatened (2)			
Vascular Plants	Purple Twayblade	*Liparis liliifolia*	ON QC
Vascular Plants	Showy Goldenrod (Boreal population)[1]	*Solidago speciosa*	ON

[1] Species currently listed on Schedule 1 as a single species. Re-assessed in November 2010 and split into two populations.

Table 2: Terrestrial species recently reassessed by COSEWIC (no consultations – species status confirmation)

Taxon	Species	Scientific Name	Range
Status confirmation (25)			
Extirpated (1)			
Reptiles	Timber Rattlesnake	*Crotalus horridus*	ON
Endangered (19)			
Mosses	Poor Pocket Moss	*Fissidens pauperculus*	BC
Vascular Plants	Furbish's Lousewort	*Pedicularis furbishiae*	NB
Vascular Plants	Long's Braya	*Braya longii*	NL
Vascular Plants	Nodding Pogonia	*Triphora trianthophoros*	ON
Vascular Plants	Seaside Birds-foot Lotus	*Lotus formosissimus*	BC
Vascular Plants	Showy Goldenrod (Great Lakes Plains population)[1]	*Solidago speciosa*	ON
Vascular Plants	Skinner's Agalinis	*Agalinis skinneriana*	ON
Vascular Plants	Small Whorled Pogonia	*Isotria medeoloides*	ON
Vascular Plants	Southern Maidenhair Fern	*Adiantum capillus-veneris*	BC
Vascular Plants	White Prairie Gentian	*Gentiana alba*	ON
Arthropods	Taylor's Checkerspot	*Euphydryas editha taylori*	BC
Amphibians	Blanchard's Cricket Frog	*Acris blanchardi*	ON
Amphibians	Oregon Spotted Frog	*Rana pretiosa*	BC
Reptiles	Desert Nightsnake	*Hypsiglena chlorophaea*	BC
Birds	Barn Owl (Eastern population)	*Tyto alba*	ON
Birds	Henslow's Sparrow	*Ammodramus henslowii*	ON QC
Birds	King Rail	*Rallus elegans*	ON
Birds	Sage Thrasher	*Oreoscoptes montanus*	BC AB SK
Birds	White-headed Woodpecker	*Picoides albolarvatus*	BC
Threatened (1)			
Mammals	Pallid Bat	*Antrozous pallidus*	BC
Special Concern (4)			
Birds	Barrow's Goldeneye (Eastern population)	*Bucephala islandica*	QC NB PE NS NL
Birds	Long-billed Curlew	*Numenius americanus*	BC AB SK
Mammals	Eastern Mole	*Scalopus aquaticus*	ON
Mammals	Woodland Vole	*Microtus pinetorum*	ON QC

[1] Species currently listed on Schedule 1 as a single species. Re-assessed in November 2010 and split into two populations.

THE COSEWIC SUMMARIES OF TERRESTRIAL SPECIES ELIGIBLE FOR ADDITION OR RECLASSIFICATION ON SCHEDULE 1

The following section presents a brief summary of the reasons for the COSEWIC status designation of individual species, and their biology, threats, distribution and other information. For a more comprehensive explanation of the conservation status of an individual species, please refer to the COSEWIC status report for that species, also available on the Species at Risk Public Registry at:

www.sararegistry.gc.ca

or contact:
COSEWIC Secretariat
c/o Canadian Wildlife Service
Environment Canada
Ottawa ON K1A 0H3

Barn Owl – Western population

Photo: © Gordon Court

Scientific name
Tyto alba

Taxon
Birds

COSEWIC Status
Threatened

Canadian Range
British Columbia

Reason for Designation

Western Canada supports a small fraction of the global population of this charismatic nocturnal raptor that preys on small rodents. Owing to its intolerance of cold climates and deep snow cover, populations in Canada are restricted to parts of southern British Columbia and southwestern Ontario. The Western population in British Columbia is small and threatened by ongoing loss and degradation of grassland and old field habitat to intensive agriculture and urbanization and by the conversion of old wooden barns and other rural buildings to more modern structures. This owl is also exposed to increasing levels of road-kill mortality owing to expansion of the road network and increases in traffic volume.

Species Information

The Barn Owl (*Tyto alba*) is a medium-sized, long-legged owl with a distinctive, heart-shaped facial disk and dark eyes. Its upper body colour is variably rufous, golden or buff, lightly to heavily vermiculated with grey, and with tiny white and black spots. The lower body colour is white to buff, unspotted to heavily spotted with dark brown or rust. Flight feathers on the wings and tail have dark brown bars.

Within the climatic tolerances of its breeding range, the Barn Owl is a good ecological indicator of native and agricultural grasslands. Because it is associated with traditional small-scale mixed farming, trends in its population reflect intensification of agriculture. There have been global declines in this species as a result of habitat loss, toxic chemicals, human disturbance and severe winters. The species is economically beneficial to farmers in its role as predator of rodent populations. The Barn Owl is also a popular and emotive species to the general public.

Distribution

The Barn Owl is one of the most widely distributed of all land birds and is found on every continent except Antarctica. Its northern distribution is limited by winter temperatures. As such, in the Americas, it breeds locally in parts of southern Canada and the northern U.S., but becomes much more common and ubiquitous south through the southern U.S., Mexico and South America.

There are two populations (designatable units) in Canada. The Western population is resident year-round in southern British Columbia, mostly in the southwestern corner of the province. It occurs locally on southeastern Vancouver Island from Victoria to Nanaimo, and rarely north to Campbell River and the Gulf Islands. It is most common in the Fraser Valley east to Hope, but is rare and sporadic in the central/southern interior. The Eastern population is very small and found sporadically in southwestern Ontario (mostly within 50 km of the Lower Great Lakes). Definitive evidence for breeding has not been reported in Quebec.

North American distribution of the Barn Owl.

Source: "Birds of North America Online" **http://bna.birds.cornell.edu/bna** maintained by the Cornell Lab of Ornithology, Ithaca, NY.

Habitat

Barn Owls require landscapes that provide adequate foraging habitat for their primary prey (voles and mice), and suitable sites for nesting. Primary foraging habitats include old agricultural fields, rough pasture, hayfields, grassy roadsides, and grassy marshes. A wide variety of natural and artificial nest structures are used by Barn Owls, including cavities in live and dead trees, chimneys, elevated platforms in barn lofts, silos, hangars, water towers, bridges/overpasses, attics, and nest boxes.

Biology

Barn Owls breed for the first time at one year old. Life-span is, however, typically short (2–3 years on average). Second broods in one year are rare in temperate regions like Canada, and usually coincide with abundant prey. Clutch size is variable depending on latitude, but usually ranges between four and eight eggs. Fledglings become independent at about 120 days of age. If there is adequate suitable foraging habitat and linkage to source populations, Barn Owls can respond well to nest box programs, but the success of such programs varies regionally.

Population sizes and trends

In British Columbia, the Western population consists of 250–1000 mature individuals, and is probably closer to the lower estimate. In Ontario, the Eastern population consists of no more than about 20 mature birds. Detailed data on population trends are not available, but both populations are likely declining in concert with declines in suitable nesting and foraging habitat.

Limiting factors and threats

Loss of foraging habitat due to marked changes in agricultural practices and other land uses threaten both the Eastern and Western populations. The availability of nesting sites has also severely declined, owing to the conversion of old, open wooden farm buildings to modern, closed metal structures. The extent to which this trend has been mitigated by recent nest box programs is equivocal; some success

has been documented in British Columbia but not in Ontario. Barn Owls are also particularly susceptible to being killed on roads, which represents a significant cause of mortality. Finally, because Barn Owls are poorly adapted to low temperatures and deep snow, bouts of severe winter weather act to limit populations in Canada.

Existing protection

The Barn Owl is not covered under the federal *Migratory Birds Convention Act, 1994*. COSEWIC previously assessed the Western population of Barn Owl in April 1999 as Special Concern; it is currently listed as Special Concern on the federal *Species at Risk Act* (SARA) Schedule 1. SARA prohibitions do not apply to Special Concern taxa. The Barn Owl, its eggs and active nests are protected in British Columbia under the British Columbia *Wildlife Act*.

COSEWIC previously assessed the Eastern population of Barn Owl in April 1999 as Endangered; it is presently listed as Endangered on SARA Schedule 1, which affords protection to the birds and their residences on federal lands. In Ontario, the Barn Owl is classified as Endangered under the province's *Endangered Species Act, 2007*. It is also protected as a "Specially Protected Bird" under Ontario's *Fish and Wildlife Conservation Act*. ■

Barn Swallow

Photo: © Gordon Court

Scientific name
Hirundo rustica

Taxon
Birds

COSEWIC Status
Threatened

Canadian Range
Yukon Territory, Northwest Territories, British Columbia, Alberta, Saskatchewan, Manitoba, Ontario, Quebec, New Brunswick, Nova Scotia, Prince Edward Island, Newfoundland and Labrador

Reason for Designation

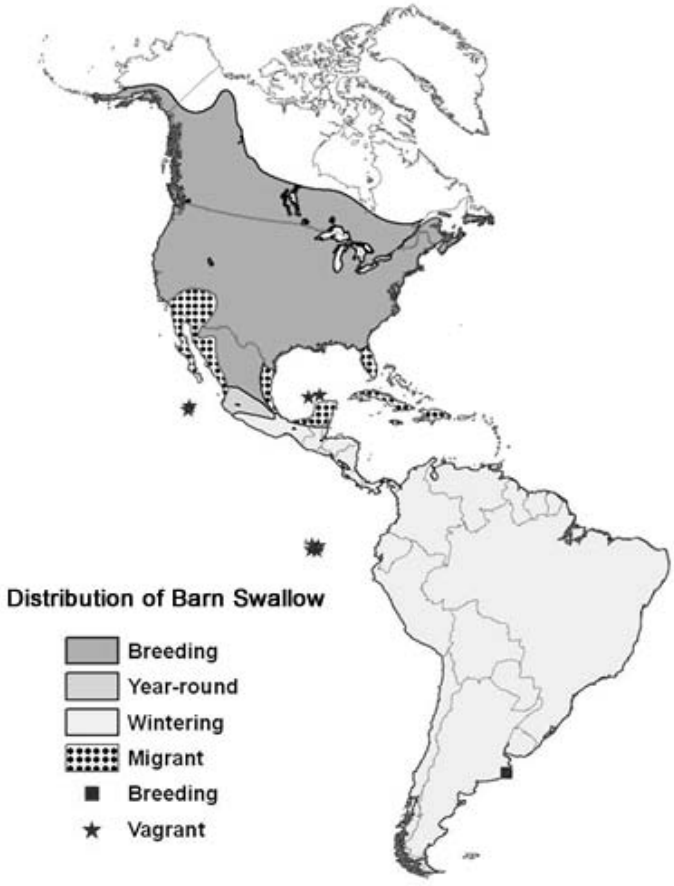
This is one of the world's most widespread and common landbird species. However, like many other species of birds that specialize on a diet of flying insects, this species has experienced very large declines that began somewhat inexplicably in the mid- to late 1980s in Canada. Its Canadian distribution and abundance may still be greater than prior to European settlement, owing to the species' ability to adapt to nesting in a variety of artificial structures (barns, bridges, etc.) and to exploit foraging opportunities in open, human-modified, rural landscapes. While there have been losses in the amount of some important types of artificial nest sites (e.g., open barns) and in the amount of foraging habitat in open agricultural areas in some parts of Canada, the causes of the recent population decline are not well understood. The magnitude and geographic extent of the decline are cause for conservation concern.

Wildlife species description and significance

The Barn Swallow is a medium-sized songbird that is easily recognized by its steely-blue upperparts, cinnamon underparts, chestnut throat and forehead, and by its deeply forked tail. Sexes have similar plumage, but males have longer outer tail-streamers than females and tend to be darker chestnut on their underparts.

Distribution

The Barn Swallow has become closely associated with human rural settlements. It is the most widespread species of swallow in the world, found on every continent except Antarctica. It breeds across much of North America south of the treeline, south to central Mexico. In Canada, it is known to breed in all provinces and territories. It is a long-distance migrant and winters through Central and South America.



Western hemisphere distribution of the Barn Swallow.

Source: 2011 COSEWIC Status Report.

Habitat

Before European colonization, Barn Swallows nested mostly in caves, holes, crevices and ledges in cliff faces. Following European settlement, they shifted largely to nesting in and on artificial structures, including barns and other outbuildings, garages, houses, bridges, and road culverts.

Barn Swallows prefer various types of open habitats for foraging, including grassy fields, pastures, various kinds of agricultural crops, lake and river shorelines, cleared rights-of-way, cottage areas and farmyards, islands, wetlands, and subarctic tundra.

Biology

The Barn Swallow is social throughout the year, travelling and roosting in flocks during migration and on the wintering grounds. It is socially monogamous, but polygamy is common. The Barn Swallow nests in small, loose colonies that usually contain no more than about 10 pairs. Nests are built largely of mud pellets. Egg-laying starts in the second week of May in southern Canada. Two broods are frequently produced each year, except in the far north. This species forages in the air, and specializes on a diet of flying insects.

Population sizes and trends

In Canada, the current Barn Swallow population is estimated at about 2.45 million breeding pairs (about 4.9 million mature individuals). Although the species is still common and widespread, Breeding Bird Survey (BBS) data for the period 1970 to 2009 indicate a statistically significant decline of 3.6% per year in Canada, which corresponds to an overall decline of 76% in the 40-year period. Most of the decline started to occur sometime in the mid-1980s. Over the most recent 10-year period (1999 to 2009), BBS data show a statistically significant decline of 3.5% per year, which represents an overall decadal decline of 30%. Regional surveys, such as breeding bird atlases in Ontario and the Maritimes, and the Étude des populations d'oiseaux du Québec, also show significant declines over the long term, as do surveys from the United States. Despite these losses, the distribution and numbers of this species are acknowledged to be far greater than they were before European settlement created a large amount of artificial nesting and foraging habitat that the species readily exploited.

Threats and limiting factors

Although poorly understood, the main causes of the recent decline in Barn Swallow populations are thought to be: 1) loss of nesting and foraging habitats due to conversion from conventional to modern farming techniques; 2) large-scale declines (or other perturbations) in insect populations; and 3) direct and indirect mortality due to an increase in climate perturbations on the breeding grounds (cold snaps). Other limiting factors include high nestling mortality due to high rates of ectoparasitism; and interspecific competition for nest sites with an invasive species (House Sparrow). Additional threats may also be affecting the species during migration and on the wintering grounds, including loss of foraging habitat and exposure to pesticides.

Protection, status, and ranks

In Canada, the Barn Swallow and its nests and eggs are protected under the *Migratory Birds Convention Act, 1994*. It is ranked as secure in Canada by NatureServe, but is ranked as sensitive in several provinces and territories, including Alberta, British Columbia and most Maritime provinces. ■

Batwing Vinyl Lichen

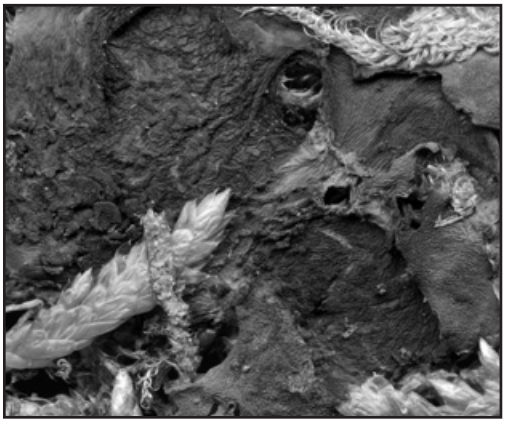


Photo: © Timothy Wheeler

Scientific name
Leptogium platynum

Taxon
Lichens

COSEWIC Status
Endangered

Canadian Range
British Columbia

Reason for Designation

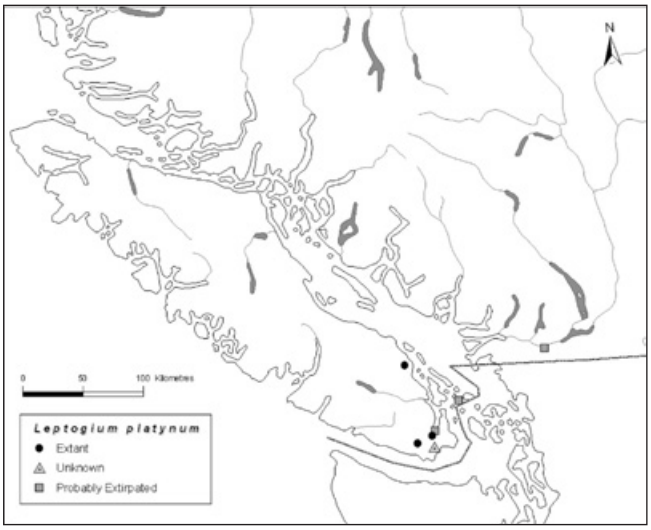
This leafy lichen occurs in western North America reaching the northern limit of its range in coastal southwestern British Columbia where it commonly occurs at three, possibly four, locations on Vancouver Island. The lichen grows on calcium/magnesium-rich rock outcrops and more than 80% of individuals occur at one location. It has been extirpated from three other locations. This lichen is vulnerable to stochastic events, competition from mosses and liverworts, pollution from industrial/agricultural activities, and increasingly frequent summer drought resulting from climate change.

Wildlife species description and significance

The Batwing Vinyl Lichen (*Leptogium platynum*) is a distinctive rock-dwelling "jellyskin" lichen characterized by leafy, medium-sized lobes and a dark bluish upper surface usually bearing numerous fruit bodies and occasional tiny lobules which function as vegetative propagules. It is unusual among cyanolichens in its almost invariable production of both sexual and vegetative propagules. It has its northern limits in southern coastal British Columbia.

Distribution

The Batwing Vinyl Lichen is endemic to western North America, where it occurs at scattered locations in summer-dry coastal regions from southern California (32°N) northward to southern Vancouver Island, in British Columbia (49°N). Other populations have also been reported from Mexico, New Mexico and Texas.



Canadian distribution of Batwing Vinyl Lichen.

Source: May 2011 COSEWIC Status Report.

Habitat

This species occurs at low elevations on rock outcrops where it colonizes inclined rock faces subject to periodic seepage. Only base-rich rock types appear to be colonized, often in association with a variety of mat-forming mosses and hepatics. The Batwing Vinyl Lichen is thus restricted by a requirement for substrata with a rather high pH.

Biology

Sexual reproduction imposes a requirement for thallus resynthesis at each generation, which may partly account for the highly disjunct distribution of the Batwing Vinyl Lichen throughout its range. The

lobules are relatively heavy vegetative propagules which are unlikely to disperse more than a few metres from the parent thallus. The life cycle of the Batwing Vinyl Lichen thus involves persisting for long periods via vegetative maintenance at a given site, punctuated by very rare long distance dispersal events resulting from the establishment of new thalli from fungal spores ejected from the lichen fruit bodies associating with compatible strains of cyanobacteria.

Population sizes and trends

The Batwing Vinyl Lichen has been documented in Canada from seven locations; two were found for the first time in 2009. Of the five historical locations, four were revisited in 2009 and one was not reachable. Only one of the historical sites was still found to support the Batwing Vinyl Lichen. Thus this species is currently confirmed to be extant in only three locations. Collectively these three locations have 370 thalli with a combined surface area of less than 9 m^2. Three hundred of these thalli are concentrated in a single location. The reasons for the disappearance of the Batwing Vinyl Lichen from more than half of the formerly known locations cannot be assigned with certainty.

Threats and limiting factors

The apparent loss of the Batwing Vinyl Lichen from three of the seven locations may be attributed to natural causes such as competition by mosses and increasingly dry summers as a result of climate change. This lichen is also vulnerable to stochastic events such as exceptionally heavy rainfall. The loss at one location is likely due to nutrient enrichment of the habitat from nearby intensive agricultural activity. The region where this lichen occurs also includes areas with a rapidly expanding human population which could lead to both loss of available habitat and increasing air pollution.

Protection, status, and ranks

All three Canadian locations currently known to support this species are situated in permanently designated protected areas. Of the four “historical” locations, two are also located in protected areas, whereas the other two are on private land. The Oregon Natural Heritage Information Center currently ranks the Batwing Vinyl Lichen as S1/S2. ■

Blue Felt Lichen

Photo: © David Richardson

Scientific name
Degelia plumbea

Taxon
Lichens

COSEWIC Status
Special Concern

Canadian Range
New Brunswick, Nova Scotia, Newfoundland and Labrador

Reason for Designation

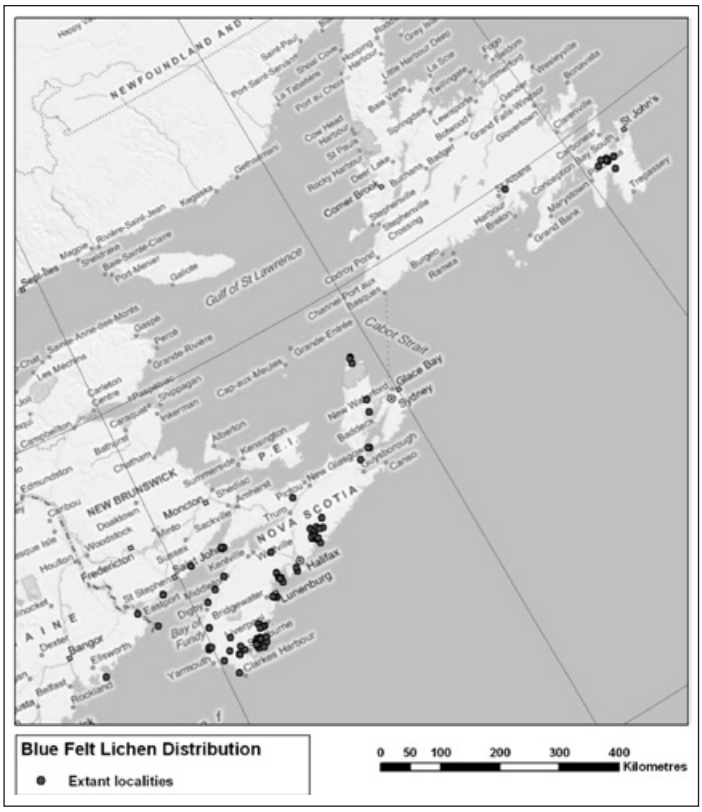
Within Canada, this lichen occurs only in the Atlantic region. It is very rare in New Brunswick, uncommon in Newfoundland, but more frequent in Nova Scotia. It grows as an epiphyte, predominately on hardwoods in woodlands and is vulnerable to disturbance that leads to a reduction in habitat humidity. The species is also very sensitive to acid rain. Forest harvesting is a threat to the species through direct removal or through the creation of an edge effect, leading to reduced humidity within the stand. In Newfoundland, the browsing of the lichen's host tree by a high density of moose is also of concern. Air pollution is a threat, especially in New Brunswick, but also in Nova Scotia.

Wildlife species description and significance

The Blue Felt Lichen, *Degelia plumbea*, is a large, blue-grey, leafy lichen that has longitudinal ridges and crescent-shaped curves which often give it a scallop-like shape. A prominent beard-like fungal mat (hypothallus) that is usually blue-black protrudes beyond the margin of the thallus, which may exceed 10 centimetres in diameter. Vegetative propagules are lacking. Sexual reproductive structures are usually present and numerous. The fruit bodies are red-brown but often darken with age. The spore sacs (asci) within the fruit body contain eight non-septate, colourless, oval ascospores. The photosynthetic component of this lichen is *Nostoc*, the most common cyanobacterial partner found in lichens.

Distribution

The Blue Felt Lichen, like the Boreal Felt Lichen, *Erioderma pedicellatum*, is one of the lichens that occurs in both eastern North America and western Europe. In North America the Blue Felt Lichen is restricted to the northeast, being found in three Canadian provinces: New Brunswick, Nova Scotia, and the island of Newfoundland (Newfoundland and Labrador). The Blue Felt Lichen is relatively common in Nova Scotia, uncommon in Newfoundland, and rare in New Brunswick. In the U.S. it is known from just two occurrences in Maine.



Current distribution of Blue Felt Lichen in Canada and adjacent Maine (USA).

Source: November 2010 COSEWIC Status Report.

Habitat

The Blue Felt Lichen is usually found on the trunks of old broad-leaved trees growing in moist habitats or close to stream and lake margins. In Canada and northwestern Europe, this lichen occurs in coastal suboceanic areas but also some distance inland in damp valleys. It prefers cool, humid woodlands that may be mixed coniferous/hardwood or dominated by deciduous trees. The Blue Felt Lichen seems to prefer mature deciduous trees, particularly maple, ash and yellow birch. In New Brunswick at two of the three known occurrences, its substratum is eastern cedar and in Newfoundland it grows mainly on yellow birch but very occasionally occurs also on white spruce. At its northerly limit of distribution in Nova Scotia, the Blue Felt Lichen has once been found on moss-covered rocks.

Biology

The Blue Felt Lichen is part of a group of lichens known as cyanolichens. Such lichens consist of a fungal partner and a cyanobacterium, which photosynthesizes and fixes atmospheric nitrogen providing the necessary carbohydrates and amino acids for growth. The Blue Felt Lichen reproduces via fruit bodies from which spores are shot into the air. If these land on a suitable substratum and encounter a compatible cyanobacterium of the genus *Nostoc* then a new lichen becomes established.

Population sizes and trends

Currently there are 100 occurrences of the Blue Felt Lichen in Canada. More than 771 lichen thalli have been identified from 88 current occurrences in Nova Scotia, 61 thalli from three occurrences in New Brunswick, and more than 102 thalli from eight natural-habitat occurrences in Newfoundland. A ninth occurrence at Sir Robert Bond Park, Newfoundland, has 821 thalli growing on non-native trees. Only two current occurrences are known in the U.S.: one from Mt. Desert Island, Maine, with a single thallus and a second near Cobscook Bay State park close to the border with New Brunswick. An “occurrence” is defined as a place where this lichen occurs that is more than 1 km from a second occurrence. There is evidence to suggest a decline in populations, particularly in New Brunswick (on Grand Manan and Campobello Islands) and in Maine. A trend of becoming rare or vanishing has also been noted for the Blue Felt Lichen in other countries. For example, in SW Sweden, it is still common at some sites but has disappeared from many where it once occurred. It has also disappeared from Luxembourg and many locations in France, North Africa and Eastern Europe.

Threats and limiting factors

The Blue Felt Lichen prefers locations where there is high humidity. Most lumber and pulp companies concentrate on forests dominated by fir, spruce and pine and avoid swampy conditions. Furthermore, riparian boundary regulations have also helped maintain Blue Felt Lichen habitat. However, any loss of forest continuity through logging increases light levels and decreases humidity in its habitat. This has and will affect the persistence of this lichen in Nova Scotia. The habitat and substrate preferences of the Blue Felt Lichen have generally kept it from being directly harvested. Land development for housing and cottages, plus policy changes in the forest industry leading to increased biomass, may also open forests that are Blue Felt Lichen habitats up to harvest. While the need for landscape-level measures is acknowledged, there are currently no accepted strategies to sustain the lichen communities that include the Blue Felt Lichen.

In Nova Scotia there are more than 80 current occurrences of the Blue Felt Lichen and for the reasons given above, it is unlikely to disappear from counties where it presently occurs. However, the number of occurrences may well decline over the next decade if forest removal continues at its current rate. Microclimate changes on the edge of cut areas are likely to affect this lichen adversely. The Blue Felt Lichen is most frequently found on deciduous trees in red maple swales and forestry activities in or around these will likely increase with the new focus on the use of forest biomass for electricity generation. To date maple swales have not been mapped in the province or considered for protection.

The Blue Felt Lichen is much rarer in New Brunswick and Newfoundland. In the latter province, some occurrences are in blocks approved, until recently, for commercial harvesting. The Newfoundland harvest of mature hardwood for firewood and browsing by the large populations of

moose will limit the future availability of old yellow birch, the main host for this lichen.

Like other cyanolichens, the Blue Felt Lichen is very sensitive to air pollution and acid rain. Although acidifying pollutants in eastern North America are predicted to decline over the next 12 years, planned industrial developments in Newfoundland, New Brunswick and Nova Scotia may locally increase pollutant levels in some areas. Such developments may pose a threat to existing populations of this lichen.

A further threat is changing climate. Preliminary analyses of fog frequency along the Atlantic coast of Nova Scotia and the Avalon Peninsula of southeastern Newfoundland suggest that a significant decline has occurred over the past several decades. The Blue Felt Lichen is particularly sensitive to changes in moisture regimes so that declines in fog frequency could negatively affect it.

Protection, status, and ranks

The Blue Felt Lichen has not yet been assigned protected status by any of the Canadian provinces, although it is one of 14 yellow-listed (sensitive) lichens in Nova Scotia. Funding has recently been provided for its conservation in Newfoundland. Its occurrence in two provincial parks and three protected wilderness areas in Nova Scotia ensures that in those areas, at least, forest harvesting is not a threat. No current legislation in Atlantic Canada protects the swampy habitat of this lichen. In Newfoundland it has protection at the Sir Robert Bond Park. Elsewhere, riparian buffers related to commercial forestry developments are required but are modest (~20–50m) and unlikely to conserve adequately the macro- and micro-habitat needs of the Blue Felt Lichen and other rare lichens like the Boreal Felt Lichen and Vole Ears. ■

Butler's Gartersnake

Photo: © Daniel W. A. Noble

Scientific name
Thamnophis butleri

Taxon
Reptiles

COSEWIC Status
Endangered

Canadian Range
Ontario

Reason for Designation

Most populations of this species occur in small, scattered habitat remnants. Most are isolated so they are threatened by the negative genetic effects of small population size and by demographic stochasticity. Recent surveys have not detected the species at several sites where they were formerly known. Road mortality, ongoing habitat loss and fragmentation are also threats to this small specialized snake.

Wildlife species information

Butler's Gartersnake (*Thamnophis butleri*) is a small, non-aggressive gartersnake with three distinct longitudinal yellow stripes on its dark brown back. This snake was first described in 1889 by E.D. Cope. Like most other small Canadian snakes, this species has been poorly studied. It is often confused with two other *Thamnophis* species coexisting in its range, the Eastern Gartersnake, *T. sirtalis*, and the Eastern Ribbonsnake, *T. sauritus*. Butler's Gartersnake, however, is shorter in total length (38–51 cm), is much more docile and possesses a unique pattern and position of side stripes. The latter facilitates its identification.

Distribution

Butler's Gartersnake has one of the most restricted global distributions of any snake in North America. This distribution is patchy and confined to southwestern Ontario, and parts of four U.S. states in the Great Lakes Region (Wisconsin, Ohio, Indiana and Michigan). In Ontario, it occurs in western Essex and Lambton counties from Amherstburg to Errol with disjunct locations at Skunk's Misery (Lambton and Middlesex counties), Parkhill (Middlesex County) and Luther Marsh (Dufferin and Wellington counties). The Canadian distribution of Butler's Gartersnake occupies approximately 16% of its global distribution.

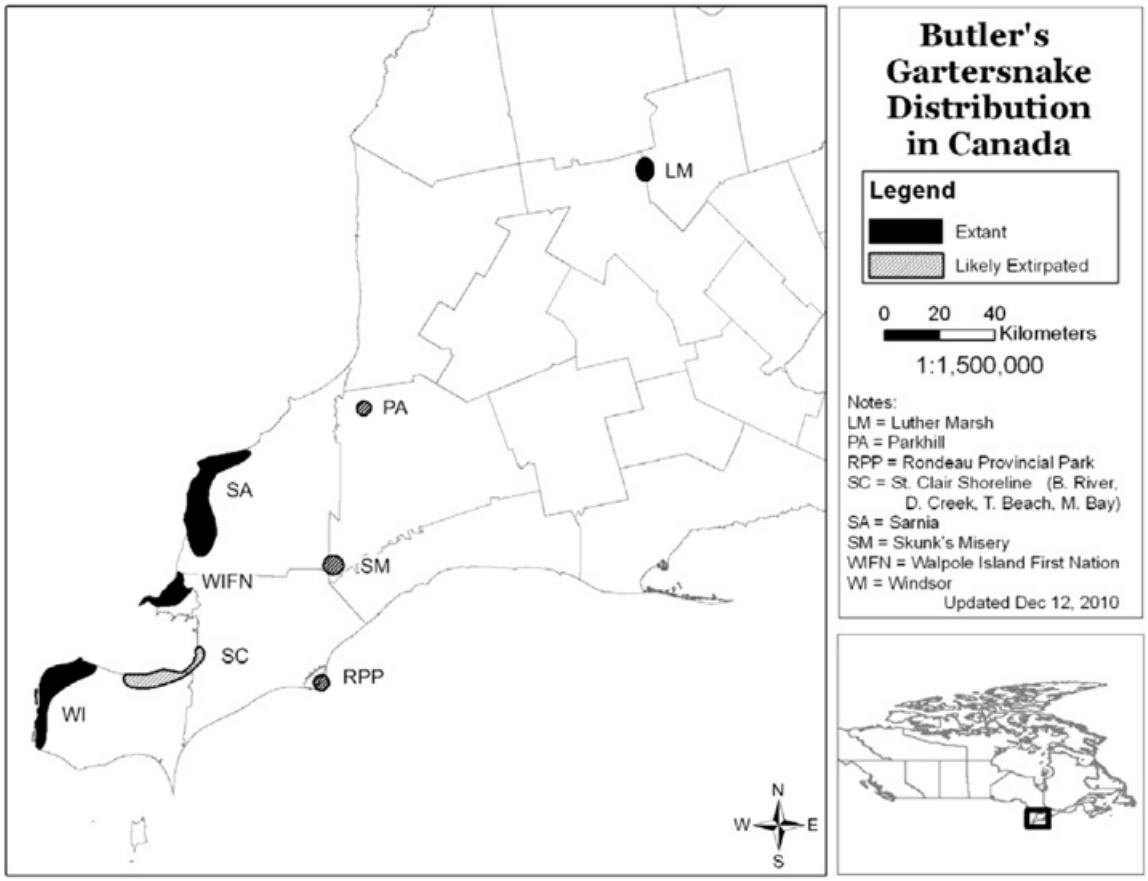
Habitat

Characteristic habitat of Butler's Gartersnake includes old fields, disturbed sites, urban and industrial sites and Tallgrass Prairie. Essential habitat components include a dense cover of grasses or herbs with a heavy thatch layer and an abundance of earthworms as prey. This snake can be found near small bodies of water (including seasonally dry marshes and swales) in a small number of vacant urban lots (including industrial lands) and parks and in Tallgrass Prairie remnants. The species is difficult to find in its preferred habitat outside of the mating season and is then more frequently observed under rocks and debris. Although overwintering sites have not been directly observed in Canada, it is assumed that this snake hibernates in small mammal burrows, ant mounds, loose fill and/or crayfish burrows.

Habitat loss has occurred in the Windsor-Sarnia region in the last three decades due to urbanization and agriculture. Skunk's Misery has lost *T. butleri* habitat due to agriculture and forest succession, whereas habitat at Luther Marsh may have increased.

Biology

In southwestern Ontario, Butler's Gartersnakes generally are active from April to October. Mating occurs in early spring and 8–10 young are born live



Canadian distribution of Butler's Gartersnake.

Source: November 2010 COSEWIC Status Report courtesy of J Choquette and D. Noble.

from June to September. Sexual maturity is estimated at two years and generation time is estimated to be four years. This snake feeds primarily on earthworms, which raises some questions as this food source did not occur in its current range until after European settlement. Predators of Butler's Gartersnake, although unrecorded, are presumably the same as those of other *Thamnophis* species.

The majority of Butler's Gartersnakes in a population exhibit fairly limited movements. Maximum activity range is less than 1 ha and mean movement distance is 300 m. A small percentage of individuals have been observed moving much farther.

Population sizes and trends

Butler's Gartersnake occurs in four "regions" and occasionally appears to be locally abundant as it is readily observed at a few of its historic locations. In the largest region, Windsor-Sarnia, 32% of locations, including the largest population (Location 18) have been lost or have not produced reliable *T. butleri* sightings in at least a decade. An overall decline in the number of *T. butleri* localities in this region is presumed, despite the discovery of "new" locations. In 2009, population sizes were estimated at two locations: 105 adults at Location 22 in Windsor and 240 adults at Location 41 in Sarnia. Major developments are proposed for both sites and are likely to have negative impacts on the snakes. At Luther Marsh, increased searches have expanded the area known to be occupied by this snake. At Skunk's Misery, it appears that habitat has been severely reduced and this species has not been recorded there in more than two decades, despite several targeted searches and being common historically. At Parkhill, the only record of Butler's Gartersnake was reported in 1992. In a fifth region, Rondeau Provincial Park, the species has not been recorded in over 60 years and it no longer occurs there.

Limiting factors and threats

The current disjunct distribution of Butler's Gartersnake suggests a much wider historical range. Agricultural practices and increased urbanization are the major limits to the species and have contributed to the loss of most potential habitat of Butler's Gartersnake in Canada. Available habitat is still decreasing and becoming more fragmented into small, isolated patches. This ongoing habitat loss and fragmentation are the major threats. Illegal collection for the pet trade probably occurs in some areas. This species is not commonly available in the pet trade, but is captured for personal collections. The severity of this threat is unknown. Multiple roadkill records exist in Ontario, but population level effects have not been assessed.

Special significance of the species

The entire Canadian distribution of Butler's Gartersnake is limited to four regions within Ontario, which represent 16% of its global range. There are unique morphological variants of this species observed in Ontario that are unrecorded in American populations. The close similarities between *T. butleri*, the Short-headed Gartersnake (*T. brachystoma*) and the Plains Gartersnake (*T. radix*) suggest ongoing speciation events.

Butler's Gartersnake is one of three species of the genus *Thamnophis* coexisting in southern Ontario. There are no other areas in Canada, east of Saskatchewan, where three or more closely related snake species are found in the same region. For this reason, the faunal assemblage is of particular interest both for its diversity and for its demonstration of the ecological principles of habitat and resource partitioning. The dietary specialization of Butler's Gartersnakes raises interesting evolutionary and ecological questions.

Existing protection or other status designations

Butler's Gartersnake is assessed as "Endangered" by the Committee on the Status of Endangered Wildlife in Canada (COSEWIC), and as "Threatened" by the Committee on the Status of Species at Risk in Ontario (COSSARO). It was listed as Threatened under the federal *Species at Risk Act* in 2003. In 2007, it was listed as Threatened by the Ontario Ministry of Natural Resources (OMNR). *Thamnophis butleri* has species' protection, but not habitat protection under Ontario's *Endangered Species Act, 2007* (ESA) in 2008. Habitat regulation will come into effect in 2013 under Ontario's *Endangered Species Act, 2007*. Hunting and trapping of this species is regulated under Ontario's *Fish and Wildlife Conservation Act*. As of 2009, approximately 40% of Butler's Gartersnake habitat in Ontario is found within areas with varying degrees of protection, although development is proceeding in surrounding areas, further fragmenting populations.

In the United States, Butler's Gartersnake is considered "Critically Imperiled" in Indiana, "Vulnerable" in Wisconsin, "Apparently Secure" in Michigan and unranked in Ohio. Globally, Butler's Gartersnake is ranked G4 (secure). ■

Cerulean Warbler

Photo: © Carl Savignac

Scientific name
Dendroica cerulea

Taxon
Birds

COSEWIC Status
Endangered

Canadian Range
Ontario, Quebec

Reason for Designation

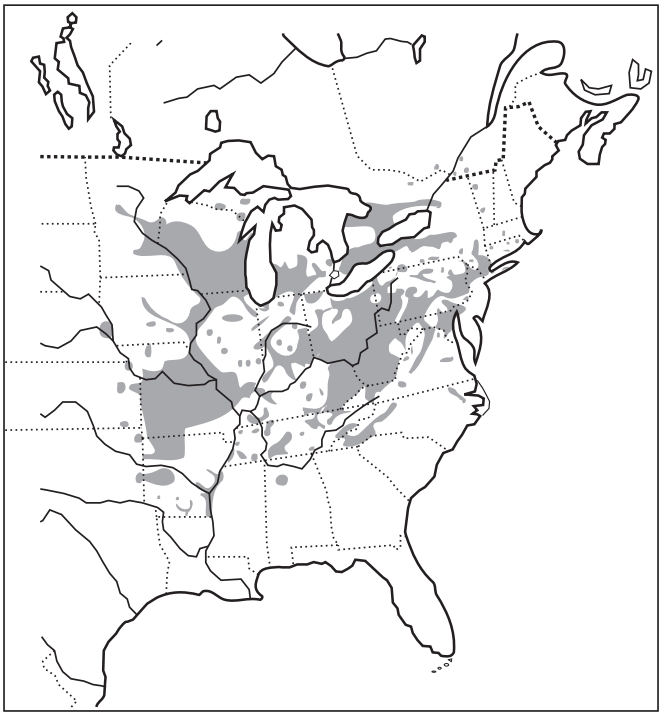
This sky-blue forest songbird is at the northern edge of its breeding range in Canada. Relying on relatively large tracts of undisturbed hardwood forest, it has rather specialized habitat requirements on both its breeding and wintering grounds. Its population has been experiencing significant declines across most of its range since the 1960s and the present Canadian population is estimated at about only 1000 individuals. These declines are believed to be driven mostly by loss and degradation of this species' wintering habitat, which is restricted to montane forests in the northern Andes of South America. It is also threatened by habitat loss and degradation on its breeding grounds. There is evidence for continuing declines. Also, new information on demographics suggests that chances for population rescue in Canada are lower than previously thought.

Description and significance

The Cerulean Warbler (*Dendroica cerulea*) is a small wood-warbler. The adult male is sky blue above and white below, while the female is blue-green above and whitish below. Both sexes have two prominent white wing-bars and white tail spots. The species has generated considerable public, scientific and conservation interest recently due to its beauty, habitat specificity, and international conservation concerns. It is considered an umbrella species that reflects the maintenance of populations of other bird species that require mature deciduous forest habitats.

Distribution

This species breeds in the deciduous forests of eastern North America but has a patchy distribution. The Canadian breeding range consists of two main geographic clusters in southwestern and southeastern Ontario, plus a small number of breeding individuals in southwestern Quebec. It winters in a relatively narrow elevational zone in the eastern Andes of South America, from Venezuela to northwestern Bolivia.



Breeding distribution of the Cerulean Warbler.

Source: "Birds of North America Online"
http://bna.birds.cornell.edu/bna maintained by the Cornell Lab of Ornithology, Ithaca, NY.

Habitat

On the breeding grounds, Cerulean Warblers are associated with large tracts of mature deciduous forest with tall trees and an open understory. They are found in both wet bottomland forests and upland areas. At a finer spatial scale, canopy configuration (e.g., foliage stratification, gap distribution, tree species distribution) are predictors of habitat suitability. On the wintering grounds in the Andes, they occupy a rather narrow elevational range (roughly 500–2000 m above sea level). Here, they are found principally in mature and relatively undisturbed humid forests, but will also use rustic shade-coffee, cardamom and cacao plantations that retain native trees.

Biology

Female Cerulean Warblers lay 2–5 eggs per clutch. Only a single brood is produced per year. Generally 2–3 fledglings are produced per breeding pair and about 75% of pairs have successful nests. The species appears to have low between-year survivorship, likely due to a combination of mortality experienced during long-distance migration and low survivorship on the wintering grounds. While demographic studies across the species' breeding range have shown that nest success and fecundity in eastern Ontario are among the highest in North America, it appears that immigration from the U.S. is required to maintain the Canadian population.

Population sizes and trends

The Canadian population is estimated to be 433–543 pairs (866–1086 mature individuals), most of which are found in the Frontenac Axis region of southeastern Ontario. The most recent global population estimate is 625,000 mature individuals. Hence, Canada supports roughly 0.2% of the global population.

The Cerulean Warbler's North American population experienced an average decline of about 2.9% per year from 1966 to 2006. In Ontario, recent breeding bird atlas work suggests a non-significant decline of 30% province-wide over a 20-year period (1981–85 and 2001–2005), which is equivalent to a decline of at least 16% over 10 years. More severe declines have occurred in the province's Carolinian region (at least 24% over 10 years). In Quebec, Cerulean Warblers have disappeared from five of six known sites occupied since the 1960s. Overall, the Canadian population has declined by at least 16% over the past 10 years. The potential for rescue is believed to be low, owing to ongoing population declines in the U.S.

Threats and limiting factors

Habitat loss and degradation on the wintering grounds are believed to be the primary threats. Massive deforestation of primary montane forests of the northern Andes has occurred in recent decades, and this threat continues. The major threats on the breeding grounds are also related to habitat loss and degradation caused by some forms of intensive logging and the conversion of mature forest to agricultural lands. Habitat fragmentation, which increases nest parasitism by cowbirds and the risk of nest depredation, also seems to be an important threat. Other threats include predicted increases in catastrophic weather events (e.g., severe ice-storms and hurricanes) on the breeding grounds and during migration, decreasing habitat quality due to exotic forest pathogens and forest insect outbreaks, and increasing risks of collision with tall structures during migration.

Protection, status and ranks

In Canada, the Cerulean Warbler was assessed by COSEWIC in May 2003 as Special Concern and is currently listed under Schedule 1 of the Canadian *Species at Risk Act*. Its nests and eggs are also protected under the *Migratory Birds Convention Act, 1994*. In Ontario, it is classified as Special Concern and receives consideration under the *Endangered Species Act*, *2007*. In Quebec, effective October 2009, the species is listed as Threatened under the *Act Respecting Threatened or Vulnerable Species*. In the United States, it is of Conservation Concern and is under consideration for listing as Threatened under the U.S. *Endangered Species Act*. Globally, the species is considered vulnerable by the International Union for the Conservation of Nature. NatureServe ranks it as Vulnerable in Canada and Ontario. In Quebec, it is ranked as Severely Imperiled. ■

Crumpled Tarpaper Lichen

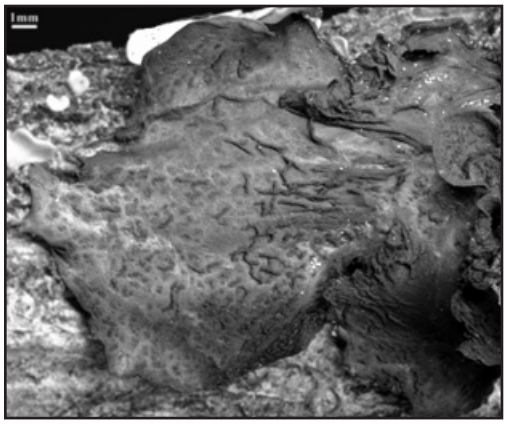


Photo: © Timothy Wheeler

Scientific name
Collema coniophilum

Taxon
Lichens

COSEWIC Status
Threatened

Canadian Range
British Columbia

Reason for Designation

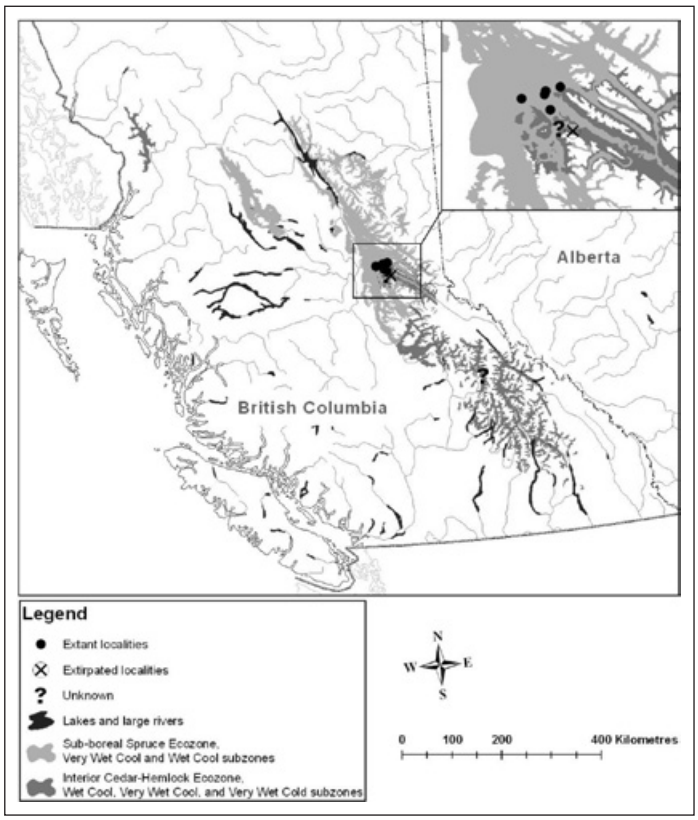
This foliose, tree-inhabiting cyanolichen is endemic to Canada where it occupies a narrow range restricted to trees in old-growth forests on calcareous soils in humid, inland British Columbia. The lichen is poorly adapted for dispersal since it has never been found with sexual reproductive structures and its vegetative propagules are not easily dispersed. The lichen has an apparently declining distribution, resulting from ongoing loss of old-growth forest through clear-cut logging. The factors underlying its rarity and narrow endemism are not well understood.

Wildlife species description and significance

Crumpled Tarpaper Lichen, *Collema coniophilum*, is a distinctive, moderately sized leafy lichen with several broad, mostly rounded lobes, at most 2–4 (–5) mm wide. The smooth upper surface is dark olive green to blackish brown that becomes weakly and sparsely covered in low "blisters" that eventually expand upwards into low broad ridges. Small, blackish, finger-like protrusions are present on the upper surface, and contrast with the upper surface. The lower surface varies from dark olive green to pale olive beige, and sometimes has tufts of tiny white hairs.

Distribution

Crumpled Tarpaper Lichen is currently known to be endemic to Canada. Its core range occupies a small, humid portion of the Rocky Mountain trench, approximately 65 km east of Prince George, though additionally it is known from the Upper Adams River, in the Columbia Mountains, 20 km southeast of Blue River. Biogeoclimatically these regions are located within the wettest, coolest subzones of the Interior Cedar-Hemlock and Sub-boreal Spruce Zone.



Distribution of Crumpled Tarpaper Lichen in Canada.

Source: November 2010 COSEWIC Status Report.

Habitat

Throughout its range, Crumpled Tarpaper Lichen appears to be restricted to base-rich or base-enriched trees, including Subalpine Fir, Western Hemlock, Engelmann Spruce and to a much lesser extent Black Cottonwood, Trembling Aspen, and Western

Red-Cedar. Its establishment at a given locality is greatly enhanced by, and indeed certainly depends on, nutrient enrichment from any of several sources. This species has been documented only from humid old forests older than about 100 years.

Biology

Crumpled Tarpaper Lichen is a colonist of young twigs. It appears to be an asexual species, reproducing exclusively via coarse granular outgrowths of the upper surface known as isidia. Isidia are too large to be effectively dispersed by wind; and because they have no special mechanism of adhesion, successful long-distance dispersal on the feet of birds is also expected to occur rather rarely. In the event, however, that an isidium does reach a new locality, successful establishment is likely to occur only on nutrient-rich or nutrient-enriched twigs and young branches. Throughout the wettest portions of its geographic range, nutrient-rich twigs and branches are presumably infrequently encountered owing to the leaching effects of heavy precipitation. This greatly reduces this species' frequency of occurrence.

Population sizes and trends

To date, Crumpled Tarpaper Lichen has been documented at only eight localities worldwide, with a total of 170 thalli. Recent attempts to relocate this species at three of these localities have been unsuccessful, notwithstanding that two of them now enjoy legislated protection through the establishment of provincial parks. The third locality has been lost as a result of recent clearcut logging.

At one of the remaining four localities, Crumpled Tarpaper Lichen occurs in rather large numbers, with about 140 thalli observed in 2006. Even here, however, there is evidence of population decline, presumably owing to recent reductions in road traffic, and hence diminished incidences of road dust (see section below).

Threats and limiting factors

To date Crumpled Tarpaper Lichen has been recorded only from old growth forests; it is not known to inhabit younger forest types. This being the case, there can be little doubt that the loss of old growth forests as a result of clearcut logging is causing a corresponding decline in this species, at least under natural conditions. There is evidence, however, that logging activities may actually be promoting Crumpled Tarpaper Lichen at some sites through the artificial creation of nodes of nutrient enrichment in connection with calcareous road dust. Thus the very act of hauling logs to mill seems to favour the establishment of sizable populations of this species. It is doubtful that Crumpled Tarpaper Lichen could accumulate to such numbers – 140 thalli at one locality – under natural conditions. So long as this dust effect persists, and so long as the old growth stands that support Crumpled Tarpaper Lichen at such stands remain intact, the future of this species would seem secure. Unfortunately, there is no easy way to ensure that old forests will be allowed to intersect indefinitely with calcareous gravel roads. What is more, any land use practice that tends, through the loss of old forests, to confine Crumpled Tarpaper Lichen to a small number of artificially enhanced roadside stands clearly jeopardizes this species, e.g., through increased vulnerability to stand-replacing disturbance such as wildfire, disease, insect outbreak, and blow down.

Protection, status and ranks

To date, Crumpled Tarpaper Lichen has received legislated protection at only two of the eight localities at which it has been documented. Unfortunately, it is no longer known to occur at either of these localities. Elsewhere throughout its range it is vulnerable to habitat loss through logging. ■

Dune Tachinid Fly

Photo: © Shannon Henderson and James E. O'Hara

Scientific name
Germaria angustata

Taxon
Arthropods

COSEWIC Status
Special Concern

Canadian Range
Yukon

Reason for Designation

This rare fly is restricted to a very small area of unglaciated Beringia in southwestern Yukon. It is known from 11 largely isolated locations where it occurs in active to semi-stabilized dunes. It is a parasite of the larvae of a dune moth. The threats include a continuing decline in habitat caused by succession on dunes and the use of all-terrain vehicles in some areas which destroy required dune vegetation.

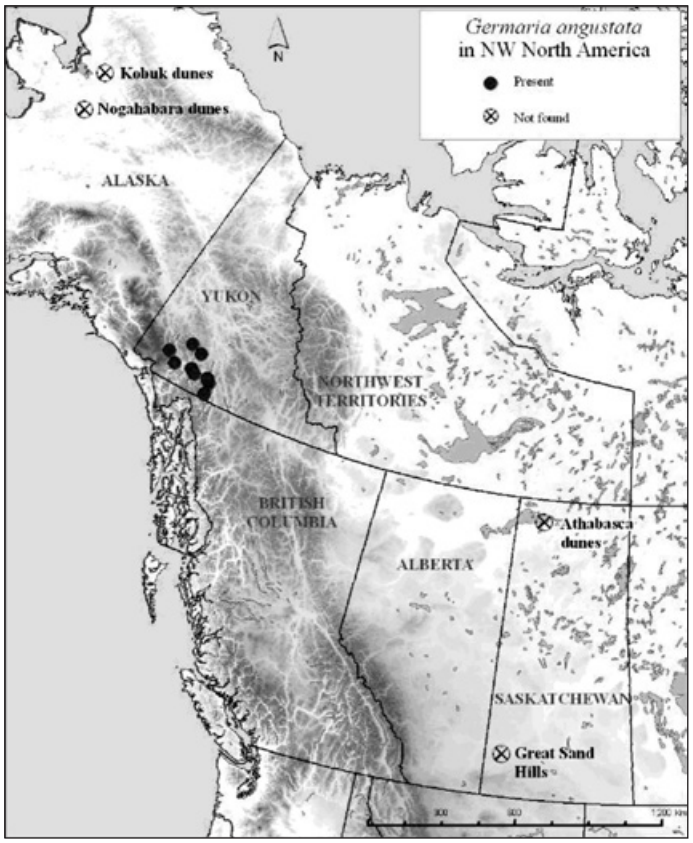
Wildlife species description and significance

The Dune Tachinid Fly, *Germaria angustata* (Zetterstedt), is a black, bristly, medium-sized fly in the family Tachinidae. The second segment of the antennal branch (arista) is elongated and the third aristomere is flattened side-to-side; these two features give the arista a distinctive, elbowed appearance which helps to identify this species.

This fly is significant in that it represents a group of invertebrate and plant species (a number of which are undescribed scientifically) that, at least in North America, are restricted to active dunes in the southern Yukon.

Distribution

In North America, the known distribution is restricted to 11 locations (14 individual sites) in the southwestern Yukon, from Whitehorse and Carcross west to Kluane National Park and Reserve. In Eurasia, it is rare at European coastal and interior dunes; and is known from a number of localities in Mongolia and adjacent China and Siberia.



North American distribution of Dune Tachinid Fly.

Source: May 2011 COSEWIC Status Report.

Habitat

The Dune Tachinid Fly is restricted to active or semi-stabilized dunes or smaller sand blowouts with scattered grasses, sedges, and other vegetation. This habitat preference is probably related to the habitat needs of its likely specific, but as yet unknown host

Photo: © Sydney Cannings

caterpillar. In the Yukon, the known habitat always includes some grass or grasses. The dunes can be in coastal areas with a mesic climate (in Europe) or in interior boreal regions, with a more extreme (cold winter, hot summer) climate.

Biology

Tachinid flies are parasites of the larvae of other insects, often moth larvae. The host of the Dune Tachinid Fly is unknown. Female Dune Tachinid Flies fly low over the open sand, alighting on single stems of grass, walking to the base of each, and apparently depositing an egg there. The eggs undoubtedly hatch into a first instar larva that waits for a host caterpillar to come by. Because of the egg placement at the base of grass or sedge stems, the host of the Dune Tachinid Fly may be a cutworm larva (a moth in the family Noctuidae) that lives underground during the day and comes to the surface at night to feed on the base of the grass. A dune specialist cutworm that is found at Whitehorse and Carcross, and has a very similar global range to that of the Dune Tachinid Fly is the Coast Dart. In the Yukon, adult Dune Tachinid Flies have been collected from 6 June to 23 July; in coastal Europe the flight season is longer, from late May to mid-August.

Population sizes and trends

Appropriate habitat at a site is often limited, and this is a parasitic species dependent on a host moth, so population sizes are probably quite small for an insect. There is no information on population trends. Population size may vary a great deal from year to year, as in other tachinid flies, but there are no data. Although population size and density are difficult to estimate, 30-minute searches in appropriate habitat result in catches of up to 13 specimens, usually 0–7.

Threats and limiting factors

There is no detailed information on limiting factors. The main, proximate limiting factor is probably the distribution and abundance of the Dune Tachinid Fly's host moth. Since the end of the Pleistocene, dune stabilization and vegetation succession has eliminated most of the active dune habitat in the region. While some active dunes appear to be in equilibrium (i.e., new blowouts approximately equal areas stabilized), succession will probably eliminate more open dune area, especially at the large, but relatively young Alsek dunes in Kluane National Park and Reserve.

A potential, but significant threat is invasive species that have the ability to quickly stabilize dunes. Potential threat species include Altai Wild Rye and White Sweet-clover.

At the Carcross dunes, increasing recreational all-terrain vehicle use has caused a decline in habitat by eliminating vegetation and thereby eliminating food plants for host moths.

Protection, status, and ranks

There is no legal protection for this fly in Canada, except for that afforded its populations within Kluane National Park and Reserve and Kusawa Territorial Park.

It has not been ranked by the National General Status program; NatureServe ranks it G4G5 globally; the Yukon Conservation Data Centre ranks it S2 in the Yukon. ■

Dwarf Lake Iris

Photo: © Jessie M. Harris

Scientific name
Iris lacustris

Taxon
Vascular plants

COSEWIC Status
Special Concern

Canadian Range
Ontario

Reason for Designation

This globally vulnerable Great Lakes endemic is a small clonal perennial iris restricted in Canada to areas near the shore of Lake Huron in Ontario. Of 40 extant Canadian populations consisting of over 50 million stems, two thirds occur outside of protected areas and are susceptible to shoreline development. This species is also sensitive to road construction, trampling, and fire suppression. However, recent survey efforts, which greatly increased the known number of populations and number of plants, have reduced the level of risk for this species.

Species Information

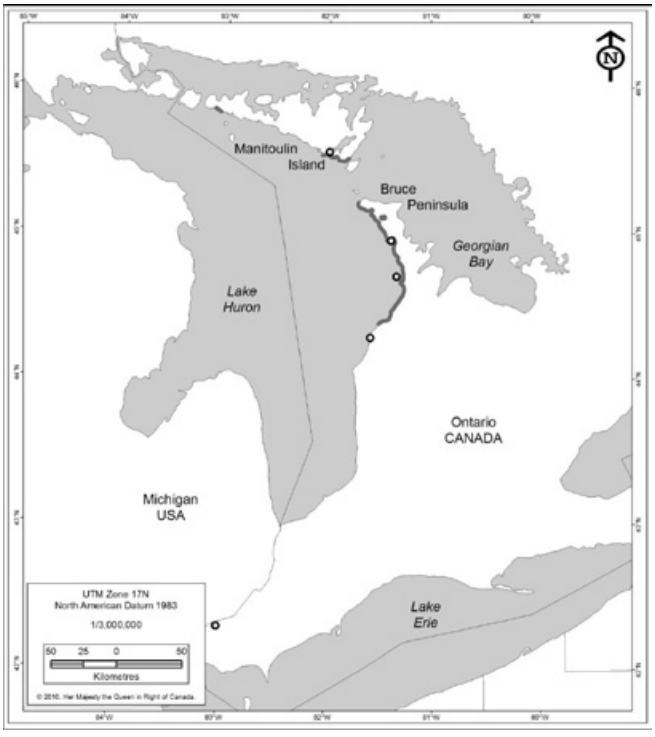
Dwarf Lake Iris is a small perennial plant with flat, strap-shaped leaves that grow all in one plane. The plants spread by rhizomes, often forming large colonies of shoots. Flowers sit directly on the ground, not on a stalk, and have showy blue or purple petals with orange, bearded crests. When not in flower, Dwarf Lake Iris can be confused with Sticky False Asphodel, which grows in many of the same habitats.

Distribution

Dwarf Lake Iris is endemic to the Great Lakes basin and restricted to the northern shores of Lakes Michigan and Huron. There are 40 extant populations in Canada (all in Ontario), as well as 80 sites in Michigan and 15 in Wisconsin. The current Canadian range runs from southern Bruce County north to Tobermory and along the south shore of Manitoulin Island from the Owen Channel to the Carter Bay area, with a disjunct population at Belanger Bay.

Habitat

In Canada, Dwarf Lake Iris grows on alvars, dolostone bedrock shorelines, sand or gravel beach ridges, and in openings in coniferous woodlands. The majority of populations are within 500 m of the shore of Lake Huron, but the largest ones occur up to several kilometres from the lake. Wildfire has likely played an important role in creating habitat. In the absence of fire, natural succession eventually causes conditions to become unsuitable for Dwarf Lake Iris. This process may take anywhere from 50 to several



Canadian range of Dwarf Lake Iris. Open circles represent historic populations. Width of range is slightly exaggerated: actual range is usually only within a few kilometres from the lakeshore, with a few exceptions. Please note the distribution is not continuous as depicted on this map.

Source: November 2010 COSEWIC Status Report.

hundred years. Shoreline development has completely removed or destroyed habitat in some locations, while at others it has improved habitat by opening the canopy and creating new open ground. Roughly 37% of the Canadian population is on land in protected areas.

Biology

Dwarf Lake Iris blooms from mid-May to early June. Plants are self-compatible, but natural fruit set and seed set are low. Age of maturity (from seedling to first flowering) is estimated to be at least seven years. Average age of individuals and generation time are unknown, but given the size of some colonies, it can be speculated that some plants live for decades. Seeds of Dwarf Lake Iris have an oily appendage that is attractive to ants, but dispersal distances are probably relatively small compared to the size of colonies. The species has very low genetic diversity. The total population is not considered to be severely fragmented.

Population sizes and trends

Several colonies documented in recent surveys are on the order of hectares, square kilometres, or in linear strips many kilometres in length. Currently, the total Canadian population totals over 50 million ramets, at least 50 times more than previously reported. This estimate includes extensive newly discovered populations, more comprehensive surveys of previously known sites, and a re-evaluation of existing data. There is little information on trends because most populations have had only one observation or had no previous abundance data. Eight populations of <10 m^2 or <1000 ramets are presumed to be in decline due to succession and shoreline development, and portions of a few extant sites are known to have been lost.

Limiting factors and threats

Threats resulting from human activity and natural or inherent limiting factors currently affect the survival of Dwarf Lake Iris. The threats are: shoreline development and road construction, loss of habitat from fire suppression, and trampling from ATVs, heavy machinery, pedestrians, and bicycles. The limiting factors include: inability to grow in shade; lack of insect pollinators; low genetic diversity; and low dispersal ability. Cottage development and trail use by ATVs or foot traffic may be either a threat or a benefit, depending on the degree or intensity of the activity. There are situations in which Dwarf Lake Iris can thrive with human activities.

Special significance of the species

Dwarf Lake Iris is endemic to the Great Lakes region, and populations in Ontario, Michigan, and Wisconsin comprise the entire global range. The species has no specific cultural use to humans and no medicinal or cultural use is known among local Aboriginal groups. However, the plant is conspicuous and showy when in flower and became the state wildflower of Michigan in 1998.

Existing protection

Dwarf Lake Iris is listed as threatened on Schedule 1 of the federal *Species at Risk Act* (SARA). The species is also listed as a threatened, transition species on Schedule 4 of the Ontario *Endangered Species Act, 2007* (ESA). Habitat for this species has not been regulated anywhere.

Part of the Dwarf Lake Iris population on the Wikwemikong Reserve is protected in an area that has been a protected wilderness since the mid-1980s (designated by a band council resolution). In this area, no logging, residential development, or hunting is allowed. Two national parks and several provincial parks and nature reserves also afford some protection to a number of populations.

The Global NatureServe rank for Dwarf Lake Iris is vulnerable (G3), nationally the NatureServe rank is vulnerable (N3) in Canada, and the Natural Heritage Information Centre ranks it as vulnerable (S3) in Ontario. ■

Eastern Meadowlark

Photo: © Julien Brisson

Scientific name
Sturnella magna

Taxon
Birds

COSEWIC Status
Threatened

Canadian Range
Ontario, Quebec, New Brunswick, Nova Scotia

Reason for Designation

This ground-nesting grassland specialist has seen major changes in its population size and breeding range since European settlement. Most of its native prairie habitat had fallen to the plough by the end of the 19th century. However, these habitat losses were effectively counter-balanced by the provision of large amounts of surrogate grasslands (primarily pastures and hayfields) as a result of the widespread conversion of eastern deciduous forests to agricultural land. The species initially responded with expansions in its breeding range (primarily eastward). Since the mid-20th century, however, the amount and quality of surrogate grasslands across its range have declined. Although the species' population is still relatively large, it has been undergoing persistent rangewide declines. These declines are believed to be driven mostly by ongoing loss and degradation of grassland habitat on both the breeding and wintering grounds, coupled with reduced reproductive success resulting from some agricultural practices.

Wildlife species description and significance

The Eastern Meadowlark is a medium-sized songbird that is a member of the blackbird family. It has a relatively long, pointed bill and short tail. Adults are patterned with brown on the back, and have a bright-yellow throat and belly with a large black "V" pattern in the middle of the chest. The white outer tail feathers are especially visible in flight. The Eastern Meadowlark closely resembles the Western Meadowlark – a species found in similar habitat but nesting primarily in western North America. Sixteen subspecies of the Eastern Meadowlark are recognized, but only one occurs in Canada (*Sturnella magna magna*).

Distribution

Including all subspecies, the Eastern Meadowlark's global breeding range extends from central and eastern North America, south through parts of South America. However, there is only one subspecies in Canada and the neighbouring northeastern U.S. In Canada, the bulk of the population breeds in southern Ontario, becoming progressively less common through southern Quebec, New Brunswick, and southern

Distribution of the Eastern Meadowlark in North and Central America, showing the breeding, year-around and wintering ranges.

Source: "Birds of North America Online" **http://bna.birds.cornell.edu/bna** maintained by the Cornell Lab of Ornithology, Ithaca, NY.

Nova Scotia. Eastern Meadowlarks are short-distance migrants, with most of the Canadian population believed to winter in the southcentral and southeastern United States.

Habitat

Eastern Meadowlarks prefer grassland habitats, including native prairies and savannahs, as well as non-native pastures, hayfields, weedy meadows, herbaceous fencerows and airfields.

Biology

The Eastern Meadowlark employs a mixed reproductive strategy that includes both monogamy and polygyny. Polygyny is frequent. In Canada, males arrive on the breeding grounds in April, while females return about 2–4 weeks later. Nests are situated on the ground. They are well concealed in vegetation and consist of a grass cup covered by grass woven from the surrounding vegetation. Clutch size is usually four to five eggs. Up to two broods can be raised in a breeding season. Age of first reproduction is one year.

Population sizes and trends

In Canada, the Eastern Meadowlark population is estimated to be about 250,000 mature individuals (roughly 125,000 breeding pairs). The population size and breeding range of this species in central and eastern Canada expanded soon after European settlement, owing to the provision of large acreages of pasturelands and hayfields following the clearing of the native forests. This also roughly coincided with large declines in the availability of the species' natural habitat (e.g., native prairie). All sources of available information now demonstrate a decline of the species in Canada, which probably began sometime in the mid-20th century, concomitant with the decline in the amount of surrogate agricultural habitats and intensification of agricultural practices. Meanwhile, the Eastern Meadowlark's native prairie has not returned and remains only a fraction of its historic acreage.

Population trend information from the Breeding Bird Survey for the period 1970 to 2009 shows a statistically significant decline of 3.1% per year in Canada, which corresponds to an overall decline of 71%. Over the most recent 10-year period (1999 to 2009), there has been a statistically significant decline of 3.3% per year, which corresponds to an overall decline of 29%. Regional surveys, such as the Ontario Breeding Bird Atlas, the Maritimes Breeding Bird Atlas and the Étude des populations d'oiseaux du Québec, also indicate significant declines in recent decades.

Threats and limiting factors

The main causes of the decline in Eastern Meadowlark populations have been identified as: 1) habitat loss on the breeding grounds (and probably also on the wintering grounds) caused by large-scale conversion of forage crops to intensive grain crops and other row crops, reforestation of abandoned farmlands, and urbanization; 2) intensification and modernization of agricultural techniques promoting earlier and more frequent haying during the nesting season, which results in low breeding success; 3) a high (and probably increasing) rate of nest predation; 4) overgrazing by livestock; 5) mortality due to pesticide use on the breeding and wintering grounds; and 6) reduced reproductive output stemming from Brown-headed Cowbird nest parasitism.

Protection, status, and ranks

In Canada, the Eastern Meadowlark and its nests and eggs are protected under the *Migratory Birds Convention Act, 1994*. It is currently ranked as "globally secure" by NatureServe. In Canada, it is ranked "secure and common". It is ranked "apparently secure" in Ontario, "vulnerable" in Quebec, "imperiled" in New Brunswick, and "critically imperiled" in Nova Scotia. ■

Hine's Emerald

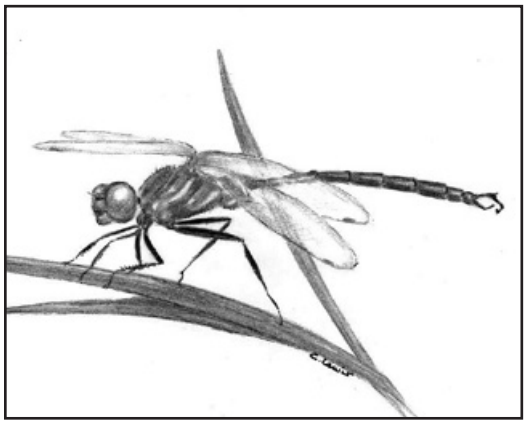


Illustration: © Christina Lewis

Scientific name
Somatochlora hineana

Taxon
Arthropods

COSEWIC Status
Endangered

Canadian Range
Ontario

Reason for Designation

This dragonfly, which is rare throughout its range, is known from only one Canadian location where habitat decline is considered likely due to urban development and invasive species.

Wildlife species description and significance

Somatochlora hineana, the Hine's Emerald, is a dragonfly (Order Odonata) in the family Corduliidae, the emeralds. Adults have brilliant green eyes, a metallic green thorax with two lateral yellow stripes, and a blackish-brown abdomen. Hine's Emerald is a globally rare species.

Distribution

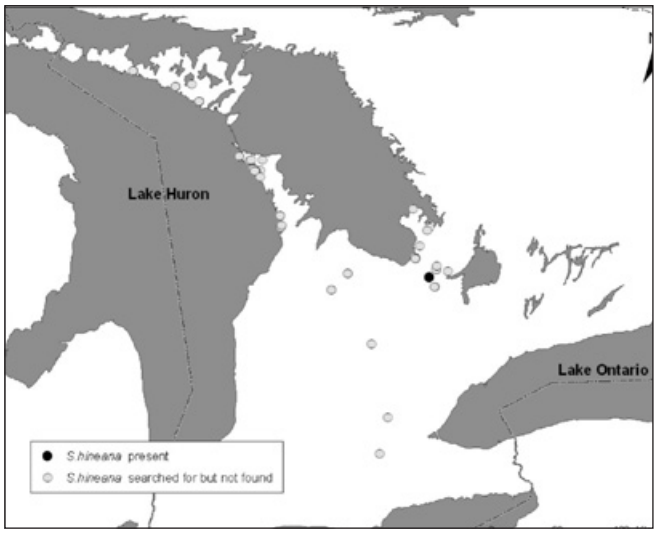
The extant global range of Hine's Emerald includes Ontario and four states in the United States: Wisconsin, Michigan, Illinois and Missouri. Historically, it was also known from Ohio, Indiana and Alabama, where it is now thought to be extirpated. In Ontario, Hine's Emerald is known from only a single site – the Minesing Wetlands in Simcoe County, west of Barrie.

Habitat

Hine's Emerald is restricted to calcareous wetlands (marshes, sedge meadows, and fens) dominated by graminoid vegetation and fed primarily by groundwater from intermittent seeps. Most sites have an underlying layer of dolomitic bedrock close to the surface. Some biologists believe that the habitat in Minesing Wetlands has become increasingly dry over the past 35 years and anticipated urban development in the surrounding region is considered a serious threat as a result of loss of groundwater recharge. On the other hand development appears to be restricted. There is more general agreement that invasive plants such as European Common Reed and Glossy Buckthorn are serious threats. The presence of crayfish burrows likely represents a critical component of Hine's Emerald habitat and may be a factor limiting its distribution.

Biology

Hine's Emerald undergoes incomplete metamorphosis involving three stages: egg, larva (nymph) and adult. Mated females lay eggs in muck and/or shallow water and the eggs hatch into aquatic larvae that live in the wetland for 3–5 years before emerging as adults. The larvae are generalist predators and feed upon a variety of other



Distribution of Hine's Emerald in Canada.

Source: May 2011 COSEWIC Status Report.

invertebrates. Once mature, larvae crawl from their aquatic environment onto an emergent plant where the adult emerges from the larval skin. The timing of adult emergence in the Canadian portion of the range likely begins somewhere between early to mid-June. Following a week-long pre-reproductive period, adults choose breeding sites and use these areas to mate and lay eggs. Adult dragonflies are aerial predators and feed on a variety of insects.

Population sizes and trends

Population size at the single known site in Canada is unknown. Likewise, there are no data on year-to-year fluctuations or trends in this population.

Threats and limiting factors

Changes in surface and sub-surface hydrology could be detrimental to populations of Hine's Emerald if alterations of water regimes affect water to reduce or eliminate potential larval habitat. The aquifer that is believed to be the principal source of groundwater supplying the eastern portion of the Minesing Wetlands (where the only known Canadian population of Hine's Emerald is found) is located in the uplands to the east. Proposed housing developments in these uplands are expected to reduce the baseflow of water to the wetlands, thus impacting larval habitat.

Contamination of groundwater is also a potential threat to Hine's Emerald habitat. The uplands containing the aquifer that supplies the Minesing Wetlands are primarily comprised of permeable sand and gravel formations. As a result, the source of the water supplying the eastern portion of Minesing could be contaminated by agricultural pesticides and nutrient management, faulty or degraded septic beds and potential future development pressures.

Yet another threat is the likely invasion of European Common Reed, which forms dense stands in fens, virtually eliminating native biodiversity.

Protection, status, and ranks

Hine's Emerald is listed as Endangered in the United States federally and by the states of Illinois, Michigan, Ohio and Wisconsin. The species is currently not protected under the *Species at Risk Act* in Canada or Ontario's *Endangered Species Act, 2007*. It is ranked by NatureServe as Imperiled to Vulnerable globally G2G3, and nationally as N1 in Canada, and provincially as S1 in Ontario. It is listed as Near Threatened in the International Union for Conservation of Nature Red List of Threatened Species.

The Minesing Wetlands are protected from development and site alteration by a number of provincial and municipal natural heritage designations, regulations and policies. Much of the area is owned by the Nottawasaga Valley Conservation Authority. ■

Hungerford's Crawling Water Beetle

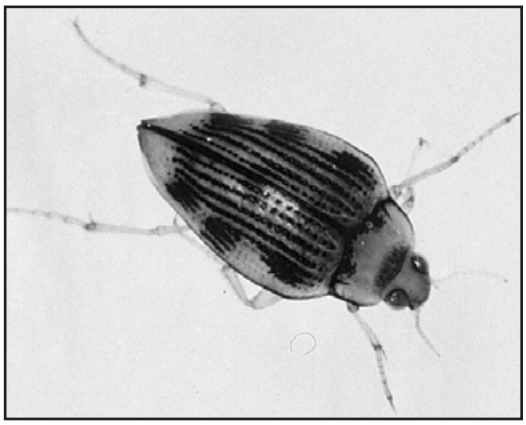


Photo: © Steve Marshall

Scientific name
Brychius hungerfordi

Taxon
Arthropods

COSEWIC Status
Endangered

Canadian Range
Ontario

Reason for Designation

A probable early postglacial relict, this water beetle is endemic to the upper Great Lakes and is Endangered in the U.S. In Canada, it is restricted to a small area and is known from only three locations in Ontario. This species has declined and may be extirpated at the North Saugeen River. It is threatened by further planned developments at the North Saugeen and Saugeen River locations, by hydrological alterations at the Rankin River location, and by continuing declines in water quality due to events associated with increasing human population at all locations.

Wildlife species description and significance

Brychius hungerfordi, or Hungerford's Crawling Water Beetle, is a small insect 3.7–4.4 mm long and yellowish-brown in colour with irregular dark stripes on the back. The larvae are long and slender with a distinctive curved hook at the tip of the abdomen.

Distribution

Hungerford's Crawling Water Beetle is endemic to the Great Lakes region with approximately 40% of its distribution in Canada. All Canadian populations are found within Ontario. The species is restricted to five streams in three counties (Emmet, Montmorency and Presque Isle) in northern Michigan and to three rivers (the Rankin, the North Saugeen and the Saugeen) in Bruce County, Ontario. Over the last 10 years the possible loss of one of three locations has been documented.

Global distribution of Hungerford's Crawling Water Beetle. The shaded area indicates the global extent of occurrence (EO) and the shaded area in Ontario suggests a possible region of occurrence but not the Canadian EO. Black dots are known locations.

Source: May 2011 COSEWIC Status Report.

Habitat

Hungerford's Crawling Water Beetle is a specialist of small to medium-sized streams characterized by a moderate to fast flow, good stream aeration, cool temperatures (15°C to 25°C), inorganic substrate, and alkaline water conditions. Populations are often, but not always, found immediately downstream from culverts, beaver dams, and human-made dams. The presence of the alga *Dichotomosiphon* may be a critical component of the habitat because the beetle larvae appear to be very dependent upon it as a food source. Some areas within two watersheds (Saugeen and Grey-Sauble) containing Hungerford's Crawling Water Beetle are relatively pristine while others are

very degraded. Poor agricultural practices, wetland degradation, impoundment and other watercourse alterations, and urban development are current threats in these watersheds. There is some evidence that the habitat at the location on the North Saugeen River has been impacted in such a way that may have led to a decline or loss of the Hungerford's Crawling Water Beetle population.

Biology

Hungerford's Crawling Water Beetle has four life stages: egg, larva, pupa and adult. The egg stage has not been described nor has egg-laying been observed for Hungerford's Crawling Water Beetle, but based upon studies of closely related species, females probably lay their eggs in spring or early summer on or in aquatic plants. The larvae are herbivorous and a recent study suggests that they may specialize upon the filamentous alga *Dichotomosiphon tuberosus*. The larvae probably feed and grow until the fall when they then move from the water to damp soil along the edge of the river where they probably remain over the winter. The following spring, they likely transform from larvae to adults before returning to the water. The adult beetles may live as long as 18 months.

Population sizes and trends

Population size at each of the three known locations in Canada is unknown. In Michigan, the population in a single pool was estimated to consist of approximately 1100 individuals. Over a three-year period the population size remained fairly constant. There are little data on year-to-year fluctuations or trends of Hungerford's Crawling Water Beetle populations in Canada. One of the Canadian populations has declined or is possibly extirpated.

Threats and limiting factors

Although the habitat requirements of Hungerford's Crawling Water Beetle are not fully understood, it is likely that threats to this species include any activities that degrade water quality or remove or disrupt the pools and riffle environment of streams in which this species lives. Such threats may include stream modification (e.g., channelization, dredging, bank stabilization, erosion control, and impoundment), pollution, impacts to the groundwater quality and quantity and invasive alien species.

Alternations to stream flow as a result of waterpower development, waterpower management regimes, permits to take water (either surface water directly from the stream or groundwater that may feed the stream), discharge of storm water and other activities may also impact Hungerford's Crawling Water Beetle populations by altering the hydrology, temperature, substrate and water chemistry of the stream. These activities all currently occur in the three Canadian watersheds where Hungerford's Crawling Water Beetles are found. Such activities and the resulting changes to stream flow could also impact the shoreline pupation sites of this beetle (e.g., through erosion and/or flooding).

One Canadian location is adjacent to lands where an expansion to a landfill site is proposed. Such an expansion could have impacts on groundwater quality which may result in negative direct or indirect effects upon the Hungerford's Crawling Water Beetle population at this location.

Protection, status, and ranks

Hungerford's Crawling Water Beetle is listed as endangered in the United States both federally and by the state of Michigan, the only state in which it occurs. It is not protected under any species at risk legislation in Canada.

None of the locations where Hungerford's Crawling Water Beetle are found are within provincial or federal parks. The Rankin River location is largely surrounded by Crown land and land managed by the Grey-Sauble Conservation authority and Bruce County.

This species receives some protection under the Ontario provincial *Planning Act*. Indirectly, it may receive some protection under other regulations and acts (e.g., locally under the *Development, Interference with Wetlands and Alteration to Shorelines and Watercourses Regulations*, provincially under the *Conservation Authorities Act*, *Lakes and Rivers Improvement Act*, *Nutrient Management Act*, *Environmental Assessment Act*, *Environmental Protection Act*, *Water Resources Act*, and *Source Water Protection Act* and federally under the *Fisheries Act*). ■

Jefferson Salamander

Photo: © Gary Allen

Scientific name
Ambystoma jeffersonianum

Taxon
Amphibians

COSEWIC Status
Threatened

Canadian Range
Ontario

Reason for Designation

This salamander has a restricted range within populated and highly modified areas. Over the past three generations, the species has disappeared from many historic locations and the remaining locations are threatened by development, loss of habitat and, potentially, the presence of sperm-stealing unisexual populations of salamanders.

Wildlife species information

Ambystoma jeffersonianum, Jefferson Salamander, is a long, slender, dark grey to brownish member of the mole salamander family with elongated limbs and toes. Light bluish-grey flecks may occur along the lower sides of the body and tail. Adults range in size from 60 to 104 mm snout-vent length with a tail that is nearly as long as the body and is laterally compressed. Males, in breeding condition, have a distinctly swollen cloacal region. Unisexual (all-female) *Ambystoma*, which co-exist with Jefferson Salamanders in all known Canadian populations, have a very similar morphology to female Jefferson Salamanders.

Distribution

The geographic range of Jefferson Salamander roughly coincides with upland deciduous forest in northeastern North America from New England to Indiana and south to Kentucky and Virginia. In Canada, the species is found only in isolated populations that are mostly associated with the Niagara Escarpment and Carolinian forest regions in Ontario.

Global range of Jefferson Salamander (from Petranka, J.W. 1998. Salamanders of the United States and Canada. Smithsonian Institution Press. 587pp). The arrow points to an isolated population in Illinois.

Source: April 2011 COSEWIC Status Report.

Habitat

Adult Jefferson Salamanders, throughout their range, are found within deciduous or mixed upland forests containing, or adjacent to, suitable breeding ponds. Breeding ponds are normally ephemeral, or vernal, woodland pools that dry in late summer. Terrestrial habitat is in mature woodlands that have small mammal burrows or rock fissures that enable adults to over-winter underground below the frost line.

Biology

Adults migrate to and from breeding ponds at night very early in spring when temperatures are moderate. Most migration events to or from breeding ponds coincide with rain. Courtship and egg deposition may

occur under the ice of vernal pools and individual males court several females. Within a day or two after mating, females deposit several egg masses on sticks or emergent vegetation. Duration of egg and larval development is variable and temperature-dependent. Carnivorous larvae normally transform in July or early August and leave the pond. Adults spend most of their time under rocks, logs, or in mammal burrows in the forest. Adults over-winter in the terrestrial environment below the frost line.

Unisexual Ambystoma, which are mostly polyploid, occur in all known Jefferson Salamander populations in Ontario. They are much more numerous than Jefferson Salamanders and, apparently, have the same behaviour as female Jefferson Salamanders. These females court male Jefferson Salamanders and use sperm from the males to initiate development of their eggs. The sperm may or may not be incorporated into the egg.

Population sizes and trends

Estimation of population sizes of the Jefferson Salamander is difficult because of the presence of unisexuals that are morphologically similar to female Jefferson Salamanders. Simply counting the number of salamanders migrating to or from a breeding pond would include unisexual individuals. Recent surveys show that very low numbers of pure Jefferson Salamanders actually exist in populations, even those that have a high density of salamanders. Most of the historical sites surveyed in 1990 and 1991 no longer supported populations of either the Jefferson Salamander or unisexuals in 2003 and 2004. Furthermore, at some sites where both Jefferson Salamanders and unisexuals still existed in 2003–04, there was a notable reduction in the number of egg masses compared to numbers found in the earlier surveys.

Limiting factors and threats

In Ontario, the Jefferson Salamander is limited by availability of suitable habitat that would include deciduous or mixed forested upland areas associated with fishless ponds that are most often temporary or vernal pools. Threats include the partial or absolute elimination of suitable habitat, construction of barriers (e.g., roads) across migratory routes to or from breeding ponds, stocking fish in breeding ponds, or reduction of the hydro period of breeding ponds so larvae do not have time to complete their development.

Special significance of the species

Jefferson Salamander is a large salamander and is considered to be a good biological indicator of a healthy environment in the United States. In Canada, it is only found in Ontario and is associated with upland, forested areas that are, historically, relatively unchanged. Unisexual (all-female) *Ambystoma*, which are more numerous than female Jefferson Salamanders, use male Jefferson Salamanders as sperm donors in all known Ontario populations. The co-evolution of Jefferson Salamander and the unisexuals has special significance because it appears to be a unique evolutionary system.

Existing protection

Over most of its range in the U.S., Jefferson Salamander is listed as secure but it is listed as imperiled in Vermont and Illinois. In Canada, the species was assessed as Threatened by the Committee on the Status of Endangered Wildlife in Canada (COSEWIC) in 2000, and listed as Threatened under Canada's *Species at Risk Act* (SARA) in 2002. It has also been assessed by the Committee on the Status of Species at Risk in Ontario (COSSARO), and listed as Threatened by the Ontario Ministry of Natural Resources (OMNR) in 2004. In 2008, the species was listed as Threatened in Regulation 230/08 (the Species at Risk in Ontario (SARO) List) under the new Ontario *Endangered Species Act*, *2007* (ESA). The species received habitat protection under the ESA, 2007, in the form of a habitat regulation which came into force February 18, 2010 (Regulation 242/08). The Provincial Recovery Strategy for the Jefferson Salamander was published in February 2010. ■

Lyall's Mariposa Lily

Photo: © Ned M Lowry

Scientific Name
Calochortus lyallii

Taxon
Vascular plants

COSEWIC Status
Special Concern

Canadian Range
British Columbia

Reason for Designation

This species is a distinctive, long-lived perennial with a small range in Canada. It is known from only five populations in forest openings and sagebrush grasslands in southern B.C., near Osoyoos. Plants emerge from underground bulbs in late spring, but are capable of remaining dormant for one or more years. This plant was formerly designated Threatened, but most of the area where it occurs has been designated as a provincial protected area, and the main threats, related to grazing and forest management, have now been mitigated.

Species information

Lyall's Mariposa Lily (*Calochortus lyallii*) is a bulbous perennial herb in the lily family. Important diagnostic features include white to purplish-tinged petals with fringed margins and crescent-shaped glands, differentiated sepals, and erect capsules.

Distribution

Lyall's Mariposa Lily occurs along the eastern slope of the Cascade Mountains from extreme south-central British Columbia to Yakima Co., Washington. Canadian populations are known only from highlands west of Osoyoos, adjacent to the U.S. border.

Approximate global range of Lyall's Mariposa Lily.

Source: May 2011 COSEWIC Status Report.

Habitat

The species occurs on well-drained soils in sagebrush grasslands and grassy forest openings between 900 m and 1300 m elevation.

Biology

Lyall's Mariposa Lily is a long-lived perennial that emerges each year from a subterranean bulb and reproduces exclusively by seed. Generation time is estimated as 15 years. Flowers are insect-pollinated, and capable of outcrossing and selfing. Seeds are shed in the summer and germinate close to the parent plant the following spring. Mature plants can alternate over time between reproductive (flowering) and vegetative (non-flowering) states. Bulbs have the ability to remain dormant underground for over three years, although dormancy episodes typically last a single year. Herbage and fruits are browsed by insects and bulbs are browsed by small mammals.

Population sizes and trends

There are five populations and 15 occurrences in Canada; these can be divided into three locations based on common threats (see below). Subpopulations range in size from a few hundred to hundreds of thousands of individuals, with an estimated total in 2009 of over 800,000 mature (flowering and non-flowering) stems. Population trends prior to 1996 are unknown; however, from 1997 to 2009, estimates of mature plant abundance from quadrats sampled in three subpopulations show declines of roughly 45% over this 12-year time period. This includes a period of decline of nearly 90% (based on visual estimates) between 1997 and 2007, with subsequent increases, but not to previously documented levels. The causes of fluctuations are not fully understood, but appear to be part of a natural cycle for this species. Increased survey efforts have resulted in the discovery of additional subpopulations within the known area of occupancy, such that the number of confirmed natural occurrences has increased from 3–14 since 1995 (with an additional site established by seeding). Despite these new discoveries, the total known population in 2009 remains approximately what it was in 1997, i.e., roughly 855,000 mature individuals in 1997, and 812,000 in 2009.

Limiting factors and threats

Establishment of the South Okanagan Grasslands Protected Area (by the BC Ministry of Environment) in 2001 and subsequent management actions have substantially reduced anthropogenic threats (e.g., from silvicultural practices and overgrazing) at the largest location, which encompasses three of five populations, and more than 85% of known individuals. Threats from invasive alien plant species, livestock trampling, and forest ingrowth still exist at this location, but do not appear imminent. The remaining two populations are on private land and are each treated as locations. The threats from silviculture and grazing at these sites may persist, and have the greatest potential to result in declines at these locations. Observed fluctuations in the number of mature individuals are not well understood, but may be part of the natural cycle for this species. Fluctuations of these magnitudes represent a potential limiting factor for the persistence of subpopulations, but as these do not appear related to human activity, and appear to be mitigated by persistence of dormant individuals, they are not considered extreme fluctuations by COSEWIC definitions. Currently, stochastic factors such as a long fire interval, unfavourable climatic conditions, and high rates of herbivory by small mammals may be combining to limit population size. Poor seed dispersal is an intrinsic limiting factor.

Special significance of the species

The genus *Calochortus* (mariposa lilies) includes about 70 species in western North America and Central America, only three of which are found in Canada (all in British Columbia). Many *Calochortus* species, including Lyall's Mariposa Lily, are local endemics with highly restricted ranges. Their high rate of local endemism and distinctive growth habit have made them important subjects in the study of plant rarity, population dynamics and speciation. Lyall's Mariposa Lily holds strong charismatic appeal for naturalists, botanists, and photographers in British Columbia, where public interest in conserving the lily helped to propel the creation of the South Okanagan Grasslands Protected Area.

Existing protection

Lyall's Mariposa Lily is not protected internationally. Nationally, it was assessed as Threatened by COSEWIC in 2001 and is listed on Schedule 1 of the federal *Species at Risk Act*. Four of the five Canadian populations occur in a provincial protected area and are regulated by the British Columbia *Park Act*. ■

Macropis Cuckoo Bee

Photo: © Cory Sheffield

Scientific Name
Epeoloides pilosulus

Taxon
Arthropods

COSEWIC Status
Endangered

Canadian Range
Nova Scotia

Reason for Designation

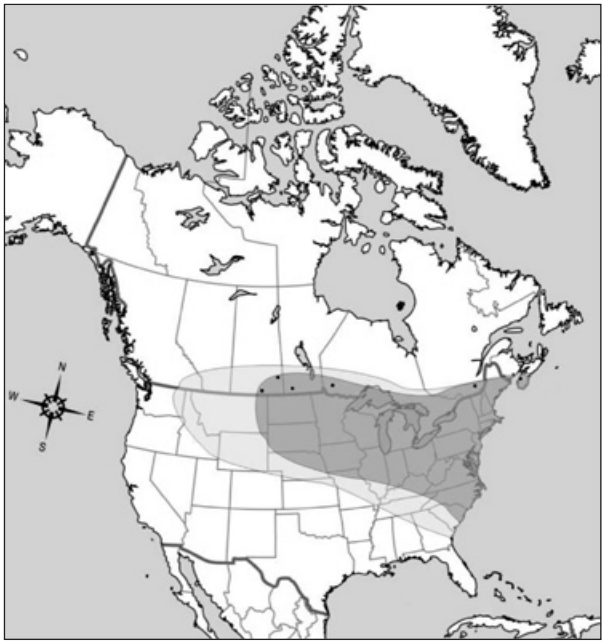
This species is a habitat specialist, requiring both a suitable host (*Macropis* bees) and their host's foodplant. The foodplant requires moist habitat and the host bee requires sunny, sandy slopes for its nest site. Historically in Canada, this species was known from six sites across five provinces. Despite recent increases in bee surveying activity nationwide, it has been found in Canada only once in the past 50 years and has not been seen again at this locality or nearby despite recent extensive searches. With only one location and a predicted continuing decline in habitat area and quality, this species is at imminent risk of extinction.

Wildlife species information

The *Macropis* cuckoo bee, *Epeoloides pilosulus* (Cresson), is the only North American member of a genus that contains two species, the other being found in the Old World. *Epeoloides* is the only genus of the tribe Osirini (Apidae, Apinae) found in both the New and Old World, the remaining genera are otherwise restricted to the Neotropics. All Osirini are cleptoparasites (i.e., cuckoos), thought to have oil-collecting bees as hosts; many of them are rare. Cleptoparasitic bee females sneak into the nests of their hosts and lay eggs on the food provision collected by the host bee. The egg or larva of the host bee is killed by the cleptoparasite.

Distribution

Historically, *Epeoloides pilosulus* ranged throughout much of eastern and central North America. In Canada, *Epeoloides pilosulus* has been found originally from Quebec, but has since been reported from Ontario, Manitoba and Saskatchewan. In the past 40 years, it has only been collected in Canada at only one site in Nova Scotia and has not been found in more recent surveys there. In the United States, it was reported from Massachusetts south to Georgia and west to Montana. Recently it has been found only once in the U.S.



The approximate distribution of North American *Macropis* bee species (Mellitidae) (light shaded area) and the historic global distribution of the cleptoparasite *Macropis* Cuckoo Bee (dark shaded area). Black dots indicate known sites of collections within Canada.

Source: April 2011 COSEWIC Status Report.

Habitat

Epeoloides pilosulus is found in habitats supporting both *Macropis bees* (Melittidae) and their food plant, Yellow Loosestrife (*Lysimachia*). Most species of *Lysimachia* known to be food hosts for *Macropis* bees in North America grow in swampy or moist habitats, and several are relatively common (and much more widely distributed than *Macropis*). Nest sites of *Macropis* (which serve as the "nesting sites" of *Epeoloides pilosulus*) are typically located within or adjacent to the host plant population, usually in sandy soil with sun exposure and vegetative undergrowth.

Biology

Epeoloides pilosulus attacks nests of *Macropis* in North America, a genus which is dependent on its floral host, *Lysimachia*, for pollen and floral oil, though nectar from other plant species is also collected. *Epeoloides coecutiens* (Fabricius, 1775) from Europe is known to attack *Macropis* nests which it locates by the scent of nesting provisions (i.e., pollen and oil from *Lysimachia* flowers).

Population sizes and trends

Until the recent captures of two male specimens of *Epeoloides pilosulus* in Nova Scotia (2002) and one female in Connecticut (2006), this species was thought to be possibly extinct as no specimens had been seen since the early 1960s and very few since the early 1940s. Despite the commonness and wide distribution of oil-producing *Lysimachia, E. pilosulus* is very rare.

Threats and limiting factors

The main factors contributing to the tenuous existence of this species are primarily linked to loss or reduction of *Macropis* nesting sites. Both cleptoparasite and host bee are dependent on host plant populations of suitable size, and their distribution is thus restricted within the range of the food plant. As the oil-producing *Lysimachia* species normally used by North American *Macropis* usually grow in wet or swampy habitats, populations may be isolated from one another, preventing gene flow among both floral and bee populations. Under such conditions, local extirpation of both bee species is possible due to intrinsic factors linked to the haplodiploid reproductive system of bees, i.e., the production of sterile or inviable males instead of fertile females as population size declines, leading to fewer egg-laying females in the population which exacerbates the other impacts of small population size. Loss of large stands of *Lysimachia* through natural and anthropogenic causes with resulting increased distances between isolated patches are probably affecting *Macropis* populations, which in turn is probably the main factor contributing to the rarity of *Epeoloides pilosulus*.

Special significance

This species is one of only two species of *Epeoloides* in the world, a disjunct taxon of the otherwise Neotropical tribe Osirini. This species is one of the rarest bees in North America; only three specimens have been collected since 1958 despite increased collecting effort in recent decades.

Existing protection, status, and ranks

Although until recently thought to be possibly extinct, this species has not previously received any protection in Canada. After its rediscovery in Nova Scotia in 2002, *Epeoloides pilosulus* was recognized by the Xerces Society in its Red List for Pollinator Insects as critically imperiled (CI): "At very high risk of extinction due to extreme rarity (often 5 or fewer populations), very steep declines, or other factors". It is listed G1 globally and N1 for Canada on NatureServe. However, no protection exists for this species. ■

Olive Clubtail

Photo: © Jim Johnson

Scientific Name
Stylurus olivaceus

Taxon
Arthropods

COSEWIC Status
Endangered

Canadian Range
British Columbia

Reason for Designation

This highly rare, stream-dwelling dragonfly with striking blue eyes is known from only five locations within three separate regions of British Columbia. It is restricted to small areas along warm lowland rivers, and infrequently lakes, where continuing decline in the quality of habitat is occurring. Threats include loss and disturbance of habitat due to human activity, such as beach recreation, impacts of invasive species of fish, invasive aquatic plants, and pollution by pesticides and fertilizing nutrients.

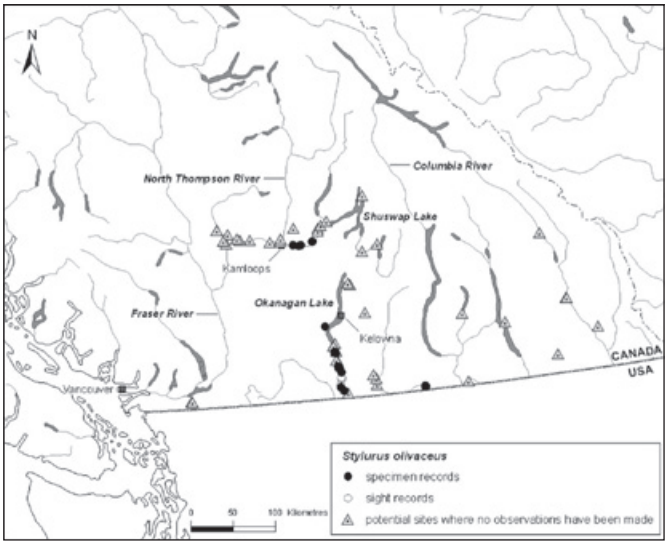
Wildlife species description and significance

The Olive Clubtail is a dragonfly in the clubtail family. Adults are 56–60 mm long, have widely separated eyes and the tip of the abdomen, especially in males, is swollen; the wings are clear. The thorax is grey-green with broad, brown shoulder stripes and the black abdomen bears a yellow mark on the top of each segment and has yellow on the sides. The elongate larvae are distinguished by vestigial burrowing hooks on the tibiae (middle of front legs). All larval records of the Olive Clubtail in Canada are of exuviae (singular "exuvia"), the cast exoskeletons of the final larval stage, left on the shore after adult emergence.

The Olive Clubtail is the only representative of the genus *Stylurus* in British Columbia. Few odonates (damselflies and dragonflies) in British Columbia develop in streams; this species may prove to be a good indicator of stream ecosystem health for warm, mesotrophic lowland rivers – a scarce habitat in the province.

Distribution

The Olive Clubtail lives in scattered populations across western North America from south-central British Columbia south through the interior of Washington and Oregon, Idaho, Utah, Nevada, and California. There are five locations in three separate regions in British Columbia and Canada – South Thompson River, Christina Creek and the Okanagan Valley (including three locations). Based on substantial search effort, it is a rare species throughout its Canadian range.



Canadian range of Olive Clubtail. Potential sites that were searched without success are also shown.

Source: May 2011 COSEWIC Status Report.

Habitat

Larvae burrow in the bottom of mud- or sand-bottomed rivers or streams, rarely along lakeshores. The rivers can be as large as the lower Columbia River below Portland, Oregon, and the streams may be as small as the 10 m-wide Christina Creek. Because the habitat requirements of the larvae are imprecisely known, it is difficult to determine whether there has been a decline in quality and quantity of habitat. Most of the Canadian length of the Okanagan River was channeled in the 1950s; presumably this has reduced both quantity and quality of habitat. The South Thompson River is relatively natural, except for agricultural, transportation and housing developments along some stretches. Christina Creek remains mostly in a natural state.

Biology

The larvae of Olive Clubtails are aquatic predators, living for about two years in the bottom sediments of streams or lakes until emerging as adults. They eat bottom-dwelling invertebrates. Adults, like other dragonflies, consume a great variety of small, flying insects. In British Columbia, adults fly from mid-July to mid-October. Males fly over open water, as opposed to along the shore. Females lay eggs on the water surface. Adults rest in riparian perennials, shrubs and trees; sometimes they perch on the ground.

Population sizes and trends

Populations in British Columbia are not known well enough to provide good size estimates. The data set used in this report consists of 31 specimens and 26 sight records; each record may relate to more than one individual. Specimens total 18 adults and 69 larval exuviae. Speculative estimates for the whole Canadian population are: Christina Creek – <500; Okanagan Valley – 1000–50,000; South Thompson River – 1000–40,000; total population – 2500–90,000. The large ranges in these estimates renders them unsatisfactory and more comprehensive counts of exuviae are required before any useful population estimates can be reached.

Although its preference for flying over water and perching inconspicuously in trees may reduce the chances of *S. olivaceus* adults being encountered, it is still clearly a rare species in British Columbia. There is no reliable trend information for British Columbia although populations appear to be stable based on their long persistence.

Threats and limiting factors

Much of the Olive Clubtail's habitat in the south Okanagan has been altered by river channeling. Urban, residential, transportation and marina developments; pollution from power boats; and disturbance at popular swimming beaches all have potential impact on larval survival. Introduced fish have altered the ecology of the Okanagan and Christina watersheds and are major predators of odonate larvae. Both watersheds have also been invaded by Eurasian Milfoil, an aggressive aquatic weed that changes aquatic environments.

Pollutants may come from land development, agricultural practices, storm water runoff, sewage systems, forestry and range activities, and other sources. Pesticides are a potential problem in the South Okanagan, as the Okanagan River flows through many orchard and vineyard lands. Eutrophication resulting from agricultural runoff and sewage is a worry in the Okanagan and along the Thompson River, although major nutrient from sewage have been reduced dramatically through tertiary treatment of sewage, which was implemented in all major centres in the 1980s.

Protection, status, and ranks

The Olive Clubtail has a global NatureServe rank of G4 ("apparently secure but perhaps potential future conservation concerns"). The British Columbia Conservation Data Centre gives it a rank of S1S2 (imperiled) and the British Columbia Ministry of Environment's Conservation Framework rank is 1, the highest priority rank for action. The species is ranked "May be at Risk" nationally and provincially under the national General Status program. Most of the provincial parks within the distribution of this species occur on lakes where the Olive Clubtail is rarely present and are managed primarily for recreation. Only a few protected areas are associated with the rivers that are the main habitat of the Olive Clubtail. ■

Peacock Vinyl Lichen

Photo: © Timothy Wheeler

Scientific Name
Leptogium polycarpum

Taxon
Lichens

COSEWIC Status
Special Concern

Canadian Range
British Columbia

Reason for Designation

This jellyskin lichen, endemic to western North America, reaches the limit of its northern distribution in Canada where it is known from only 13 locations in the coastal forests of southwestern British Columbia with one isolated location in Haida Gwaii. This lichen grows on deciduous trees, especially Bigleaf Maple and Red Alder. Almost 1000 individuals of this lichen are known but confined to only 67 trees. In addition to stochastic events, threats to this sensitive lichen include air pollution from industrial and agricultural activities, forestry and associated infrastructure as well as seasonal drought due to climate change.

Wildlife species description and significance

The Peacock Vinyl Lichen (*Leptogium polycarpum*) is a distinctive tree-dwelling "jellyskin" lichen characterized by leafy lobes that are medium-sized lobes and have a dark bluish upper surface bearing numerous button-like fruit bodies containing sexual spores termed ascospores. The production of four spores per ascus is unusual for this genus in which eight is the normal number.

Distribution

The Peacock Vinyl Lichen is endemic to western North America, where it occurs from northern California (40°N) northward to southern British Columbia (51°N) in summer-dry coastal regions. There is one outlying population (52°N) at Haida Gwaii (formerly known as the Queen Charlotte Islands).

Habitat

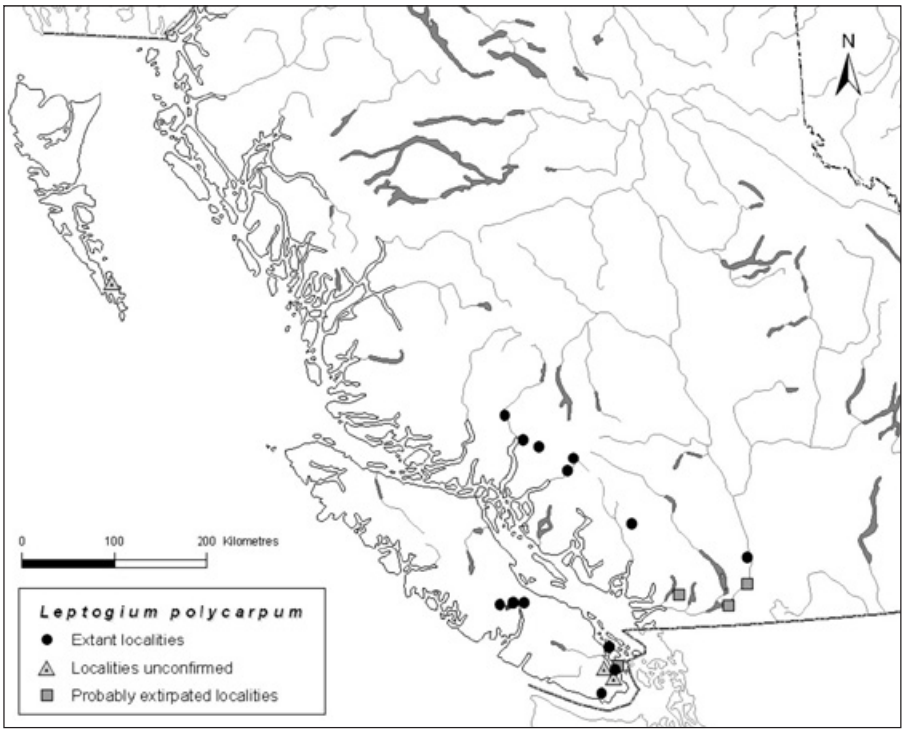
In Canada, the Peacock Vinyl Lichen occurs at low elevations on the branches and (mossy) trunks of deciduous trees, particularly Bigleaf Maple and Red Alder, in rather well-lit, mid-successional stands. At most locations its host trees are rooted in nutrient-rich soils derived from marine sediments deposited during the Pleistocene. Generally, the Peacock Vinyl Lichen grows on epiphytic moss mats which appear to promote its establishment and maintenance. At two locations, it colonizes trees near the spray of waterfalls from which it seems to benefit.

Biology

Sexual reproduction in the Peacock Vinyl Lichen depends upon on the production and dissemination of fungal spores from the lichen fruit body. This means there is a requirement for thallus resynthesis at each generation which presumably accounts for the sporadic distribution of this lichen. As a "jellyskin" lichen, in which the photopartner is a cyanobacterium, the Peacock Vinyl Lichen is further restricted by the requirement for the tree bark on which it grows to be base-rich. Only a few trees appear to satisfy this requirement in coastal B.C., where bark is leached by the heavy winter rains.

Population sizes and trends

The Peacock Vinyl Lichen has been documented in Canada from 20 locations, 11 of which were reported for the first time in surveys carried out in 2009. Of the nine "historical" locations, six were revisited in 2009, though only two of these were found still to support the Peacock Vinyl Lichen. The loss of this species



Canadian distribution of Peacock Vinyl Lichen.

Source: May 2011 COSEWIC Status Report.

from four locations, formerly known to support it, may be due to the enhanced growth of mosses as a consequence of forest succession. It is currently extant at only 13 locations, with a total of 970 thalli distributed on 67 trees. A majority of these thalli, and about half of all host trees, are concentrated in only three locations. The other locations support only small numbers of the Peacock Vinyl Lichen on only one or a few trees. Whether this species is in decline in Canada at the present time is unclear.

Threats and limiting factors

This lichen grows most commonly in association with Bigleaf Maple and in woodlands, which include at least 5% maples, and which are in the narrow, low-elevation coastal strips. This includes the lower Fraser Valley where there has been a decline in lichen diversity over the past 20 years with the replacement of rare lichens, including cyanolichens, by a flora that is typical of nutrient-rich habitats. The likely causes are nitrogenous aerosols from intensive pig and poultry operations as well as some air pollution from the city of Vancouver. Seven of the 13 locations for the Peacock Vinyl Lichen are on Crown land and so could be vulnerable to habitat loss as a result of forestry or other human activity. Forest-dwelling lichens like the Peacock Vinyl Lichen are subject to stochastic events leading to habitat loss over a large areas. These events include wildfires, insect attacks or storms. As the Peacock Vinyl Lichen has only been found to date on 67 trees in 13 locations, stochastic events can have a serious effect on the population. The principal threat to the Peacock Vinyl Lichen, in the medium to long term, is increased seasonal drought due to climate change. This could result in additional stress to this lichen, which requires humidity and liquid water for photosynthesis, growth and reproduction. Stress can reduce the frequency of resynthesis and establishment of the lichen and could cause a rapid decline in its abundance.

Protection, status, and ranks

Five of the 13 Canadian locations currently known are situated in permanently designated protected areas. However, it only occurs on more than five trees at one of these locations. The Peacock Vinyl Lichen has not yet been accorded conservation status in the United States. ■

Pitcher's Thistle

Photo: © Dr. Gunn Collec

Scientific Name
Cirsium pitcheri

Taxon
Vascular plants

COSEWIC Status
Special Concern

Canadian Range
Ontario

Reason for Designation

This globally vulnerable endemic thistle of the Great Lakes occupies a small area including a series of sandy shoreline habitats from southeastern Lake Huron to Pukaskwa National Park on the north shore of Lake Superior. The species' core range in Canada occurs along the southern margin of Manitoulin Island and nearby islands. Increases in population size and number have occurred over the past decade due to increased surveys. This species is at continued but reduced risk because of its specialized life history of flowering and reproducing only once at age 3–11 years before dying, its mainly small populations that undergo fluctuation, and ongoing habitat impacts from a variety of causes. Such threats as recreational ATV use in the species' habitat, presence of an exotic grass (Common Reed) and spread of woody plants into its habitat affect various populations.

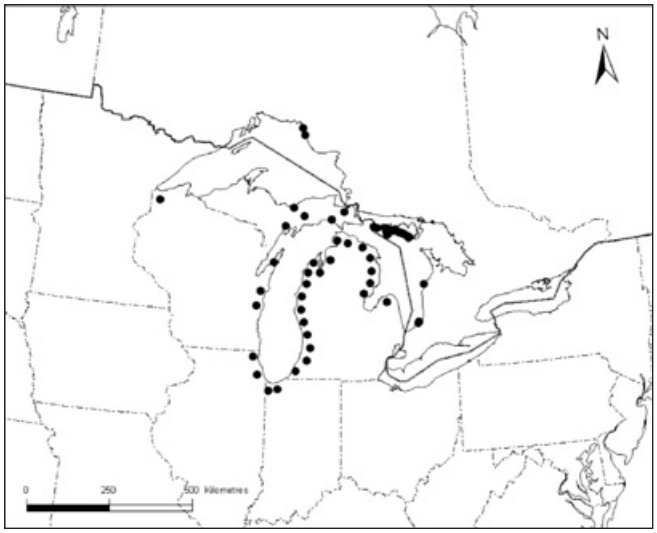
Wildlife species description and significance

Pitcher's Thistle is a perennial herb of the aster family that flowers only once in its lifetime. It spends 3–11 years as a ring (rosette) of leaves at ground level, then produces a flowering stem with a thistle head of flowers, sets seed, and dies. Plants have a whitish-green colour from a layer of fine hairs on the surface of the plant. Spines are present only at the tips of the leaves and on the flower head. Pitcher's Thistle has no means of vegetative reproduction.

Pitcher's Thistle is a globally rare endemic of the Great Lakes region. It is also an indicator of beach habitat quality. No Aboriginal traditional ecological knowledge has been identified.

Distribution

In Canada, it is found only in Ontario. In the U.S., it is found in Michigan, Indiana, Illinois and Wisconsin. There are 30 extant populations in Canada: two on Lake Superior, 20 on Manitoulin Island, five on islands surrounding Manitoulin Island, and three on Southern Lake Huron. The species has a linear shoreline distribution of about 835 km in extent by about 100 m in width covering about 83.5 km^2 of shoreline habitat.



Global distribution of Pitcher's Thistle.

Source: November 2010 COSEWIC Status Report.

Photo: © Gary Allen

Habitat

Pitcher's Thistle is found only on sand dunes and sandy beaches. Optimal Pitcher's Thistle habitat is open, dry, loose sand with sparse or no vegetation immediately surrounding or shading the thistles. The habitat is dynamic due to effects from wind, water, and ice which move sand, causing the build-up of mounds, burial of vegetation, exposure of roots, and blowouts. Natural succession may cause habitat to become unsuitable when vegetation becomes too dense. The amount of habitat has stayed roughly the same since the last status report. Of 30 total, four small populations are in national or provincial parks.

Biology

Pitcher's Thistle flowers mainly from mid-June through July. Flowers are self-fertile, but selfing produces lower seed-set than open pollination. A wide array of insects visit Pitcher's Thistle, so pollination is probably not a limiting factor. Seeds are viable for up to three years and are wind-dispersed. The entire seed head may occasionally break off and disperse as a unit. Long-distance dispersal of up to 99 km has been confirmed in the Manitoulin Region but this is probably uncommon because there is also unoccupied habitat in the region.

Population sizes and trends

Considerable fieldwork undertaken since 2000 has greatly increased the number of Canadian populations from about 10 to 30. Annual monitoring shows a multi-year increase in numbers of plants in most populations. In the total Canadian population, 15 populations show a steady increase in numbers; seven have natural fluctuations from flowering and die-off; three are stable; only five currently show serious declines. The total Canadian population had 50,435 plants (rosettes, flowering plants and seedlings) in 2008. Of these, 11,739 flowered and died. The trigger for flowering in this species is still not understood; consequently there is no way to estimate how many plants will flower and die in subsequent years.

On Lake Superior there are two populations. Population #1 (consisting of 119 rosettes, flowering plants and seedlings) is declining and could become extirpated within 5–8 years. A subpopulation has already become extirpated. Population #2 (total of 331 plants of all stages) is an introduced site and is increasing. Along southeastern Lake Huron, of three populations (total of 233 plants of all stages), one is declining and two are increasing. In the Manitoulin Island Region, of 25 populations, 12 have steadily increased since 2001, and of these, six have increased 200–800%. Seven populations have shown apparently natural fluctuations from flowering and die-off, and three populations appear stable. Only three populations have shown declines due to threats. The Manitoulin Region had a total of about 50,000 plants at all stages in 2008.

Most populations in the Manitoulin Region have increased greatly in numbers, and this increase has occurred with little human intervention. It is not known why numbers were so low at previously surveyed sites when monitoring began in 2001.

Threats and limiting factors

For the five populations that are declining, natural succession and filling in of vegetation is the primary threat, compounded by browsing and/or ATV use. Recreational use may be causing a decline at one population.

Protection, status, and ranks

COSEWIC previously assessed Pitcher's Thistle as Endangered in May 2000, and it is currently listed as endangered on Schedule 1 of the federal *Species at Risk Act* (SARA). The Pitcher's Thistle – Dune Grasslands Recovery Strategy has not yet been posted on the SARA Public Registry but will include a critical habitat definition for sites in Pukaskwa

National Park. The species is also listed on Schedule 3 of the Ontario *Endangered Species Act*, *2007* as a transition species to be listed as Endangered. Most of the Canadian Pitcher's Thistle population is on municipal and private land in the Manitoulin District. Habitat for the species has not yet been regulated anywhere. The Ontario *Provincial Parks and Conservation Reserves Act (2006)* mandates that parks and conservation reserve lands are managed to maintain the ecological integrity of habitats for native species, including species at risk.

In the United States, Pitcher's Thistle is ranked nationally as vulnerable, critically imperiled in Illinois and imperiled in Indiana and Wisconsin. It is also ranked vulnerable in Michigan. Pitcher's Thistle is designated Threatened and legally listed as such under the U.S. *Endangered Species Act* and is ranked globally as vulnerable. ■

Purple Twayblade

Photo: © Gary Allen

Scientific Name
Liparis liliifolia

Taxon
Vascular plants

COSEWIC Status
Threatened

Canadian Range
Ontario, Quebec

Reason for Designation

This small inconspicuous orchid extends across southern Ontario to southwestern Quebec as a series of scattered populations. The discovery of several new populations in recent years has extended its known range in Canada. The few individuals present in the majority of the populations and the overall small size of the entire Canadian population places the species at continued risk from chance events.

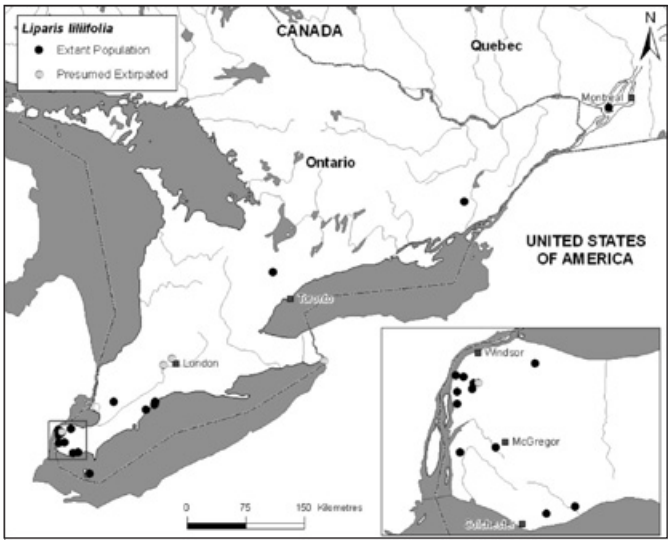
Wildlife species description and significance

Purple Twayblade (*Liparis liliifolia*) is a terrestrial perennial orchid whose leafy flowering shoot develops from a bulbous corm. The plant attains a height of about 25 cm. The flowering stalk of five to 33 flowers arises from the centre of two oval to elliptic fleshy leaves. Flowers consist of a prominent, broad violet-mauve lip (10–14 mm long) streaked with a fine network of reddish-purple veins. The two lateral petals are linear to thread-like and greenish to pale purple. Three greenish-white narrowly lanceolate sepals surround the petals. The fruit develops into an erect ellipsoid capsule about 15 mm long.

Because Purple Twayblade is a rare orchid, it is of considerable interest to naturalists and photographers.

Distribution

Purple Twayblade occurs in the United States from New England and Minnesota south to Arkansas and Alabama. The Canadian distribution was previously believed to be limited to southwestern Ontario. However, two new records in the last decade have extended the Canadian range of Purple Twayblade into eastern Ontario and southwestern Quebec. It has also been recently reported on Pelee Island.



Canadian range of Purple Twayblade, indicated by dots. Only the historic populations that have not been relocated have been mapped as extirpated. A number of other more recent populations are likely also extirpated.

Source: November 2010 COSEWIC Status Report.

Habitat

Purple Twayblade is found in a wide variety of plant communities and soil conditions. Although it is generally found in dry to mesic conditions, it has recently been reported from wetlands in Canada. Canadian occurrences are from open oak woodland and savannah, mixed deciduous forest,

shrub thicket, shrub alvar, deciduous swamp, and conifer plantation. The presence of a specific fungal associate may be more important than substrate conditions.

Biology

Purple Twayblade is an early colonizing species found in woodlands and also in a variety of disturbed sites. Plants are self-incompatible and flowers require cross-pollination to produce viable seed. Flowers are pollinated by flies, although the species is not known. As with most orchids, capsules produce a large number of tiny, dust-like seeds that are dispersed by wind and possibly by water. Developing protocorms require association with a mycorrhizal associate in order to survive.

Population sizes and trends

Purple Twayblade has been documented at 23 sites in Canada. Four of the populations at these sites are historical and presumed extirpated. Since 1998, the number of populations has increased from around 12 to about 19. This may be due to increased reporting of previously existing populations although it is possible that some of the newly documented populations may be recently established.

Since 1998, it is presumed that only 10–12 populations are extant based on fieldwork in 2007–2009. At six of 13 sites visited in 2008 (#5, #6a, #12a, #13, #17, #18), no plants were observed; at three of these sites (#5, #12a, and #13) the habitat had become overgrown and shaded, or invasive plants had become established. It is assumed that these populations have become extirpated. At one of these sites, part of the population has not been seen in several decades (#6a) and the remaining sub-population (#6b) will likely be destroyed imminently by a housing project. One private site not visited in 2008 (#15) only had two plants in 1986 and none in 1998 and is possibly also extirpated. A formerly large population (#17) that had dwindled to just a few plants in 2000 was no longer evident in 2008. A large new population (#18) discovered in 2001 appears to have disappeared after flooding of its habitat by beavers and has not re-appeared subsequent to dam removal.

Since the last status report update, three large populations of 180+ plants have been newly documented (#14, #18, #19). It is uncertain whether these populations have existed for a long time, or if they have been recently established. Most extant sites have fewer than 40 plants.

The Canadian population may consist of only 200–500 plants. This is possibly a conservative estimate, because the species is easily overlooked and some sites have not been recently visited. Based on fieldwork in 2007–2009, ~360 plants were confirmed at 10 sites.

Threats and limiting factors

Threats to Purple Twayblade include housing development and urbanization, invasive species, and potentially small population sizes.

Protection, status, and ranks

COSEWIC assessed this species as Endangered in May 2001. Purple Twayblade is provincially listed as Endangered under Ontario's *Endangered Species Act*, 2007 and is listed as Endangered on Schedule 1 of the federal *Species at Risk Act* (SARA). Eleven of 19 Purple Twayblade occurrences are wholly or partially protected through public or conservation ownership. Of protected sites, two are managed by Ontario Parks, six are in municipal ownership, and three are on properties owned by conservation organizations or universities. The remaining eight occurrences are believed to be on private land.

NatureServe ranks the species as globally secure and nationally imperiled in Canada but secure in the U.S. In Ontario, it is also ranked as imperiled. In Quebec, the species is critically imperiled. ■

Roell's Brotherella Moss

Photo: © Judy A. Harpel

Scientific Name
Brotherella roellii

Taxon
Mosses

COSEWIC Status
Endangered

Canadian Range
British Columbia

Reason for Designation

This moss is endemic to western North America, where all known extant populations occur in the densely populated southwestern mainland area of British Columbia. Extensive collecting within and beyond this region has shown this species to occur only on hardwoods and rotten logs in remnant second-growth stands within urban areas. Twenty-nine individuals are known from nine of the 26 extant locations that have recently been verified. The species is subject to pressures from recreational use, road construction and urban, agricultural, resource and industrial development, all of which threaten the quantity of its preferred habitat and host trees and logs, as well as the quality of these habitats in terms of moisture levels and air quality.

Wildlife species description and significance

Roell's Brotherella Moss (*Brotherella roellii*) is a small, yellow to golden green, shiny moss that forms turf-like mats; leafy shoots small, ca. 0.5 mm, somewhat flattened (not complanate); reproduction is via spores or occasionally deciduous flagelliferous shoots. Populations of Roell's Brotherella Moss in British Columbia currently represent the only known extant sites in the world.

Distribution

Roell's Brotherella Moss is a Western North American endemic known only from southwestern British Columbia and Washington State. Today Roell's Brotherella Moss is known from only 26 current and four historical records, isolated locations within the Lower Mainland of the Fraser River and Howe Sound area. There are only six known locations in Washington State, all historical, thus *B. roellii* may now be endemic to Canada.

Global distribution of Roell's Brotherella Moss. All six U.S. locations are historical.

Source: November 2010 COSEWIC Status Report.

Habitat

In Canada, Roell's Brotherella Moss occurs in cool, humid mixed deciduous and conifer, second-growth forests on stream terraces, swampy floodplains, and occasionally in ravines with creeks. Many of the current locations occur within city parks. The primary substratums include: alder, big leaf maple, dogwood trees, rotten logs and stumps.

Biology

This species needs high levels of humidity in order to survive as evidenced by the species' microhabitat: rotten wood, which holds moisture well, and on tree trunks in floodplain areas or along creeks. Reproduction is via spores or deciduous flagelliferous shoots.

Population sizes and trends

Twenty-seven locations and four historical locations are reported for Roell's Brotherella Moss in Canada after 134 years of collections. The four historical sites are considered extirpated. In addition, two extant locations have been severely damaged and one colony at one location has been destroyed. Nine new locations have been recently discovered. The population size and trends for the remaining 15 locations have not been confirmed because detailed locality information was not available.

Threats and limiting factors

Threats to this species include: urbanization, industrialization, agricultural development, mining, construction of pipelines, roads, trails, and air pollution. The highly fragmented nature of its distribution indicates that dispersal may be limited despite this plant's ability to produce spores.

Protection, status and ranks

Roell's Brotherella Moss had a global rank of G3 (vulnerable) in 2003 according to NatureServe. It has not been ranked nationally in either Canada or the United States. In Washington it is listed as SH (historical occurrences only but still expected to occur) by the Washington Natural Heritage Program (2009). In British Columbia, Roell's Brotherella Moss is listed as S3 (vulnerable in the province due to a restricted range, relatively few populations [often 80 or fewer], recent and widespread declines or other factors making it vulnerable to extirpation) and was placed on the B.C. Blue List by the Conservation Data Centre (BC CDC 2009). ■

Showy Goldenrod – Boreal population

Photo: © Gary Allen

Scientific Name
Solidago speciosa

Taxon
Vascular plants

COSEWIC Status
Threatened

Canadian Range
Ontario

Reason for Designation

A morphologically and ecologically distinct population has recently been found at a single location in northwestern Ontario. It occurs in a geographically distinct area from the Great Lakes Plains population. This small population may consist of only about 1000 individuals. Such geographically restricted small populations are potentially subject to negative chance events.

Wildlife species description and significance

Showy Goldenrod (*Solidago speciosa*) is a perennial plant in the aster family. Plants have as many as 30 stems up to 1.5 m tall. These are typically unbranched, smooth, and usually reddish in colour with alternate, lance-shaped leaves. The inflorescence is large and showy, up to 30 cm long, consisting of many small, bright yellow compound flower heads arranged into a panicle. Its branches are erect, and do not curve downwards like those of other large goldenrods. Flowering in Ontario starts in late August to early September and continues into mid-October.

Two subspecies of Showy Goldenrod have been recognized but only *Solidago speciosa* subspecies *speciosa* occurs in Canada. Two varieties of this subspecies are currently recognized (variety *speciosa* and variety *rigidiuscula*), but these are difficult to distinguish and have overlapping ranges in the United States. Only *S. speciosa* var. *rigidiuscula* is presently reported for Canada. However, this report also documents the occurrence of a population of Showy Goldenrod in northwestern Ontario near Kenora that differs morphologically from the Walpole Island plants. Consequently, the taxonomic status of *Solidago speciosa* requires further study.

Showy Goldenrod is a popular garden plant sold widely in the U.S. horticultural trade as evident through web advertisements from suppliers in five states. Decoctions of various parts of the plant have been used medicinally. Showy Goldenrod infected by the *Coleosporium* rust fungus can cause sickness and death in cattle and horses.

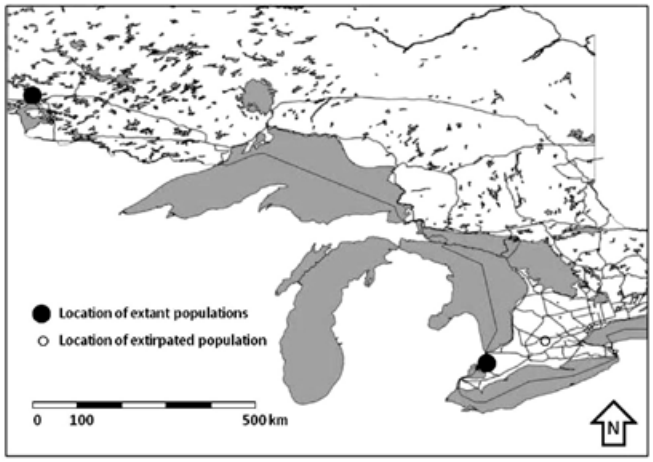
Distribution

The range of the entire species extends across much of the eastern United States, but also includes areas of Montana, Wyoming and Colorado. In Canada, Showy Goldenrod is restricted to Walpole Island First Nation (WIFN) in southwestern Ontario and another Ontario site northwest of Kenora. The latter population was recently discovered and extents the global range of the species considerably northwards. Much less than 1% of the total range of the species is in Canada.

Habitat

On WIFN, Showy Goldenrod stands are found in moist oak savannah and open tallgrass prairie on sandy loam and sandy clay loam soils. Fire is an important factor in maintaining the tallgrass prairie and savannah habitat in which Showy Goldenrod grows.

In NW Ontario, the plants are found on an open south-facing slope dominated by Porcupine Grass and Big Bluestem, fringed on the upper slope by Jack Pine, Red Pine and Eastern White Pine.



Canadian distribution of Showy Goldenrod. The Boreal population is illustrated by northernmost black dot.

Source: November 2010 COSEWIC Status Report.

Biology

Showy Goldenrod is a perennial that reproduces primarily by seed. Longevity in the wild is unknown, but garden plants will survive several years. Plants vary in size, producing 1–30 or more flowering shoots.

The species is insect pollinated and the heavy, sticky pollen is carried by a wide assortment of insects including bees, wasps, flies, beetles, moths and butterflies. The caterpillars of many moths feed on various parts of this goldenrod. Additional insect feeders include various leafhoppers, lace bugs, plant bugs, and beetles. Seed predation by the larvae of an unidentified species of Casebearer Moth Family is prevalent on Showy Goldenrod at WIFN.

Population sizes and trends

In 2008, the Great Lakes Plains DU consisted of about 800 plants in two populations compared to about 1300 plants in the same area in 2003.

Part of one population was destroyed when a house was built in 2003, and a decreased frequency of fire in the savannah around the house has resulted in the loss of plants and a decline in the quality of habitat. A late spring burn in 2008 at another site appears to have reduced the number of plants. Plants have also disappeared from a small grove of trees in which the canopy cover continues to increase and where the site was not burned between 2003 and 2008. Part of one population may also have been destroyed during the expansion of a cemetery prior to the census in 2003.

The Boreal DU was only discovered in 2005; a cursory survey in 2007 documented only 30 plants. A more complete survey in 2009 recorded about 1100 plants.

Threats and limiting factors

The major limiting factor for the Great Lakes Plains DU is the decline in tallgrass prairie and savannah habitat where the species occurs. Closing in of the canopy and encroachment by shrubs such as Staghorn Sumac may be causing a decline in the vigour of some plants.

Conversion of habitat to agriculture, housing and other land uses has destroyed some sites and reduced the availability of habitat. A reduction in the frequency of fire is also reducing habitat availability. Excavation of sand, trampling, dumping and the spread of exotics are all ongoing threats. Mowing has likely caused the loss of part of one population.

No obvious threats occur for the Boreal DU.

Protection, status, and ranks

The entire species of *Solidago speciosa* is considered globally secure by NatureServe based mainly on its secure status in the U.S. where most of its range occurs. In Canada, it is listed as Endangered under Schedule 1 of the federal *Species at Risk Act*, which applies to populations on Federal Land, including Walpole Island First Nation. Identification of critical habitat for this species is still under review. In Ontario, it is ranked as critically imperiled and listed as Endangered under the *Endangered Species Act*, *2007*. Because critical habitat has not yet been identified for this species in Ontario, its habitat is not protected.

Variety *rigidiuscula* is ranked by NatureServe as apparently secure globally and is not ranked in the United States. In Canada, it is ranked by NatureServe as critically imperiled and is listed as critically imperiled in Georgia and is not ranked or unrankable in the other 16 states where it occurs. ■

Skillet Clubtail

Photo: © Denis Doucet

Scientific Name
Gomphus ventricosus

Taxon
Arthropods

COSEWIC Status
Endangered

Canadian Range
New Brunswick

Reason for Designation

This rare dragonfly of large, clean, and medium to slow-running rivers with fine sand, silt, or clay bottoms is currently known in only three locations in Canada. It disappeared over 60 years ago from two other rivers. The largest population is subject to a number of threats that are cumulatively leading to a decline in the quality of habitat.

Wildlife species information

The Skillet Clubtail is one of the most striking dragonfly species in Canada due to the almost circular expansion at the end of its otherwise slim abdomen. It is dark brown and black, with strong yellow markings on the dorsal abdomen, greenish-yellow markings on the thorax, dark green eyes, and clear wings.

Distribution

The global range of the Skillet Clubtail is confined to North America east of the Mississippi and Red rivers, north to Rainy River and as far south as Tennessee. In Canada it has been reported historically from Nova Scotia, Ontario and Quebec, is currently well known from a location along the southern Saint John River in New Brunswick and possibly breeding in two other New Brunswick locations.

Habitat

It is a specialist of clean, large, medium to slow-running waters with fine substrate, usually having a significant component of silt and/or clay. Such habitats are usually confined to segments of larger running waters where they flow through rich soils at a low gradient, and it is a comparatively rare type of habitat in southeastern Canada. Examples with clean water are particularly rare because such rivers are often surrounded by agricultural landscapes. Habitat of the largest known population is likely declining.

Biology

Eggs are deposited in the water, and the shallow-burrowing larvae take at least two years to develop before emergence. The species has a largely synchronous emergence in the latter two weeks of June over most of its Canadian range, as early as the end of May in the centre of the continent, and flies until mid-August. Following emergence, the

Global range of Skillet Clubtail.

Source: November 2010 COSEWIC Status Report.

dragonflies fly from the river for an extended period of maturation. Adults seem to spend little time at the larval waters, and likely spend the bulk of their life in the surrounding forest.

Larvae are believed to be fed upon by turtles, fish, and crayfish, as well as by other predacious aquatic insects. It seems likely that most adult mortality is from insectivorous birds feeding in the riparian forests and clearings. Larvae likely eat whatever small creatures are also present in or on their substrate habitat based on observations of related species. Adults feed on whatever flying insects are available.

Population sizes and trends

Population size of the species in Canada is unknown, but several hundred individuals are likely necessary to sustain each population. The Canadian population is likely stable at present, but declined by 40% more than approximately 60 years ago.

A very substantial search effort in New Brunswick and Nova Scotia, and elsewhere in eastern and central Canada, has produced very few records of the species, suggesting that it is truly very rare. It appears that populations on the Saint John River (N.B.) and possibly on two other New Brunswick rivers are the only definitely extant populations for the species in Canada.

Limiting factors and threats

Anthropogenic habitat change represents the greatest potential threat to the species. Water of "marginal" quality has been identified in the Saint John River population. Eutrophication due to excessive nutrient input from sewage, or sedimentation due to agricultural or forestry runoff, pesticides and herbicides, and accidental or illegal dumping of chemicals may kill larvae in rivers. The extent to which pollution is a current problem is unclear. Terrestrial habitat is declining although very rapid and extensive declines seem unlikely in the near future.

Invasive species can alter the biota to the detriment of the species; a particular diatom would likely extirpate the species where introduced. Predators supported by humans with food and/or cover, including a variety of birds such as Common Grackles, European Starlings and various swallows, the latter nesting under bridges, may have substantial impact on emerging larvae. The deliberate or inadvertent introduction of higher aquatic organisms may represent a threat; crayfish and fish species can have serious impacts.

Direct potential threats to the species are road-kill as a result of collision with vehicles, interference with emergence by recreational use of waters and construction along shorelines. With regard to recreational use, waves from passing boats during the hours of emergence may kill the emerging dragonflies, but the importance of this threat is unknown.

A potentially serious impact on the aquatic habitat is sea level rise. Already the downstream limit of the Saint John population is within 5 km of saline influence, and this influence will move upstream with noticeable effects likely over the next decade.

Special significance of the species

This species is an indicator of large, clean, running water habitats, with the (comparatively rare for Canada) substrate of fine sand, clay or silt, and may be expected to occur with other restricted species. It reaches its northern range limit in Canada, and its global viability may be dependent upon the lower level of anthropogenic impact on Canadian waters than is experienced farther to the south.

Existing protection or other status designations

Status designations for the Skillet Clubtail reflect rarity across the global distribution. It has a NatureServe global conservation rank of vulnerable (G3), and is ranked nationally for the United States as N3 and for Canada as N1. The general status rank assigned to the species was 2 ("may be at risk") nationally and for all individual provinces within its range. All United States listings and rankings are in the rare categories. No definitely known Canadian location for the species has formal habitat protection. ■

Spring Salamander – Adirondack/ Appalachian population and Carolinian population

Photo: © David Green

Scientific Name
Gyrinophilus porphyriticus

Taxon
Amphibians

COSEWIC Status
Threatened (Adirondack / Appalachian population); Extirpated (Carolinian population)

Canadian Range
Quebec (Adirondack / Appalachian population); Ontario (Carolinian population)

Reason for Designation

Adirondack / Appalachian population:

This species occurs in clear, cool headwater streams in the Appalachians and Adirondacks of southeastern Quebec. The species' habitat is threatened by several kinds of development, including ski resorts, windfarms and golf courses that may alter water availability in the streams. Similarly, forestry activities affect the salamander's habitat by reducing shade, altering stream temperatures and increasing silt. Introduction of predatory game fish is also a severe threat to the species' larvae and adults.

Carolinian population:

No valid records in more than 50 years.

Wildlife species description and significance

The Spring Salamander (*Gyrinophilus porphyriticus*) is among the largest species in the family Plethodontidae (lungless salamanders), reaching 23 cm in total length. Adults are usually pink or orange and possess dark and diffused reticulations, spots or streaks. The aquatic larvae have reddish gills, lack reticulations and become brightly coloured at metamorphosis. Both adults and larvae are characterized by a pale line from eye to snout, a pale belly, and a laterally compressed tail that forms a fin. In Canada, the species is represented by the most widely distributed subspecies, the Northern Spring Salamander (*G. p. porphyriticus*).

Distribution

The Spring Salamander has a patchy distribution in high-elevation streams along the Appalachian uplift of eastern North America. The species' Canadian range extends from the U.S. border to Kinnear's Mills in Quebec. The Canadian distribution includes between 0.7% and 8.6% of the global range and is limited to elevations above 100 m on the outskirts of the Appalachian Mountains. Quebec populations occur within two areas: the Adirondack Piedmont and the Appalachian Mountains. The species has also been recorded from Niagara Regional Municipality in southern Ontario, but this population is considered extirpated. The species' extent of occurrence (EO) in Canada is 17,237 km^2, of which the Adirondack Piedmont accounts for 50 km^2.

Habitat

The species is mainly associated with headwater mountain streams with cool, well-oxygenated water, abundant rocky or gravelly substrates, and few predatory fish. Both adults and juveniles take refuge in interstitial spaces among rocks in the streambed. Adults may venture onto the stream bank to forage, whereas the strictly aquatic larvae remain in the stream. Eggs are laid under large rocks or other protective cover, submerged or partially embedded in the stream bank. The salamanders spend winter on the stream bottom or hidden under the stream bank, protected from freezing. Abundant forest cover is required to maintain essential habitat features.

Global range of Spring Salamander with historical distribution in Ontario and areas where further investigation is needed.

Source: November 2010 COSEWIC Status Report.

Biology

The Spring Salamander has a two-phase life cycle characterized by a long larval period lasting 3–6 years. Sexual maturity is generally attained within one year after metamorphosis, though maturation may be delayed at higher elevations. Mating occurs in summer or autumn and females oviposit annually. Fecundity increases with body size, and clutch size varies between nine and 132 eggs across the species' range. Hatching occurs in late summer or early autumn. Longevity is about 10 years.

The Spring Salamander's small size, permeable skin and aquatic life stage also make them susceptible to dehydration and water acidification. The species is territorial and nocturnal. Terrestrial and aquatic invertebrates are most commonly consumed, but Spring Salamanders may prey upon smaller salamanders including conspecifics.

Dispersal occurs primarily upstream along stream corridors. Downstream movements are infrequent and relatively short (rarely more than 10 m). Terrestrial movements of adults are generally restricted to within 2 m from the stream edge.

Population sizes and trends

The size of Canadian populations remains unknown. The species is naturally rare and local densities are usually low. Higher abundances are observed in streams where predatory fish are absent. Occasionally, up to 25 salamanders have been recorded in a single area, but usually smaller numbers are encountered.

Fluctuations and trends for Canadian populations have not been recorded. Numerous surveys in the past decade led to the discovery of nine new populations. Accordingly, the extent of occurrence has increased, likely reflecting greater search effort rather than population growth or the establishment of new populations. Failure to confirm the species' persistence at historical sites suggests that some populations might have disappeared.

Threats and limiting factors

Over the past 20 years, residential development and recreational infrastructure (e.g., ski resorts, golf courses) have significantly increased in the Appalachians, resulting in habitat loss throughout the species' range. Housing developments and wind farms also threaten and degrade the species' habitat.

Alteration or reduction of water quality and water flow remain the principal threats to the Spring Salamander. Because of a long, strictly aquatic life stage, larvae are vulnerable to acidification and other changes in water conditions. The Spring Salamander is also vulnerable to contamination of water by pesticides and herbicides.

Timber harvesting has negative effects on the species by altering water chemistry, temperature, quality or supply. Another important negative effect

of timber harvesting on Spring Salamanders is that it increases silt which then fills the interstitial spaces used for foraging and shelter. An indirect effect is reduction of oxygen levels.

Another threat, particularly to larvae, is predation by fish, especially introduced Brook Trout. The impact of Brook Trout increases when interstitial refuges become scarce from increased silt.

Protection, status, and ranks

At the federal level, the Spring Salamander is listed under the *Species at Risk Act* (SARA) in Schedule 1 as Special Concern.

In 2009, the Spring Salamander was designated Vulnerable in Quebec by the provincial government, under the *Act Respecting Threatened or Vulnerable Species*. Consequently, the species is protected by the provincial *Act Respecting Conservation and Development of Wildlife* (R.S.Q, c. C-61.1) which prohibits collecting, buying, selling or keeping specimens in captivity.

In Ontario, the Spring Salamander is listed as Extirpated in Ontario under the *Endangered Species Act, 2007* (ESA).

In Quebec, protective measures for stream salamanders, regarding silvicultural practices on public provincial lands, have been recently adopted and implemented. However, most of the Spring Salamander's range in southern Quebec is located on private lands. Article 22 of the provincial *Environment Quality Act* offers protection against unregulated degradation of environmental quality.

Globally, the species is ranked secure (G5) by NatureServe (2009). In Canada, the Spring Salamander is considered Vulnerable (N3), and in Quebec, it is ranked vulnerable (S3).

At the present time, nearly a quarter of the species' observations occur in three protected areas and areas covered by 12 ownership agreements, representing overall about 25% (127 km^2) of total habitat occupied in Quebec. ■

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GLOSSARY

Aquatic species: A wildlife species that is a fish as defined in section 2 of the *Fisheries Act* or a marine plant as defined in section 47 of the Act. The term includes marine mammals.

***Canada Gazette*:** The *Canada Gazette* is one of the vehicles that Canadians can use to access laws and regulations. It has been the "official newspaper" of the Government of Canada since 1841. Government departments and agencies as well as the private sector are required by law to publish certain information in the *Canada Gazette*. Notices and proposed regulations are published in *Canada Gazette*, Part I, and official regulations are published in *Canada Gazette*, Part II. For more information, please visit canadagazette.gc.ca.

Canadian Endangered Species Conservation Council: The Council is made up of federal, provincial and territorial ministers with responsibilities for wildlife species. The Council's mandate is to provide national leadership and coordination for the protection of species at risk.

COSEWIC: The Committee on the Status of Endangered Wildlife in Canada. The Committee comprises experts on wildlife species at risk. Their backgrounds are in the fields of biology, ecology, genetics, Aboriginal traditional knowledge and other relevant fields. These experts come from various communities, including, among others, government and academia.

COSEWIC assessment: COSEWIC's assessment or re-assessment of the status of a wildlife species, based on a status report on the species that COSEWIC either has had prepared or has received with an application.

Federal land: Any land owned by the federal government, the internal waters and territorial sea of Canada, and reserves and other land set apart for the use and benefit of a band under the *Indian Act*.

Governor in Council: The Governor General of Canada acting on the advice of the Queen's Privy Council for Canada, the formal executive body which gives legal effect to those decisions of Cabinet that are to have the force of law.

Individual: An individual of a wildlife species, whether living or dead, at any developmental stage, and includes larvae, embryos, eggs, sperm, seeds, pollen, spores and asexual propagules.

Order: Order in Council. An order issued by the Governor in Council, either on the basis of authority delegated by legislation or by virtue of the prerogative powers of the Crown.

Response statement: A document in which the Minister of the Environment indicates how he or she intends to respond to the COSEWIC assessment of a wildlife species. A response statement is posted on the Species at Risk Public Registry within 90 days of receipt of the assessment by the Minister, and provides timelines for action to the extent possible.

RIAS: Regulatory Impact Analysis Statement. A description of a regulatory proposal that provides an analysis of the expected impact of each regulatory initiative and accompanies an Order in Council.

Species at Risk Public Registry: Developed as an online service, the Species at Risk Public Registry has been accessible to the public since proclamation of the *Species at Risk Act* (SARA). The website gives users easy access to documents and information related to SARA at any time and location with Internet access. It can be found at www.registrelep-sararegistry.gc.ca.

Schedule 1: A schedule of SARA; also known as the List of Wildlife Species at Risk, the list of the species protected under SARA.

Up-listing: A revision of the status of a species on Schedule 1 to a status of higher risk. A revision of the status of a Schedule 1 species to a lower risk status would be down-listing.

Wildlife Management Board: Established under the land claims agreements in northern Quebec, Yukon, Northwest Territories, British Columbia and Nunavut, Wildlife Management Boards are the "main instruments of wildlife management" within their settlement areas. In this role, Wildlife Management Boards not only establish, modify and remove levels of total allowable harvest of a variety of wildlife species, but also participate in research activities, including annual harvest studies, and approve the designation of species at risk in their settlement areas.

Wildlife species: A species, subspecies, variety or geographically or genetically distinct population of animal, plant or other organism, other than a bacterium or virus. To be eligible for inclusion under SARA, a wildlife species must be wild by nature and native to Canada. Non-native species that have been here for 50 years or more can be considered eligible if they came without human intervention.