



Acuteleaf Small Limestone Moss



Photo: © Richard Caners

Scientific name
Seligeria acutifolia

Taxon
Mosses

COSEWIC status
Endangered

Canadian range
British Columbia

Reason for designation

This minute, habitat-specific moss has a very restricted distribution in Canada, where it is known from only two sites on Vancouver Island, British Columbia. It is confined to limestone outcrops near sea level beneath a high, coniferous forest canopy in hypermaritime climatic regions near the coast. Primary threats include impacts to habitat from quarrying, logging, and roads. The site near Kennedy Lake is currently not expected to be harvested. However, plans to quarry the marble deposit at the site near Wood Cove, where two-thirds of the known Canadian population occurs, imminently threaten this subpopulation.

Wildlife Species Description and Significance

Acuteleaf Small Limestone Moss (*Seligeria acutifolia*) is a minute, upright, light-green-coloured moss that forms sparse colonies on vertical surfaces of limestone bedrock. Characters distinguishing it from closely related species include the highly differentiated

specialized leaves (known as perichaetial leaves) surrounding the female reproductive organ, and the short, stout stalks (setae) supporting the spore-bearing capsules.

The species is known from Europe, eastern Asia, and northwestern North America. Phylogeographic relationships among the various populations have not been studied but are of interest owing to the large gaps between the occurrences.

Distribution

Acuteleaf Small Limestone Moss is known from only three sites in North America: two on western Vancouver Island, British Columbia, and one in southeastern Alaska. The distance between the sites in British Columbia is around 173 km, and the site in Alaska is located approximately 870 km north of the northernmost Canadian site.



Global distribution of Acuteleaf Small Limestone Moss (*Seligeria acutifolia*).

Source: COSEWIC. 2018. COSEWIC assessment and status report on the Acuteleaf Small Limestone Moss *Seligeria acutifolia* in Canada. Committee on the Status of Endangered Wildlife in Canada. Ottawa. xi + 35 pp.

Habitat

Acuteleaf Small Limestone Moss is a narrow habitat specialist. In coastal British Columbia it has only been found on moist vertical surfaces of slightly granular limestone outcrops beneath a high canopy of conifers near sea-level. Both sites are located within the ‘Southern variant’ of the Very Wet Hypermaritime subzone of the Coastal Western Hemlock biogeoclimatic zone (CWHvh1); this variant is confined to the west coast of Vancouver Island and a small strip of low-lying land on the adjacent mainland coast

near the northern tip of Vancouver Island. The climate of the CWHvh1 is characterized by cool temperatures, high rainfall, and fog throughout much of the year.

The limestone bedrock is characterized as 'pure' to 'highly pure' and is associated with undifferentiated Parson Bay and Quatsino formations and possibly an undifferentiated Buttle Lake Group Formation. These formations do not occur further north and differ in geological history and composition from most substrates on the mainland coast and Haida Gwaii.

Biology

The reproductive biology of Acuteleaf Small Limestone Moss is poorly known. The moss is monoicous, meaning both male and female reproductive structures occur on the same shoots. Although spore-containing capsules were observed at both sites on Vancouver Island in 2016, they were not abundant, and it is not known whether the spores were viable. However, it is thought that *Seligeria* must reproduce relatively frequently for the colony to persist in its habitat. The species has an estimated generation time of 5–8 years.

Dispersal via wind to suitable habitat beyond the immediate vicinity of the sites where the species occurs in British Columbia is unlikely because the thin-walled, delicate spores of *Seligeria* have poor survivability and the places where Acuteleaf Small Limestone Moss occurs are sheltered by coniferous forest and rugged topography.

The species does not produce specialized structures to facilitate asexual reproduction, unlike some mosses including *Seligeria carniolica*. Vegetative reproduction by means of fragmentation has not been observed and the gametophytes (i.e., shoots) are firmly attached to the rock surface, limiting potential long-distance dispersal by birds.

The adaptability of Acuteleaf Small Limestone Moss is unknown but is thought to be highly limited by its small size, which reduces its competitiveness on wetter and drier rock surfaces, and its close affinity to sheltered moist, vertical calcareous rock substrates of a particular chemical composition and texture.



Photo: © Richard Caners

Population sizes and trends

The population of Acuteleaf Small Limestone Moss in Canada consists of at least three colonies comprised of an estimated 800–1500 shoots. Two of the colonies are found near Wood Cove in Kashutl Inlet on northwestern Vancouver Island, and the third is located near Kennedy Lake, to the south. The subpopulations have not been monitored; therefore, population trends are unknown. However, based on herbarium specimens it is known that both subpopulations have persisted for at least 45 years.

Threats and limiting factors

Acuteleaf Small Limestone Moss occupies an uncommon niche on the hypermaritime coast of British Columbia. Calcareous rock outcrops occur sporadically in sheltered sites at low elevation, and despite targeted surveys for this report and extensive surveys by numerous experienced bryologists throughout the coast in the past decades, the species has only been found twice.

The primary threats to the Canadian population are quarrying, roads, and logging. Most imminent is quarrying; the northern subpopulation (Wood Cove) is associated with a commercially valuable marble deposit within an active mineral claim. Logging is a threat to both subpopulations; if the canopy of mature conifers was to be removed, the species would likely be extirpated. Although there are no roads near the remote Wood Cove site, the Kennedy Lake subpopulation could be impacted by road maintenance activities such as rock blasting and grading.

Rescue from the subpopulation in Alaska, which is approximately 870 km to the north, is extremely unlikely. Dispersal is severely limited by biological and environmental factors and by the sparseness of potentially suitable habitat.

Protection, status, and ranks

Acuteleaf Small Limestone Moss has no legal protection or status. Its global conservation rank is 'Apparently Secure', rounded from a "range-rank" of 'Vulnerable' to 'Secure' (reflecting uncertainty). In Canada, it has been assessed as 'Critically Imperiled' at both the national and provincial levels.

In the United States Acuteleaf Small Limestone Moss is not ranked, but in Europe it is assessed as 'Vulnerable' in several countries. However, in a recent assessment of the conservation status of European bryophytes the species was not included in the candidate list, and the International Union for the Conservation of Nature (IUCN) currently places it in the category of 'Least Concern'.

Source: COSEWIC. 2018. COSEWIC assessment and status report on the Acuteleaf Small Limestone Moss *Seligeria acutifolia* in Canada. Committee on the Status of Endangered Wildlife in Canada. Ottawa. xi + 35 pp.

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Allegheny Mountain Dusky Salamander (Appalachian population)



Photo: © David Green

Name change, currently listed on SARA Annexe 1 as Allegheny Mountain Dusky Salamander (Great Lakes – St. Lawrence population)

Scientific name

Desmognathus ochrophaeus

Taxon

Amphibians

COSEWIC status

Endangered

Canadian range

Quebec

Reason for designation

This salamander with aquatic larvae inhabits forested brooks, cascades, springs, and seeps, where there is abundant cover in the form of crevices between stones, logs, or leaf litter. Its entire Canadian distribution is confined to a small area at Covey Hill, Québec, and is isolated from other populations in Canada and in the United States. Its small range makes this salamander highly susceptible to environmental fluctuations and chance events, and effects of various human

activities. All occupied streams emanate from a single water source and are thus vulnerable to any activities or events that could lead to drying of habitats or contamination of the water source. Within the past decade, increased survey efforts have allowed better delineation of occupied areas and clarified threats, but substantial threats remain, and the risk to the population has increased due to increasing demand for water.

Wildlife species description and significance

Allegheny Mountain Dusky Salamander is a member of the lungless salamanders of the family Plethodontidae. Adults measure between 70 and 100 mm in total length and have a light mid-dorsal stripe that extends from the head to the tail. The dorsal stripe is straight-edged and flanked by very dark pigments; it often has a row of chevron-shaped dark spots down the middle.

Distribution

Allegheny Mountain Dusky Salamander is found throughout the Appalachian Mountain system of eastern North America. In Canada, its entire known distribution consists of two isolated populations near the U.S. border, one in Québec and the other in Ontario. A single historical record for the species in New Brunswick appears to be attributable to a misidentification.

The species was first discovered in Québec in 1988, where it occupies several streams and seeps on the north side of Covey Hill, with an extent of occurrence of 56 km². A second population was discovered in Ontario in 1989, although it was not recognized as Allegheny Mountain Dusky Salamander until 2004. Surveys carried out in 2010 resulted in the discovery of an additional locality for the species in this area, at a distance of over 350 m from the first locality. The Ontario population now includes two isolated streams in the Niagara Gorge with an extent of occurrence of only 4 km².



Canadian range of Allegheny Mountain Dusky Salamander.

Source: COSEWIC. 2018. COSEWIC assessment and status report on the Allegheny Mountain Dusky Salamander *Desmognathus ochrophaeus*, Appalachian population and Carolinian population in Canada. Committee on the Status of Endangered Wildlife in Canada. Ottawa. xvi + 95 pp.

Habitat

Allegheny Mountain Dusky Salamander lives near small, slow-flowing streams, springs, seeps, wet rocky outcrops, and seepage areas with cold, well-oxygenated water in forested habitats at high elevations. The salamanders are typically beneath cover objects (stones, woody debris, moss, leaf litter) or in moist underground retreats near water. These habitats help them avoid predation and dehydration and provide shelter for resting, foraging, nesting, and larval development. Hibernation takes place in subterranean refugia with a constant supply of water.

Biology

The life cycle is complex and, unlike in many other plethodontid salamanders, includes an aquatic larval stage. The duration of the larval stage ranges from a few days to several months depending on moisture, temperature and food availability, and the larvae metamorphose when they reach a snout-vent length (SVL) of 10 – 18 mm. Sexual maturity is usually attained around the third or fourth year of life, when males and females reach a total length of 70 mm (37 mm SVL) and 73 mm (30 mm SVL), respectively. Females lay 8 – 24 eggs and remain with them through hatching, which occurs in fall and spring. Survivorship is high in early and middle life stages. Individuals have an average life span of 7 years but can live as long as 15 years. The generation time is presumed to be approximately 5 years.

Exchange of respiratory gases in adults takes place through the skin, and as a result the salamanders are very vulnerable to dehydration. This constraint

imposes long periods of inactivity during dry periods, when the salamanders remain in moist retreats. The species is a generalist feeder that uses a sit-and-wait (ambush) mode of predation and can survive without food for long periods. Predators include carabid beetles, crayfish, snakes, small mammals, and birds. Individual salamanders occupy a small home range (less than 1 m²) from May – September but if displaced have been documented to home over distances of up to 30 m. They may move underground toward springs to forage or reproduce and to avoid predation or competition. The salamanders typically move along the stream corridor in an upstream direction, always remaining within reach of wet retreat sites.



Photo: © Alexandra Rutherford

Population Sizes and Trends

Despite the major efforts devoted to searching for dusky salamanders in Canada, the distribution of Allegheny Mountain Dusky Salamander remains extremely restricted, and the small populations are vulnerable to various anthropogenic threats and stochastic environmental events. The two Canadian populations are completely isolated from each other, and there is no possibility of exchange of individuals with U.S. populations. While both populations are very small (probably no larger than 1000 and 100 mature individuals in the Appalachian and Carolinian populations, respectively), there are no robust population estimates, and population trends cannot be determined from the available data.

Threats and Limiting Factors

Activities that could compromise the water supply and water quality in the habitat of Allegheny Mountain Dusky Salamander represent the most significant threats to the species in Canada. Lowering of the

groundwater table and alteration of the streams supplying water to the occupied streams have the potential to destroy habitat and hinder the movement and continued existence of the salamanders. Contamination of groundwater and surface water by effluents from agricultural or silvicultural operations, runoff from urbanized or industrial areas, and/or air pollutants can reduce water quality. At the Niagara Gorge, landslides and mudslides could potentially reduce or eliminate the species' habitat. Other threats include logging and urban development, which can have a major impact on moisture and temperature conditions and increasing sedimentation and siltation in streams, invasive species such as European Common Reed, and climate change, particularly droughts and their cumulative effect on the water table.

The species' cutaneous respiration, limited dispersal capacity, and specialized environmental needs, along with its subjection to predation and competition, are limiting factors that contribute to the isolation of Canadian populations and to the species' vulnerability.

Protection, Status, and Ranks

Allegheny Mountain Dusky Salamander, Great Lakes / St. Lawrence population (now termed Appalachian population), was listed as Threatened in Schedule 1 of the *Species at Risk Act* (SARA) in 2009. The Carolinian population was listed as Endangered in Schedule 1 of SARA in 2009. In Québec, the species was listed as threatened under the *Québec Act* respecting threatened or vulnerable species (CQLR, c. E-12.01) in 2009, and it is protected under the *Québec Act* respecting the conservation and development of wildlife (CQLR, c. C-61.1). In Ontario, the species is listed as Endangered under the provincial *Endangered Species Act, 2007* (S.O. 2007, c. 6). Approximately 2% of the area of occupancy of the Allegheny Mountain Dusky Salamander is located on protected land. The remaining 98% is on private land.

Source: COSEWIC. 2018. COSEWIC assessment and status report on the Allegheny Mountain Dusky Salamander *Desmognathus ochrophaeus*, Appalachian population and Carolinian population in Canada. Committee on the Status of Endangered Wildlife in Canada. Ottawa. xvi + 95 pp.

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Caribou - Dolphin and Union population

Photo: © Mathieu Dumond



Name change, currently listed on SARA Annexe 1 as Barren-ground Caribou (Dolphin and Union population)

Scientific name
Rangifer tarandus

Taxon
Mammal

COSEWIC status
Endangered

Canadian range
Northern Territories, Nunavut

Reason for designation

This Arctic caribou population is endemic to Canada, occurring in Nunavut and the Northwest Territories. Recognized for its unique migration pattern from Victoria Island across the sea ice to the mainland, observations have shown that its distribution has retracted and expanded since the beginning of the 20th century, in rough correspondence with population size. In the early 1900s, the herd was reported to be large, then a strong decline was likely precipitated by the introduction of firearms, combined with severe winters. A 50-60-year period of low densities and no sign of migration across the sea ice followed. The herd started to increase in the late 1970s, and resumed its migration to the mainland in the late 1980s, increasing in numbers until the 1990s. In 2015, the herd was estimated at about 18,000 animals. Three survey estimates over the

last 18 years and Aboriginal Traditional Knowledge suggest a decline as high as 50-60%, which appears to have accelerated since 2010. The population is experiencing multiple threats, including reduced connectivity and disrupted migration between winter and summer range associated with commercial shipping in Dease Strait that is increasingly supported by ice-breakers. Climate change is linked with decreased periods of ice cover and irregularity of sea ice conditions, causing mortality through drowning and delays in migration with consequences for nutrition and parasite burdens. Overharvest has been involved in past declines and recent exploitation levels are unknown, although access opportunities from five additional communities have increased. The spread of insect pests and pathogens as a consequence of climate change is an additional concern. Natural fluctuations of the population remain a source of uncertainty.

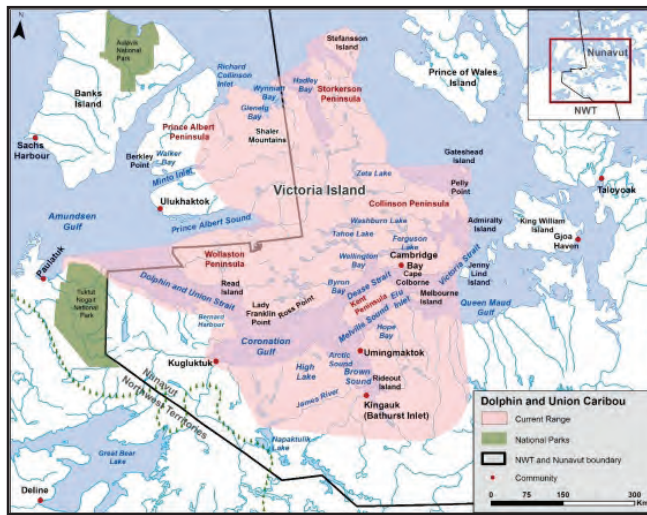
Wildlife species description and significance

Dolphin and Union Caribou are easily recognizable from Barren-ground and Peary Caribou. Intermediate in body size, they are morphologically and behaviourally distinct from both, and genetic analyses have consistently confirmed their uniqueness. A key distinguishing behavioural trait relative to other Caribou populations is the seasonal migrations that occur twice a year when members of this population cross the sea ice between Victoria Island and the mainland in a synchronous and coordinated way to reach their summer or winter ranges. They are integral components of Inuit and Inuvialuit culture, and have high spiritual, economic, and subsistence value.

Distribution

Endemic to Canada, the range of Dolphin and Union Caribou spans two jurisdictions: Northwest Territories and Nunavut. These Caribou summer as one population occupying most of Victoria Island. Having first been documented in the mid-1850s crossing the Dolphin and Union Strait, they now migrate across the Coronation Gulf, the Dease Strait and Queen Maud Gulf to winter on the mainland. Recorded observations show that the distribution of Dolphin and Union Caribou has retracted and expanded at various points in time since the beginning of the 20th century, in rough

correspondence with population size.



Canadian distribution of Dolphin and Union Caribou.

Source: COSEWIC. 2017. COSEWIC assessment and status report on the Caribou, Dolphin and Union population, *Rangifer tarandus*, in Canada. Committee on the Status of Endangered Wildlife in Canada. Ottawa. xii + 51 pp.

Habitat

Calving areas on Victoria Island are not discrete and lie in the Northern Arctic Terrestrial Ecozone, while wintering areas on the mainland coast are in the Southern Arctic Ecozone. The annual range is composed of tundra habitats populated by prostrate dwarf-shrubs, forbs, sedges, mosses and lichens. Given their regular migrations between Victoria Island and the mainland, a key habitat requirement for Dolphin and Union Caribou is the seasonal sea ice connecting the Island and mainland.

Habitat changes brought about by climate change include changes to sea ice, shifts in vegetation community composition, and amount and timing of plant growth. Although there has been minimal natural resource development within the range to date, there are two operating mines and several proposed mining developments with accompanying infrastructure, as well as plans for ships passing through ice-crossing areas, that are likely to compromise habitat quality and continuity in the future.

Biology

Similar to Barren-ground Caribou, Dolphin and Union Caribou follow an annual cycle, undertaking pre-calving and fall migrations between seasonal ranges. Although pre-calving migration is relatively gregarious, individuals disperse to calve over much of Victoria Island. The rut likely occurs during either

migration or staging and Caribou males will often mate with more than one female. Dolphin and Union Caribou have a reproductive lifespan of about 12 years, usually first calving when they are 3 years old, or at 2 years when high-quality forage is available. Generation time is estimated at 7 to 9 years. These Caribou have a similar morphology to Peary Caribou, which appears to have arisen by convergent adaptation to a highly seasonable and cold climate. They share their annual range with four large mammalian predators, two other populations of Caribou (Barren-ground and Peary), Muskoxen, and several species of smaller-bodied mammalian herbivores and waterfowl, all of which have experienced population and distribution changes in recent years. Humans and Wolves are the main predators of Dolphin and Union Caribou.

Population Sizes and Trends

In the early 1900s, the Dolphin and Union Caribou population was thought to be about 100,000 individuals, but this was a best guess. Shortly afterwards, this population declined precipitously, a likely consequence of the introduction of firearms combined with severe winters. By the 1920s, its migration across the Dolphin and Union Strait ceased. Caribou were rarely seen on Victoria Island for the next five decades. In 1959, the resident, non-migratory population on Victoria Island was estimated at 671 individuals. Inuit from Cambridge Bay began seeing Caribou in the 1970s and 1980s and, by 1993, up to 7,000 were once again migrating annually across Coronation Gulf and Dease Strait.

Three surveys in 1997, 2007 and 2015 have deployed a consistent methodology, with comparable results, to allow for a quantitative trend estimate over three generations. The first two survey estimates were retroactively corrected: A 1997 survey that estimated $27,989 \pm \text{SE } 3,367$ total Caribou in the visual survey strata was later revised to $34,558 \pm \text{CI } 6,801$, extrapolated to include animals outside the survey area based on information from radio collars. In 2007, $21,753 \pm \text{SE } 2,343$ were estimated, later revised to $27,787 \pm \text{CI } 7,537$. In 2015, the population was estimated at $18,413 \pm 6,795$ (95% CI, 11,664- 25,182). Using the original and revised estimates from the surveys as minima and maxima, there has been an overall exponential decline of over 50% since 1997. Inuit Qaujimagatuqagit (IQ), Aboriginal Traditional Knowledge and local

knowledge have also noted a declining trend of about 80%, which accelerated after 2010. IQ collected in 2014 observed declines in numbers in the young age classes, a high proportion of animals with poor body condition, and increased observations of diseased animals.

Threats and Limiting Factors

Dolphin and Union Caribou are facing a large number of direct threats to population persistence, which have been assessed as High-Very High Impact, although there is much uncertainty. Reduced connectivity of sea ice is a primary concern, with ice-breaker-supported shipping in Dease Strait already showing signs of disrupting migration. Decreased periods of ice cover and/or irregularity of sea ice conditions has also been observed, associated with climate change, which causes mortality through drowning and delays migration with consequences for nutrition and parasite burdens. Overharvest has been involved in past declines and recent exploitation levels are unknown, although access opportunities from five additional communities have increased. Predation from Wolves and Grizzly Bears is an additional concern. The spread of insect pests and pathogens associated with climate change is a threat. An unknown mortality factor may be involved in Dolphin and Union Caribou population declines, possibly involving Muskox populations through multi-prey interactions with wolves and/or multi-host interactions with parasites and pathogens. Also uncertain is the future cumulative disturbance and habitat change if any, or all, of several proposed mining projects with associated infrastructure (roads and ports) are approved for construction.

Protection, Status and Ranks

Dolphin and Union Caribou are co-managed in Nunavut according to the Nunavut Land Claims Agreement, and are co-managed in the Northwest Territories according to the Inuvialuit Final Agreement. These agreements confer primary wildlife management authority on the respective management boards: the Nunavut Wildlife Management Board and, in the NWT, the Wildlife Management Advisory Council and the Inuvialuit Game Council.

Dolphin and Union Caribou are currently listed as Special Concern under both the federal *Species at*

*Risk Act (2003) (on Schedule 1) and the territorial *Species at Risk (NWT) Act (2013)*. COSEWIC originally assessed Dolphin and Union Caribou as Special Concern in May 2004, and this population was reassessed as Endangered in November 2017.*

Globally, Caribou is listed by the International Union for Conservation of Nature (IUCN) as Vulnerable; subspecies or ecotypes are not differentiated. NatureServe ranked Caribou as secure globally and Not Yet Ranked for Dolphin and Union Caribou, which is ranked imperiled-vulnerable at the national level (N2N3), imperiled-vulnerable (S2S3) in the NWT, and unranked (SNR) in Nunavut.

Tuktuk Nogait National Park includes coastline in the southwestern portion of Dolphin and Union Caribou range and the Queen Maud Gulf Bird Sanctuary offers a certain level of habitat protection to part of the wintering range.

Source: COSEWIC. 2017. COSEWIC assessment and status report on the Caribou, Dolphin and Union population, *Rangifer tarandus*, in Canada. Committee on the Status of Endangered Wildlife in Canada. Ottawa. xii + 51 pp.

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Common Nighthawk

Photo: © Gordon Court



Scientific name
Chordeiles minor

Taxon
Birds

COSEWIC status
Special Concern

Canadian range
Yukon, Northwest Territories, Nunavut, British Columbia, Alberta, Saskatchewan, Manitoba, Ontario, Québec, New Brunswick, Prince Edward Island, Nova Scotia, Newfoundland and Labrador

Reason for designation
This aerial insectivore is a widespread breeding bird across southern and boreal Canada. Its population in southern Canada has declined by 68% since 1970, but the rate of decline has slowed appreciably over the past decade, and the species appears to be quite abundant in suitable boreal habitats. Concerns remain over the effects of human activities and changing climates in reducing food and nest-site availability. The causes of decline are not well known, but include threats that reduce the numbers of aerial

insects on which this species forages, which can be attributed to agricultural and other pesticides, and changes in precipitation, temperature and hydrological regimes. An increasing frequency of severe or extreme weather events is also likely impacting this species by reducing its productivity and increasing mortality.

Wildlife species description and significance

Common Nighthawk (*Chordeiles minor*) is the most frequently seen member of the nightjar family. It pursues and catches flying insects on the wing, and is most active from dusk to dawn. It is extremely well-camouflaged by its mottled brown plumage when perched on the ground or horizontal surfaces. Common Nighthawk is most often seen in flight, when it can be recognized by its distinctive bounding flight, white bar near the end of the wing, and nasal peent call.



Photo: © Her Majesty the Queen in Right of Canada; photo: Charles Francis

Distribution
The species breeds across Canada, as far north as central Yukon and southwestern Northwest Territories in the west, and slightly north of the Boreal Shield in the east. It breeds throughout the contiguous United States and locally south into Central America. It winters in South America, mainly in the lowlands east of the Andes Mountains.



Breeding, migrating and wintering range of Common Nighthawk.

Source: COSEWIC. 2018. COSEWIC assessment and status report on the Common Nighthawk *Chordeiles minor* in Canada. Committee on the Status of Endangered Wildlife in Canada. Ottawa. xi + 50 pp.

Habitat

Common Nighthawk breeds in a range of open and partially open habitats, including forest openings and post-fire habitats, prairies, bogs, and rocky or sandy natural habitats, as well as disturbed areas. It is also found in settled areas that meet its habitat needs, those with open areas for foraging and bare or short-cropped surfaces for nesting. The species' use of a wide range of habitats makes it difficult to estimate trends in habitat availability, except in urban habitats, where their main nesting sites – flat graveled roofs – are disappearing.

Biology

Common Nighthawk can breed by its second year, lays 1-2 eggs, and raises one brood per year. The limited data available on longevity suggest it lives for

4-5 years on average, with a generation time of about 2-3 years. Other key demographic variables, such as survival rates and site fidelity, are poorly known. Survival and reproduction of individuals are thought to be constrained by the availability of flying insects on which to forage.

Population Sizes and Trends

Population size estimates are poor, because Common Nighthawk is difficult to detect during most of the day, and much of its boreal habitat is not well-surveyed. The Canadian population is estimated from Breeding Bird Survey (BBS) results as 900,000 adults, about 10% of the global population. The Boreal Avian Modelling project, which collects data from additional sources in the northern parts of the breeding range, estimates a population of 270,000 adults in Canada, although this value is likely an underestimate. The BBS provides the best available information on population trends, especially in southern Canada. It shows that numbers there declined by 68% between 1970 and 2015, and that the rate of decline has slowed appreciably to 12% over the 10-year period 2005-2015. Analysis of eBird records suggests that the population may have stabilized in recent years, and the species appears to be quite abundant in suitable boreal habitats.

Threats and Limiting Factors

Widespread threats that may have an important impact include reduced abundance of aerial insects due to effects of agricultural and other pesticides, changes in precipitation and hydrological regimes, changes in temperature regimes, and increasing frequency of severe or extreme weather events. Several other threats have been proposed, but appear to be less severe or affect only a small proportion of the population.

Protection, Status and Ranks

Common Nighthawk and its nests are protected under the *Migratory Birds Convention Act*, 1994, and the species is listed as Threatened under Schedule 1 of the *Species at Risk Act*. A national recovery strategy has been developed to address key threats, close knowledge gaps and identify critical habitat. The species is ranked as Not at Risk globally (G5), Apparently Secure (N4B) in Canada and Secure (N5B) in the United States. However, it is considered as

Critically Imperilled (S1), Imperilled (S2), or Vulnerable (S3) in 14 of 48 states and nine of 13 provinces and territories in which it occurs. In the remaining provinces (British Columbia, Alberta, Saskatchewan, and Ontario) it is ranked Apparently Secure (S4) or Secure (S5).

Source: COSEWIC. 2018. COSEWIC assessment and status report on the Common Nighthawk *Chordeiles minor* in Canada. Committee on the Status of Endangered Wildlife in Canada. Ottawa. xi + 50 pp.

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Downy Yellow False Foxglove



Photo: © Mary Gartshore

Scientific name
Aureolaria virginica

Taxon
Vascular Plants

COSEWIC status
Endangered

Canadian range
Ontario

Reason for designation

This perennial plant species has a distribution restricted in Canada to southwestern Ontario. There are few individuals remaining in a small number of locations within oak savannas and woodlands. Declines have been observed in its distribution and quality of habitat. Fire suppression and browsing by White-tailed Deer threaten the remaining extant locations.

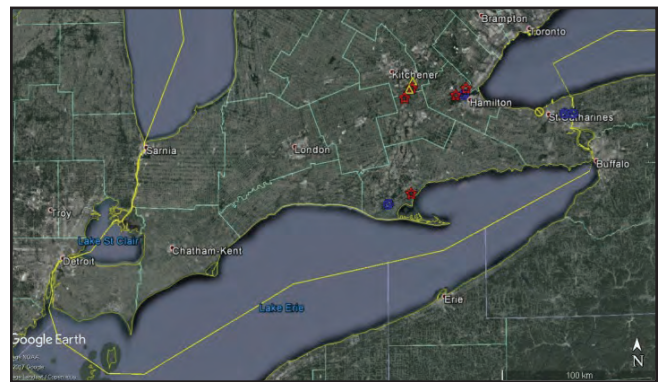
Wildlife species description and significance

The three species of Yellow False Foxglove that occur in Canada are herbaceous plants with showy yellow flowers. The Smooth Yellow False Foxglove (*Aureolaria flava*) has smooth stems whereas the stems and leaves of the Downy Yellow False Foxglove (*Aureolaria virginica*) are covered by fine downy hairs. The stems and leaves of the Fern-leaved Yellow False Foxglove (*Aureolaria pedicularia*) are covered by sticky glandular hairs. The leaves of the latter species are more dissected than the lobed leaves of the other two species. Yellow False Foxgloves are hemi-

parasites which can take up water and nutrients by attaching to the roots of oaks or other host plants.

Distribution

Yellow False Foxgloves occur only in eastern North America. A small part of the global range of the three species extends into southwestern Ontario. All three species have disappeared from many former sites. Seven subpopulations of Smooth Yellow False Foxglove persist. Six subpopulations of Fern-leaved Yellow False Foxglove were confirmed in 2016, along with five subpopulations of Downy Yellow False Foxglove.



Canadian distribution of Downy Yellow False Foxglove.

Source: COSEWIC. 2018. COSEWIC assessment and status report on the Yellow False Foxglove Bundle, Smooth Yellow False Foxglove *Aureolaria flava*, Fern-leaved Yellow False Foxglove *Aureolaria pedicularia* and the Downy Yellow False Foxglove *Aureolaria virginica*, in Canada. Committee on the Status of Endangered Wildlife in Canada. Ottawa. xx + 100 pp.

Habitat

In Canada, Yellow False Foxgloves are found in dry, open to semi-open, upland oak ecosystems. Fern-leaved Yellow False Foxglove is found in open savanna and woodland habitats along with Black Oak, its preferred host tree. The other two species can persist under dappled light conditions and occur in oak woodlands and forests, typically with White Oak present. All three species are shade intolerant to varying degrees. Their hemi-parasitic behaviour provides them with a competitive advantage on drought-prone soils provided they can attach to a suitable host.

Biology

Smooth Yellow False Foxglove and Downy Yellow False Foxglove are perennial herbs that send up multiple flowering stalks each year. In contrast, Fern-leaved Yellow False Foxglove is a short-lived species, which

flowers only once, typically in its second year. All three species reproduce only from seeds. The flowers are pollinated by bumble bees and other insects. Fern-leaved Yellow False Foxglove plants can self-pollinate, whereas the other two species require pollen from other plants to set seeds.

Population Sizes and Trends

Little was known about the size of Canadian populations of Smooth Yellow False Foxglove and Fern-leaved Yellow False Foxglove prior to 2016. Downy Yellow False Foxglove was the focus of a targeted survey in 1990.

The Canadian population of Smooth Yellow False Foxglove is estimated to be between 464 and 1409 mature individuals. Over 60% of the population is found at three sites in the Ojibway Prairie Complex subpopulation. Population trend information is not available.

The Canadian population of Fern-leaved Yellow False Foxglove is estimated to be between 7602 and 11820 plants. About 85% of the population occurs in the Pinery Complex and Turkey Point Complex subpopulations. Population trend information is not available.

The Canadian population of Downy Yellow False Foxglove is very small, consisting of about 400 mature individuals in five subpopulations. Three-quarters of the population is at a site near Cambridge, Ontario where the number of plants has increased 15-fold since 1990. There have been serious declines at the other four sites.

Threats and Limiting Factors

All three species face a suite of similar threats due to their association with open to semi-open oak ecosystems. Oak ecosystems across eastern North America are in decline for a variety of reasons. Fire suppression and invasive species are threats to the persistence of Yellow False Foxgloves in Canada because they result in increased shading and competition from other species. Active habitat management, including prescribed burning and invasive plant control, is taking place at several Yellow False Foxglove sites to restore and maintain open oak ecosystems.

Moderate to severe damage to plants due to browsing by White-tailed Deer was observed at most sites during 2016 fieldwork. Deer occur at high densities in southern Ontario as their diet is supplemented by agricultural crops. Deer browsing is affecting the perennial species especially, resulting in greatly reduced seed production at most subpopulations. Residential development is a potential threat at one site supporting a substantial portion of the Fern-leaved Yellow Foxglove population. Some small subpopulations of each species are at considerable risk of extirpation as the plants are situated near heavily used recreational trails.

Protection, Status and Ranks

These species have not been previously assessed by COSEWIC and they do not have any special legal status anywhere in Canada. In the United States, some species are protected in a few states on the periphery of the species' range. All three species are considered globally secure. Downy Yellow False Foxglove has a non-legal status rank of critically imperilled in Canada and Ontario. Smooth Yellow False Foxglove and Fern-leaved Yellow False Foxglove were both ranked as imperilled in Canada and Ontario, although these rankings are flagged as tentative as recent survey information was not available at the time.

Source: COSEWIC. 2018. COSEWIC assessment and status report on the Yellow False Foxglove Bundle, Smooth Yellow False Foxglove *Aureolaria flava*, Fern-leaved Yellow False Foxglove *Aureolaria pedicularia* and the Downy Yellow False Foxglove *Aureolaria virginica*, in Canada. Committee on the Status of Endangered Wildlife in Canada. Ottawa. xx + 100 pp.

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Eastern Painted Turtle

Photo: © Scott Gillingwater



Nom scientifique

Chrysemys picta picta

Taxon

Reptiles

COSEWIC status

Special Concern

Canadian range

Québec, New Brunswick, Nova Scotia

Reason for designation

This widespread species is subject to a suite of continuing threats, including road mortality, habitat degradation and loss, invasive species, and subsidized predators, which are unlikely to diminish in the future. Although data on declines of this species are limited, the ‘slow’ life history of turtles, characterized by late maturation, long lifespan, and long generation time, increases vulnerability constrains resilience to these threats. The species may become Threatened if these threats are neither reversed nor managed with demonstrable effectiveness.

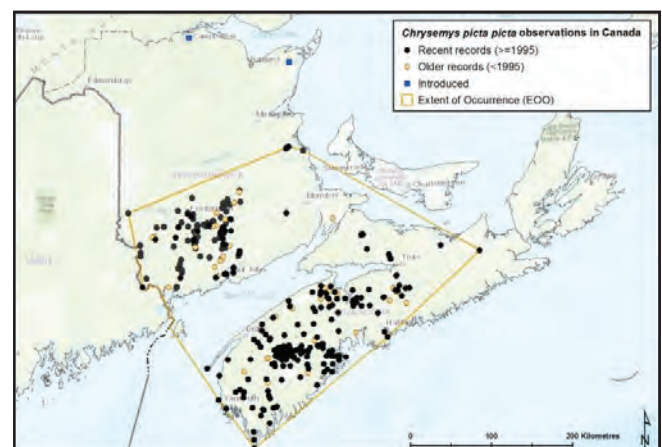
Wildlife species description and significance

Painted Turtle (*Chrysemys picta*) is a small to medium-sized freshwater turtle widespread across North America. In eastern Canada and the northeastern United States, two subspecies are recognized: Midland Painted Turtle (*C. p. marginata*) and Eastern Painted Turtle (*C. p. picta*). Painted

Turtles play multiple ecological roles in aquatic ecosystems, including nutrient cycling and seed dispersal, and are of cultural importance for Aboriginal peoples of Canada. In addition, Painted Turtles have been the subject of numerous comparative life history studies and are frequently used as model organisms in experimental studies. The species’ large geographic range, gregarious basking behaviour, and easily recognizable colours and patterns have made it a flagship species to naturalists, biologists, and the general public.

Distribution

Painted Turtle has one of the largest and most northerly geographic ranges of freshwater turtles of North America, largely owing to their adaptability and cold tolerance. In southern Canada, the species is found in a non-continuous (Canadian) distribution from British Columbia east to New Brunswick and Nova Scotia. Western Painted Turtle (*C. p. bellii*), the range of which extends from British Columbia to northwestern Ontario, was recently re-assessed by COSEWIC (2016). The range of Midland Painted Turtle extends from Ontario and western Québec south to the Great Lakes-Ohio Valley states. Eastern Painted Turtle is found in New Brunswick, Nova Scotia, and the Atlantic coastal states east of the Appalachian Mountains. A broad but poorly delineated zone of intergradation exists between Midland and Eastern Painted Turtles in Québec.



Geographic distribution of Eastern Painted Turtle (*Chrysemys picta picta*) in New Brunswick and Nova Scotia, Canada.

Source: COSEWIC. 2018. COSEWIC assessment and status report on the Midland Painted Turtle *Chrysemys picta marginata* and the Eastern Painted Turtle *Chrysemys picta picta* in Canada. Committee on the Status of Endangered Wildlife in Canada. Ottawa. xvi + 107 pp.

Habitat

Painted Turtles occupy slow moving, relatively shallow and well-vegetated wetlands (e.g., swamps, marshes, ponds, fens, bogs, and oxbows) and water bodies (e.g., lakes, rivers, creeks, and streams) with abundant basking sites and organic substrate. These turtles are found in association with submergent aquatic plants, which are used for cover and feeding. The species is semi-tolerant of human-altered landscapes and may occasionally be found occupying urban ponds and lands subject to anthropogenic disturbance (e.g., farm ponds, impoundments, water treatment facilities). Suitable nesting habitat includes open, often south-facing, and sloped areas with sandy-loamy and/or gravel substrate usually within 1200 m of aquatic active season habitats. Painted Turtles overwinter in shallow water with deep sediment.

Biology

With slow growth, late age at maturity, low juvenile survival but high post-maturity survival, long lifespan, and low annual reproductive investment, Painted Turtles exemplify the bet-hedging life history strategy consistent among turtles. Low temperatures and short growing seasons constrain annual growth of individuals in northern populations. Nest and juvenile survival are low and often highly stochastic due to predation. However, adult males and females demonstrate exceptionally high annual survivorship (97-98%), which is important for achieving high lifetime reproductive potential and maintaining population stability. The lifespan of Painted Turtles exceeds 60 years in the wild, although maximum age and maximum reproductive lifespan remain unknown. Midland Painted Turtles exhibit a generation time of 29-44 years for subpopulations in Canada, and it is likely similar for Eastern Painted Turtles. Life history data show that the Painted Turtle, like all other turtle species in Canada, is vulnerable to chronic increases in adult mortality. Mating occurs in spring and autumn, nesting in late spring and summer, and young hatch in autumn. Owing to the evolution of physiological tolerance of low temperatures and low oxygen, hatchlings are capable of overwintering on land in their natal nests, and adults may spend half the year submerged in wetlands with very low dissolved oxygen while inactive during hibernation. Despite the scope of research conducted on Painted Turtles across the species' range, there is still a great deal unknown about their basic biology, especially for Eastern Painted Turtles in Atlantic Canada.

Population Sizes and Trends

Population densities of Painted Turtles can reach high values but are also subject to considerable regional variability and some temporal fluctuation. Sex ratios are also highly variable among populations and may be influenced by differential mortality between the sexes and/or environmental conditions during egg incubation. In Canada, localized population declines have been observed, including in areas of protected habitat, though subpopulations in more remote areas are likely stable. There are insufficient historical and contemporary data across the range of Midland and Eastern Painted Turtles to evaluate subpopulation statuses and estimate sizes and trends for local, regional, and national subpopulations.

Threats and Limiting Factors

Midland and Eastern Painted Turtles are subject to a myriad of threats including, but not limited to: road mortality, habitat loss, subsidized predators, introduced plant and animal species, climate change, fisheries by-catch, pollution, disease, and collection. The many threats that reduce adult survival and recruitment destabilize the species' otherwise adaptive bet-hedging strategy. Rapid environmental changes brought on by humans undermine the long-term scale over which turtles have evolved their life history characters. Limiting factors include slow reproductive rate and low temperatures that limit reproductive success.

Protection, Status and Ranks

Painted Turtle is recognized as a species of Least Concern by the International Union for Conservation of Nature Red List and populations are considered secure across most of North America. Midland and Eastern Painted Turtles are afforded legal protection from being harassed, injured, killed, captured, maintained captive, and exported in all Canadian provinces in which they occur.

Source: COSEWIC. 2018. COSEWIC assessment and status report on the Midland Painted Turtle *Chrysemys picta marginata* and the Eastern Painted Turtle *Chrysemys picta picta* in Canada. Committee on the Status of Endangered Wildlife in Canada. Ottawa. xvi + 107 pp.

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False-foxglove Sun Moth

Photo: © Mary Gartshore



Scientific name

Pyrrhia aurantiago

Taxon

Arthropods

COSEWIC status

Endangered

Canadian range

Ontario

Reason for designation

This rare moth is extant at three locations in Canada, all within the oak-dominated savannas and open woodlands of southern Ontario. It is estimated that 99% of this habitat type has been lost in Ontario. The larvae depend on Smooth Yellow False Foxglove and Fern-leaved Yellow False Foxglove, both of which are species at risk in Canada. Canadian subpopulations of this moth are mostly in protected areas where the primary threats are over-browsing of the larval host plants by native White-tailed Deer and the effects of competition from invasive plants on the host plants.

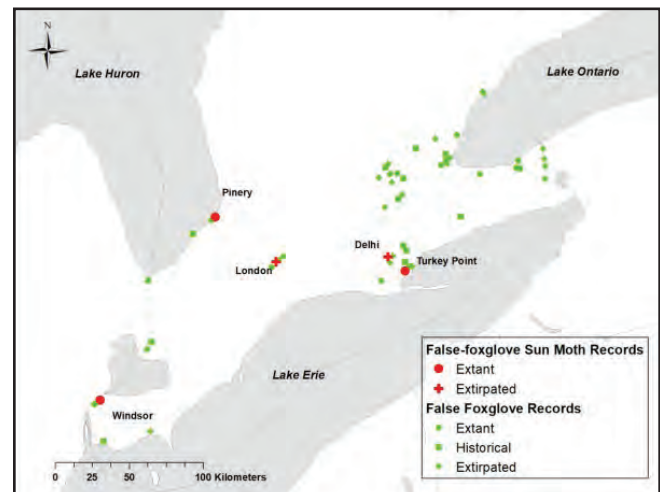
Wildlife species description and significance

False-foxglove Sun Moth is an owlet moth (family Noctuidae). Adults are approximately 30 mm long with a wingspan of 25 – 33 mm. The forewing is dark orange at the base and purple on the outer third, separated by a dark, jagged band. The hind wing is

yellowish at the base, grading into dull red or pink on the outer third. The thorax and abdomen are covered with orange hairs. Younger larvae are whitish to yellowish and unmarked. Mature larvae are an overall dark brown with paler stripes on the sides and back and blackish patches on the head.

Distribution

Globally, False-foxglove Sun Moth ranges from southern Maine, west through southern Ontario and southern Wisconsin, south to eastern Texas and central Florida. In Canada, the species ranges in southwestern Ontario from eastern Lake Erie, west to Lake Huron, and south to Windsor. There are five known subpopulations of the moth. The subpopulations in the Pinery area, at Turkey Point, and the Ojibway Prairie Complex at Windsor are considered extant and the occurrences at London and Delhi are considered extirpated.



Canadian range of False-foxglove Sun Moth

Source: COSEWIC. 2018. COSEWIC assessment and status report on the False-foxglove Sun Moth *Pyrrhia aurantiago* in Canada. Committee on the Status of Endangered Wildlife in Canada. Ottawa. x + 40 pp.

Habitat

False-foxglove Sun Moth inhabits oak-dominated savannas and open woodlands where its larval host plants, Smooth Yellow False Foxglove (*Aureolaria flava*) and Fern-leaved Yellow False Foxglove (*Aureolaria pedicularia*), co-occur. Habitats include dry sandy or loamy soils near the Great Lakes. These host plants are also species at risk in Canada.

Biology

False-foxglove Sun Moth typically has a single generation per year. In late summer, females lay eggs on the flowers of host plants and the larvae burrow into the seed capsules, and feed on the seeds until the fall. Sometime from late September to October larvae find a suitable place in the soil beneath the host plants to seek winter diapause. The larvae emerge the following spring and may feed further before pupation. Adults emerge the following summer, or may remain as pupae for two or three years before emerging. Adults are active in August and September, are nocturnal and feed on nectar.

Population Sizes and Trends

Population size and trends of False-foxglove Sun Moth are poorly understood, due mainly to the lack of specimens observed and/or collected. The species has probably declined in Canada due to the decline of both its host plants and associated habitat. About 99% of savanna habitat has been lost in southern Ontario and the species is apparently extirpated at two of the five historical sites. The number of occupied sites appears to be stable over the last 10 years.

Threats and Limiting Factors

The three extant Canadian subpopulations are within protected areas where the primary threats are over-browsing of the larval host plants by native White-tailed Deer; and ecosystem modifications from invasive plant competition and subsequent displacement of the host plants. Historically, False-foxglove Sun Moth was threatened by loss of oak savanna habitat.

Protection, Status and Ranks

All extant populations of False-foxglove Sun Moth in Canada are in provincial or municipal parks. The species is not protected under the federal *Species*

at Risk Act or Ontario's *Endangered Species Act*. The global conservation status rank for False-foxglove Sun Moth is vulnerable (G3) and the provincial conservation status rank is critically imperilled (S1) in Ontario.

Source: COSEWIC. 2018. COSEWIC assessment and status report on the False-foxglove Sun Moth *Pyrrhia aurantiago* in Canada. Committee on the Status of Endangered Wildlife in Canada. Ottawa. x + 40 pp.

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Fern-leaved Yellow False Foxglove



Photo: © Mary Gartshore

Scientific name
Aureolaria pedicularia

Taxon
Vascular Plants

COSEWIC status
Threatened

Canadian range
Ontario

Reason for designation

This perennial plant species has a distribution restricted in Canada to southwestern Ontario. There are few individuals in the five remaining locations within oak savannas and woodlands. Declines have been observed in its distribution and quality of habitat. Fire suppression and browsing by White-tailed Deer threaten the remaining extant locations.

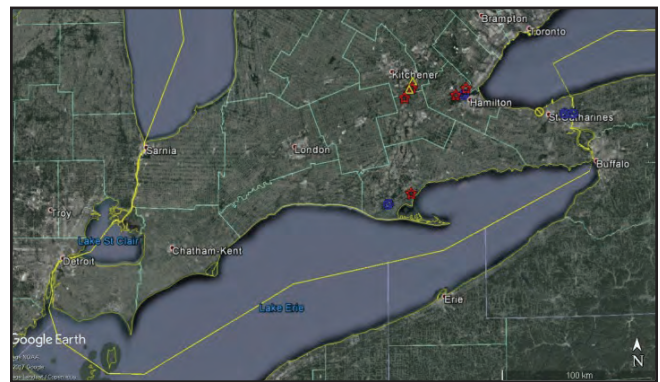
Wildlife species description and significance

The three species of Yellow False Foxglove that occur in Canada are herbaceous plants with showy yellow flowers. The Smooth Yellow False Foxglove (*Aureolaria flava*) has smooth stems whereas the stems and leaves of the Downy Yellow False Foxglove (*Aureolaria virginica*) are covered by fine downy hairs. The stems and leaves of the Fern-leaved Yellow False Foxglove (*Aureolaria pedicularia*) are covered by sticky glandular hairs. The leaves of the latter species are more dissected than the lobed leaves of the other two species. Yellow False Foxgloves are hemi-

parasites which can take up water and nutrients by attaching to the roots of oaks or other host plants.

Distribution

Yellow False Foxgloves occur only in eastern North America. A small part of the global range of the three species extends into southwestern Ontario. All three species have disappeared from many former sites. Seven subpopulations of Smooth Yellow False Foxglove persist. Six subpopulations of Fern-leaved Yellow False Foxglove were confirmed in 2016, along with five subpopulations of Downy Yellow False Foxglove.



Canadian distribution of Fern-leaved Yellow False Foxglove

Source: COSEWIC. 2018. COSEWIC assessment and status report on the Yellow False Foxglove Bundle, Smooth Yellow False Foxglove *Aureolaria flava*, Fern-leaved Yellow False Foxglove *Aureolaria pedicularia* and the Downy Yellow False Foxglove *Aureolaria virginica*, in Canada. Committee on the Status of Endangered Wildlife in Canada. Ottawa. xx + 100 pp.

Habitat

In Canada, Yellow False Foxgloves are found in dry, open to semi-open, upland oak ecosystems. Fern-leaved Yellow False Foxglove is found in open savanna and woodland habitats along with Black Oak, its preferred host tree. The other two species can persist under dappled light conditions and occur in oak woodlands and forests, typically with White Oak present. All three species are shade intolerant to varying degrees. Their hemi-parasitic behaviour provides them with a competitive advantage on drought-prone soils provided they can attach to a suitable host.

Biology

Smooth Yellow False Foxglove and Downy Yellow False Foxglove are perennial herbs that send up multiple flowering stalks each year. In contrast, Fern-leaved

Yellow False Foxglove is a short-lived species, which flowers only once, typically in its second year. All three species reproduce only from seeds. The flowers are pollinated by bumble bees and other insects. Fern-leaved Yellow False Foxglove plants can self-pollinate, whereas the other two species require pollen from other plants to set seeds.

Population Sizes and Trends

Little was known about the size of Canadian populations of Smooth Yellow False Foxglove and Fern-leaved Yellow False Foxglove prior to 2016. Downy Yellow False Foxglove was the focus of a targeted survey in 1990.

The Canadian population of Smooth Yellow False Foxglove is estimated to be between 464 and 1409 mature individuals. Over 60% of the population is found at three sites in the Ojibway Prairie Complex subpopulation. Population trend information is not available.

The Canadian population of Fern-leaved Yellow False Foxglove is estimated to be between 7602 and 11820 plants. About 85% of the population occurs in the Pinery Complex and Turkey Point Complex subpopulations. Population trend information is not available.

The Canadian population of Downy Yellow False Foxglove is very small, consisting of about 400 mature individuals in five subpopulations. Three-quarters of the population is at a site near Cambridge, Ontario where the number of plants has increased 15-fold since 1990. There have been serious declines at the other four sites.

Threats and Limiting Factors

All three species face a suite of similar threats due to their association with open to semi-open oak ecosystems. Oak ecosystems across eastern North America are in decline for a variety of reasons. Fire suppression and invasive species are threats to the persistence of Yellow False Foxgloves in Canada because they result in increased shading and competition from other species. Active habitat management, including prescribed burning and invasive plant control, is taking place at several Yellow False Foxglove sites to restore and maintain open oak ecosystems.

Moderate to severe damage to plants due to browsing by White-tailed Deer was observed at most sites during 2016 fieldwork. Deer occur at high densities in southern Ontario as their diet is supplemented by agricultural crops. Deer browsing is affecting the perennial species especially, resulting in greatly reduced seed production at most subpopulations. Residential development is a potential threat at one site supporting a substantial portion of the Fern-leaved Yellow Foxglove population. Some small subpopulations of each species are at considerable risk of extirpation as the plants are situated near heavily used recreational trails.

Protection, Status and Ranks

These species have not been previously assessed by COSEWIC and they do not have any special legal status anywhere in Canada. In the United States, some species are protected in a few states on the periphery of the species' range. All three species are considered globally secure. Downy Yellow False Foxglove has a non-legal status rank of critically imperilled in Canada and Ontario. Smooth Yellow False Foxglove and Fern-leaved Yellow False Foxglove were both ranked as imperilled in Canada and Ontario, although these rankings are flagged as tentative as recent survey information was not available at the time.

Source: COSEWIC. 2018. COSEWIC assessment and status report on the Yellow False Foxglove Bundle, Smooth Yellow False Foxglove *Aureolaria flava*, Fern-leaved Yellow False Foxglove *Aureolaria pedicularia* and the Downy Yellow False Foxglove *Aureolaria virginica*, in Canada. Committee on the Status of Endangered Wildlife in Canada. Ottawa. xx + 100 pp.

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Midland Painted Turtle

Photo: © Scott Gillingwater



Scientific name

Chrysemys picta marginata

Taxon

Reptiles

COSEWIC status

Special Concern

Canadian range

Ontario, Quebec

Reason for designation

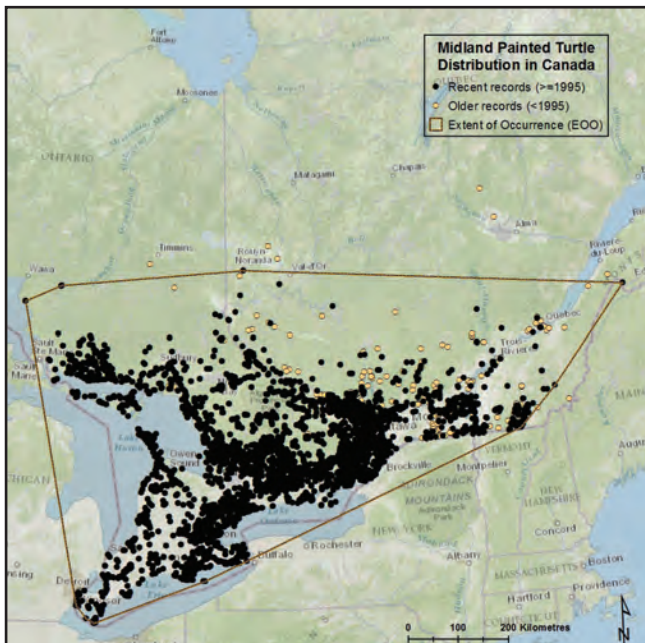
The loss of >70% of wetlands in southern Ontario over the past 200 years (<6 turtle generations) has very likely resulted in significant regional declines in both abundance and distribution of this species, although quantitative data on declines are limited. The species is subject to a suite of continuing threats, including road mortality, habitat degradation and loss, invasive species, and subsidized predators, which are unlikely to diminish in the future. The 'slow' life history of turtles, characterized by exceedingly late maturation, high adult survival, and long generation time, increases vulnerability and limits population resilience to these threats. The species may become Threatened if these threats are neither reversed nor managed with demonstrable effectiveness.

Wildlife species description and significance

Painted Turtle (*Chrysemys picta*) is a small to medium-sized freshwater turtle widespread across North America. In eastern Canada and the northeastern United States, two subspecies are recognized: Midland Painted Turtle (*C. p. marginata*) and Eastern Painted Turtle (*C. p. picta*). Painted Turtles play multiple ecological roles in aquatic ecosystems, including nutrient cycling and seed dispersal, and are of cultural importance for Aboriginal peoples of Canada. In addition, Painted Turtles have been the subject of numerous comparative life history studies and are frequently used as model organisms in experimental studies. The species' large geographic range, gregarious basking behaviour, and easily recognizable colours and patterns have made it a flagship species to naturalists, biologists, and the general public.

Distribution

Painted Turtle has one of the largest and most northerly geographic ranges of freshwater turtles of North America, largely owing to their adaptability and cold tolerance. In southern Canada, the species is found in a non-continuous (Canadian) distribution from British Columbia east to New Brunswick and Nova Scotia. Western Painted Turtle (*C. p. bellii*), the range of which extends from British Columbia to northwestern Ontario, was recently re-assessed by COSEWIC (2016). The range of Midland Painted Turtle extends from Ontario and western Québec south to the Great Lakes-Ohio Valley states. Eastern Painted Turtle is found in New Brunswick, Nova Scotia, and the Atlantic coastal states east of the Appalachian Mountains. A broad but poorly delineated zone of intergradation exists between Midland and Eastern Painted Turtles in Québec.



Geographic distribution of Painted Turtle (*Chrysemys picta*) in Ontario (*C. p. marginata*) and Québec.

Source: COSEWIC. 2018. COSEWIC assessment and status report on the Midland Painted Turtle *Chrysemys picta marginata* and the Eastern Painted Turtle *Chrysemys picta picta* in Canada. Committee on the Status of Endangered Wildlife in Canada. Ottawa. xvi + 107 pp.

Habitat

Painted Turtles occupy slow moving, relatively shallow and well-vegetated wetlands (e.g., swamps, marshes, ponds, fens, bogs, and oxbows) and water bodies (e.g., lakes, rivers, creeks, and streams) with abundant basking sites and organic substrate. These turtles are found in association with submergent aquatic plants, which are used for cover and feeding. The species is semi-tolerant of human-altered landscapes and may occasionally be found occupying urban ponds and lands subject to anthropogenic disturbance (e.g., farm ponds, impoundments, water treatment facilities). Suitable nesting habitat includes open, often south-facing, and sloped areas with sandy-loamy and/or gravel substrate usually within 1200 m of aquatic active season habitats. Painted Turtles overwinter in shallow water with deep sediment.

Biology

With slow growth, late age at maturity, low juvenile survival but high post-maturity survival, long lifespan, and low annual reproductive investment, Painted Turtles exemplify the bet-hedging life history strategy consistent among turtles. Low temperatures and short growing seasons constrain annual growth of individuals in northern populations. Nest and juvenile survival are low and often highly stochastic due to predation. However, adult males and females demonstrate exceptionally high annual survivorship (97-98%), which is important for achieving high lifetime reproductive potential and maintaining population stability. The lifespan of Painted Turtles exceeds 60 years in the wild, although maximum age and maximum reproductive lifespan remain unknown. Midland Painted Turtles exhibit a generation time of 29-44 years for subpopulations in Canada, and it is likely similar for Eastern Painted Turtles. Life history data show that the Painted Turtle, like all other turtle species in Canada, is vulnerable to chronic increases in adult mortality. Mating occurs in spring and autumn, nesting in late spring and summer, and young hatch in autumn. Owing to the evolution of physiological tolerance of low temperatures and low oxygen, hatchlings are capable of overwintering on land in their natal nests, and adults may spend half the year submerged in wetlands with very low dissolved oxygen while inactive during hibernation. Despite the scope of research conducted on Painted Turtles across the species' range, there is still a great deal unknown about their basic biology, especially for Eastern Painted Turtles in Atlantic Canada.



Photo: © Scott Gillingwater

Population Sizes and Trends

Population densities of Painted Turtles can reach high values but are also subject to considerable regional variability and some temporal fluctuation. Sex ratios are also highly variable among populations and may be influenced by differential mortality between the sexes and/or environmental conditions during egg incubation. In Canada, localized population declines have been observed, including in areas of protected habitat, though subpopulations in more remote areas are likely stable. There are insufficient historical and contemporary data across the range of Midland and Eastern Painted Turtles to evaluate subpopulation statuses and estimate sizes and trends for local, regional, and national subpopulations.

Threats and Limiting Factors

Midland and Eastern Painted Turtles are subject to a myriad of threats including, but not limited to: road mortality, habitat loss, subsidized predators, introduced plant and animal species, climate change, fisheries by-catch, pollution, disease, and collection. The many threats that reduce adult survival and recruitment destabilize the species' otherwise adaptive bet-hedging strategy. Rapid environmental changes brought on by humans undermine the long-term scale over which turtles have evolved their life history characters. Limiting factors include slow reproductive rate and low temperatures that limit reproductive success.

Protection, Status and Ranks

Painted Turtle is recognized as a species of Least Concern by the International Union for Conservation of Nature Red List and populations are considered secure across most of North America. Midland and Eastern Painted Turtles are afforded legal protection from being harassed, injured, killed, captured, maintained captive, and exported in all Canadian provinces in which they occur.

Source: COSEWIC. 2018. COSEWIC assessment and status report on the Midland Painted Turtle *Chrysemys picta marginata* and the Eastern Painted Turtle *Chrysemys picta picta* in Canada. Committee on the Status of Endangered Wildlife in Canada. Ottawa. xvi + 107 pp.

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Olive-sided Flycatcher

Photo: © John D. Reynolds



Scientific name
Contopus cooperi

Taxon
Birds

COSEWIC status
Special Concern

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

Reason for designation

The Canadian population of this widespread forest songbird has experienced a substantial long-term decline, although the rate of decrease has slowed over the past decade. Loss of wintering habitat in northern South America is likely the greatest threat facing this aerial insectivore, but the species may also be affected by changes on the breeding grounds such as the effects of altered fire regimes and changing climates on nesting habitat quality, and reductions in the abundance and availability of aerial insect prey. Concerns for the species remain, as most of these threats are continuing, and those related to climate change may increase.

Wildlife species description and significance

Olive-sided Flycatcher (*Contopus cooperi*) is a medium-sized songbird, 18-20 cm in length. Adults are a deep brownish-olive above, with whitish

extending from the throat, centre of breast and belly to the undertail coverts, contrasting sharply with the dark flanks and sides of the breast to appear vested. White tufts are also often visible above the wings on each side of the rump. The wings are dark with indistinct pale wing bars, and the bill is stout. Olive-sided Flycatchers tend to perch conspicuously atop tall trees or snags while foraging, giving their distinctive song—a loud three-note whistle: *Quick, THREE BEERS!*

Distribution

Olive-sided Flycatcher is a widespread migratory species, with 53% of its breeding range across most of forested Canada, and the remainder in the western and northeastern United States. The winter distribution is concentrated in northern South America, particularly in the Northern Andes Mountains in Colombia, Ecuador, and Peru, but also in western Brazil, Venezuela, and Bolivia. It is occasionally found wintering in other highland areas from Mexico through Central America, including parts of Guatemala, Belize, Honduras, and Costa Rica.



Global range of Olive-sided Flycatcher

Source: Altman and Sallabanks 2012; Partners In Flight Science Committee 2013a; Haché et al. 2014

Habitat

Olive-sided Flycatcher is most often associated with edges of coniferous or mixed forests with tall trees or snags for perching, alongside open areas, or in burned forest with standing trees and snags. In natural conditions, these habitats may include open to semi-open mature forest stands, as well as mature stands with edges near wet areas (such as rivers, muskeg, bogs or swamps), burned forest, openings created by insect outbreaks, barrens, or other gaps. The species

also uses forest stands adjacent to human-created openings (such as clearcuts, thinned stands, and prescribed burns). There is some limited evidence that birds nesting in and near harvested habitats experience lower breeding success than those nesting adjacent to natural (e.g., burned) openings. In the Rocky Mountains and westward, Olive-sided Flycatcher occurs in sparsely vegetated forests from sea level to 2250 m in proximity to wetland edge, whereas farther east, it is most frequently found near wetland areas or in recent burns.

Biology

Olive-sided Flycatcher is an aerial insectivore, generally making short foraging flights from a high perch to intercept flying insects. The egg and nestling stages in Canada can last from late May/mid-June to early/mid-August, depending on latitude. Olive-sided Flycatchers arrive on their Canadian breeding grounds between April and June, but predominantly around mid-May. They are socially monogamous, with large territories of 10-20 ha. Nests are typically built in coniferous trees. Average clutch size is three eggs, and a single brood is raised. Nest success ranges from 30 to 65%, differing by region and habitat type. Renesting is common if the first clutch fails. Olive-sided Flycatchers have been known to live for at least 7 years. Fall migration begins in late July, with most birds departing for the wintering grounds between mid-August and early September.

Population Sizes and Trends

Breeding Bird Survey (BBS) data indicate declines for Olive-sided Flycatcher in Canada, which are not significant in the short term (2.1% mean annual decline for the period 2006-2016, equating to a cumulative decline of 19%), but are significant in the long term (2.8% mean annual decline for the period 1989-2016, and a cumulative decline of 72% since 1970). Both short and long-term declines have been greatest in New Brunswick, British Columbia, Manitoba, and Yukon. Data from another large dataset (Boreal Avian Modelling Project) do not provide evidence of decline between 1997 and 2013.

Some migration monitoring stations report declining trends, though data are scarce. In the U.S. portion of the breeding range, there is evidence of northward range retractions in California, New Hampshire, and New York. Overall, evidence suggests that declines have continued over the past decade, though on average at a somewhat lower rate than previously.

Threats and Limiting Factors

Forest loss on the wintering grounds in Central and South America may be the most significant factor driving population declines. Insectivorous birds as a group have been experiencing declines, likely associated with widespread insect declines, pesticide use (particularly neonicotinoids), and changes in prey availability during the breeding season as a possible result of climate change. Habitat loss or degradation is likely affecting this species on both the breeding and wintering grounds. On the breeding grounds, this occurs through forest harvesting, anthropogenic disturbance such as development and service corridors, and changes in fire regimes associated with climate change and direct human intervention (fire suppression), all of which may reduce habitat quality and affect nest success.

Protection, Status, and Ranks

Olive-sided Flycatcher is classified as G4 (Apparently Secure) globally and in the United States, and N3 (Vulnerable) in Canada by NatureServe. Provincial and territorial breeding season rankings (except Nunavut, where it was not assessed) range from S1S3 to S4 (Critically Imperilled to Apparently Secure). All regional rankings have changed to be less secure since the last COSEWIC assessment in 2007. The IUCN Red List classified this species as Near Threatened in 2012 and again in 2016. Olive-sided Flycatcher is protected in Canada by the *Species at Risk Act* (2002), where it is listed as Threatened under Schedule 1. It is also listed on provincial species at risk legislation in New Brunswick, Nova Scotia, and Newfoundland and Labrador. It is protected in Canada under the *Migratory Birds Convention Act* (1994) and by similar legislation in the United States and Mexico.

Source: COSEWIC. 2018. COSEWIC assessment and status report on the Olive-sided Flycatcher *Contopus cooperi* in Canada. Committee on the Status of Endangered Wildlife in Canada. Ottawa. ix + 52 pp.

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Peregrine Falcon *anatum/tundrius*

Photo: © Gordon Court



Scientific name

Falco peregrinus anatum/tundrius

Taxon

Birds

COSEWIC status

Not at Risk

Canadian range

Yukon, Northern Territories, Nunavut, British Columbia, Alberta, Saskatchewan, Manitoba, Ontario, Quebec, New Brunswick, Nova Scotia, Newfoundland and Labrador

Reason for designation

Following dramatic declines in the mid-20th century, this species has rebounded significantly over the past few decades, with continued moderate to strong increases in many parts of Canada since the last status report in 2007. The initial recovery was a result of reintroductions across much of southern Canada following the ban of organochlorine pesticides (e.g., DDT). Increasingly, the ongoing population growth is a function of healthy productivity and, in the case of urban-nesting pairs, exploitation of previously unoccupied habitat. While pollutants continue to be used on the wintering grounds of some individuals, and can be found in tissue samples, they appear to be at levels that are not affecting reproductive success at the population level. The extent to which populations have recovered relative to historical levels is generally unknown, but the consistent strong growth of the overall population suggests that there are currently no significant threats to the species.

Wildlife species description and significance

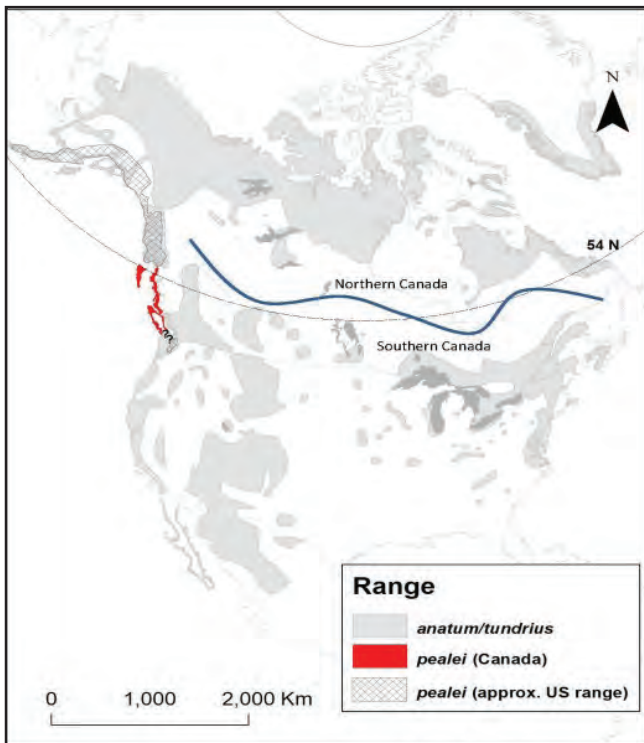
The Peregrine Falcon is a crow-sized raptor with long, pointed wings. Sexes are best distinguished by size, with females being on average 15-20% longer and 40-50% heavier than males. Adults have bluish-grey or darker upperparts, and pale underparts with variable amounts of dark spotting and barring. Immatures have upperparts that vary from pale to slate or chocolate brown, and underparts that are buffy with blackish streaks. A dark malar stripe extends from the eye across the cheek, and is generally wider on adults.

Nineteen subspecies of Peregrine Falcon are recognized globally, three of which occur in North America. The *pealei* subspecies is darker overall and is the largest, on average, in North America. The *anatum* and *tundrius* subspecies cannot be distinguished genetically, and are considered as a single entity for the purpose of this status report. Within the *anatum/tundrius* complex, northern birds are typically paler and smaller, while more southern birds tend to have orange to brownish tinges to their underparts.

The Peregrine Falcon became an important symbol of environmental degradation due to its dramatic declines in abundance in the middle of the 20th century, and its recovery has been heralded as a conservation success story. It is one of the more desired falconry species globally.

Distribution

The Peregrine Falcon is one of the world's most widely distributed bird species, occurring on every continent except Antarctica. The *pealei* subspecies is restricted to the western coast of North America, and in Canada it is limited to the marine coasts of British Columbia from northwestern Vancouver Island to the Alaska panhandle, with the majority occurring on Haida Gwaii (formerly known as the Queen Charlotte Islands). The *anatum/tundrius* Peregrine Falcon is widely distributed across Canada, breeding in every jurisdiction except Prince Edward Island, but its distribution in southern Canada is discontinuous. It occurs in southern parts of British Columbia and the Prairie Provinces, and across eastern Canada from the Great Lakes Basin to the Bay of Fundy, but does not breed on the island of Newfoundland. Arctic-nesting Peregrine Falcons breed from the Beaufort Sea coast of the Yukon east to Labrador and north to Baffin Island.



Canadian and North American breeding distribution of the Peregrine Falcon.

Source: COSEWIC. 2017. COSEWIC assessment and status report on the Peregrine Falcon *Falco peregrinus* (*pealei* subspecies – *Falco peregrinus pealei* and *anatum/tundrius* – *Falco peregrinus anatum/tundrius*) in Canada. Committee on the Status of Endangered Wildlife in Canada. Ottawa. xviii + 108 pp.

Habitat

The Peregrine Falcon breeds in a wide variety of habitats, including tundra, coastal islands, desert canyons, and major metropolitan centres. Higher densities are often found in Arctic and coastal habitats. Although its diet is flexible, it breeds only where there is access to sufficient food supplies. The most commonly used habitats contain cliffs or buildings for nesting and open landscapes for foraging, with large rivers or lakes typically present nearby. Breeding sites may have a linear distribution, following rivers or coastlines. Nest sites of *pealei* Peregrine Falcons are usually on island cliffs. The *anatum/tundrius* Peregrine Falcons in northern Canada nest primarily on cliffs along large river systems. Urban habitats have become increasingly used by Peregrine Falcons in southern Canada in recent decades, with buildings, bridges and other structures being used as nest sites. The proportion of

individuals nesting on cliffs versus urban habitats varies substantially across Canada. Alternate nest sites, which are not used every year, are often located within a nesting territory.

Peregrine Falcons often migrate along coasts, which provide prime hunting habitat because they coincide with the migration routes of preferred prey species, but some migrate through the interior. Peregrine Falcon wintering habitat varies widely, but typically contains aquatic and wetland habitats, and can also include urban areas. Northern-nesting *anatum/tundrius* birds generally migrate the farthest, to Central and South America, while more southern-nesting birds may not migrate as far and some even overwinter on their nesting territories. Many *pealei* Peregrine Falcons winter on or close to their nesting territories.

Biology

Peregrine Falcons maintain a nesting territory, although in areas with abundant prey, nest sites can be close together. Adults typically return to previously used nest sites, and those with high productivity are often occupied throughout successive generations. Breeding typically begins at 2-3 years of age, typically one year younger for females than males. The nest is a simple scrape on a nest ledge, usually a cliff or building, and occasionally in a stick nest of another bird. Peregrine Falcons typically lay 3-4 eggs, and incubation averages 32-35 days. The young usually begin to take flight around 40 days after hatching, with males typically fledging earlier than females. Both adults incubate, with the female usually doing more of the incubation. Nest productivity varies considerably, both annually and regionally, and is heavily influenced by individual condition, severe weather events, and prey availability. Productivity among *pealei* Peregrine Falcons averages 1.9 young fledged per territorial pair. For *anatum/tundrius* Peregrine Falcons in southern Canada it has ranged between 1.5-1.9 young/territorial pair since 1995, while in northern Canada it has consistently remained at or below 1.5. Peregrine Falcons typically prey upon small to medium-sized birds that are hunted in the air, although they can pursue a wide range of prey, including rodents in the Arctic.

Photo: © Gordon Court



Population Sizes and Trends

The Canadian *pealei* Peregrine Falcon nesting population is presently considered to be stable to slightly increasing, with the recent total of 119 occupied nests documented in 2015 being a record high, although the trend may in part reflect increasing survey effort over time. Overall, the population is estimated at 250-1000 mature individuals.

There are 300 known pairs of *anatum/tundrius* Peregrine Falcons in southern Canada, an area with good survey coverage, and the total population for the region is estimated at approximately 1000 mature individuals. In northern Canada, a minimum of 479 known nesting sites¹ have been identified within regularly surveyed study areas, and the population for these surveyed areas is estimated at 1,500 mature individuals. However, the vast majority of the Arctic region is not surveyed and the total population is undoubtedly much larger. The total post-breeding population of northern North America (Canada, Alaska, and Greenland) in 2000, based upon mark-recapture studies of hatching-year birds, was estimated to represent more than 60,000 mature individuals. Based upon this estimate and subsequent rates of population growth, the Peregrine Falcon population in northern Canada is conservatively estimated to be at least 35,000 mature individuals.

¹ Based upon the number of observed nesting sites in the 2010 survey, supplemented by higher counts for regions also surveyed in 2015 and the highest recent count for regions not surveyed in 2010.

Although the historical population size was not well documented, given the remoteness of most nest sites, there was an evident dramatic decline in Peregrine Falcon numbers in the middle of the 20th century because of widespread contamination by DDT (dichlorodiphenyltrichloroethane), which resulted in impaired reproduction through thinning of eggshells. The *pealei* Peregrine Falcon population has been gradually increasing over the past several decades at an estimated rate of almost +2% per year. The most recent estimates of population growth over a 20-year period for southern Canada *anatum/tundrius* subpopulations range from +50% in Saskatchewan to +3233% in Ontario. Although generally increasing, northern-nesting *anatum/tundrius* Peregrine Falcon subpopulations have shown more variability across jurisdictions and years. From 1990-2010, the number of occupied territories in five regularly surveyed areas of northern Canada increased by an average of 1.3% per year, with a range over 20 years from -5% in Labrador to 100% in Nunavut.

Threats and Limiting Factors

The Peregrine Falcon remains potentially vulnerable to threats including toxic chemicals, heavy metal contamination, and severe weather effects associated with climate change. However, climate change may also have some positive effects, such as an extended nesting season for High Arctic subpopulations. Regulated harvest levels for falconry purposes appear to be sufficiently low to avoid population impacts. Overall, no substantial threats are currently apparent for *anatum/tundrius*, as reflected by the steady increase in numbers across most of Canada. Given its reliance on seabirds, the *pealei* subspecies remains vulnerable to oil spills and other pollution that may affect these prey, as well as other natural system modifications that could result in seabird declines.

Protection, Status and Ranks

Peregrine Falcon *anatum/tundrius* was assessed by COSEWIC as Special Concern in April 2007 and reassessed as Not at Risk in November 2017. The *pealei* subspecies was assessed as Special Concern in April 2007 and November 2017. The *anatum/tundrius* and the *pealei* subspecies of the Peregrine Falcon are both listed as Special Concern under Schedule 1 of the federal *Species at Risk Act*.

Peregrine Falcon is currently listed under Appendix 1 of the Convention on International Trade in Endangered Species of Flora and Fauna. In addition to the national management plan, a number of provinces and national parks have management plans or recovery strategies for the Peregrine Falcon.

Source: COSEWIC. 2017. COSEWIC assessment and status report on the Peregrine Falcon *Falco peregrinus* (*pealei* subspecies – *Falco peregrinus pealei* and *anatum/tundrius* – *Falco peregrinus anatum/tundrius*) in Canada. Committee on the Status of Endangered Wildlife in Canada. Ottawa. xviii + 108 pp.

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Prairie Skink

Photo: © Neil Craig Gushulak



Scientific name

Plestiodon septentrionalis

Taxon

Reptiles

COSEWIC status

Special Concern

Canadian range

Manitoba

Reason for designation

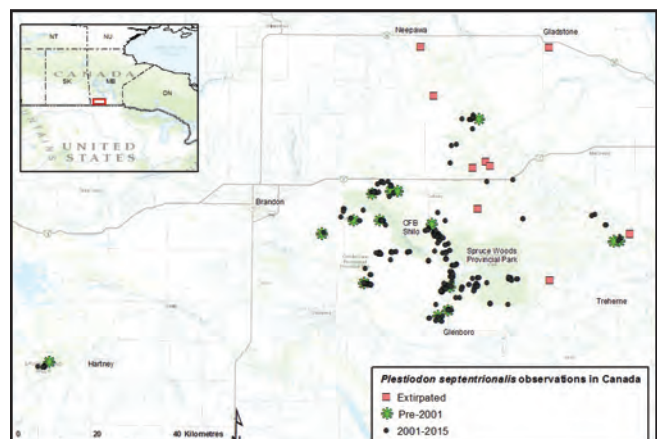
The Canadian distribution of this species is restricted to a small area of mixed-grass prairie on sandy soils in Manitoba and is isolated from the rest of the species' range in the USA by over 100 km. Its prairie habitat has been historically lost and fragmented mainly due to agricultural activities. Aspen succession and invasion by exotic plants continue to degrade remaining habitats. Several new localities have been discovered within the known range since the last assessment as a result of increased survey efforts, and habitat management is ongoing within portions of the skink's range on federal and provincial lands. Change in status from the previous assessment results from a different interpretation of status assessment criteria by COSEWIC. While the species is deemed to no longer be at risk of imminent extinction, it could become Threatened if factors affecting it are unmitigated.

Wildlife species description and significance

Prairie Skink is a small, slender lizard with body (snout-vent) length up to 85 mm; the tail can be approximately as long as the body. Prairie Skink is brown with four light stripes along the length of the body and extending onto the tail. Males have reddish orange colouration on the head and throat during the breeding season, and juveniles have bright blue tails. There are three subspecies, but only Northern Prairie Skink occurs in Canada. Northern Prairie Skink's complete association with the mixed-grass prairie sandhill ecosystems of southwestern Manitoba make it an indicator of this rare landform.

Distribution

Globally, Prairie Skink occurs in a narrow band from southern Manitoba south to coastal Texas with the distribution of the Northern Prairie Skink subspecies extending south to Kansas. In Canada, its distribution is limited to a small area of southwestern Manitoba in the Brandon and Lauder sandhills. It is disjunct from populations in the United States, separated by approximately 125 km.



Canadian range of Prairie Skink within the Brandon Sandhills (east) and Lauder Sandhills (southwest) in southwest Manitoba.

Source: COSEWIC. 2017. COSEWIC assessment and status report on the Prairie Skink *Plestiodon septentrionalis* in Canada. Committee on the Status of Endangered Wildlife in Canada. Ottawa. xiii + 48 pp.

Habitat

Prairie Skink is associated with mixed-grass prairies and savannas and limited to areas with sandy soils. The skinks require heterogeneous habitat structure for foraging and nesting. Such habitats provide a range of temperatures for thermoregulation, gestation and incubation, and for shelter from predators. The skinks preferentially select warm micro-sites with cover objects and leaf litter. In Manitoba, the skinks occur in mixed-grass prairie with patches of grasses/shrubs or open areas near forest edges. They also use edges of deciduous and mixed-wood forest and have been documented to move through these forest types.

Biology

Prairie Skinks spend over seven months of the year (September – April) in hibernation. They burrow beneath the frost line in sandy soils for overwintering. In Manitoba, they become active in mid- to late April and breed in spring. Home ranges are fairly small (typically <100 m in greatest dimension). Females lay a clutch of 1 – 18 eggs (~5 eggs on average) from late June to early July and remain with the eggs until hatching in late July or early August. The young reach sexual maturity at 1 – 3 years and can live up to approximately seven years of age. The generation time is thought to be 3 – 5 years.

Prairie Skinks are prey for a variety of birds, mammals, and snakes. If captured by a predator, they can detach their tail as a defence mechanism. The severed tail can twitch and move for over 15 minutes, giving the skink time to escape. Prairie Skinks feed on a variety of invertebrates, with crickets and spiders being common food items.

Population Sizes and Trends

Estimating the size of the Canadian population is challenging because the full extent of the species' distribution is incompletely known, the distribution is patchy, and densities vary greatly among sites and years. Extrapolation from density estimates from mark-recapture studies suggests that the population probably consists of at least 10,000 adults with ~98% of the population in the Brandon Sandhills and the remainder in the Lauder Sandhills. Limited information suggests that declines might have

occurred at monitored sites in the Brandon Sandhills between 1989 and 2007, but broad scale population trends within the past three generations are unknown. Approximately 28% of the species' Canadian distribution and 20% of the proposed Critical Habitat under the Species at Risk Act are located within CFB Shilo, where the skinks are currently afforded protection from habitat modification and military training activities. As the species is conservation dependent and requires active habitat management over a significant proportion of its small Canadian range and the main threats to mixed-grass prairie habitat persist, the population could decline if the current level of protection is not maintained and threats across its distribution are not adequately mitigated.

Threats and Limiting Factors

Prairie Skinks are at the northern limits of their distribution in southern Manitoba and are habitat specialists, increasing their inherent vulnerability to perturbations. The major threats to Prairie Skinks are habitat degradation from invasive plants and vegetation succession of prairie to forest due to fire suppression, and residential development. Roads, railroads, utility and service lines, all-terrain-vehicle trails, grazing, military exercises, and predation by domestic cats may also be threats at some sites. The impact of chemicals applied to crops adjacent to skink habitat and the effect of climate change on skink populations are potential threats but with unknown impacts. Cultivation has destroyed significant amounts of skink habitat in the past, but this threat to new areas has mostly ceased.

Protection, Status and Ranks

In Canada, Prairie Skink is listed federally as Endangered and is in Schedule 1 under the *Species at Risk Act*. In Manitoba, the species is also listed as Endangered under the provincial *Endangered Species and Ecosystems Act*. A recovery strategy has been proposed as part of national-level planning in Canada. Provincially, a draft Manitoba provincial action plan and recovery strategy have been prepared. Globally, the Prairie Skink's IUCN status is Least Concern.

A significant portion of suitable Prairie Skink habitat occurs on protected lands in Canadian Forces Base Shilo (28%) and Spruce Woods Provincial Park (13%). However, while the land in these areas may be protected from development, threats from invasive plants, vegetation succession, and soil compaction still exist.

Source: COSEWIC. 2017. COSEWIC assessment and status report on the Prairie Skink *Plestiodon septentrionalis* in Canada. Committee on the Status of Endangered Wildlife in Canada. Ottawa. xiii + 48 pp.

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Quebec Rockcress

Photo: © Norman Dignard



Scientific name

Boechea quebecensis

Taxon

Vascular Plants

COSEWIC status

Endangered

Canadian range

Quebec

Reason for designation

This plant is endemic to Canada and restricted to limestone cliffs and escarpments of the Gaspé Peninsula in eastern Quebec. There are few individuals located in a small number of scattered sites. It is threatened by rock-climbers, and its growth on unstable rocks makes it vulnerable to rock-fall events.

Wildlife species description and significance

Quebec Rockcress is an herbaceous biennial or short-lived perennial that grows 10–45 cm tall. The inflorescence comprises 11 to 41 flowers with lavender to greenish sepals and white petals arranged on a single side of the stem.

Quebec Rockcress is endemic to Canada and occurs only in eastern Quebec. The Bic and Forillon areas are known for their unique flora thought to have evolved and persisted through the last glaciation. Quebec Rockcress is a good example of this unique flora.

Distribution

Quebec Rockcress occurs only on the limestone cliffs and escarpments of eastern Quebec. There are eight known subpopulations of the species, but two of these are historical and one is considered extirpated, leaving five extant subpopulations.



Global range of Quebec Rockcress.

Source: COSEWIC. 2017. COSEWIC assessment and status report on the Quebec Rockcress *Boechea quebecensis* in Canada. Committee on the Status of Endangered Wildlife in Canada. Ottawa. x + 32 pp.

Habitat

Quebec Rockcress is a calciphile that occurs on limestone cliffs and escarpments. Subpopulations generally occur in protected concave depressions at the base of slopes that partially prevent light rain from reaching the ground. Only the smallest subpopulations are exposed on the limestone, which detaches from the escarpment in small chunks. The species seems to prefer dry, sunny conditions, but it is also known to occur in cavities at the base of escarpments, which are more shaded.

Biology

Quebec Rockcress is a biennial or perennial of hybrid origin with the putative parents being Holboell's Rockcress, a species not known at present from Canada, and Drummond's Rockcress.

Its small extent of occurrence could be attributable to its limited dispersal ability. The species reproduces mainly by apomixis (seed production without fertilization). Seed dispersal is considered limited because it lacks any obvious adaptations promoting long-distance dispersal. No herbivory of Quebec Rockcress or its seeds has been observed.

Population Sizes and Trends

In 2015, 317 mature Quebec Rockcress individuals were present in Canada. Available evidence does not suggest significant change in the overall population in Canada over the past 10 years. The number of mature individuals observed shows some evidence of declines from that observed in the early 2000s but the different counting methods used preclude direct comparison.

Threats and Limiting Factors

The most significant threat to Quebec Rockcress is rock climbing. Most Quebec Rockcress habitat is isolated from anthropogenic threats, but its extremely limited range makes it vulnerable to stochastic environmental events. The rock faces where Quebec Rockcress occurs are friable (easily crumbling) and such events can quickly lead to the disappearance of the micro-habitats in which the species is currently found. Climate change is a potential threat to the species, through promoting the expansion of forest cover in Arctic-alpine regions.

Protection, Status and Ranks

Quebec Rockcress was designated with the provincial status of threatened in Quebec in January 2012. This designation makes it illegal to possess any specimen of the plant or any of its parts, including its progeny, outside its natural environment, or harvest, exploit, mutilate, destroy, acquire, transfer, offer to transfer, or genetically manipulate it. The species receives no specific protection under federal legislation. It has been assigned global, national and subnational conservation status ranks of “critically imperilled” (G1, N1, and S1, respectively).

The habitat of one extant, one extirpated, and two historical subpopulations of Quebec Rockcress are currently protected. The Mont Saint-Alban subpopulation is located in Forillon National Park. The historical subpopulation (Anse à Doucet) and the extirpated subpopulation (Îlet du Quai) are

located within the boundaries of Bic National Park, and the historical subpopulation of Cap Bon-Ami is located in Forillon National Park. The Lac de la Falaise subpopulation is located in an exceptional forest ecosystem known as “forêt refuge du Lac-de-la-Falaise”, which is protected from forest harvesting. Although it is public land, it is not listed in Quebec’s Register of Protected Areas. The other subpopulations are located on private lands.

Source: COSEWIC. 2017. COSEWIC assessment and status report on the Quebec Rockcress *Boechea quebecensis* in Canada. Committee on the Status of Endangered Wildlife in Canada. Ottawa. x + 32 pp.

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Red-headed Woodpecker

Photo: © U.S. Fish & Wildlife Service – SARFB



Scientific name

Melanerpes erythrocephalus

Taxon

Birds

COSEWIC status

Endangered

Canadian range

Saskatchewan, Manitoba, Ontario, Quebec

Reason for designation

This boldly-patterned woodpecker, which inhabits open deciduous forests, has experienced a substantial long-term population reduction. This decline is associated primarily with reduced quality of breeding habitat, particularly the loss of standing dead trees needed for nesting, fly-catching, and food caching. Other threats include increased competition for nest sites from native and non-native bird species. The Canadian population is now likely less than 6,000 mature individuals, almost all in Manitoba and Ontario. It appears to not be self-sustaining, and ongoing declines may accelerate given that numbers are also decreasing in adjacent parts of the U.S. range.

Wildlife species description and significance

Red-headed Woodpecker is a medium-sized bird, approximately 20 cm long. It is easily recognized by its crimson head, neck, throat, and upper breast,

which contrast with its stark white and black upperparts. In flight, large white patches are visible on the wings, formed by the inner secondaries and tertial feathers. Red-headed Woodpecker is sexually monomorphic, with males and females externally indistinguishable. Juvenile birds are recognizable by the lack of uniform colouration on their head, neck, throat and upper breast, which ranges from brownish-grey to mottled crimson.

Red-headed Woodpecker plays an important ecological role within deciduous forest ecosystems across its range. As a primary excavator, it creates numerous nest holes, many of which may later be used by other species, including secondary cavity-nesting birds, mammals, insects, and amphibians. Cavity creation also plays a role in the deterioration of standing dead wood to fallen dead wood, an important part of the forest ecosystem cycle. In addition, because of the species' dependence on mast crops, it is significant in maintaining the deciduous forest ecosystems of eastern North America by dispersing large quantities of acorns and bechnuts during feeding and caching.

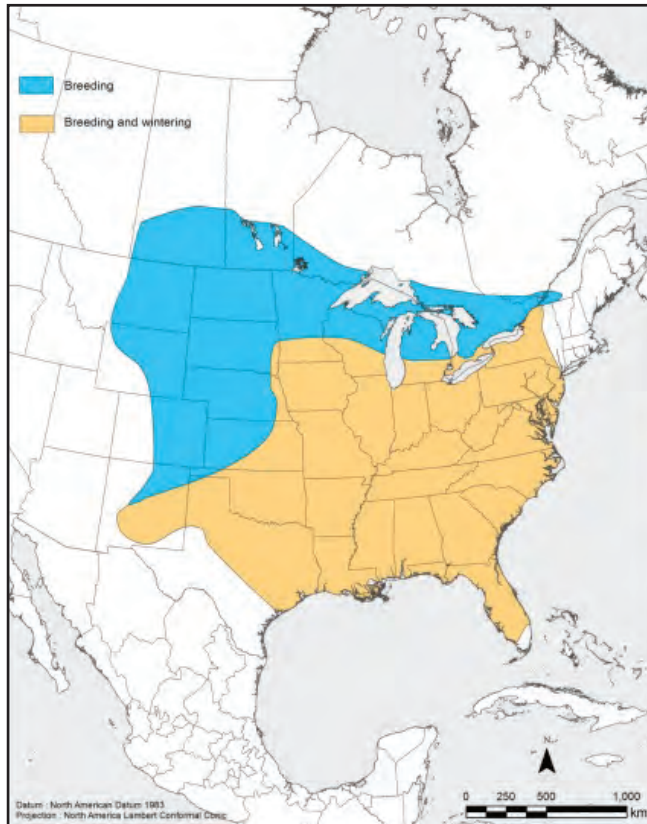


Photo: © Corel Corporation – SARFB

Distribution

Red-headed Woodpecker occurs only in North America. In Canada, its range is primarily in southern Manitoba and southern Ontario, with small numbers extending into Saskatchewan and southern Québec. In the United States, the species ranges from New England to the Great Plains, and south to Florida and

the Gulf states. Partially migratory, Red-headed Woodpeckers typically withdraw from the northern part of their range to winter in the United States, although yearly dynamics fluctuate widely and may be influenced by the abundance of hard mast.



Range of Red-headed Woodpecker in North America

Source: COSEWIC. 2018. COSEWIC assessment and status report on the Red-headed Woodpecker *Melanerpes erythrocephalus* in Canada. Committee on the Status of Endangered Wildlife in Canada. Ottawa. xii + 60 pp.

Habitat

Red-headed Woodpecker can be found in a variety of treed habitats, including deciduous woodlands, open woodlots, parks, golf courses, cemeteries, treed agricultural and urban areas, savannah-like grasslands with scattered trees, riparian forests, wetlands, beaver ponds, burned areas, and along forest edges and roadsides. During the breeding period, dead limbs or snags are required for nesting, and an open canopy is preferred.

Biology

Red-headed Woodpecker is a monogamous species, with rare occurrences of cooperative breeding reported. The nesting period of Red-headed Woodpecker begins around the second week of May and extends to around the third week of August. Clutch size range from 3 to 10 eggs, but is typically 4 to 7. Incubation lasts 12-14 days, and fledglings remain in the nest for 24-27 days. Red-headed Woodpecker is an omnivorous generalist; its diet includes seeds, nuts, berries, fruit, insects, invertebrates, and even eggs and nestlings of other birds. It is also an expert flycatcher, and spends much of its foraging time in summer capturing insects on the wing. It is one of only four woodpecker species worldwide that commonly caches food items, and the only woodpecker known to cover stored food.

Population Sizes and Trends

The current Canadian population estimate of Red-headed Woodpecker based on Breeding Bird Survey (BBS) data is 6000 mature individuals, or approximately 3000 pairs. However, provincial Breeding Bird Atlas (BBA) estimates from Ontario, Manitoba, and Québec (data for Saskatchewan are lacking but likely negligible) collectively suggest a lower estimate of approximately 4000 to 4500 mature individuals for Canada, and are considered more likely to be accurate for this species than BBS data.

The BBS shows a significant long-term annual rate of decline of -1.88% per year (95% credible interval [CI]: -3.91, -0.16) between 1970 and 2016 for Red-headed Woodpecker in Canada, amounting to -58.2% in total (95% CI: -84.0, -7.0). Declines have been steepest in Ontario, with a significant decline of -3.42% per year (95% CI: -5.00, -1.42) between 1970 and 2016, or -79.8% in total (95% CI: -90.6, -48.1). Over the most recent three-generation period (2004-2016), the trend for Canada is -1.44% per year (95% CI: -6.19, 3.50). However, the wide confidence interval highlights the substantial variability from year to year, and the average annual rate of decline over the past three generations has remained close to the long-term estimate, which corresponds to a decline of 20% over three generations (12 years).

Threats and Limiting Factors

The main threats to Red-headed Woodpecker are habitat degradation and ecosystem modifications, particularly the loss of standing dead wood critical for nesting, flycatching, and food caching. This is primarily due to suppression of disturbances that may lead to the creation of standing dead wood such as fire, dead wood removal for aesthetic reasons, or through harvesting activities, and other human-driven modifications to the ecosystem that reduce standing dead wood. The species faces other threats, including interference competition for nest sites with European Starlings (*Sturnus vulgaris*), loss of American Beech trees (*Fagus grandifolia*) as a result of Beech Bark Disease, habitat degradation due to agricultural intensification or changes to agricultural management, mortality from collisions with structures or motor vehicles, and possible chemical exposure. Red-headed Woodpecker may also have limited ability to recover from population declines due to low fecundity, and the ephemeral nature of highly decayed dead wood that the species requires as a weak primary cavity nester. Strongly negative population trends in many adjacent states suggest that the potential for rescue from the United States is declining.

Protection, Status and Ranks

Red-headed Woodpecker is protected in Canada under the Migratory Birds Convention Act and Species at Risk Act (listed as Threatened), and provincially under Québec's *Loi sur les espèces menacées ou vulnérables* (listed as Threatened), Ontario's *Endangered Species Act, 2007* (listed as Special Concern), and Manitoba's *Endangered Species and Ecosystems Act* (listed as Threatened). Red-headed Woodpecker is not federally listed under the US *Endangered Species Act*, but is listed by six states and protected under the *Migratory Bird Treaty Act*. It is also recognized as being at risk on several non-legal status rankings across its range, including as Near Threatened on the IUCN Red List, as a common species in steep decline on the Partners in Flight species assessment database, and as a "D" Yellow Watch List species in the Partners in Flight 2016 Landbird Conservation Plan Revision. In

Canada, the vast majority of suitable Red-headed Woodpecker habitat is under private ownership, with limited habitat protected in publicly, federally, or provincially owned and managed parks. Some Red-headed Woodpeckers are found in Important Bird Areas, particularly in Manitoba.

Source: COSEWIC. 2018. COSEWIC assessment and status report on the Red-headed Woodpecker *Melanerpes erythrocephalus* in Canada. Committee on the Status of Endangered Wildlife in Canada. Ottawa. xii + 60 pp.

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Red-tailed Leafhopper - Great Lakes Plains Population

Photo: © BOLD SYSTEMS



Scientific name
Aflexia rubranura

Taxon
Arthropods

COSEWIC status
Special Concern

Canadian range
Ontario

Reason for designation

This is a flightless species with limited dispersal ability, restricted to remnant grassland and savanna alvar habitats on Manitoulin and adjacent islands, Ontario. The species' only known host plant, Prairie Dropseed, has a wider distribution but is also rare. The species is known from a small number of sites threatened from ongoing aggregate extraction, fire and fire suppression, livestock grazing, and recreational use.

Wildlife species description and significance

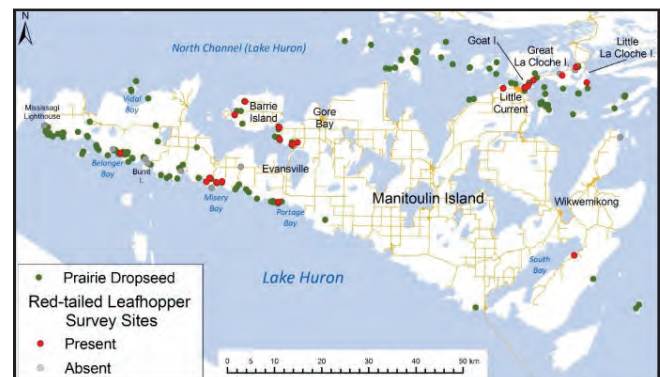
Red-tailed Leafhopper is a small (3 – 4 mm length) member of the leafhopper family, Cicadellidae (Order Hemiptera). They are predominately tan-coloured, with distinctive black transverse bars and spots on the head and thorax. The species is aptly named for the prominent red segment at the tip of the abdomen on adult males. Males and most females have shortened and non-functional wings, although occasionally some females develop longer wings and

may (but are not known to) fly. It is unknown how often females may develop longer wings, what proportion of a subpopulation they may represent or what environmental factors may trigger such growth. Nymphs are smaller, wingless and have a similar body form with an unmarked yellow back and a brown underside. The eggs have not been described.

Red-tailed Leafhopper is the only member of its genus *Aflexia* which is globally imperilled. The species is restricted to relict prairie, savanna, and alvar habitats which are also imperilled ecosystems in Canada.

Distribution

In Canada, Red-tailed Leafhopper is known from 27 sites separated into two designatable units (DUs). Designatable units should be discrete and evolutionarily significant units of the taxonomic species, where “significant” means that the unit is important to the evolutionary legacy of the species as a whole and if lost would likely not be replaced through natural dispersion. The two DUs for Red-tailed Leafhopper are the Prairie population (8 known sites) which occurs in southern Manitoba and the Great Lakes Plains population (19 known sites) which occurs in Manitoulin and adjacent islands in southern Ontario. The two DUs are separated by over 1000 km of unsuitable habitat, demographically, and have been genetically disjunct for at least 9000 years. Within the United States, the leafhopper is known from a small number (< 50) of sites in Minnesota, Wisconsin, Illinois, and South Dakota.



Known Ontario occurrences of Red-tailed Leafhopper

Source: COSEWIC. 2018. COSEWIC assessment and status report on the Red-tailed Leafhopper *Aflexia rubranura*, Prairie Population and Great Lakes Plains Population in Canada. Committee on the Status of Endangered Wildlife in Canada. Ottawa. xv + 53 pp..

Habitat

Red-tailed Leafhopper is found in open grassland and savanna habitats where its host plant, Prairie Dropseed (*Sporobolus heterolepis*) grows. Prairie Dropseed is more widely distributed than Red-tailed Leafhopper; however, the presence of the host plant does not ensure the leafhopper's presence. In southern Manitoba and the United States, Red-tailed Leafhoppers are found in remnant patches of Bur Oak savanna within tallgrass prairie. In Ontario, the species is restricted to alvar grasslands and savannas.

Biology

Red-tailed Leafhoppers are monophagous, with both nymphs and adults feeding only on the fluids of Prairie Dropseed. They also use the large clumps of this bunchgrass as shelter. Adults are active from mid-July to mid-September and are believed to oviposit in the stems of Prairie Dropseed where the eggs overwinter until the following spring. In Canada, they have one generation per year, although farther south (Illinois) they can have two generations a year.

Population Sizes and Trends

Red-tailed Leafhopper appears less abundant now than historically due to the near-complete loss of its tallgrass prairie Bur Oak habitat in Manitoba and less drastic losses of its alvar habitat in Ontario. The number of sites occupied by Red-tailed Leafhopper in Canada appears to be stable since it was first recorded in the country approximately 45 years ago, with an increased number of known sites due to increased search effort. There are too few data available from which to derive population estimates.

Threats and Limiting Factors

Habitat trends within the last ten years are poorly known, particularly for the Manitoba (Prairie population) sites. The primary threats to Manitoba subpopulations are conversion to agriculture, and the cumulative effects of fire/fire suppression and native tree encroachment within the open habitats, thereby out-competing and reducing the abundance of host plants available to the leafhopper. Threats to Ontario subpopulations (Great Lakes Plains population) are habitat conversion to housing (e.g., cottage development), fire and fire suppression and subsequent ingrowth of native and non-native plants, livestock over-grazing and habitat degradation from

recreation. The primary limiting factors for Red-tailed Leafhopper are its limited dispersal ability, and the availability of Bur Oak savanna habitat in Manitoba and alvar habitat in Ontario; the abundance of its host plant, Prairie Dropseed; and vulnerability to weather patterns.

Protection, Status and Ranks

Red-tailed Leafhopper has no legal protection at the federal or provincial level in Canada. In Ontario, two sites (Misery Bay East and West) are protected by Misery Bay Provincial Park and one site (East Belanger Bay) is in Queen Mother Mndoo Mmissing Provincial Park. The Red-tailed Leafhopper site south of St. Laurent, Manitoba, is within the Lake Francis Wildlife Management Unit (WMA). The St. Charles Rifle Range is owned by the federal Department of National Defence. One Ontario site near South Bay is on Wikwemikong First Nation land. A few Red-tailed Leafhopper sites along road allowances may be Crown or municipal land.

Red-tailed Leafhopper is ranked by NatureServe as globally (G2) and nationally (N1N2) imperilled; unranked (NNR) nationally in the United States; critically imperilled (S1) in Ontario and unranked (SNR) in Manitoba.

Source: COSEWIC. 2018. COSEWIC assessment and status report on the Red-tailed Leafhopper *Aflexia rubranura*, Prairie Population and Great Lakes Plains Population in Canada. Committee on the Status of Endangered Wildlife in Canada. Ottawa. xv + 53 pp.

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Red-tailed Leafhopper - Prairie Population

Photo: © Chris Dietrich



Scientific name
Aflexia rubranura

Taxon
Arthropods

COSEWIC status
Special Concern

Canadian range
Manitoba

Reason for designation

This flightless leafhopper has limited dispersal ability. It is restricted to remnant oak savanna grassland habitat in southern Manitoba, a habitat that has largely been lost from the province. It relies on the presence of the host plant Prairie Dropseed. The species is known from 8 sites at present, but there are likely to be additional sites found. Current and cumulative threats include agricultural habitat conversion and native and non-native plant succession from fire suppression and overgrazing.

Wildlife species description and significance

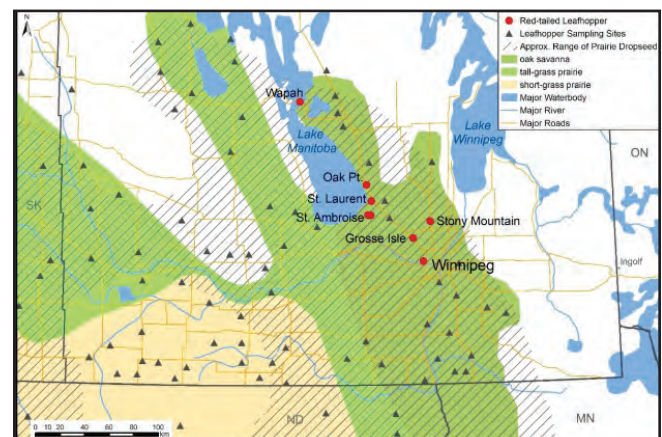
Red-tailed Leafhopper is a small (3 – 4 mm length) member of the leafhopper family, Cicadellidae (Order Hemiptera). They are predominately tan-coloured, with distinctive black transverse bars and spots on the head and thorax. The species is aptly named for the prominent red segment at the tip of the abdomen on adult males. Males and most females have shortened and non-functional wings, although

occasionally some females develop longer wings and may (but are not known to) fly. It is unknown how often females may develop longer wings, what proportion of a subpopulation they may represent or what environmental factors may trigger such growth. Nymphs are smaller, wingless and have a similar body form with an unmarked yellow back and a brown underside. The eggs have not been described.

Red-tailed Leafhopper is the only member of its genus *Aflexia* which is globally imperilled. The species is restricted to relict prairie, savanna, and alvar habitats which are also imperilled ecosystems in Canada.

Distribution

In Canada, Red-tailed Leafhopper is known from 27 sites separated into two designatable units (DUs). Designatable units should be discrete and evolutionarily significant units of the taxonomic species, where “significant” means that the unit is important to the evolutionary legacy of the species as a whole and if lost would likely not be replaced through natural dispersion. The two DUs for Red-tailed Leafhopper are the Prairie population (8 known sites) which occurs in southern Manitoba and the Great Lakes Plains population (19 known sites) which occurs in Manitoulin and adjacent islands in southern Ontario. The two DUs are separated by over 1000 km of unsuitable habitat, demographically, and have been genetically disjunct for at least 9000 years. Within the United States, the leafhopper is known from a small number (< 50) of sites in Minnesota, Wisconsin, Illinois, and South Dakota.



Known Manitoba occurrences of Red-tailed Leafhoppers

Source: COSEWIC. 2018. COSEWIC assessment and status report on the Red-tailed Leafhopper *Aflexia rubranura*, Prairie Population and Great Lakes Plains Population in Canada. Committee on the Status of Endangered Wildlife in Canada. Ottawa. xv + 53 pp.

Habitat

Red-tailed Leafhopper is found in open grassland and savanna habitats where its host plant, Prairie Dropseed (*Sporobolus heterolepis*) grows. Prairie Dropseed is more widely distributed than Red-tailed Leafhopper; however, the presence of the host plant does not ensure the leafhopper's presence. In southern Manitoba and the United States, Red-tailed Leafhoppers are found in remnant patches of Bur Oak savanna within tallgrass prairie. In Ontario, the species is restricted to alvar grasslands and savannas.

Biology

Red-tailed Leafhoppers are monophagous, with both nymphs and adults feeding only on the fluids of Prairie Dropseed. They also use the large clumps of this bunchgrass as shelter. Adults are active from mid-July to mid-September and are believed to oviposit in the stems of Prairie Dropseed where the eggs overwinter until the following spring. In Canada, they have one generation per year, although farther south (Illinois) they can have two generations a year.

Population Sizes and Trends

Red-tailed Leafhopper appears less abundant now than historically due to the near-complete loss of its tallgrass prairie Bur Oak habitat in Manitoba and less drastic losses of its alvar habitat in Ontario. The number of sites occupied by Red-tailed Leafhopper in Canada appears to be stable since it was first recorded in the country approximately 45 years ago, with an increased number of known sites due to increased search effort. There are too few data available from which to derive population estimates.

Threats and Limiting Factors

Habitat trends within the last ten years are poorly known, particularly for the Manitoba (Prairie population) sites. The primary threats to Manitoba subpopulations are conversion to agriculture, and the cumulative effects of fire/fire suppression and native tree encroachment within the open habitats, thereby out-competing and reducing the abundance of host plants available to the leafhopper. Threats to Ontario subpopulations (Great Lakes Plains population) are habitat conversion to housing (e.g., cottage development), fire and fire suppression and subsequent ingrowth of native and non-native plants, livestock over-grazing and habitat degradation from recreation. The primary limiting

factors for Red-tailed Leafhopper are its limited dispersal ability, and the availability of Bur Oak savanna habitat in Manitoba and alvar habitat in Ontario; the abundance of its host plant, Prairie Dropseed; and vulnerability to weather patterns.

Protection, Status and Ranks

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Red-tailed Leafhopper is ranked by NatureServe as globally (G2) and nationally (N1N2) imperilled; unranked (NNR) nationally in the United States; critically imperilled (S1) in Ontario and unranked (SNR) in Manitoba.

Source: COSEWIC. 2018. COSEWIC assessment and status report on the Red-tailed Leafhopper *Aflexia rubranura*, Prairie Population and Great Lakes Plains Population in Canada. Committee on the Status of Endangered Wildlife in Canada. Ottawa. xv + 53 pp.

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Smoker's Lung Lichen

Photo: © Stephen Sharnoff



Scientific name

Lobaria retigera

Taxon

Lichens

COSEWIC status

Threatened

Canadian range

British Columbia

Reason for designation

This lichen is strongly associated with humid old growth forests in British Columbia and is a “flagship” species for a suite of rare and uncommon lichens and bryophytes. More than 50% of the North American range is in Canada. The Canadian population comprises three subpopulations; however, nearly all remaining individuals (>90%) are found in the Northwestern subpopulation (Kispiox and Skeena valleys). The threats to this species in Canada are extensive forest harvesting, both past and present, leading to declines in the population from the direct impacts (removal of host trees), as well as indirect impacts (edge effects) in adjacent habitats. Predicted climate change may lead to further declines in the remaining populations of this lichen.

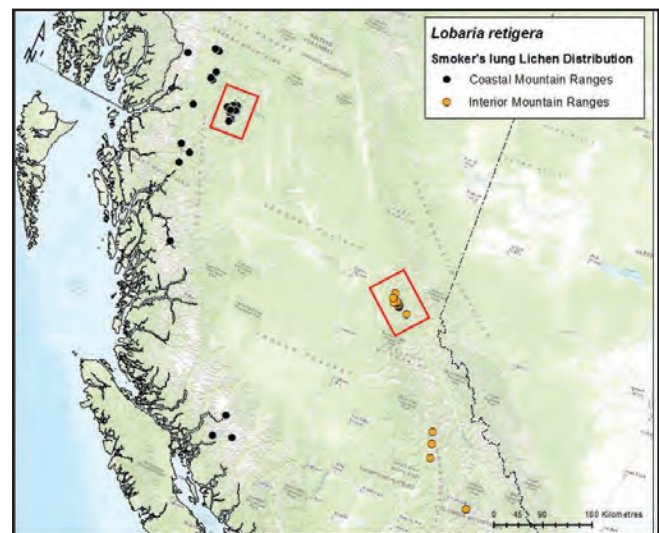
Wildlife species description and significance

The Smoker's Lung Lichen is a rare cyanolichen, strongly associated with humid mature to old growth forests and is characterized by a net-ridged/reticulate

dark upper surface and abundant grain-like vegetative propagules called isidia. The lower surface is tomentose (dark pigmented tangled hyphae), and the tomentum is interrupted by white patches that give a characteristic contrasting dark-light pattern. The spore-bearing fruit bodies, apothecia, are unknown in North American populations. Smoker's Lung Lichen is a “flagship” species among a suite of rare and uncommon epiphytic lichens and bryophytes that depend on humid, old growth forests in British Columbia (B.C.), many of which exhibit an unusual coastal-inland disjunct distribution.

Distribution

The North American distribution of Smoker's Lung Lichen is wholly within the geographic boundaries of Alaska and British Columbia. The Canadian portion of the range accounts for more than 50% of the total spatial distribution in North America. Smoker's Lung Lichen is also found in tropical and subtropical areas of Asia, the Indian subcontinent, Oceania, and Africa. Within Canada, the core range for Smoker's Lung Lichen falls within the Kispiox region of northwestern British Columbia.



Smoker's Lung Lichen (*Lobaria retigera*) occurrences in British Columbia.

Source: COSEWIC. 2018. COSEWIC assessment and status report on the Smoker's Lung Lichen *Lobaria retigera* in Canada. Committee on the Status of Endangered Wildlife in Canada. Ottawa. xi + 61 pp.

Habitat

In Canada, Smoker's Lung Lichen is confined to moist mature to old forests at elevations below 1000 m. Avoidance of summer drought is a key attribute of Smoker's Lung Lichen habitat. In British Columbia, this requirement is met in mature to old growth forests growing in oceanic and humid continental regions. The three Canadian subpopulations occur in the Coastal Western Hemlock (CWH) and the Interior Cedar-Hemlock (ICH) biogeoclimatic zones. The lichen colonizes twigs and branches of Western Hemlock, as well as leaning snags and dead trunks, but can be found on other coniferous species, including Western Redcedar, Subalpine Fir, and Amabilis Fir. It is occasionally found on older alder and willow trees, especially those that have rough bark.

Biology

Smoker's Lung Lichen produces asexual propagules, isidia, which are thought to be locally dispersed by rain and animals. Dispersal of isidia may be a limiting factor for Smoker's Lung Lichen as in North America it does not form sexual structures (apothecia), so long distance dispersal of the fungal component by ascospores does not occur. In coastal forests, the lack of available substrata, due to the competing cover of mosses and/or liverworts, is also a major constraint. The photosynthetic partner of the Smoker's Lung Lichen is *Nostoc*, a cyanobacterium.



Photo: © Stephen Sharnoff

Population Sizes and Trends

The Canadian distribution of Smoker's Lung Lichen is limited to three geographic regions in B.C.: (1) ICH biogeoclimatic zone of interior B.C., (2) the ICH biogeoclimatic zone of northwestern B.C.,

and (3) the CWH biogeoclimatic zone in Coastal B.C. The estimated number of thalli in the three subpopulations is ca. 150, 58,000 and 100 respectively, based on enumerated thalli and habitat modelling. The number of thalli at each occurrence varied from single thalli to over 2000 thalli at the most abundant site in northwestern B.C., which is the core range for this lichen. Evidence suggests that extirpation has occurred at three occurrences, with another 21, mostly in northwestern B.C. being at risk within the next two to three generations (40-60 years) due to logging and associated edge effects. Many trees on which the Smoker's Lung Lichen was found to be abundant in the 2015 and 2016 preharvest surveys of planned cut blocks in the Kispiox valley have been designated for placement in wildlife tree patches (with a 35 m buffer placed around the trees). However, the survival of these thalli is uncertain, as this lichen species is highly sensitive to microclimate changes associated with edge effects.

Threats and Limiting Factors

Smoker's Lung Lichen is limited by the availability of suitable habitat (humid mature and old growth forests) and poor dispersal efficiency. Humid, wet, mature or old growth, cedar-hemlock forests have diminished in abundance with the progressive expansion of forest harvesting. Additional threats are from Hemlock-looper infestations and fire which are predicted to increase in severity and frequency due to rising mean annual temperatures as a result of global warming. The cumulative effects of these threats: harvesting, climate change, insect infestations and fire, are expected to lead to a decline in the number of mature individuals of Smoker's Lung Lichen over the next two to three generations.

Protection, Status and Ranks

Smoker's Lung Lichen is a Blue-listed species in British Columbia. Fifteen extant Canadian occurrences of Smoker's Lung Lichen are situated within parks or protected areas, eight of which are found in the newly designated Ancient Forest/Chun T'oh Whudujut Provincial Park in the upper Fraser River watershed. The remaining forty-one occurrences are on Crown Land, where most do not have long-term protection from forest harvesting or other disturbances. Some have limited protection

in designated Old Growth Management Areas (OGMAs) and/or Wildlife Tree Retention patches. The Smoker's Lung Lichen also occurs in Alaska where it is ranked S2S3 (Imperilled or Vulnerable).

Source: COSEWIC. 2018. COSEWIC assessment and status report on the Smoker's Lung Lichen *Lobaria retigera* in Canada. Committee on the Status of Endangered Wildlife in Canada. Ottawa. xi + 61 pp.

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Smooth Yellow False Foxglove



Photo: © Mary Gartshore

Scientific name

Aureolaria flava

Taxon

Vascular Plants

COSEWIC status

Threatened

Canadian range

Ontario

Reason for designation

This perennial plant species has a distribution restricted in Canada to southwestern Ontario. There are few individuals remaining in a small number of locations within oak savannas and woodlands. Declines have been observed in its distribution and quality of habitat. Fire suppression and browsing by White-tailed Deer threaten the remaining extant locations.

Wildlife species description and significance

The three species of Yellow False Foxglove that occur in Canada are herbaceous plants with showy yellow flowers. The Smooth Yellow False Foxglove (*Aureolaria flava*) has smooth stems whereas the stems and leaves of the Downy Yellow False Foxglove (*Aureolaria virginica*) are covered by fine downy hairs. The stems and leaves of the Fern-leaved Yellow False Foxglove (*Aureolaria pedicularia*) are covered by sticky glandular hairs. The leaves of the latter species are more dissected than the lobed leaves of the other two species. Yellow False Foxgloves are hemi-

parasites which can take up water and nutrients by attaching to the roots of oaks or other host plants.

Distribution

Yellow False Foxgloves occur only in eastern North America. A small part of the global range of the three species extends into southwestern Ontario. All three species have disappeared from many former sites. Seven subpopulations of Smooth Yellow False Foxglove persist. Six subpopulations of Fern-leaved Yellow False Foxglove were confirmed in 2016, along with five subpopulations of Downy Yellow False Foxglove.



Canadian distribution of Smooth Yellow False Foxglove.

Source: COSEWIC. 2018. COSEWIC assessment and status report on the Yellow False Foxglove Bundle, Smooth Yellow False Foxglove *Aureolaria flava*, Fern-leaved Yellow False Foxglove *Aureolaria pedicularia* and the Downy Yellow False Foxglove *Aureolaria virginica*, in Canada. Committee on the Status of Endangered Wildlife in Canada. Ottawa. xx + 100 pp.

Habitat

In Canada, Yellow False Foxgloves are found in dry, open to semi-open, upland oak ecosystems. Fern-leaved Yellow False Foxglove is found in open savanna and woodland habitats along with Black Oak, its preferred host tree. The other two species can persist under dappled light conditions and occur in oak woodlands and forests, typically with White Oak present. All three species are shade intolerant to varying degrees. Their hemi-parasitic behaviour provides them with a competitive advantage on drought-prone soils provided they can attach to a suitable host.

Biology

Smooth Yellow False Foxglove and Downy Yellow False Foxglove are perennial herbs that send up multiple flowering stalks each year. In contrast, Fern-leaved Yellow False Foxglove is a short-lived species, which

flowers only once, typically in its second year. All three species reproduce only from seeds. The flowers are pollinated by bumble bees and other insects. Fern-leaved Yellow False Foxglove plants can self-pollinate, whereas the other two species require pollen from other plants to set seeds.

Population Sizes and Trends

Little was known about the size of Canadian populations of Smooth Yellow False Foxglove and Fern-leaved Yellow False Foxglove prior to 2016. Downy Yellow False Foxglove was the focus of a targeted survey in 1990.

The Canadian population of Smooth Yellow False Foxglove is estimated to be between 464 and 1409 mature individuals. Over 60% of the population is found at three sites in the Ojibway Prairie Complex subpopulation. Population trend information is not available.

The Canadian population of Fern-leaved Yellow False Foxglove is estimated to be between 7602 and 11820 plants. About 85% of the population occurs in the Pinery Complex and Turkey Point Complex subpopulations. Population trend information is not available.

The Canadian population of Downy Yellow False Foxglove is very small, consisting of about 400 mature individuals in five subpopulations. Three-quarters of the population is at a site near Cambridge, Ontario where the number of plants has increased 15-fold since 1990. There have been serious declines at the other four sites.

Threats and Limiting Factors

All three species face a suite of similar threats due to their association with open to semi-open oak ecosystems. Oak ecosystems across eastern North America are in decline for a variety of reasons. Fire suppression and invasive species are threats to the persistence of Yellow False Foxgloves in Canada because they result in increased shading and competition from other species. Active habitat management, including prescribed burning and invasive plant control, is taking place at several Yellow False Foxglove sites to restore and maintain open oak ecosystems.

Moderate to severe damage to plants due to browsing by White-tailed Deer was observed at most sites during 2016 fieldwork. Deer occur at high densities in southern Ontario as their diet is supplemented by agricultural crops. Deer browsing is affecting the perennial species especially, resulting in greatly reduced seed production at most subpopulations. Residential development is a potential threat at one site supporting a substantial portion of the Fern-leaved Yellow Foxglove population. Some small subpopulations of each species are at considerable risk of extirpation as the plants are situated near heavily used recreational trails.

Protection, Status and Ranks

These species have not been previously assessed by COSEWIC and they do not have any special legal status anywhere in Canada. In the United States, some species are protected in a few states on the periphery of the species' range. All three species are considered globally secure. Downy Yellow False Foxglove has a non-legal status rank of critically imperilled in Canada and Ontario. Smooth Yellow False Foxglove and Fern-leaved Yellow False Foxglove were both ranked as imperilled in Canada and Ontario, although these rankings are flagged as tentative as recent survey information was not available at the time.

Source: COSEWIC. 2018. COSEWIC assessment and status report on the Yellow False Foxglove Bundle, Smooth Yellow False Foxglove *Aureolaria flava*, Fern-leaved Yellow False Foxglove *Aureolaria pedicularia* and the Downy Yellow False Foxglove *Aureolaria virginica*, in Canada. Committee on the Status of Endangered Wildlife in Canada. Ottawa. xx + 100 pp.

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Spoon-leaved Moss

Photo: © Peter Kelly



Scientific name

Bryoandersonia illecebra

Taxon

Mosses

COSEWIC status

Threatened

Canadian range

Ontario

Reason for designation

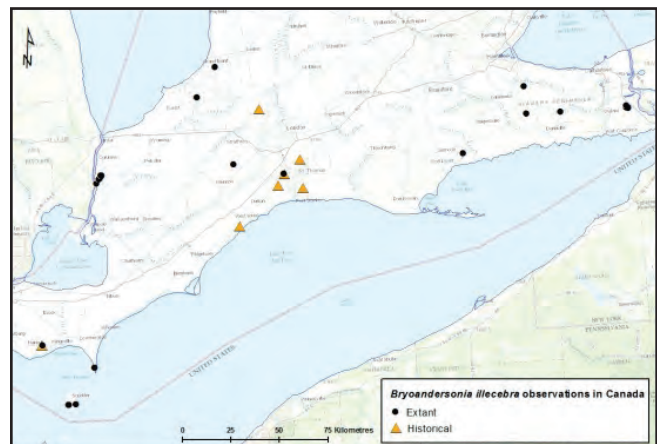
This large, long-lived, profusely branching moss is known in Canada only from southern Ontario, where most locations fall within the highly fragmented Carolinian zone. Potential threats include pollution, recreational activities, forestry, and residential and commercial development. Although it is more abundant within this restricted ecological zone than it was thought to be when first assessed by COSEWIC, it is still uncommon, and its absence from large areas of apparently suitable habitat suggests limitation by additional threats or natural factors. When present, the number of colonies is typically low even with intensive search effort. While the presence of this species in recently created habitats shows that dispersal is possible, the means by which it is achieved is not certain. Only female plants have been recorded in Canada and sporophytes have never been observed.

Wildlife species description and significance

A large and distinctive species, Spoon-leaved Moss (*Bryoandersonia illecebra*) is readily distinguished in the field by cylindrical, worm-like shoots. *Bryoandersonia* is a monotypic genus that is endemic to eastern North America. The position of Canadian subpopulations, at the edge of the species' geographic range, may be associated with unique genetic characters.

Distribution

Spoon-leaved Moss is found from Michigan to Massachusetts, including southern Ontario, in the northern part of its global range, and from Texas to Florida in the south. It is reportedly much more abundant south of the limit of Wisconsinan glaciation. The Canadian population has been recorded only in Ontario, south of a line from Grand Bend, near the southern end of Lake Huron, east to the municipality of Hamilton. Sites are concentrated within Canada's Carolinian zone, the southernmost part of Canada's Mixedwood Plain Ecozone.



Known Canadian distribution of Spoon-leaved Moss

Source: COSEWIC. 2017. COSEWIC assessment and status report on the Spoon-leaved Moss *Bryoandersonia illecebra* in Canada. Committee on the Status of Endangered Wildlife in Canada. Ottawa. xi + 40 pp. .

Habitat

In North America, Spoon-leaved Moss is found in forests, wetlands, meadows, lawns, and edge habitats. In Canada, it appears to be associated with young or mid-seral forest: most known subpopulations are in deciduous thickets or forests regenerating in formerly cleared areas. Spoon-leaved Moss has also been found in several plantations of approximately 60 to 70 years in age. It favours mineral soil substrates, especially on banks or hummocks covered with little or no leaf litter, but it can also grow on other forest-floor substrates such as tree bases, exposed roots, and rock. In that Spoon-leaved Moss is associated with the Carolinian zone, climate (e.g., warm mean temperature, long growing season) is also assumed to play a role in determining habitat suitability. The Carolinian zone is expected to expand with climate change, yet natural forest cover in southern Ontario is low and continues to decline, making overall trends in suitable habitat difficult to predict. Large areas of apparently suitable habitat are unoccupied.

Biology

Sexual reproduction in Spoon-leaved Moss relies on close proximity of male and female plants. So far, only female plants have been found in Canada, and spore production has never been documented here. Spore production is reportedly rare throughout the northern part of the species' North American range. Spoon-leaved Moss presumably also reproduces asexually by regenerating from undifferentiated plant fragments, which may be created and/or dispersed by vectors such as animals, machinery, water, and wind. The presence of Spoon-leaved Moss in young, isolated woodlots suggests that reproduction and dispersal are possible, but the dominant mechanisms have not been identified. Plants show adaptations typical of long-lived perennial mosses, with large, indeterminately branching shoots and small spores. Generation time is estimated to be about 20 years.



Photo: © Peter Kelly

Population Sizes and Trends

At least 20 subpopulations of Spoon-leaved Moss are known in Canada, with a minimum of 66 mature individuals (colonial patches) with an areal extent of 163 m². Habitat patches supporting 6 of the 20 subpopulations have been searched extensively, and there is additional potential habitat that has not been searched, both within the remaining 14 habitat patches where Spoon-leaved Moss is known to occur, and elsewhere within its known range. The sizes of most subpopulations that have been revisited since their discovery appear to be stable. Rescue from US populations is possible.

Threats and Limiting Factors

Residential, commercial and agricultural development, transportation and service corridors, and pollution are common within the known range of Spoon-leaved Moss, and continue to reduce the extent and quality of natural habitat there. However, Spoon-leaved Moss persists within natural or naturalized habitat fragments, where it often appears to have established within the past 20 to 70 years. Increases in leaf litter and soil organic matter such as those associated with natural forest succession may reduce habitat suitability for Spoon-leaved Moss over time. Invasive earthworms may actually increase suitable habitat by facilitating access to mineral soil substrates. Climate change is also expected to increase habitat by expanding the area characterized by Carolinian climate in Canada.

Protection, Status and Ranks

Spoon-leaved Moss is listed as Endangered in Schedule 1 of Canada's federal *Species at Risk Act*, and on the *Species at Risk* in Ontario List (Ontario Regulation 230/08). Its global conservation status is G5 (Secure), and its status in Ontario is S2 (Imperiled). Thirteen of the 20 known Canadian subpopulations of Spoon-leaved Moss are found within areas managed for conservation and/or recreation by various branches or agencies of national, provincial or municipal government, or by Conservation Authorities.

Source: COSEWIC. 2017. COSEWIC assessment and status report on the Spoon-leaved Moss *Bryoandersonia illecebra* in Canada. Committee on the Status of Endangered Wildlife in Canada. Ottawa. xi + 40 pp.

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Striped Whitelip



Photo: © A. Nicolai

Scientific name

Webbhelix multilineata

Taxon

Molluscs

COSEWIC status

Endangered

Canadian range

Ontario

Reason for designation

This large terrestrial snail is present on Pelee Island in Lake Erie and at three sites on the mainland of southwestern Ontario: Point Pelee National Park, Walpole Island, and Bickford Oak Woods Conservation Reserve. The species appears to have been extirpated from four other historically known mainland sites and at least one site on Pelee Island. Human-driven habitat loss and alteration led to decline and population isolation. Threats are extreme weather events (e.g., droughts), prescribed burns, and human disturbance (i.e., trampling as the species forages on trails in moist conditions). Wild Turkeys on Pelee Island and in Point Pelee National Park also might eat this snail.

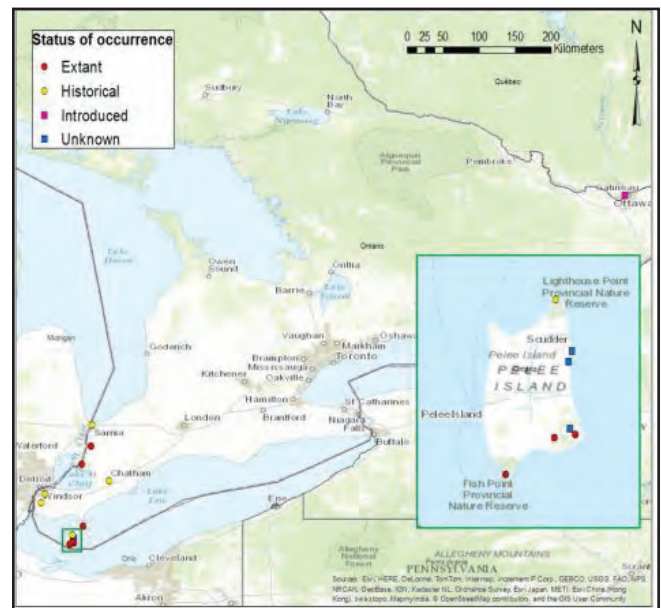
Wildlife species description and significance

Striped Whitelip is a large land snail (adult shell width 2.0 – 2.5 cm) with a round, but slightly flattened, thin pale-yellow shell that has dark spiral bands. This species is part of the unique fauna of the Carolinian

Forest in Canada and has significance for ecosystem function through nutrient cycling. The range-edge population in Canada is important for the global conservation of this species.

Distribution

The distribution of Striped Whitelip extends from southern Ontario southward to Tennessee in the east and Nebraska in the west. In Canada, the species is currently known to occur in the following areas of southwestern Ontario: Pelee Island, Point Pelee National Park, Walpole Island, and Bickford Oak Woods Conservation Reserve. The species appears to have been extirpated in Sarnia, Devonwood Conservation Area, Chatham, and Canard River Scout Camp near Windsor.



Distribution of Striped Whitelip *Webbhelix multilineata* in Ontario

Source: COSEWIC. 2018. COSEWIC assessment and status report on the Striped Whitelip *Webbhelix multilineata* in Canada. Committee on the Status of Endangered Wildlife in Canada. Ottawa. x + 62 pp.

Habitat

Striped Whitelip inhabits wet, lowland forest, at the margins of periodically flooded areas (marshland or swamp) or in continuously wet parts. These damp woods are composed of oak, hickory, and maple, with a rich litter layer including logs, bark, leaves, and twigs.

Potential habitats (where the snail has been observed but the entire area not searched) total over 2000 ha

and are mainly old-growth forest. Pelee Island is largely developed for agriculture and habitat loss is historical i.e., occurred in the past. Protected areas on the island and mainland are managed with mechanical thinning or prescribed burns to control invasive species and enhance endangered species habitat. The habitat at all sites is surrounded by unsuitable arable land or water.

Biology

Striped Whitelip is an air-breathing (pulmonate) snail that is a simultaneous hermaphrodite (possesses both male and female reproductive organs) and lays eggs. Few details of the life history of the species in Canada are known. Mating probably occurs in mid-spring and mid-summer, and egg-laying in late spring and late summer. Hibernation extends from early October until April in temperate regions. Striped Whitelip is freeze resistant and can survive harsh winters but its cold hardiness decreases in spring. Dormancy in summer may occur only during prolonged drought, because they are usually active in warm weather. Sexual maturity is probably reached at 2–3 years. The generation time is probably 4 years. The species feeds mainly on fresh plants, such as germinating tree seedlings, and can move across roads and in human-altered habitat to search for food. However, active dispersal for colonization of new areas is in the order of tens of metres over several years, and the species is not found on agricultural land. Passive dispersal by flooding of rivers or transportation by birds is possible but has not been documented. There is no evidence that the species is transported by humans.

Population Sizes and Trends

Striped Whitelip usually occurs locally in large numbers elsewhere, but abundance and distribution in Ontario are extremely heterogeneous and dependent on the density of moist microsites. Population size appeared small and snails were only found in wet areas in 2016, likely due to the drought in August that year. There was a change in the gastropod community composition on higher ground in 2016 compared to 2013–2015 because of Striped Whitelip's absence. Size class distribution was normal and did not differ between Point Pelee National Park and Pelee Island. Recruitment was observed in most sites where the species was found. Nothing is known about the population's genetic structure. Rescue from outside Canada is not possible due to Lake Erie and the St. Clair River acting as barriers.

Threats and Limiting Factors

Low dispersal ability, low physiological resistance to fluctuating environmental factors such as temperature and humidity, and predation by Wild Turkeys at Point Pelee National Park are limiting factors. Threats to the species are climate change (droughts, changes in frost regimes), natural system modifications (prescribed burns on Pelee Island), and human intrusions and disturbances (trampling). Other threats include transportation and service corridors, pollution, and invasive species. Depending on the threat or combination of threats, there are 4–6 locations.

Protection, Status and Ranks

Striped Whitelip has no legal designations. It is ranked by Nature Serve as globally secure and nationally secure in the US, but imperilled-vulnerable in Canada and in Ontario. In Ontario, most of the species' range is on protected lands managed by Parks Canada, the Nature Conservancy Canada, or the Ontario Ministry of Natural Resources and Forestry.

Source: COSEWIC. 2018. COSEWIC assessment and status report on the Striped Whitelip *Webbhelix multilineata* in Canada. Committee on the Status of Endangered Wildlife in Canada. Ottawa. x + 62 pp.

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Yukon Wild Buckwheat



Photo: © Allan Harris

Scientific name

Eriogonum flavum var. *aquilinum*

Taxon

Vascular Plants

COSEWIC status

Special Concern

Canadian range

Yukon

Reason for designation

This perennial plant is restricted in Canada to a handful of sites in the southwestern Yukon. It occurs on dry, south-facing grassland slopes, which are uncommon relicts of the vast steppes of unglaciated Beringia. Despite apparently low recruitment, the number of mature individuals remains stable. This species could become Threatened as rapid climate change brings increased precipitation and encroachment of the grasslands by native trees and shrubs.

Wildlife species description and significance

Yukon Wild Buckwheat is a perennial herb with basal leaves that form a compact mat up to about 35 cm wide. The stems and leaves are covered with a dense layer of short, whitish hairs and arise from a stout, woody caudex (underground stem). The flowers are bright yellow and arranged in an umbel at the end of the stem. Yukon Wild Buckwheat is of Beringian origin and endemic to unglaciated areas of Yukon and

Alaska. Species of buckwheat have been used medicinally by First Nations people.

Distribution

The range of Yukon Wild Buckwheat is restricted to southwestern Yukon and east-central Alaska. The two populations are separated by about 400 km. The Canadian range is confined to an area between Sekulmun and Aishihik lakes and extends about 8 km from north to south and 4.5 km east to west. Within this area, Yukon Wild Buckwheat has been found on 23 patches of grassland, corresponding with five subpopulations, ranging in size from 21 ha to less than 0.1 ha.



Global range of Yukon Wild Buckwheat

Source: Yukon CDC; Nawrocki et al. 2013

Habitat

Yukon Wild Buckwheat inhabits grassland communities on dry, south-facing slopes. The Canadian population occurs at elevations of 900 to 1000 m on well-drained sandy or silty soils with gravel and cobbles. Vegetation is low and relatively sparse.

Biology

Little is known about the biology of Yukon Wild Buckwheat. It is a long-lived perennial herb. Flowering occurs in June and July and seeds mature in late July. Larger plants have several hundred individual flowers each of which can produce a single seedlike achene, but seedlings are rare and the recruitment rate is apparently low. Vegetative reproduction also occurs but is apparently

uncommon. The achenes lack specialized dispersal structures and long distance dispersal is probably rare. Yukon Wild Buckwheat is probably pollinated by a wide range of insects including bumblebees, solitary bees, flies, butterflies, and moths. It is adapted to dry, open habitats and apparently intolerant of shading and heavy competition with grasses and other plants.

Photo: © Robert Foster



Protection, Status and Ranks

All known Canadian occurrences of Yukon Wild Buckwheat are on Champagne and Aishihik First Nations lands. It has no legal protection at the federal or territorial level in Canada, nor is it listed under the US *Endangered Species Act*. Yukon Wild Buckwheat was assessed by COSEWIC as Special Concern in November 2017. It is ranked as imperilled (at the variety level) globally (G5T2) and critically imperilled in Canada (N1). It is critically imperilled (S1) in Yukon and imperilled (S2) in Alaska.

Source: COSEWIC. 2017. COSEWIC assessment and status report on the Yukon Wild Buckwheat *Eriogonum flavum* var. *aquillinum* in Canada. Committee on the Status of Endangered Wildlife in Canada. Ottawa. x + 32 pp.

Population Sizes and Trends

Yukon Wild Buckwheat in Canada consists of a single population composed of five subpopulations. In 2016, the total number of mature individuals was estimated at 22,721 plants in the 11 sites that were sampled. No comprehensive trend data are available but the few abundance estimates available between 2004 and 2016 suggest that the population is stable.

Threats and Limiting Factors

An increase in habitat damage by Wood Bison and feral horses may threaten Yukon Wild Buckwheat, although the impacts of these species are unknown. Invasive plants are another potential threat. Trembling Aspen has invaded some grasslands in southwestern Yukon over the last 60 to 80 years, possibly caused by warmer and wetter conditions associated with climate change, but aspen invasion may be limited by rapid drainage on the steep slopes. Yukon Wild Buckwheat is probably limited by the scattered distribution of grasslands within its extent of occurrence and its apparent low recruitment rate and limited dispersal capability.

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