

**Ontario Species at Risk Evaluation Report for
Suckley's Cuckoo Bumble Bee
Bourdon de Suckley
(*Bombus suckleyi*)**

Committee on the Status of Species at Risk in Ontario
(COSSARO)

Assessed by COSSARO as Endangered

February 2021

Bourdon de Suckley (*Bombus suckleyi*)

Le bourdon de Suckley (*Bombus suckleyi*) est classé dans la catégorie des espèces en voie de disparition en Ontario par le CDSEPO.

Le bourdon de Suckley appartient à un clade de plusieurs bourdons, dont le psithyre bohémien auquel il est le plus étroitement relié. La population canadienne est considérée comme une seule unité désignable. Les mentions historiques du bourdon de Suckley sont rares et sa présence est principalement indiquée dans le sud de l'Ontario, ainsi que dans le nord de la province, à la suite de quelques rares observations.

L'observation la plus récente de l'espèce remonte à 1971 en Ontario. Au-delà de l'Ontario, le bourdon de Suckley est principalement une espèce de l'ouest du Canada, présente à proximité de l'Arctique. On le trouve dans toutes les provinces et tous les territoires canadiens, mais il est moins abondant à l'est du 100^e méridien. On estime que son aire de répartition plus vaste pertinente sur le plan biologique ne s'étend pas au-delà des administrations voisines de l'Ontario où l'espèce a également décliné considérablement, notamment au Manitoba où on la considère comme probablement disparue.

Ces bourdons sont des parasites sociaux obligatoires des autres espèces de bourdons qui sont des nidificateurs. Cette espèce est principalement menacée par le déclin de ses espèces hôtes : le bourdon de l'Ouest dans l'ouest du Canada et le bourdon terricole dans l'est du Canada. Ces dernières sont menacées par plusieurs facteurs dont, vraisemblablement, l'usage des pesticides, la dissémination d'agents pathogènes et la perte de ressources florales et d'habitat attribuables à l'intensification de l'agriculture. Comme cette espèce est parasite, elle est intrinsèquement moins nombreuse que ses hôtes.

Des recherches raisonnables ont été réalisées dans le sud de l'Ontario au cours des dernières années, mais aucun bourdon de Suckley n'a pu y être observé. De plus, les relevés effectués de manière inadéquate au centre et au nord de l'Ontario rendent impossible la confirmation du statut de l'espèce.

Le bourdon de Suckley est classé dans la catégorie des espèces en voie de disparition en Ontario, en raison d'un déclin déduit supérieur à 50 %, fondé sur l'observation directe, sur le déclin de la qualité de son habitat (les populations d'espèces hôtes) et sur les répercussions des menaces posées notamment par les agents pathogènes et polluants. Bien que la classification en fonction des critères liés au déclin de la population s'appuie, en principe, sur les 10 années précédentes, son application dans ce cas précis respecte les critères. Si cette espèce est encore présente en Ontario, sa population est vraisemblablement réduite, demeure menacée et sa disparition est imminente. Il est impossible de classer cette espèce actuellement dans la catégorie des espèces disparues, en raison des efforts insuffisants déployés dans la province en matière de relevés.

Le statut de l'espèce en Ontario diffère de celui du COSEPAC, qui l'a désignée comme espèce menacée, en raison de sa population plus petite et dont les déclinés sont supérieurs.

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Executive summary

Suckley's Cuckoo Bumble Bee belongs to a clade of several cuckoo bumble bees and is most closely related to the Gypsy Cuckoo Bumble Bee. The Canadian population is considered a single designable unit. Historic records of Suckley's Cuckoo Bumble Bee exist are sparse, occurring primarily Southern Ontario, with a handful of northern observations. The species was most recently observed in Ontario in 1971. Beyond Ontario, Suckley's Cuckoo Bumble Bee is a primarily western Neararctic species; it occurs in most Canadian jurisdictions but is less abundant east of the 100th meridian. The species' broader biologically relevant range is not considered to extend beyond Ontario's neighboring jurisdictions where the species has also declined significantly and is considered possibly extirpated in Manitoba.

Cuckoo bumble bees are obligate social parasites of other nest-building bumble bee species. The species is primarily threatened by the decline of its host species: Western Bumble Bee in Western Canada, and Yellow-banded Bumble Bee in eastern Canada. These species are threatened by a number of factors likely including: pesticide usage, pathogen spillover and loss of floral resources and habitat due to agricultural intensification. As parasitic species, cuckoo bumble bees are inherently less numerous than their hosts. A reasonable search effort for bumble bees in Southern Ontario in recent years has produced no new observations of Suckley's Cuckoo Bumble Bee, however the survey effort in central and northern Ontario has been inadequate to confirm the species' status.

Suckley's Cuckoo Bumble Bee is classified as Endangered in Ontario, due to an inferred decline of greater than 50% based upon direct observation, a decline in its quality of habitat (host species populations) and the effects of threats including pathogens and pollutants. Although classification under the criteria of population decline specifies a period over the past 10 years, its application here meets the spirit of the criteria. If this species still occurs in Ontario it likely small and remains under threat and is facing imminent extirpation. The species does not currently qualify as Extirpated due to insufficient survey effort across the province. The Ontario status differs from the COSEWIC status of Threatened due to the species' smaller population and greater declines in Ontario.

1. Eligibility for Ontario status assessment

1.1. Eligibility conditions

1.1.1. Taxonomic distinctness

Suckley's Cuckoo Bumble Bee was first described in *Western Science* in 1860 (Greene 1860), and belongs to a clade containing three to five additional species (Hines 2008; Lhomme and Hines 2018). It is likely a sister taxon to the other species, having split approximately 4 million years ago in North America (Hines 2008). It is most closely related to the Gypsy Cuckoo Bumble Bee, but the species are considered distinct.

1.1.2. Designatable units

COSEWIC (2019) considers Suckley's Cuckoo Bumble Bee to be a single DU in Canada.

1.1.3. Native status

Ontario is within the natural range of Suckley's Cuckoo Bumble Bee (COSEWIC 2019).

1.1.4. Occurrence

Suckley's Cuckoo Bumble Bee was historically recorded as occurring in Ontario, last observed in 1971 (COSEWIC 2019).

1.2. Eligibility results

Suckley's Cuckoo Bumble Bee (*Bombus suckleyi*) is eligible for status assessment in Ontario.

2. Background information

2.1. Current designations

- GRANK: G2 (NatureServe 2021)
- IUCN: Critically Endangered (2014)
- NRANK Canada: N3
- COSEWIC: Threatened (November 2019)
- SARA: Under consideration for addition
- ESA 2007: Not listed
- SRANK: SH (ranked in 2016)

2.2. Distribution in Ontario

Suckley's Cuckoo Bumble Bee was most recently observed in Ontario in 1971 (COSEWIC 2019). Its historical distribution in the province was sparse and primarily limited to occasional records in Southern Ontario, with an additional three records in northwestern Ontario close to the borders with Manitoba and Minnesota, and a single record south of James Bay close to the Quebec border. Extensive bumble bee surveys in Southern Ontario have produced no observations since 1971, while central and northern Ontario have not been adequately surveyed (COSSARO 2016; pers. comm. Colin Jones 2021; pers. comm. Shelia Colla, Amanda Liczner & Victoria MacPhail 2021).

2.3. Distribution, status and the broader biologically relevant geographic range outside Ontario

Suckley's Cuckoo Bumble Bee is primarily a western Nearctic species (Lhomme and Hines 2018), found from southeastern Alaska to northern California, and east to Manitoba and Colorado. Suckley's Cuckoo Bumble Bee has been recorded in every Canadian province and territory except for Nunavut. While this species has been recorded on the East Coast, it primarily occurs in West Coast, and becomes rarer east of the 100th meridian (COSEWIC 2019). Suckley's Cuckoo Bumble Bee is considered globally Imperiled (NatureServe 2021), with subnational rankings varying between S1 and S3 where available (NatureServe 2021).

The absence of records for this species in Ontario over the past 50 years, means that a BBRGR for this species in Ontario is challenging to determine accurately. Suckley's Cuckoo Bumble Bee does occur in most Canadian ecozones (COSEWIC 2011), however, the absence of recent records for this species in neighboring jurisdictions precludes the possibility of population dynamics or rescue effect. However, Suckley's Cuckoo Bumble Bee appears to be declining throughout its global range, following the decline of its host species. Therefore, if the BBRGR for the Ontario population is taken to be the species' global range, the condition should be considered as Threatened and declining (COSEWIC 2019).

Table 1. Condition of the Species in Adjacent Jurisdictions and Broader Biologically Relevant Geographic Range

Adjacent Jurisdictions	Biologically Relevant to Ontario (n/a, yes, no)	Condition	Notes & Sources
Quebec	n/a	SNR, likely extirpated	Last observation pre-1968 (COSEWIC 2019; Natureserve 2021)
Manitoba	n/a	S3S4, possibly extirpated	Last observation pre-1995 (COSEWIC 2019; Natureserve 2021)
Michigan	n/a	NA	
Minnesota	n/a	SNR	(Natureserve 2021)
Nunavut	n/a	NA	
New York	n/a	NA	
Ohio	n/a	NA	
Pennsylvania	n/a	NA	
Wisconsin	n/a	NA	
<i>Other Relevant Jurisdiction</i>	n/a		

2.4. Ontario conservation responsibility

Ontario accounts for 0% of global records in the past fifty years, and 7% of total historical Canadian records (COSEWIC 2019).

2.5. Direct threats

Suckley's Cuckoo Bumble Bee is primarily threatened by the decline of its host species: Western Bumble Bee in Western Canada and Yellow-banded Bumble Bee in eastern Canada (COSEWIC 2019). These host species have declined in recent years, likely due to pesticide usage, pathogen spillover and the loss of floral resource and habitat due to agricultural intensification and natural system modification (COSEWIC 2019).

2.6. Specialized life history or habitat use characteristics

Suckley's Cuckoo Bumble Bee is an obligate social parasite of nest-building bumble bees: females emerge in the spring and parasitize the nests of hosts by killing or subduing the queen and takes over egg laying (COSEWIC 2019). Due to their parasitic nature, cuckoo bumble bees are inherently less common than their host non-cuckoo bumble bees and are dependent on the success of their hosts (COSEWIC 2019). All cuckoo bumble bee species in North America account for only 3.8% of total bumble bees (Lhomme and Hines 2018).

3. Ontario status assessment

3.1. Application of endangered/threatened status in Ontario

3.1.1. Criterion A – Decline in total number of mature individuals

Meets Endangered under Criterion A2ace.

The last record of this species in Ontario is from 1971. However search effort is insufficient to conclude that it is extirpated. At some point in the past, this species rapidly declined in Ontario (> 50%). It has also declined in Canada over the last decade (> 30%) and the historical decline throughout its range is estimated as > 80%. The decline in Ontario is based on direct observations, a documented decline in its host species and the continued impacts of introduced pathogens and pollutants. Although Criterion A2 specifies a period over the past 10 years, its application here meets the spirit of the criteria. If this species still occurs in Ontario it likely small and remains under threat and is facing imminent extirpation.

3.1.2. Criterion B – Small distribution range and decline or fluctuation

Does not apply.

3.1.3. Criterion C – Small and declining number of mature individuals

Does not apply.

3.1.4. Criterion D – Very small or restricted total population

Does not apply.

3.1.5. Criterion E – Quantitative analysis

Does not apply.

3.2. Application of Special Concern in Ontario

Although lack of survey effort in some regions makes it challenging to completely understand the population of this Suckley's Cuckoo Bumble Bee in Ontario, the available evidence nonetheless provides justification for considering this species in an endangered/threatened category. Thus Special Concern does not apply.

3.3. Status category modifiers

3.3.1. Ontario's conservation responsibility

Does not apply.

The species is G2, however Ontario accounts for less than 25% of the global population.

3.3.2. Status modification based on rescue effect or level of risk in broader biologically relevant geographic range

Status modification due to rescue effect does not apply.

The most recent observation in a neighbouring jurisdiction was more than 25 years ago. While populations could persist despite the lack of records, rescue effect is unlikely.

Status modification due to BBRGR does not apply.

The exact BBRGR is challenging to determine, however the species is declining throughout its range and is considered Threatened in Canada by COSEWIC (2019). The condition of the species across the broader biologically relevant geographic range in which it exists both inside and outside of Ontario, when considered, did not adjust the assessment level of this species.

3.4. Other status categories

3.4.1. Data deficient

Survey effort for central and northern Ontario is considered insufficient to determine the species' current status in these regions (COSSARO 2016; pers. comm. Colin Jones 2021; pers. comm. Shelia Colla, Amanda Liczner & Victoria MacPhail 2021). However, the available data, including direct observation of decline in Southern Ontario despite considerable survey effort and observed declines of host species, provide sufficient basis to place this species in an endangered/threatened category. Thus Data Deficient is not appropriate.

3.4.2. Extinct or extirpated

Insufficient survey effort to apply.

Extensive bumble bee surveys in Southern Ontario have produced no observations since 1971. However, central and northern Ontario have not been adequately surveyed (COSSARO 2016; pers. comm. Colin Jones 2021; pers. comm. Shelia Colla, Amanda Liczner & Victoria MacPhail 2021). The species persists in western North America, and is not globally extinct.

3.4.3. Not at risk

Does not apply.

4. Summary of Ontario status

Suckley's Cuckoo Bumble Bee (*Bombus suckleyi*) is classified as Endangered in Ontario based on meeting criterion A2ace. The Ontario status differs from the COSEWIC status of Threatened due to the species' smaller population and greater declines in Ontario.

This status of this species is consistent with the definition of Endangered under the Endangered Species Act, 2007.

5. Information sources

COSEWIC. 2011. Guidelines for recognizing designatable units. Website: <https://www.canada.ca/en/environment-climate-change/services/committee-status-endangered-wildlife/guidelines-recognizing-designatable-units.html> [Accessed September 15, 2019].

COSEWIC. 2019. COSEWIC assessment and status report on the Suckley's cuckoo Bumble Bee *Bombus suckleyi* in Canada. Committee on the Status of Endangered Wildlife in Canada. Ottawa. Xi + 70pp. (<https://www.canada.ca/en/environment-climate-change/services/species-risk-public-registry.html>)

COSSARO. 2016. Ontario Species at Risk Evaluation Report for Yellow-banded Bumble bee (*Bombus terricola*)

Greene, J.W. 1860. Review of the American Bombidae, together with a description of several species heretofore undescribed, being a synopsis of the species of this family of hymenopterous insects thus far known to inhabit North America. *Annals of The Lyceum of Natural History of New York* 7:168-176.

Hines, H.M. 2008. Historical biogeography, divergence times, and diversification patterns of bumble bees (Hymenoptera: Apidae: *Bombus*). *Systematic Biology* 57:58-75.

Lhomme, P., and H. M. Hines. 2018. Ecology and evolution of cuckoo bumble bees, *Annals of the Entomological Society of America*, <https://doi.org/10.1093/aesa/say031>

¹ A change in the classification of a species during reassessment by COSSARO may be for genuine or non-genuine reasons. Genuine reasons may include a reduction in threats to a species such that status of the species has improved, or the continuation of threats to the species such that the status of the species has further deteriorated. Non-genuine reasons may include new information on population size or threats that was not available during a previous assessment, the use of previous COSSARO criteria that may have yielded a different result or, taxonomic revisions that result in changes in range, population sizes or designatable units.

Appendix 1: Technical summary for Ontario

Species: Suckley's Cuckoo Bumble Bee (*Bombus suckleyi*)

Demographic information

Demographic attribute	Value
Generation time. Based on average age of breeding adult: age at first breeding = X year; average life span = Y years.	1 years
Is there an observed, inferred, or projected continuing decline in number of mature individuals?	Unknown
Estimated percent of continuing decline in total number of mature individuals within 5 years or 2 generations.	Unknown
Observed, estimated, inferred, or suspected percent reduction or increase in total number of mature individuals over the last 10 years or 3 generations.	Unknown
Projected or suspected percent reduction or increase in total number of mature individuals over the next 10 years or 3 generations.	Unknown
Observed, estimated, inferred, or suspected percent reduction or increase in total number of mature individuals over any 10 years, or 3 generations, over a time period including both the past and the future.	Unknown
Are the causes of the decline (a) clearly reversible, and (b) understood, and (c) ceased?	a. Unknown b. Unknown c. Unknown
Are there extreme fluctuations in number of mature individuals?	No

Extent and occupancy information in Ontario

Extent and occupancy attributes	Value
Estimated extent of occurrence (EOO). <i>If value in COSEWIC status report is not applicable, then use geocat.kew.org. State source of estimate.</i>	0 km ²
Index of area of occupancy (IAO). <i>If value in COSEWIC status report is not applicable, then use geocat.kew.org. State source of estimate.</i>	0 km ²
Is the total population severely fragmented? i.e., is >50% of its total area of occupancy is in habitat patches that are: (a) smaller than would be required to support a viable population, and	a. Unknown b. Unknown

Extent and occupancy attributes	Value
(b) separated from other habitat patches by a distance larger than the species can be expected to disperse?	
Number of locations. <i>See Definitions and Abbreviations on COSEWIC and IUCN websites for more information on the term "location". Use plausible range to reflect uncertainty if appropriate.</i>	0
Number of NHIC Element Occurrences <i>Request data from MNRF.</i>	0
Is there an observed, inferred, or projected continuing decline in extent of occurrence?	Unknown
Is there an observed, inferred, or projected continuing decline in index of area of occupancy?	Unknown
Is there an observed, inferred, or projected continuing decline in number of sub-populations or EOs?	Unknown
Is there an observed, inferred, or projected continuing decline in number of locations?	Unknown
Is there an observed, inferred, or projected continuing decline in [area, extent and/or quality] of habitat?	Unknown
Are there extreme fluctuations in number of populations?	Unknown
Are there extreme fluctuations in number of locations?	Unknown
Are there extreme fluctuations in extent of occurrence?	Unknown
Are there extreme fluctuations in index of area of occupancy?	Unknown

Number of mature individuals in each sub-population or total population (if known)

Sub-population (or total population)	Number of mature individuals
<i>Total population</i>	<i>None observed since 1971</i>

Quantitative analysis (population viability analysis conducted)

Probability of extinction in the wild is unknown.

Threats

A threats calculator was completed as part of the most recent COSEWIC assessment (2019). Assigned overall threat impact: **high**, based on the following impacts:

- Medium:
 - o Natural system modification (other ecosystem modifications)
- Low:
 - o Agriculture and aquaculture (annual & perennial non-timber crops)

- Pollution (agriculture & forestry effluents)
- Climate change & severe weather (habitat shifting & alteration; droughts)

Rescue effect

Rescue effect attribute	Value
Does the broader biologically relevant geographic range for this species extend beyond Ontario?	Possibly
Status of outside population(s) most likely to provide immigrants to Ontario	Likely extirpated: not observed for more than 20 years.
Is immigration of individuals and/or propagules between Ontario and outside populations known or possible?	No
Would immigrants be adapted to survive in Ontario?	Probably
Is there sufficient suitable habitat for immigrants in Ontario?	Probably
Are conditions deteriorating in Ontario?	Yes
Is the species of conservation concern in bordering jurisdictions?	Yes, S3S4 in Manitoba, SNR in Quebec
Is the Ontario population considered to be a sink?	Unknown
Is rescue from outside populations likely?	No

Sensitive species

Suckley's Cuckoo Bumble Bee is not a sensitive species.

Acronyms

COSEWIC: Committee on the Status of Endangered Wildlife in Canada
COSSARO: Committee on the Status of Species at Risk in Ontario
ESA: Endangered Species Act
EO: Element occurrence (as defined by NHIC)
EOO: extent of occurrence
GRANK: global conservation status assessments
IAO: index of area of occupancy
IUCN: International Union for Conservation of Nature and Natural Resources
MNRF: Ministry of Natural Resources and Forestry
NHIC: Natural Heritage Information Centre
NNR: Unranked
NRANK: National conservation status assessment
SARA: Species at Risk Act
SNR: unranked
SRANK: subnational conservation status assessment
S1: Critically Imperiled
S2: Imperiled
S3: Vulnerable
S4: Apparently Secure
S5: Secure
IUCN: International Union for Conservation of Nature and Natural Resources
CDSEPO: Le Comité de détermination du statut des espèces en péril en Ontario