

Ontario Species at Risk Evaluation Report for

Karner Blue

Mélissa Bleu

(Plebejus samuelis)

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

Assessed by COSSARO as Extirpated

November 2020

Mélissa Bleu (*Plebejus samuelis*)

Le mélissa bleu est un petit papillon d'une envergure de 2,5 cm. Le dessous de ses ailes, d'un gris argenté pâle, se ponctue de points noirs et de croissants orangés le long des bordures extérieures. Les mâles ont des ailes bleu nuit parées d'une bordure noire et d'une frange blanche extérieure. La coloration des femelles est plus foncée allant du bleu mauve au brun mauve, et les extrémités de leurs ailes présentent une rangée de taches foncées bordée de croissants orange. Les larves sont vertes et recouvertes de poils très fins, ce qui les protège des prédateurs.

Le mélissa bleu femelle pond ses œufs sur le lupin vivace ou à proximité de cette plante, qui représente la seule source de nourriture de la larve. Deux générations de papillons naissent chaque année. Au printemps, les œufs pondus l'année précédente éclosent pour donner une première génération de chenilles. Les papillons adultes qui émergent à la fin de l'été se reproduisent et pondent des œufs qui n'éclosent pas avant le printemps suivant.

L'habitat du mélissa bleu se limite aux endroits où pousse le lupin vivace : les sols sableux, les landes à pins sableuses, les dunes de plage et les savanes à chênes. Le mélissa bleu forme des populations isolées dont l'aire de répartition s'étend d'est en ouest depuis le New Hampshire et l'État de New York jusqu'au Minnesota, en passant par le sud de l'Ontario et les États riverains des Grands Lacs. Le mélissa bleu a disparu de certains des États faisant partie de cette aire de répartition, mais quelques-uns (dont l'Ohio et le New Hampshire) sont en train de le réintroduire.

Les plus récentes observations du mélissa bleu en Ontario ont été enregistrées vers la fin des années 1980 et le début des années 1990 à Port Franks et à St. Williams. Cette espèce a déjà été plus répandue, des spécimens ayant été observés à Toronto, à London et dans la moraine d'Oak Ridges. Malgré des relevés répétés, l'espèce n'a pas été observée dans la province depuis 1991 et est considérée comme une espèce disparue en Ontario.

Cette publication hautement spécialisée «COSSARO Candidate Species at Risk Evaluation for Karner Blue» n'est disponible qu'en anglais conformément au Règlement 671/92, selon lequel il n'est pas obligatoire de la traduire en vertu de la Loi sur les services en français. Pour obtenir des renseignements en français, veuillez communiquer avec le ministère l'Environnement, de la Protection de la nature et des Parcs au cossarosecretariat@ontario.ca.

Executive summary

Karner Blue is a small butterfly with a wingspan of 2.5 cm. The underside of the wings are light silver- grey in colour with black dots and orange crescents along the outer edges. Males have deep blue wings with black edges and a white outer fringe. Females are a deeper purple-blue to purple-brown in colour, with a row of dark spots with orange crescents along the wing edges. The larvae are green and covered in very fine hairs and for protection from predators.

The female Karner Blue lays eggs on or near Wild Lupine, the sole food source of the larvae. Two broods are produced each year. In spring, eggs that were laid the previous year metamorphose to produce a first brood of caterpillars. These caterpillars pupate and adult butterflies emerge in May. These adults then mate and lay eggs in June. After a week, the eggs hatch and the resulting caterpillars feed for three weeks before pupating into adult butterflies in late summer. Adult butterflies that emerge in late summer mate and lay eggs that do not hatch until the following spring.

The habitat of the Karner Blue is restricted to where Wild Lupine grows – in sandy soils, sandy pine barrens, beach dunes, and oak savannahs. Karner Blue occurs in isolated populations from New Hampshire and New York, west through southern Ontario and states bordering the Great Lakes to Minnesota. Karner Blue is extirpated from some of the states throughout its range, but some jurisdictions (e.g. Ohio and New Hampshire) have initiated reintroductions.

The most recent occurrences of Karner Blue in Ontario are from Port Franks and St. Williams in the late 1980s and early 1990s. Karner Blue was historically more widespread with records from Toronto, London and the Oak Ridges Moraine. Despite repeated searches it has not been observed in Ontario since 1991 and is assessed as Extirpated in Ontario.

1. Eligibility for Ontario status assessment

1.1. Eligibility conditions

1.1.1. Taxonomic distinctness

Karner Blue is a valid species (COSEWIC, 2019).

1.1.2. Designatable units

None.

1.1.3. Native status

Karner Blue is considered native in Ontario. It was first documented by western science in Ontario in 1894 (in Toronto) (Environment and Climate Change Canada, 2019).

1.1.4. Occurrence

Karner Blue was last recorded in the province in 1991 (COSEWIC, 2019).

1.2. Eligibility results

Karner Blue (*Plebejus samuelis*) is eligible for status assessment in Ontario.

2. Background information

2.1. Current designations

- GRANK: G1G2 (NatureServe 2020)
- IUCN: Not assessed
- NRANK Canada: NX
- COSEWIC: Extirpated (May 2019) Designated Extirpated in April 1997. Status re-examined and confirmed in May 2000, April 2010, and May 2019.
- SARA: Extirpated (Schedule 1)
- ESA 2007: Extirpated (June 2010)
- SRANK: SX

2.2. Distribution in Ontario

Karner Blue was known historically in Ontario from remnant oak savannahs from: Uxbridge, Rice Lake Plains (no specimen), Toronto, St. Williams, London, and Port Franks-Pinery. It has not been reliably reported at any site in the province since 1991, despite repeated searches of the historical sites of occurrence and other sites

supporting populations of Wild Lupine (*Lupinus perennis*) (Environment and Climate Change Canada, 2019).

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

Occurs or occurred in a limited range primarily in Great Lakes jurisdictions from Minnesota, Wisconsin, Illinois and Iowa east to Maine, Massachusetts and New Hampshire. Now extremely rare in most jurisdictions and extirpated in Iowa, Maine, Massachusetts and Pennsylvania. Globally imperiled and listed as Endangered under the U.S. *Endangered Species Act* in 1992 (US Fish and Wildlife Service, 2003).

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	No	n/a	Does not occur
Manitoba	No	n/a	Does not occur
Michigan	No	S2	State listed: Threatened (Michigan Natural Features Inventory, 2020)
Minnesota	No	S1	State listed: Endangered (Minnesota Department of Natural Resources, 2020)
Nunavut	No	n/a	Does not occur
New York	No	S1	State listed: Endangered (New York Department of Environmental Conservation, 2020)
Ohio	No	S1	
Pennsylvania	No	SX	
Wisconsin	No	S3	Species of concern but not listed (Wisconsin Department of Natural Resources, 2020)
<i>Other</i>			

2.4. Ontario conservation responsibility

Karner Blue had a restricted range in Ontario that comprised under twenty percent of distribution and population of the species.

2.5. Direct threats

The distribution and population density of Karner Blue appear to have been limited by the extent and health of the Wild Lupine. Fire likely maintain the open nature of the lupine's habitat including oak savannahs. Habitat loss, fire suppression and extensive planting of pine trees have greatly reduced the amount of available habitat.

2.6. Specialized life history or habitat use characteristics

Karner Blue have two key characteristics that increase their vulnerability:

- The larvae only feed on Wild Lupine which has a restricted and patchy distribution.
- It does not regularly disperse over long distances (> 1 km), and sites where it became locally extinct may not be recolonized

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

Does not apply.

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

Does not apply.

3.3. Status category modifiers

3.3.1. Ontario's conservation responsibility

Does not apply.

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

Does not apply.

3.4. Other status categories

3.4.1. Data deficient

Does not apply.

3.4.2. Extinct or extirpated

Karner Blue is extirpated from Ontario. It has not been seen in the province since 1991 despite repeated searches.

3.4.3. Not at risk

Does not apply.

4. Summary of Ontario status

Karner Blue (*Plebejus samuelis*) is classified as Extirpated in Ontario. It has not been observed since 1991 despite repeated searches.

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

5. Information sources

COSEWIC. (2019). *COSEWIC status appraisal summary on the Karner Blue Plebejus samuelis in Canada*. Ottawa

Environment and Climate Change Canada. (2019). *Recovery Strategy for the Karner Blue (Lycaeides melissa samuelis), Frosted Elfin (Callophrys irus) and Eastern Persius Duskywing (Erynnis persius persius) in Canada*. Ottawa

Michigan Natural Features Inventory. (2020). Michigan's Rare Plants and Animals. Retrieved from <https://mnfi.anr.msu.edu/species>

Minnesota Department of Natural Resources. (2020). Minnesota's endangered, threatened, and special concern species. Retrieved from <https://www.dnr.state.mn.us/ets/index.html>

New York Department of Environmental Conservation. (2020). Endangered Species. Retrieved from <https://www.dec.ny.gov/animals/7181.html>

US Fish and Wildlife Service. (2003). Final recovery plan for the Karner blue butterfly (*Lycaeides melissa samuelis*). *US Fish and Wildlife Service, Fort Snelling, Minnesota*.

Wisconsin Department of Natural Resources. (2020). Wisconsin's Endangered and Threatened Species Laws. Retrieved from <https://dnr.wisconsin.gov/topic/endangeredresources/laws>

Appendix 1: Technical summary for Ontario

Species: Karner Blue (*Plebejus samuelis*)

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 year (2 broods)
Is there an observed, inferred, or projected continuing decline in number of mature individuals?	Not applicable
Estimated percent of continuing decline in total number of mature individuals within 5 years or 2 generations.	Not applicable
Observed, estimated, inferred, or suspected percent reduction or increase in total number of mature individuals over the last 10 years or 3 generations.	Not applicable
Projected or suspected percent reduction or increase in total number of mature individuals over the next 10 years or 3 generations.	Not applicable
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.	Not applicable
Are the causes of the decline (a) clearly reversible, and (b) understood, and (c) ceased?	a. Yes b. Yes c. Partially
Are there extreme fluctuations in number of mature individuals?	Unknown

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	Not applicable

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>	Not applicable
Is there an observed, inferred, or projected continuing decline in extent of occurrence?	Not applicable
Is there an observed, inferred, or projected continuing decline in index of area of occupancy?	Not applicable
Is there an observed, inferred, or projected continuing decline in number of sub-populations or EOs?	Not applicable
Is there an observed, inferred, or projected continuing decline in number of locations?	Not applicable
Is there an observed, inferred, or projected continuing decline in [area, extent and/or quality] of habitat?	Not applicable
Are there extreme fluctuations in number of populations?	Not applicable
Are there extreme fluctuations in number of locations?	Not applicable
Are there extreme fluctuations in extent of occurrence?	Not applicable
Are there extreme fluctuations in index of area of occupancy?	Not applicable

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

Sub-population (or total population)	Number of mature individuals
<i>Durham (Uxbridge)</i>	0
<i>Toronto (High Park)</i>	0
<i>Lambton (Pinery-Port Franks-Grand Bend)</i>	0
<i>Norfolk (St. Williams Conservation Reserve, Charlottesville Township)</i>	0
<i>Middlesex (London)</i>	0
<i>Rice Lake Plains</i>	0

Quantitative analysis (population viability analysis conducted)

Not applicable.

Threats

Succession and habitat loss of oak savannah and woodland that resulted in the decline of Wild Lupine.

Rescue effect

Rescue effect attribute	Value
Does the broader biologically relevant geographic range for this species extend beyond Ontario?	No
Status of outside population(s) most likely to provide immigrants to Ontario	Imperilled
Is immigration of individuals and/or propagules between Ontario and outside populations known or possible?	No
Would immigrants be adapted to survive in Ontario?	Unknown
Is there sufficient suitable habitat for immigrants in Ontario?	Unknown (Environment and Climate Change Canada, 2019)
Are conditions deteriorating in Ontario?	No. There are currently efforts to restore Oak Savannah and Wild Lupine in the Norfolk area.
Is the species of conservation concern in bordering jurisdictions?	Yes
Is the Ontario population considered to be a sink?	No
Is rescue from outside populations likely?	No

Sensitive species

No

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