Ontario Species at Risk Evaluation Report for Eastern Red Bat Chauve-souris rousse d l'Est (*Lasiurus borealis*)

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

Assessed by COSSARO as Endangered

January 2024

Final

Executive summary

The Eastern Red Bat (*Lasiurus borealis*) is distinguished by fur that is usually orange but varies from yellowish-red to yellowish-grey. White hairs or white-tipped hairs give a frosted appearance. The skin is light-coloured on the face and along the margins of the arms and fingers but contrasts strongly with black wing membranes. Males are typically redder than females. Females are slightly larger than males. Moths are an important component of the diet for Eastern Red Bat. They occur primarily east of the Western Cordillera and are widespread from the boreal forest to the Gulf of Mexico. The northern extent of its range is uncertain due to low survey effort (COSEWIC IN PRESS, 2023).

Eastern Red Bat are long-distanced migrants, with some individuals moving hundreds or thousands of kilometres between summer and winter months. Eastern Red Bat overwinter in the southern United States, however migration routes are unknown. They hibernate beneath leaf litter during cold periods with periods of torpor possibly lasting several days (COSEWIC IN PRESS, 2023).

Major threats contribute cumulatively to suspected declines and include wind energy development, decline in prey availability, pollution, loss of roosting habitat and climate change. Wind energy development is identified as the greatest threat to migratory bat species (Fleming et al., 2003; COSEWIC IN PRESS, 2023). Bat mortality at turbines is comprised of 75 to 80% migratory bats and are the most common groups of bats killed at wind turbines in North America. Eastern Red Bats are the second most often killed bat species at wind energy facilities across North America, representing 22% of fatalities. In Canada, they represent 15% of fatalities (Zimmerling and Francis, 2016; Arnett and Baerwald, 2013). Wind energy development is currently widespread in Southern Ontario and is projected to increase across North America.

Eastern Red Bat has been assessed as Endangered in Ontario based on meeting criteria A2be+A3be+A4be.

1. Eligibility for Ontario status assessment

1.1. Eligibility conditions

1.1.1. Taxonomic distinctness

The Eastern Red Bat (*Lasiurus borealis*) is recognized as a distinct taxon. Recent genetic evidence suggests that Eastern Red Bat is the only subspecies of the Eastern Red Bats that occurs in Canada (Nagorsen and Paterson, 2012; Solick *et al.* 2020).

1.1.2. Designatable units

The Eastern Red Bat has a single contiguous distribution across North America and therefore comprises a single designatable unit.

1.1.3. Native status

The Eastern Red Bat is native to Canada and Ontario.

1.1.4. Occurrence

The Eastern Red Bat is known to occur across Ontario. Species occurrences are not currently tracked in Ontario.

1.2. Eligibility results

The Eastern Red Bat (*Lasiurus borealis*) is eligible for status assessment in Ontario.

2. Background information

2.1. Current designations

- GRANK: G3G4
- IUCN: Least concern
- NRANK Canada: N4B, NUM
- COSEWIC: Endangered
- SARA: Not listed (under consideration)
- ESA 2007: Not listed
- SRANK: S4

2.2. Distribution in Ontario

Eastern Red Bat's range spans most of Ontario and appears commonly on fatality data from wind energy facilities. For the purposes of range mapping, priority is given to visual observations due to the species producing vocalizations that are easily confused with Little Brown Myotis (*Myotis lucifugus*) (IN PRESS, COSEWIC, 2023).

NHIC element occurrence data was not available to assess the population information specific to Ontario.

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

Eastern Red Bat occur primarily east of the Western Cordillera and are widespread from the boreal forest to the Gulf of Mexico. The northern extent of its range is uncertain due to low survey effort. They are long-distance migrants and appear to overwinter primarily in the southeastern United States and then disperse towards the interior and northern regions of the continent during the summer. They can be found in all Canadian provinces except Prince Edward Island. Its distribution in northern Canada is unknown (COSEWIC IN PRESS, 2023).

With respect to the broader biologically relevant geographic range outside of Ontario, Eastern Red Bat are seasonal latitudinal migrants, and available evidence suggests broad mixing across their range. As such any part of their range could be considered biologically relevant. For the purpose of assessing the broader biologically relevant geographic range outside Ontario, the immediately surrounding jurisdictions were considered.

Table 1. Condition of Eastern Red Bat in Adjacent Jurisdictions and Broader Biologically Relevant Geographic Range

Adjacent Jurisdictions	Biologically Relevant to Ontario (n/a, yes, no)	Condition	Notes & Sources
Quebec	Yes	S1	NatureServe 2023
Manitoba	Yes	S3	NatureServe 2023
Minnesota	Yes	SNR	NatureServe 2023
Wisconsin	Yes	S3	NatureServe 2023
Michigan	Yes	S5	NatureServe 2023
Indiana	Yes	S4	NatureServe 2023
Ohio	Yes	SNR	NatureServe 2023
Pennsylvania	Yes	S4	NatureServe 2023
New York	Yes	S3	NatureServe 2023

2.4. Ontario conservation responsibility

Ontario represents a small portion of the species' overall range, likely less than 25%. Currently there are no estimates of the total number of mature individuals across their range in Ontario.

2.5. Direct threats

Eastern Red Bat faces several threats which contribute cumulatively to suspected declines. A threats assessment was undertaken for this species. The overall threat category assigned for the species is very high to high. Threats were identified to include wind energy development (high to very high impact), decline in prey availability (medium to high impact), pollution (low to medium impact), loss of roosting habitat (low impact), and climate change (unknown).

Wind energy development is identified as the greatest threat to migratory bat species (Fleming et al. 2003, cited in COSEWIC 2023). Bat mortality at turbines is comprised of 75 to 80% migratory bats and are the most common groups of bats killed at wind turbines in North America. Wind energy development is currently widespread in Southern Ontario. Eastern Red Bats are the second most often killed bat species at wind energy facilities across North America, representing 22% of fatalities. In Canada, they represent 15% of fatalities (Zimmerling and Francis, 2016; Arnett and Baerwald, 2013).

It is considered likely that 31-70% of Eastern Red Bats in Canada will encounter a wind turbine in the next 3 generations. There is a projected increase in wind development in North America where it is expected to continue to contribute to the decline of the species.

Next threats identified from highest to least/unknown level of threat are a decline in prey availability (medium to high impact), pollution (low to medium impact), loss of roosting habitat (low impact), and climate change (unknown).

Accidents during migration include wind turbine mortality, weather events, and predation. Cumulatively considering the threats, the overall threat for this species is very high to high.

2.6. Specialized life history or habitat use characteristics

Eastern Red Bat fur is typically orange and could vary from yellowish-red to yellowish grey. White hairs or white-tipped hairs give a frosted appearance. The skin is light-coloured on the face and along the margins of the arms and fingers but contrasts strongly with black wing membranes. Males are typically redder than females. Females are slightly larger than males. Litter sizes range from 1-4 pups for Eastern Red Bat (COSEWIC IN PRESS, 2023).

Eastern Red Bat are long-distanced migrants, with some individuals moving hundreds or thousands of kilometres between summer and winter months. Little is known with respect to migration and hibernation. Eastern Red Bat overwinter in the southern United States, however migration routes are unknown. They hibernate beneath leaf litter during cold periods with periods of torpor possibly lasting several days (COSEWIC IN PRESS, 2023).

Summer habitat is characterized as foraging, drinking and roost sites which are primarily deciduous and coniferous forests of any age class. Eastern Red Bat individuals show high fidelity to small roosting areas within their summer home ranges. Roosting occurs among the foliage of trees and occasionally shrubs but tend to be on large diameter and tall trees reaching or exceeding the height of the surrounding canopy. Roost behaviour and well-camouflaged fur results in roosts being highly cryptic. Roost sites are selected based on overhead foliage for cover with open flight space below. They also appear to be near the edge of crown and at sufficient heights to prevent access by mammalian predators. Male Eastern Red Bats in particular, have been observed to use saplings as roosts, which is rarely reported for reproductive females (COSEWIC IN PRESS, 2023).

Eastern Red Bat is an obligate insectivore and a foraging generalist. Foraging habitats likely include above aquatic habitats, low-elevation meadows, grasslands, and fields, as well as within open-canopied forest, above forest canopies, and along their edges. Foraging may occur around lights, which attract moths. Drinking habitats and winter habitats are not well known (COSEWIC IN PRESS, 2023). When searching for prey, the Eastern Red Bat produces an echolocation pulse every 200 milliseconds, but one every 5 milliseconds in the final stages of a foraging event (Fenton, 1998).

2.7. Existing Conservation and Recovery Actions

Migratory bats and specifically Eastern Red Bat is likely to occur in all of the protected areas in Canada. It is unknown if the protected area network alone would meet the habitat needs for this species.

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 Criteria A2be+A3be+A4be for Endangered. There is evidence of decline, most notably from mortality data from wind facilities. Eastern Red Bats are the second most often killed bat species at wind energy facilities across North America, representing 22% of fatalities. In Canada, Eastern Red Bats represent 15% of fatalities at wind facilities. It is considered likely that 31-70% of Eastern Red Bats in Canada will encounter a wind turbine in the next 3 generations. There is a projected increase in wind development in North America where it is expected to continue to contribute to the decline of the species.

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

Does not apply. Extent of occurrence and Index Area of Occupancy are above thresholds.

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

Does not apply. Population is not estimated to be small and exceeds thresholds.

3.1.4. Criterion D – Very small or restricted total population

Does not apply. Range covers large portion of Ontario.

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. The species is classified as G3 globally. Ontario's conservation responsibility is considered less than 25%.

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

Does not apply. Similar threats occurring and ongoing in neighbouring jurisdictions within broader biologically relevant range.

3.3.3. Rescue Effect

Rescue effect is considered unlikely (COSEWIC 2023) as US populations are considered to face greater severity of threat than in Canada.

3.4. Other status categories

3.4.1. Data deficient

Does not apply.

3.4.2. Extinct or extirpated

Does not apply.

3.4.3. Not at risk

Does not apply.

4. Summary of Ontario status

The Eastern Red Bat (*Lasiurus borealis*) is classified as Endangered in Ontario.

5. Information sources

COSEWIC. 2023. IN PRESS. COSEWIC assessment and status report on the Hoary Bat Lasiurus cinereus, Eastern Red Bat Lasiurus borealis and the Silver-haired Bat Lasionycteris noctivagans, in Canada. Committee on the Status of Endangered Wildlife in Canada. Ottawa. xxi + 101 pp. (https://www.canada.ca/en/environment-climate-change/services/species-risk-public-registry.html).

Davy, CM, K. Squires and J.R. Zimmerling. In Press. Estimation of spatiotemporal trends in bat abundance from mortality data collected at wind turbines. Trends In Bat Abundance.

Frick WF, Baerwald EF, Pollock JF, Barclay RMR, Szymanski JA, Weller TJ, Russell AL, Loeb SC, Medellin RA, McGuire LP. 2017. Fatalities at wind turbines may threaten population viability of a migratory bat. Biological Conservation 209:172–177.

Nagorsen, D.W., and B. Paterson. 2012. An update on the status of red bats, *Laiurus blossevillii* and *Lasiurus borealis,* in British Columbia. Northwestern Naturalist 93:235-237.

NatureServe. 2023. NatureServe Explorer: An online encyclopedia of life [web application]. Version 7.1. NatureServe, Arlington, Virginia. Website: http://explorer.natureserve.org [accessed September 2021].

Solick, D.I., R.M.R. Barclay, L. Bishop-Boros, Q.R. Hays, and C.L. Lausen. 2020. Distributions of eastern and western red bats in western North America. Western North American Naturalist 80:90-97.

Appendix 1: Technical summary for Ontario

Species: Eastern Red Bat (*Lasiurus borealis*)

Demographic information

Demographic attribute	Value
Generation time based on the IUCN Generation Calculator and also uses Pacifici et al. (2013) for the upper value of 6 years.	Estimated at 2-6 yrs (3 generations = 6–18 years)
Is there an observed, inferred, or projected continuing decline in number of mature individuals?	Yes, inferred
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.	Inferred reduction
Projected or suspected percent reduction or increase in total number of mature individuals over the next 10 years or 3 generations.	Suspected reduction
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.	Suspected >70% decline
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). *If value in COSEWIC status report is not applicable, then use geocat.kew.org. State source of estimate.*	Unknown
Index of area of occupancy (IAO). *If value in COSEWIC status report is not applicable, then use geocat.kew.org. State source of estimate.*	Unknown
Is the total population severely fragmented? i.e., is >50% of its total area of occupancy is in habitat patches that are:	a. No b. No

Extent and occupancy attributes	Value
(a) smaller than would be required to support a viable population, and (b) separated from other habitat patches by a distance larger than the species can be expected to disperse?	
Number of locations. *See Definitions and Abbreviations on COSEWIC and IUCN websites for more information on the term "location". Use plausible range to reflect uncertainty if appropriate.*	Unknown
Number of NHIC Element Occurrences *Request data from MNRF.*	NA
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?	Yes. Inferred decline
Are there extreme fluctuations in number of populations?	No
Are there extreme fluctuations in number of locations?	Unknown
Are there extreme fluctuations in extent of occurrence?	No
Are there extreme fluctuations in index of area of occupancy?	No

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

Sub-population (or total population)	Number of mature individuals
Ontario	*Unknown*

Quantitative analysis (population viability analysis conducted)

Not available.

Threats

Key threats (based on COSEWIC INPRESS 2023) were identified as:

I. Energy production & mining (IUCN 3) – high impact.

II. Natural system modifications (IUCN 7) – high - medium impact
III. Pollution (IUCN 9) – medium – low impact
IV. Agriculture & aquaculture (IUCN 2) - low impact
V. Transportation & service corridors (IUCN 4) – low impact
VI. Biological resource use (IUCN 5) – low impact
VII. Invasive & other problematic species and genes (IUCN 8) – low impact

Rescue effect

Rescue effect attribute	Value
Does the broader biologically relevant geographic range for this species extend beyond Ontario?	Yes
Status of outside population(s) most likely to provide immigrants to Ontario	Variable, with similar threats to Ontario
Is immigration of individuals and/or propagules between Ontario and outside populations known or possible?	Yes
Would immigrants be adapted to survive in Ontario?	Yes
Is there sufficient suitable habitat for immigrants in Ontario?	Yes
Are conditions deteriorating in Ontario?	Unknown
Is the species of conservation concern in bordering jurisdictions?	Variable
Is the Ontario population considered to be a sink?	Unknown
Is rescue from outside populations likely?	Unknown

Sensitive species

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