

**Ontario Species at Risk Evaluation Report for
Red-tailed Leafhopper (*Aflexia rubranura*)**

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

(Great Lakes Plains DU)
Assessed by COSSARO as Special Concern

August 2020

Cicadelle à queue rouge (*Aflexia rubranura*)

La cicadelle à queue rouge est un petit membre (long de 2 à 4 mm) de la famille des cicadelles, pâle et habituellement brachyptère, qui se distingue par les bandes sombres qui traversent son dos. L'espèce doit son nom au segment rouge évident situé au bout de l'abdomen du mâle adulte. L'espèce se nourrit exclusivement de sporobole à glumes inégales (*Sporolobus heterolepis*); sa capacité de dispersion est limitée par la spécificité de son hôte et le fait qu'elle ne vole pas. Le COSEPAC (2019) reconnaît deux unités désignables (UD) de cette espèce dont l'une, l'UD des plaines des Grands Lacs, se trouve entièrement en Ontario, sur l'île Manitoulin et les îles voisines; l'autre UD est à l'extérieur du territoire ontarien. L'UD des plaines des Grands Lacs est une population de fossiles vivants issue d'une expansion antérieure de l'habitat des prairies datant de la période hypsithermale (il y a 5 000 à 8 000 ans), dont l'occurrence est actuellement connue dans 19 emplacements de l'île Manitoulin et d'autres îles voisines du lac Huron. Elle est menacée par une perte d'habitat due à une variété de causes.

L'évaluation de la cicadelle à queue rouge faite par le CDSEPO la classe dans la catégorie des espèces préoccupantes en raison de la possibilité d'une réduction de la modeste aire de répartition visée par différentes menaces, et de la responsabilité qui incombe à l'Ontario de protéger la population des plaines des Grands Lacs. Ce statut est conforme à celui du COSEPAC (2019).

Cette publication hautement spécialisée «COSSARO Candidate Species at Risk Evaluation for Red-tailed Leafhopper» 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

The Red-tailed Leafhopper (*Aflexia rubranura*) is a small, pale, and usually brachypterous cicadellid (2–4mm long) with distinct dark dorsal markings. Adult males have a red-tipped abdomen, giving rise to the common name. The species feeds exclusively on Prairie Dropseed (*Sporolobus heterolepis*) and has limited dispersal ability due to its host specificity and its inability to fly. COSEWIC (2019) recognizes two designated units (DUs) for this species of which one, the Great Lakes Plains DU, occurs entirely in Ontario on Manitoulin Island and adjacent islands; the other DU does not occur in Ontario. The Great Lakes Plains DU is a relict population from a previous expansion of prairie habitat during the Hypsithermal period (5000-8000 years ago) and is currently known from 19 locations on Manitoulin and other nearby Lake Huron islands. It is threatened by habitat loss from a variety of causes.

The Red-tailed Leafhopper has been assessed by COSSARO as Special Concern based on the potential of decline the small range cause by various threats, and Ontario's conservation responsibility to the DU.

This status is consistent with COSEWIC (2019).

1. Eligibility for Ontario status assessment

1.1. Eligibility conditions

1.1.1. Taxonomic distinctness

The Red-tailed Leafhopper is a morphologically distinct species and currently the only member of the genus *Aflexia*. It can be recognized by its colouration: body generally pale with dark dorsal markings on each side (anteriorly as spots, posteriorly as lines), and the tip of the abdomen red in males. The genitalia (male and female) are also diagnostic. It is approximately 2–4 mm in length.

1.1.2. Designatable units

COSEWIC (2019) recognizes two DUs: a Great Lakes Plains DU and a Prairie DU. Only the Great Lakes Plains DU occurs in Ontario.

1.1.3. Native status

The Red-tailed Leafhopper is native to Ontario. The earliest published record of this species is from 1990, and Hamilton (2005) reports that its occurrence in Ontario is likely due to an expansion of its population, in parallel with its host plant, during the Hypsithermal period (~5000-8000 bp). Its disjunct distribution has been found in other taxa, including plants (e.g., Hamilton and Eckert 2007). The absence of Red-tailed Leafhopper in earlier collections is probably a result of a lack in collecting efforts for cicadellids on appropriate habitat as well as natural population fluctuations.

1.1.4. Occurrence

The Red-tailed Leafhopper is currently known in Ontario from several islands in Lake Huron, including Manitoulin Island, Barrie Island, Goat Island and Great La Cloche Island. Its occurrence is closely associated with its host plant, Prairie Dropseed (*Sporolobus heterolepis*). Adults are generally encountered from July to August and they overwinter as eggs (Dana et al. 2016). Prairie Dropseed has also been recorded in northwestern Ontario but no records of associated Red-tailed Leafhoppers have yet to be found.

1.2. Eligibility results

Red-tailed Leafhopper (*Aflexia rubranura*) is eligible for status assessment in Ontario.

2. Background information

2.1. Current designations

- GRANK: G2 (NatureServe 2020)
- IUCN: No Status
- NRANK Canada: N1N2 (NatureServe 2020)
- COSEWIC: Special Concern (COSEWIC 2018)
- SARA: No Status
- ESA 2007: No Status (Not previously assessed)
- SRANK: S1 (ranked in 2001; reassessed in 2020)

2.2. Distribution in Ontario

The Red-tailed Leafhopper is currently found on alvars and dolomite ridges (Bouchard et al. 2001) only on Manitoulin Island and a few smaller nearby islands. Its distribution on Manitoulin Island is reflective of the distribution of Prairie Dropseed, its only host plant. This distribution also represents the entirety of the Great Lakes Plains DU.

COSEWIC (2018) currently includes 19 sites, each treated as a separate location, although this may increase with additional sampling. Sites where Red-tailed Leafhopper is present were considered locations if there were barriers of more than 1 km between viable habitat (i.e., where no host plants were present).

Red-tailed Leafhopper's host plant, Prairie Dropseed has a broader distribution in southern and central Ontario than the Red-tailed Leafhopper, and it has recently been documented in northwestern Ontario. The Red-tailed Leafhopper is currently ranked as S1 by the Natural Heritage Information Centre.

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

NatureServe (2020) currently records the Red-tailed Leafhopper from Manitoba (SNR), Illinois (S2), Minnesota (S3) and Wisconsin (S2?), although Bouchard et al. (2001) also report it from South Dakota; these belong to the other DU, and do not belong to the Great Lakes Plains DU. Outside of Ontario, Red-tailed Leafhopper is associated with various types of prairie habitats (Bouchard et al. 2001, U.S. Forest Service, Eastern Region 2003). Hamilton (2005) provides a distribution of Prairie Dropseed and two associated flightless leafhoppers (Red-tailed Leafhopper and *Memnonia panzeri*) in the eastern prairies. The range of this species in other jurisdictions all belong to the Prairie DU.

2.4. Ontario conservation responsibility

For the Great Lakes Plains DU, Ontario's conservation responsibility is 100%. Consideration of both DUs into a single unit would significantly reduce Ontario's conservation responsibility to less than 5% (based on known occurrences provided in

COSEWIC 2018).

2.5. Direct threats

The greatest threat currently considered for the Great Lakes Plains DU is aggregate extraction, which may threaten specific subpopulations and potentially fragment habitat corridors that allow migration of individuals between appropriate habitat (COSEWIC 2018). As the Great Lakes Plains DU occurs largely on limestone alvars, aggregate extraction has the potential to cause significant effects on a subpopulation either through direct mortality or through mortality to its host plant. Some populations currently reside on conserved properties (Misery Bay Provincial Park and Nature Conservancy of Canada properties), but the future plans for aggregate quarrying at other sites is not clear.

Mortality from fires is a threat to subpopulations, as the Red-tailed Leafhopper is flightless as an adult, and unable to rapidly escape an area in the event of a fire. Eggs and nymphs are also susceptible to fire mortality as they occur above ground. Wisconsin Department of Natural Resources (2018) reports that it takes 2-4 years for Red-tailed Leafhopper numbers to recover following a burn (prescribed or natural). Complete suppression of fire is also a concern for prairie subpopulations as prairie habitat is maintained by naturally occurring fires that are ecologically crucial in nutrient recycling, and the suppression of the encroachment of invasive species and woody plants. It is currently unknown what specific burn management practices, if any, occur on Manitoulin locations and how these specific practices will affect Red-tailed Leafhopper.

Habitat loss is also a major threat to the Red-tailed Leafhopper. NatureServe (2018) indicates that the Red-tailed Leafhopper (treated as a single DU) has lost 99% of its original habitat. This loss is presumably from conversion of prairie habitat to agricultural fields, along with natural conversion of prairie habitats to forests due to the suppression of natural fires. In Ontario, alvar habitat has been utilized for range land, but due to the shallow and dry soils associated with these sites, their conversion to agricultural fields has been comparatively small. Some sites have been disturbed by development.

Although grass mowing has little to no impact on the Red-tailed Leafhopper (Wisconsin Department of Natural Resources, 2018), grazing is thought to have an indirect impact on the species via an impact on Prairie Dropseed. This effect is assumed to occur through regular damage to the plant or through removal of the root structure, either partially or completely, from the soil column.

2.6. Specialized life history or habitat use characteristics

Red-tailed Leafhopper is monophagous on Prairie Dropseed. This uncommon grass has a more extensive range in Ontario than the Red-Tailed Leafhopper, including sites in southern, eastern and northwestern parts of the province (Oldham and Brinker 2009), and is currently listed as S3. In Ontario, the Red-tailed Leafhopper is known only from alvars and dolomite ridges (Hamilton 2005) on Manitoulin Island, where it is found in close association with its host. Both species occur in prairie or prairie-like habitats (such

as alvars) in other provinces and states, although Prairie Dropseed is sometimes cultivated for use in landscaping and gardens.

The Red-tailed Leafhopper can have one to two generations per year (U.S. Forest Service, Eastern Region 2003; Wisconsin Department of Natural Resources 2018), but in Ontario it is expected that only one generation per year occurs.

The distribution of Red-tailed Leafhopper is thought to represent a unique event in the geological history of Canada. The two DUs, along with other prairies species, developed from historic glacial effects and, as a result, is associated with a “periglacial state” (Catling and Brownell 1995).

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. There is no data on the total number of mature individuals in Ontario nor is there any data to suggest there has been any distinct change in the population size.

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

Does not apply. The EOO (~2926 km²) and IAO (72 km²) meets B1 END and B2 END levels but subcriteria a is exceeded with 19 locations, if each site is taken as a location as done by COSEWIC (2018), there is not sufficient information to indicate any decline in occurrence in Ontario, there is no datum to suggest there is any extreme fluctuations in any of the measures, and the number of locations is likely higher than 10. The IAO may also be substantially larger with increased search effort (COSEWIC 2018) based on known Prairie Dropseed locations on Manitoulin Island.

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

Does not apply. There is no information to suggest any change to the number of mature individuals in Ontario, although may be fluctuations within subpopulations. New collections sites recorded by Foster and Harris (2016) are likely a result of effort and not an actual change of distribution.

3.1.4. Criterion D – Very small or restricted total population

Does not apply. There is not any population datum to consider Criterion D. It is likely that more than 1000 mature individuals occur annually throughout sites on Manitoulin Island and adjacent islands.

3.1.5. Criterion E – Quantitative analysis

Does not apply. Not quantitative analysis has been done for the Red-tailed Leafhopper.

3.2. Application of Special Concern in Ontario

Applicable. The Ontario IAO or EOO values are small enough to make it close to qualifying for Threatened under Criteria B1 and B2. Ontario's conservation responsibility is also extremely high for the Great Lakes Plains DU. This small range make the Red-tailed Leafhopper extremely susceptible to disturbance from various threats. Additionally, any threats to the Ontario population are a threat to the entire Great Lake Plains DU and the Red-tailed Leafhopper has several life history traits that make it likely to be considered Threatened if any subpopulations are lost, making Special Concern applicable.

3.3. Status category modifiers

3.3.1. Ontario's conservation responsibility

Ontario has a significant conservation responsibility to the Great Lakes Plains population as the range of this DU is entirely within Ontario, but does not have a significant Conservation responsibility to the global population of Red-tailed Leafhopper, as it has less than 5% of its global range. While there is a unique evolutionary history to the Great Lakes Plains DU, there is not enough data to suggest that it is physiologically or ecologically different from the other DU.

3.3.2. Status modification based on rescue effect

It is thought that the Ontario population of Red-tailed Leafhopper is a relict population from the Hypsithermal period, which allowed it and its host plant to expand their range into Ontario. As the Red-tailed Leafhopper is flightless and the closest known occurrences outside Ontario (in the Prairie DU) are substantially distant (>450 km), no Rescue Effect is likely.

3.4. Other status categories

3.4.1. Data deficient

Not applicable. There has been substantial effort to document the occurrence of Red-tailed Leafhopper in other parts of Ontario. Although further sampling is required based on the extent of the host plant, there is substantial enough data to provide a clear picture on the general distribution of this species, allowing us to further understand the possible threats.

3.4.2. Extinct or extirpated

Not applicable. There are extant populations on Manitoulin Island and several surrounding islands from as recently as 2016.

3.4.3. Not at risk

Not Applicable. Due to its reduced range, Red-tailed Leafhopper is susceptible to various threats that could have significant impact on the subpopulations, increasing the chance of losing this DU.

4. Summary of Ontario status

Red-tailed Leafhopper (*Aflexia rubranura*) is classified as Special Concern in Ontario based on reaching the thresholds for Endangered by criteria B1 and B2 but not meeting the subcriteria requirements, and Ontario's conservation responsibility. It is assessed here by COSSARO for the first time.

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

5. Information sources

Bouchard, P., K.G.A. Hamilton and T.A. Wheeler. 2001. Diversity and conservation status of prairie endemic Auchenorrhyncha (Homoptera) in alvars of the Great Lakes region. *Proceedings of the Entomological Society of Ontario*, 132: 39–56.

Catling, P.M. and V.R. Brownell. 1995. A review of the alvars of the Great Lakes region: distribution, composition, biogeography and protection. *Canadian Field-Naturalist*, 109: 143–171.

Committee on the Status of Endangered Wildlife in Canada (COSEWIC). 2018 (in prep.). COSEWIC assessment and status report on the Red-tailed Leafhopper *Aflexia rubranura* in Canada. Committee on the Status of Endangered Wildlife in Canada. Ottawa. xv + 53 pp.

Dana, R., El. Harper and C.H. Dietrich. 2016. *Aflexia rubranura* (DeLong, 1935). Accessed 7 August 2020.

Foster, R.F. and A.G. Harris. 2016. Summary of 2016 field surveys for Red-tailed Leafhopper (*Aflexia rubranura*). Report prepared for: Committee on the Status of Endangered Wildlife in Canada. 16 pp.

Hamilton, K.G.A. 2005. Bugs reveal an extensive, long-lost northern tallgrass prairie. *Bioscience*, 55(1): 49–59.

Hamilton, J.A. and C.G. Eckert. 2007 Population genetic consequences of geographic disjunction: a prairie plant isolated on Great Lakes alvars. *Molecular Ecology*, 16(8):

1649–1660.

NatureServe. 2020. NatureServe Explorer: An online encyclopedia of life [web application]. Version 7.1. NatureServe, Arlington, Virginia. Available <http://explorer.natureserve.org>. Accessed: 7 August 2020.

Oldham, M.J., and S.R. Brinker. 2009. Rare Vascular Plants of Ontario, Fourth Edition. Natural Heritage Information Centre, Ontario Ministry of Natural Resources. Peterborough, Ontario. 188 pp.

U.S. Forest Service, Eastern Region. 2003. Conservation assessment for Red-Veined Prairie Leafhopper (*Aflexia rubranura*). 8 pp. + Figures.

Wisconsin Department of Natural Resources. 2020. Red-tailed Prairie Leafhopper (*Aflexia rubranura*). Accessed 7 August 2020.

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: Red-tailed Leafhopper (*Aflexia rubranura*)

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
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?	<p>a. Unknown, but not likely. COSEWIC (2018) indicates “No” presumably based on loss of habitat and the inability of this species to colonize disjunct host plant populations.</p> <p>b. Yes</p> <p>c. No</p>
Are there extreme fluctuations in number of mature individuals?	Unknown. Some sites with known large established populations have greatly diminished/disappeared during follow up sampling.

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>	2926 km ² (but possible to increase with additional

Extent and occupancy attributes	Value
	search effort) COSEWIC (2018)
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>	72 km ² (but likely to increase with additional search effort) [COSEWIC (2019) reports it as 116 km ² due to miscalculation; this has been reported and verified by the report writer]
Is the total population severely fragmented? i.e., is >50% of its total area of occupancy in habitat patches that are: (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?	a. No b. Yes. Due to its limited dispersal abilities, colonization is limited to sites immediately adjacent to established subpopulations.
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>	19 locations (COSEWIC 2018)
Number of NHIC Element Occurrences <i>Request data from MNRF.</i>	Unknown
Is there an observed, inferred, or projected continuing decline in extent of occurrence?	Unknown but not likely
Is there an observed, inferred, or projected continuing decline in index of area of occupancy?	Unknown but not likely
Is there an observed, inferred, or projected continuing decline in number of sub-populations or EOs?	Unknown but not likely
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 but not likely
Are there extreme fluctuations in number of populations?	No
Are there extreme fluctuations in number of locations?	No
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)

No population estimates are available for the Red-tailed Leafhopper in Ontario.

Quantitative analysis (population viability analysis conducted)

Probability of extinction in the wild is unknown. No quantitative analysis has been conducted

Threats

COSEWIC (2018) provides a Threats Calculator for the Great Lakes Plains DU, and find that there are four threats to the Red-tailed Leafhopper, all occurring in both High and Low Range threats: Energy Production and Mining (mining and quarrying), Agriculture and Aquaculture (livestock farming and ranching), Natural System Modification (fire and fire suppression, and other ecosystem modifications), and Residential and Commercial Development (housing and urban areas).

The limited dispersal ability of Red-tailed Leafhopper and its plant host specificity make subpopulations susceptible to habitat disturbance, where the host plant population is disturbed, and through direct effects such as predation, parasitism and mortality from local weather conditions.

Rescue effect and broader biologically relevant geographic range

Rescue effect attribute	Value
Does the broader biologically relevant geographic range for this species extend beyond Ontario?	Yes and No. Red-tailed Leafhopper occurs in other jurisdictions, but the Great Lake Plains DU occurs solely in Ontario.
Status of outside population(s) most likely to provide immigrants to Ontario	Not Applicable. This is a flightless insect, moving by jumping or crawling, and therefore is unable to traverse large distances.
Is immigration of individuals and/or propagules between Ontario and outside populations known or possible?	No
Would immigrants be adapted to survive in Ontario?	Possibly
Is there sufficient suitable habitat for immigrants in Ontario?	Possibly
Are conditions deteriorating in Ontario?	Yes. There is a decrease in quality of habitat caused by development and host plants are either competing with invasive species or have been lost through natural succession

Rescue effect attribute	Value
Is the species of conservation concern in bordering jurisdictions?	Yes, but these belong to a separate DU
Is the Ontario population considered to be a sink?	No
Is rescue from outside populations likely?	No

Sensitive species

Red-tailed Leafhopper is not considered a data sensitive species.

Appendix 2: Broader biologically relevant geographic range

Information regarding rank and decline for Red-tailed Leafhopper (*Aflexia rubranura*)

Adjacent Jurisdictions	Biologically Relevant to Ontario (n/a, yes, no)	Status & Trends	Condition	Notes & Sources
Quebec	n/a			
Manitoba	No	SNR (Prairie DU). Population trends unknown		NatureServe 2020
Michigan	n/a			
Minnesota	No	S3 (Prairie DU). Population trends unknown		NatureServe 2020
Nunavut	n/a			
New York	n/a			
Ohio	n/a			
Pennsylvania	n/a			
Wisconsin	No	S2? (Prairie DU). Population trends unknown		NatureServe 2020; Wisconsin Department of Natural Resources, 2020

Broader Biologically Relevant Geographic Range in Other Jurisdictions

For the Great Lake Plains DU, there is no broader biologically relevant geographic range as it is restricted to Manitoulin Island.

Global Status and Trends

Little is known about the population trends for Red-tailed Leafhopper. NatureServe (2020) notes that it has lost 99% of its original habitat and is absent from most prairie remnants.

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