

**Ontario Species at Risk Evaluation Report for**  
**Eastern False Rue-anemone**  
**Isopyre à Feuilles Biternées**  
**(*Enemion biternatum*)**

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

Assessed by COSSARO as Special Concern

November 2022

Final

## Executive summary

Eastern False Rue-anemone (*Enemion biternatum*) is a small spring-flowering perennial herb that grows to 10-40 cm in height. The flowers are 1.5-2.0 cm wide with five white petal-like sepals surrounding a cluster of stamens with yellow anthers. This woodland perennial herb grows in moist deciduous woodlands and thickets, typically along river floodplain terraces and valley slopes.

The Canadian population of Eastern False Rue-anemone is restricted to the Carolinian Zone in southwestern Ontario. This population is distributed across several subpopulations and numerous sites, although most plants are concentrated at just two sites. Declines have occurred or are inferred to have occurred at a few sites including a large decline (approximately 70%) in the estimated number of stems at the largest reported patch.

Eastern False Rue-anemone has limited dispersal capability, low rates of visitation by pollinators due to a lack of nectar, and self-compatibility which can lead to inbreeding depression or reduced reproductive success; this is most pronounced in small subpopulations.

Competition from invasive non-native plants is considered the primary threat to Eastern False Rue-anemone in Ontario. Recreational trails that occur in close proximity to patches of Eastern False Rue-anemone plants may result in localized trampling and soil compaction. Many of the subpopulations of Eastern False Rue-anemone are in or near expanding urban areas and recreational pressures are expected to increase.

# 1. Eligibility for Ontario status assessment

## 1.1. Eligibility conditions

### 1.1.1. Taxonomic distinctness

Eastern False Rue-anemone (*Enemion biternatum*) is the only member of the genus represented in central and eastern North America. Three other species of *Enemion* are native to the Pacific coast of North America (Gleason and Cronquist, 1991) and one species (*E. savilei*) is endemic to the Queen Charlotte Islands (Calder and Taylor, 1963).

### 1.1.2. Designatable units

In Ontario there is only one designatable unit for Eastern False Rue-anemone which occurs within the Carolinian Zone (COSEWIC 2022) which is made up of six subpopulations. There is no genetic or morphological evidence to support subdivision of the Ontario population into distinct designatable units.

### 1.1.3. Native status

Eastern False Rue-anemone is native to Ontario.

### 1.1.4. Occurrence

Eastern False Rue-anemone has been documented in Ontario since 1897, occurring in five different watersheds in south-western Ontario in the general vicinity of the City of London.

## 1.2. Eligibility results

Eastern False Rue-anemone (*Enemion biternatum*) is eligible for status assessment in Ontario.

# 2. Background information

## 2.1. Current designations

- GRANK: G5 (NatureServe 2022)
- IUCN: Not assessed
- NRANK Canada: N2
- COSEWIC: Special Concern (May 2022)
- SARA: Threatened (Schedule 1)
- ESA 2007: Threatened (2005)
- SRANK: S2 (ranked in 2005)

## 2.2. Distribution in Ontario

Eastern False Rue-anemone is only found in south-western Ontario in the general area surrounding the City of London. Observations of the species occur in a narrow band of this area extending from Port Stanley to Port Franks. Individuals of this species have also been documented in the Simcoe area. There is a total of nine Element Occurrences for Eastern False Rue-anemone in Ontario; four of which are considered historical.

The COSEWIC status of this species was changed from Threatened to Special Concern in 2022. COSEWIC changed its interpretation and application of the terms 'severe fragmentation' and 'area of occupancy' to better align with IUCN assessment criteria and the species exceeds criteria thresholds as now applied.

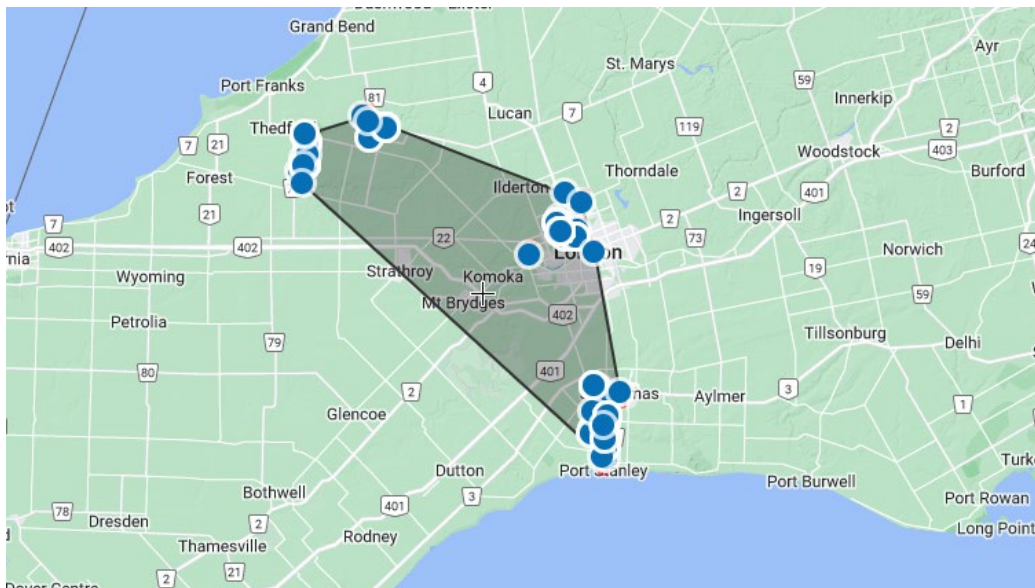


Figure 1. All verified extant Eastern False Rue-anemone records from the NHIC database. Created for this report using [GeoCAT](#) [website accessed October 2022].

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

Within Canada, Eastern False Rue-anemone is only found in Ontario. In the United States, Eastern False Rue-anemone is found along the eastern portion of the country with records in 24 states. This species is considered to be extirpated from New York State. Its status has not been assessed in Michigan or Ohio, but it appears to be common and widespread based on iNaturalist observations.

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

<b>Adjacent Jurisdictions</b>	<b>Biologically Relevant to Ontario (n/a, yes, no)</b>	<b>Condition</b>	<b>Notes &amp; Sources</b>
Quebec	n/a		NatureServe (Oct 2022)
Manitoba	n/a		NatureServe (Oct 2022)
Michigan	Yes	SNR	NatureServe (Oct 2022)
Minnesota	No	SNR	NatureServe (Oct 2022)
Nunavut	n/a		NatureServe (Oct 2022)
New York	Yes	SX	NatureServe (Oct 2022)
Ohio	Yes	SNR	NatureServe (Oct 2022)
Pennsylvania	No	SNA	NatureServe (Oct 2022)
Wisconsin	No	SNR	NatureServe (Oct 2022)
<i>Other Relevant Jurisdiction</i>			

## 2.4. Ontario conservation responsibility

Only a very small portion of the global range for Eastern False Rue-anemone is in Ontario (i.e., <1%). The conservation responsibility for this species in Ontario is very low.

## 2.5. Direct threats

It is difficult to determine whether the habitat has been drastically altered since the last status report due to the dynamic nature of floodplain systems. There does appear to be an increase in the number of trails and trail usage, possibly due to an increase in the number of homes adjacent to the floodplain. In addition, a number of invasive species seem to be colonizing the floodplain habitats generally occupied by Eastern False Rue-anemone (COSEWIC 2022). These factors may have contributed to the decline (and in some cases, extirpation) of Eastern False Rue-anemone populations that previously occupied the floodplains.

In Ontario, subpopulations of Eastern False Rue-anemone are impacted by soil compaction and trampling, due to their proximity to public areas and trails. Loss of habitat due to invasion of tall grasses, wood cutting operations, soil erosion, and agricultural activities also pose threats to populations of the Eastern False Rue-anemone (COSEWIC 2022). Spraying of herbicides and pesticides also occurs to the detriment of these plants. Road salting may also be a limiting factor.

Eastern False Rue-anemone may be negatively impacted directly through competition from invasive non-native plants and indirectly through increased canopy tree mortality as a result of non-native insects and diseases. However, despite the widespread

occurrence of invasive plant species and pest-related tree mortality at Eastern False Rue-anemone sites, there are no indications of severe declines at most sites (COSEWIC 2022).

The impact of tree removal on Eastern False Rue-anemone varies depending on the extent of ground disturbance and opening of the canopy that occurs. Where tree removal occurs during winter months, impacts to this species are considered minimal.

Eastern False Rue-anemone is susceptible to habitat alteration, droughts, and flood events linked to climate change; however, the extent to which these events impact the species is unknown. Short duration flooding events may increase long distance dispersal downstream but may also damage individual plants. Overall threats related to climate change for this species are unknown.

Eastern False Rue-anemone has limited dispersal capability, coupled with low visitation rates by pollinators and the ability to be self-compatible can all lead to inbreeding depression. Many of the known sub-populations in Ontario are found in isolated woodlots scattered in a matrix of unsuitable landcover types further increasing the likelihood of genetic isolation and reduced reproductive success (COSEWIC 2022).

## 2.6. Specialized life history or habitat use characteristics

Eastern False Rue-anemone is typically found on open wooded slopes, along river floodplains, rich woods and thickets. It is often seen growing in large colonies. Eastern False Rue-anemone is most often found growing in shady areas within mature maple-beech forests with gradual slopes. This species is absent from steep slopes and open, highly-disturbed sites. In Ontario, Eastern False Rue-anemone occurs in areas dominated by grey-brown luvisolic soils rich in calcareous till and lacustrine deposits from limestone and dolostone (Hoffman, 1989). All Ontario observations of this species are found within the Carolinian Zone where Eastern False Rue-anemone has been documented growing in mixed hardwood Carolinian forests dominated by sugar maple (*Acer saccharum*), in combination with other species including ironwood (*Ostrya virginiana*), American Beech (*Fagus grandifolia*), Hickory (*Carya* spp.), Basswood (*Tilia americana*), Butternut (*Juglans cinerea*) and Ash (*Fraxinus* spp.). Eastern False Rue-anemone is often found with other spring wildflowers (Austen, 1990), including Bloodroot (*Sanguinaria canadensis*), Trillium (*Trillium* spp.), Toothwort (*Dentaria* spp.), Anemone (*Anemone* spp.), Violet (*Viola* spp.), and Trout Lily (*Erythronium americanum*).

Flowering begins when temperatures are suitable for plant growth and pollinator activity and ends before closure of the canopy (Schemske et al., 1978). In Ontario and Illinois (Melampy and Heyworth, 1980) Eastern False Rue-anemone flowers in late April or May and is in fruit by early June. Eastern False Rue-anemone is pollinated by insects; however, the rate of visitation of these pollinators is low even when the plants are in flower. Eastern False Rue-anemone is a nectar-less plant and is not a preferred resource for insect pollinators when the nectar-bearing flowers of plants are present.

In Ontario, seeds mature by early June. Seeds have no known special means of

dispersal (Schemske et al., 1978). Leaves begin to turn yellow or brown as seeds ripen and by early to mid-June all have senesced (Baskin and Baskin, 1986). In central Kentucky new leaves emerge in mid-September, remaining green all winter and a few plants may flower in the autumn. Eastern False Rue-anemone is a hermaphrodite (both male and female organs within the same flower) and grows in clumps that probably represent clones (Melampy and Heyworth, 1980). Eastern False Rue-anemone is self-compatible but not self-pollination within a single flower.

## 2.7. Existing Conservation and Recovery Actions

A government response statement for Eastern False Rue-anemone in Canada was published in 2005 (Ministry of Environment 2005), followed by a recovery strategy in 2017 (Environment and Climate Change Canada 2017).

Approximately half of the known Canadian population of this species is on publicly owned lands. This includes almost all the largest known subpopulation located in the Medway Valley in London (SP#2). This site is owned and managed by the City of London in cooperation with the Upper Thames River Conservation Authority and is formally designated as a protected area. Two other subpopulations are included in lands owned and managed by the Ausable Bayfield Conservation Authority.

## 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

Not applicable - Declines have occurred or are inferred to have occurred at a few sites but are not believed to meet thresholds.

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

Not applicable – While the EOO (1155 km<sup>2</sup>) and IAO (74 km<sup>2</sup>) are both below the thresholds for Endangered, Eastern False Rue-anemone occurs at 23 locations (i.e., >10) in Ontario. Additionally, the population is not severely fragmented, and available data indicates that the populations do not undergo extreme fluctuations in numbers.

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

Not applicable - Population estimates of mature individuals exceeds thresholds for Endangered and Threatened.

### 3.1.4. Criterion D – Very small or restricted total population

Not applicable – The estimate of the number of mature individuals in the population exceeds thresholds for Endangered and Threatened. Additionally, the population is not considered vulnerable to rapid or substantial decline.

### 3.1.5. Criterion E – Quantitative analysis

Not applicable.

## 3.2. Application of Special Concern in Ontario

Eastern False Rue-anemone in Ontario occurs at the northern edge of its global range. This species is restricted to a small number of fragmented riverside sites in southwestern Ontario where it occurs in five EOs comprised of a total of six subpopulations and comes close to meeting the thresholds for Threatened. All subpopulations are at risk of decline in Ontario with impacts to habitat quantity and quality occurring due to activities such as recreational trail use and expansion of exotic invasive plants. Several locations in Ontario have already disappeared.

## 3.3. Status category modifiers

### 3.3.1. Ontario's conservation responsibility

The conservation responsibility for this species in Ontario is very low with less than 1% of the global range for Eastern False Rue-anemone occurring in the province. Globally the species is considered secure (G5, NatureServe 2022) with over half of the states in which Eastern False Rue-anemone occurs, listing the species at either Secure or having no rank. This criterion does not apply to Eastern False Rue-anemone.

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

Within the broader biologically relevant geographic range for Eastern False Rue-anemone, the species is considered to be extirpated from New York State and does not have a status in Michigan or Ohio. Within both Michigan and Ohio, the species is considered to be common.

### 3.3.3. Rescue Effect

The Ontario population of Eastern False Rue-anemone is not located in close proximity to any of this species populations found in adjacent jurisdictions. The seeds of this species' have no known special means of dispersal (Schemske et al., 1978) suggesting that seeds are unlikely to contribute to long-range dispersal of this species or leading to



the exchange of seeds between Ontario and outside populations. This criterion does not apply.

### 3.4. Other status categories

#### 3.4.1. Data deficient

Not applicable.

#### 3.4.2. Extinct or extirpated

Extant populations of Eastern False Rue-anemone are present in Ontario. This category is not applicable.

#### 3.4.3. Not at risk

Not applicable.

## 4. Summary of Ontario status

Eastern False Rue-anemone (*Enemion biternatum*) is classified as Special Concern in Ontario based on approaching the thresholds under criterion B associated with occurrence in only six subpopulations that are at risk of decline in area and quality of habitat resulting from various activities, including recreational trail use and expansion of exotic invasive plants.

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

## 5. Information sources

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## Appendix 1: Technical summary for Ontario

Species: Eastern False Rue-anemone (*Enemion biternatum*)

### 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.	Estimated to be 3-10 years
Is there an observed, inferred, or projected continuing decline in number of mature individuals?	No
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 <a href="http://geocat.kew.org">geocat.kew.org</a>. State source of estimate.</i>	1,155 km <sup>2</sup> for extant occurrences
Index of area of occupancy (IAO). <i>If value in COSEWIC status report is not applicable, then use <a href="http://geocat.kew.org">geocat.kew.org</a>. State source of estimate.</i>	72 km <sup>2</sup> for extant occurrences
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	a. No b. No  Due to species life history traits, it is unlikely to

<b>Extent and occupancy attributes</b>	<b>Value</b>
(b) separated from other habitat patches by a distance larger than the species can be expected to disperse?	disperse between 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>	23 locations have been confirmed extant in the last 10 years
Number of NHIC Element Occurrences <i>Request data from MNR.</i>	9 EOs with only 5 considered extant.
Is there an observed, inferred, or projected continuing decline in extent of occurrence?	No, current extent of occurrences are considered stable.
Is there an observed, inferred, or projected continuing decline in index of area of occupancy?	Yes, inferred decline over past 30 years with 4 EOs now considered historic
Is there an observed, inferred, or projected continuing decline in number of sub-populations or EOs?	Yes, inferred
Is there an observed, inferred, or projected continuing decline in number of locations?	Yes, inferred
Is there an observed, inferred, or projected continuing decline in [area, extent and/or quality] of habitat?	Yes, inferred
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)

<b>Sub-population (or total population)</b>	<b>Number of mature individuals</b>
Lower Kettle Creek	200,000-250,000 stems
Medway Valley London	200,000 stems
Parkhill (Mud) Creek	66,000 stems
Ausable River Valley	50,000-150,000 stems
Thames Riverbend London	0
Dodd Creek	5,000-10,000 stems
Lynn Valley	Unknown
East of Arva	1750 stems
Medway North of Arva	Unknown
Total	525,000-675,000 stems

## Quantitative analysis (population viability analysis conducted)

Probability of extinction in the wild is unknown.

### Threats

A threats calculator was completed in 2022 for Eastern False Rue-anemone (COSEWIC 2022). The results of the calculator indicated that the overall threat impact was LOW, and identified the following factors:

- Invasive Non-Native Species (Low Impact)
- Problematic Native Species (Low Impact)
- Recreational Activities (Low Impact)

Low capability, low rate of visitation by pollinators, and self-compatibility which can lead to inbreeding depression.

### 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	Michigan and Ohio populations do not have a status. New York population is considered to be extirpated.
Is immigration of individuals and/or propagules between Ontario and outside populations known or possible?	No – highly unlikely
Would immigrants be adapted to survive in Ontario?	Yes
Is there sufficient suitable habitat for immigrants in Ontario?	Unknown, but possibly
Are conditions deteriorating in Ontario?	Yes
Is the species of conservation concern in bordering jurisdictions?	No
Is the Ontario population considered to be a sink?	Unknown
Is rescue from outside populations likely?	No. Unlikely due to lack of specialized dispersal mechanisms.

### Sensitive species

Eastern False Rue-anemone is not considered to be a data 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