

**Ontario Species at Risk Evaluation Report for
Forked Bluecurls
Trichostème fourchu
(*Trichostema dichotomum*)**

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

Assessed by COSSARO as Endangered

April 2024

Final

Executive summary

Forked Bluecurls (*Trichostema dichotomum*) is a distinct species within the genus *Trichostema*, with no recognized synonyms or infraspecific taxa. In North America, sixteen species in this genus are accepted, and in Ontario, two species occur: Forked Bluecurls and Fluxweed (*T. brachiatum*).

Forked Bluecurls is considered a single designatable unit, and it occupies similar habitats and climatic conditions across its northern range, even though subpopulations can be separated by over 250 km. The species is presumed native to Ontario, with the earliest record from 1971 near Turkey Point. It is currently found in three extant subpopulations in southwestern Ontario.

In Ontario, Forked Bluecurls has three known subpopulations in the southwest, indicating its rarity and absence from most potential habitats. Additional localized sites might exist on unsurveyed private lands. Historically, the first record in Ontario from 1971 near Turkey Point remains extant today. One adventive subpopulation near St. Thomas, likely established from U.S. seeds, was seen only once in 1990 and is now considered extirpated.

Forked Bluecurls occur across eastern North America, from Texas, Florida, and the Bahamas to southeastern Canada. It is common in the southeastern United States but rare in northern jurisdictions like Ontario, Quebec, and Nova Scotia. Less than 1% of its global population is in Canada.

Ontario holds less than 1% of the global range and population of Forked Bluecurls. The primary threat is habitat loss due to succession from fire suppression, as the species does not tolerate shade or competition from other vegetation. Forked Bluecurls may also be impacted by agricultural activities and natural resource management practices, though these can sometimes benefit the species by maintaining open habitats.

Forked Bluecurls is a small annual mint that grows in sparsely vegetated, dry, acidic, sandy, or gravelly soils. It occupies both natural and anthropogenically disturbed habitats. In Ontario, it is closely associated with anthropogenic features like forest access roads and powerline rights of way. The species completes its lifecycle in one growing season, flowering from late July to early September.

In summary, Forked Bluecurls (*Trichostema dichotomum*) is classified as Endangered in Ontario based on small distribution range with few locations and continuing habitat decline. Meets criteria B1(a)(b)(iii)+2(a)(b)(iii). This differs from the COSEWIC classification of Threatened because the species is found in two other provinces and is not at imminent risk of extirpation from Canada. The species was not previously assessed by COSSARO.

1. Eligibility for Ontario status assessment

1.1. Eligibility conditions

1.1.1. Taxonomic distinctness

Forked Bluecurls (*Trichostema dichotomum*) is a distinct taxonomic species. No synonyms or infraspecific taxa are recognized. Of sixteen accepted species in the North America genus *Trichostema*, two occur in Ontario: Forked Bluecurls and Fluxweed (*T. brachiatum*), occurring in southern Ontario.

1.1.2. Designatable units

Forked Bluecurls is considered a single designatable unit. The species occurs in similar habitat and climatic conditions across the northern part of its range, despite subpopulations being separated by over 250 km in some instances.

1.1.3. Native status

Presumed native to Ontario, with earliest record from 1971 near Turkey Point, Ontario. Additional sites have been found within the Turkey Point subpopulations and two other subpopulations in Ontario are located about 5 km away.

1.1.4. Occurrence

The species currently occurs in Ontario.

1.2. Eligibility results

Forked Bluecurls (*Trichostema dichotomum*) is eligible for status assessment in Ontario.

2. Background information

2.1. Current designations

- GRANK: G5 Secure (NatureServe 2024) Last reviewed 2002 (Global status needs review)
- IUCN: Not ranked (N.A)
- NRANK Canada: N1 (NatureServe 2024)
- COSEWIC: Threatened (December 2023, in draft)
- SARA: Under consideration for addition (Not on Schedule 1)
- ESA 2007: Not assessed
- SRANK: S1 (ranked in 2015)

2.2. Distribution in Ontario

Ontario subpopulations of Forked Bluecurls consists of 3 extant subpopulations in southwestern Ontario (COSEWIC 2023, IN PRESS). The small number of localized subpopulations reported historically or recently indicates that this species is rare and is evidently absent from most potential habitat. It is possible that additional localized sites in the vicinity of the known subpopulations exist but due to much of the land being privately held, these areas have not been inventoried in southwestern Ontario. The first record of the species in Ontario is presumed native and was recorded first in 1971 near Turkey Point, and continues to be extant today (COSEWIC 2023, IN PRESS).

Additional sites have been found within this subpopulation and the other two subpopulations in Ontario are located only 5 km away.

One adventive subpopulation in Ontario near St. Thomas is considered extirpated and was presumed established from seed introduced by train from the U.S. subpopulations due to its establishment in highly disturbed ground in rail ballast (Oldham and Brinker, 2009). It was seen only once in 1990 and is not considered part of the Canadian subpopulation or range, therefore was excluded from further analyses prepared for this report.

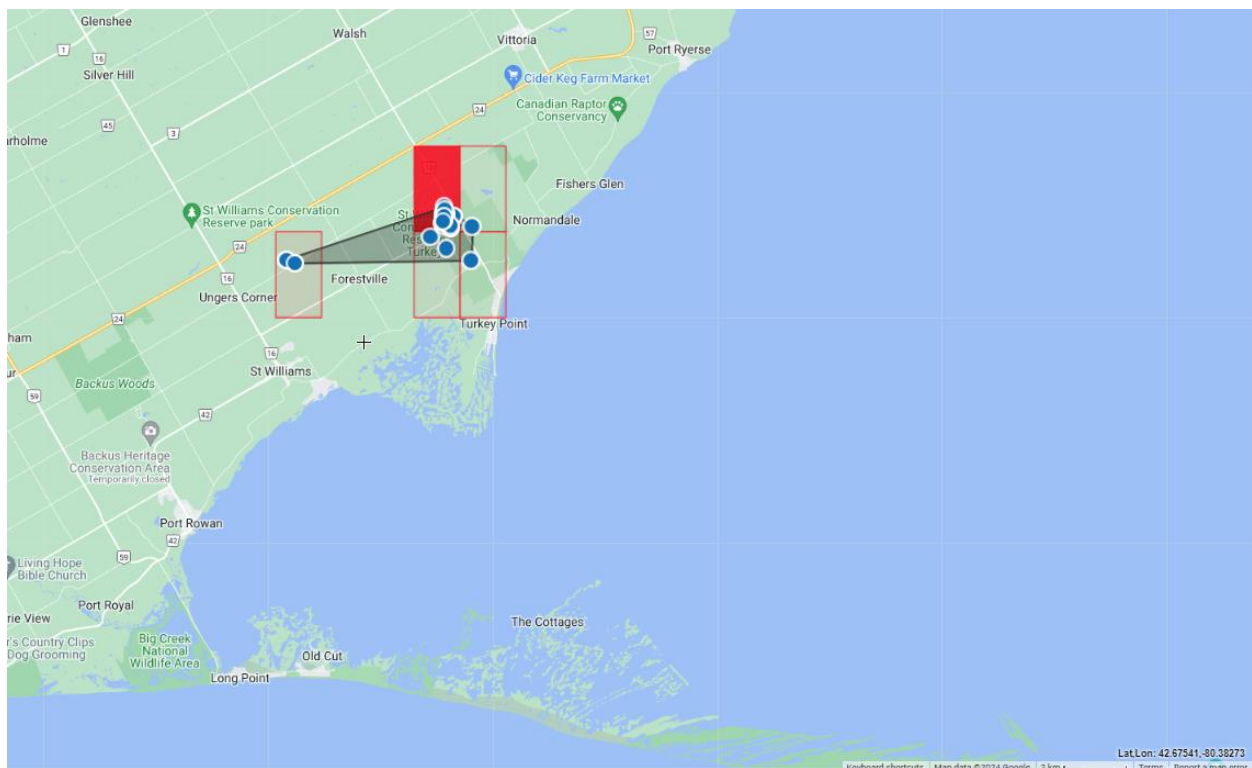


Figure 1. All Ontario Forked Bluecurls records from NHIC database (NHIC, 2024). Created for this report using [GeoCAT](#) [website accessed March 2024].

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

Forked Bluecurls occurs across eastern North America, from Texas, Florida, and the

Bahamas, north to southeastern Canada (COSEWIC 2023, IN PRESS). This species is common in southeastern United States and much of northeastern United States but is rare in several jurisdictions on the northern periphery of its range, including the states of Indiana and Michigan and the provinces of Nova Scotia, Ontario, and Quebec (Kartesz 2015; NatureServe 2022).

Less than 1% of the global range and population of Forked Bluecurls occurs in Canada. The Canadian population consists of eleven presumed native subpopulations located in southwestern Ontario, southwestern Quebec, and southern Nova Scotia (COSEWIC 2023, IN PRESS).

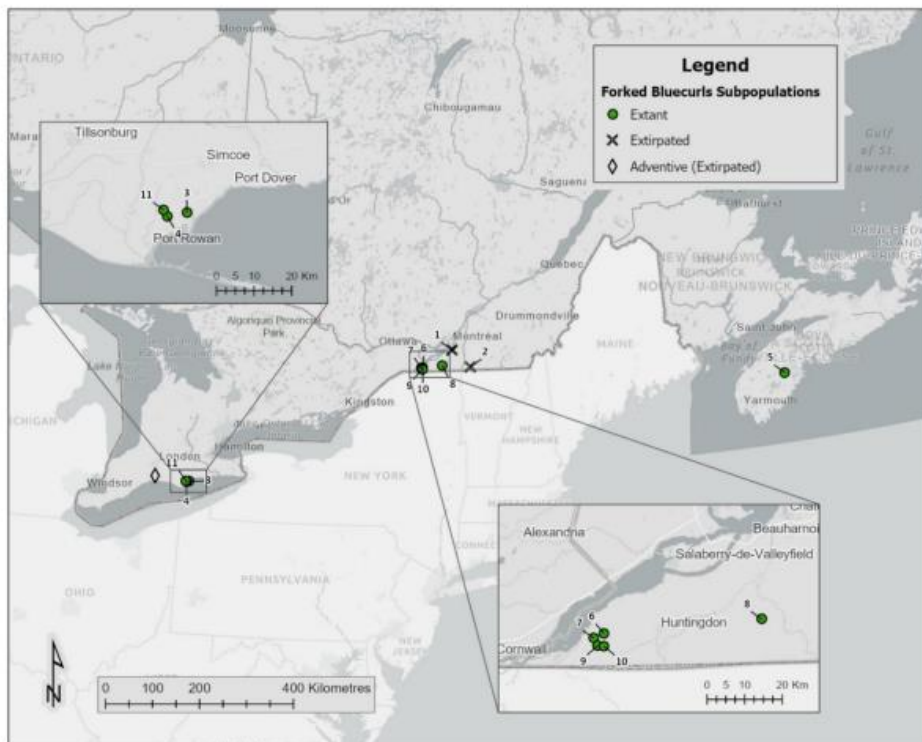


Figure 2: Canadian subpopulation of Forked Bluecurls (map courtesy of A. Fillion COSEWIC Secretariat).

Forked Bluecurls are readily identifiable, although relatively inconspicuous outside of the late summer flowering and fruiting period. Detectability is also high during this period as it typically occurs in sparsely vegetated openings.

Despite this, the small number of localized subpopulations reported historically or recently indicates that this species is rare and is evidently absent from most potential habitat. A few additional localized sites in the vicinity of the known subpopulations are expected, particularly on private land holdings in southwestern Ontario and southwestern Quebec or in other remote rock barren openings in southern Nova Scotia. The species could also potentially occur locally in southeastern Ontario or southern New Brunswick in proximity to subpopulations in the United States (COSEWIC 2023, IN

PRESS).

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	Yes	S1	NatureServe
Manitoba	NA	NA	NA
Michigan	Yes	S2	NatureServe
Minnesota	NA	NA	NA
Nunavut	NA	NA	NA
New York	Yes	Secure	NatureServe
Ohio	Yes	SNR	NatureServe
Pennsylvania	Yes	SNR	NatureServe
Wisconsin	NA	NA	NA

2.4. Ontario conservation responsibility

Less than 1% of the global range and population occurs in Canada, and even less in Ontario.

2.5. Direct threats

The threats assessment completed by COSEWIC (COSEWIC, 2023) assigned an overall threat impact of Medium-Low.

The main threat to Forked Bluecurls is general disruption to ecological processes such as fire suppression. Habitat succession in absence of disturbance such as natural wildfire impacts the species as it does not tolerate shade or competition from other vegetation. Therefore, habitat becomes unsuitable quickly without disturbance to prevent native early successional plant growth (such as goldenrods (*Solidago sp.*), trembling aspen (*Populus tremuloides*) and eastern white pine (*Pinus strobus*)). (Natural System Modification, IUCN 7 – Medium-Low).

Several other agricultural and land use / natural resource related threats may pose impact, however these are unknown overall given some sites are made suitable in habitat due to these very same threats, such as the use of protected areas by off road vehicles maintaining openness by reducing other vegetation growth. (Agricultural & Aquaculture, IUCN 2 – overall threat impact Unknown).

2.6. Specialized life history or habitat use characteristics

Forked Bluecurls is a small, aromatic annual mint arising from a taproot. Mature individuals range in height from 3 cm to 50 cm. Stems are square sided with a glandular pubescence, where smaller individuals are single-stemmed and taller may be multi-branched, with leaves entire, opposite, oblong to lanceolate.

Numerous small flowers, 4-6 mm long, form on stems arising from the leaf axils. The asymmetric blue-purple flowers are distinctive, with a curving arch formed by four elongate forked stamens extending over the flower, lending the plant its common name.

The fruit consists of up to four partly fused nutlets, 1-2 mm across and containing a single seed. The fruit forms within a distinctive asymmetric cup-like structure formed by the rotated flower calyx.

This flower completes its lifecycle in a single growing season with seed germination occurring in late April (in Connecticut) but may be later in northern subpopulations since plants are not obvious until July (MNFI 2022).

Flowering begins in late July, with peak in mid-August, tapering off by early September.

Across its range, Forked Bluecurls is found in a variety of natural habitats including barrens, rock outcrops, prairies and open woods. It also occurs in anthropogenically disturbed open habitats such as sandy fields, road and rail sides and embankments. In the northern part of its range in Canada, habitat requirements are seemingly more restrictive with the species only found in sparsely vegetated open areas on dry to mesic, acidic, sandy or gravelly mineral soils.

The habitat occupied by the three subpopulations in Ontario are in the Norfolk Sand Plain, a physiographic region occupying 313,000 ha of post-glacial sand deposits (Chapman and Putnam, 1984). Despite the expanse of the Norfolk Sand Plain, the species subpopulations in Ontario are closely associated with anthropogenic features such as linear forest access roads, off road vehicle trails or powerline rights of way and open features such as fields and sand pits. These areas have loose, exposed sand with sparse vegetation and high light exposure. The current landscape context for these subpopulations is a mosaic of agricultural fields, mixed forests and pine plantations, which historically would have occurred as sand barren inclusions within oak savanna or oak-pine woodlands in Ontario (Draper et al 2002). Open conditions in these historic habitat types would have been maintained by either natural wildfire or cultural use of fire by Indigenous peoples.

While the species can tolerate partial sun, plants in shaded habitat are smaller and less productive than those in full sun (NCC 2014). In absence of fire, anthropogenic disturbance to prevent rapid colonization of open areas by other vegetation appears to be a critical piece to the survival of the species at all Ontario sites.

Seed dispersal has not been studied, however the rotated calyx wherein the fruit develops operates as a springboard to the nutlet when depressed by rain drops or brushed. This catapults the fruit a short distance (a few metres) away from the plant (COSEWIC, 2023).

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 insufficient data from which to estimate the decline in the Ontario population.

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

Meets B1(a)(b)(iii) and B2(a)(b)(iii).

Extent of occurrence (EOO) is less than 100 km², meeting criteria B1. Number of locations is 3 in Ontario, meeting criteria (a) for Endangered, and continuing decline is inferred in (b)(iii) area, extent and/or quality of habitat.

Index of area of occupancy (IAO) in Ontario is 20 km², less than 500 km², meeting criteria B2. Number of locations is less than 5 in Ontario, meeting criteria (a) for Endangered, and continuing decline is inferred in (b)(iii) area, extent and/or quality of habitat.

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, however it does meet D2 for Threatened. Index of area of occupancy (IAO) in Ontario is 20 km² and number of locations is less than 5.

3.1.5. Criterion E – Quantitative analysis

Insufficient information.

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. Global rank is G5, and <25% of global range and population is found in Ontario.

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

relevant geographic range

Does not apply.

3.3.3. Rescue Effect

Not considered a major factor for this species.

Whether rescue from subpopulations in adjacent states is possible is unknown, largely due to the long distances between subpopulations in adjacent geographies. Historical records suggest adventive subpopulations have been established from seed or plant material presumably transported via train.

Suitable habitat in Ontario has not been exhaustively surveyed due to private land ownership, and whether this has occurred along transportation routes is unknown, though not impossible based on historical occurrences (COSEWIC 2023, IN PRESS).

3.4. Other status categories

3.4.1. Data deficient

Does not apply. Data on species is available.

3.4.2. Extinct or extirpated

Does not apply. This species continues to exist in the wild in Ontario and globally.

3.4.3. Not at risk

Does not apply. Does not meet criteria for Not at risk.

4. Summary of Ontario status

Forked Bluecurls (*Trichostema dichotomum*) is classified as Endangered in Ontario based on meeting criterion B - Small distribution range and decline or fluctuation B1(a)(b)(iii)+2(a)(b)(iii).

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

5. Information sources

Chapman, L.J. and D.F. Putnam. 1984. The Physiography of Southern Ontario. Ontario Geological Survey, Special Volume 2. 270 pp.

COSEWIC. 2023. COSEWIC Assessment and Status Report on the Forked Bluecurls *Trichostema dichotomum* in Canada. Committee on the Status of Endangered Wildlife in Canada. Ottawa. Xii + 47 pp.

NatureServe. 2022. NatureServe Explorer [web application]. NatureServe, Arlington, Virginia. Website: <https://explorer.natureserve.org>. [accessed March 2024].

Newcomb, L. 1977. Newcomb's Wildflower Guide.

Muma, Walter. 2012. Ontario Wildflowers. [website accessed March 2024].

Appendix 1: Technical summary for Ontario

Species: Forked Bluecurls (*Trichostema dichotomum*)

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.	3 years
Is there an observed, inferred, or projected continuing decline in number of mature individuals?	No based on stable Ontario numbers of mature individuals.
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.	Not applicable. Although Canadian population experienced >50% reduction inferred due to observed decline in abundance at 4 subpopulations with comparable repeat surveys, Ontario population numbers are stable, though limited IAO and EOO.
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. No c. No
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).	5.9 km ²
Index of area of occupancy (IAO).	(estimated using GeoCAT) 20 km ²
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. No
Number of locations.	3
Number of NHIC Element Occurrences	50
Is there an observed, inferred, or projected continuing decline in extent of occurrence?	No
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 – historical decline in habitat
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)

Sub-population (or total population)	Number of mature individuals
<i>Turkey Point</i>	1400
<i>Ungers Corners East</i>	380
<i>Ungers Corners North</i>	50-500 (inferred)

Quantitative analysis (population viability analysis conducted)

Probability of extinction in the wild is unknown.

Threats

Overall threat impact was assigned to Medium-Low.

Key threats:

- Natural System Modification (IUCN 7) – Medium-Low
- Agricultural and aquaculture (IUCN 2) – Unknown

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	Quebec – Threatened (COSEWIC, 2023) United States: Stable - (Secure (S5) in New York, Imperilled (S2) in Michigan. Not assessed but possibly Apparently Secure (S4) in Vermont, Ohio, New Hampshire, and Maine.
Is immigration of individuals and/or propagules between Ontario and outside populations known or possible?	Unknown – Possible – anecdotal evidence immigration may be possible through seed dispersal from train
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 - Possibly
Is the species of conservation concern in bordering jurisdictions?	Yes in Michigan and Quebec; No in others.
Is the Ontario population considered to be a sink?	No – population known for over 50 years at one location with no evidence of immigration
Is rescue from outside populations likely?	No – human assisted introduction events will likely occur occasionally in southern and eastern Ontario

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