

Ontario Species at Risk Evaluation Report for
Prairie-dock
Silphe térébenthine
(*Silphium terebinthinaceum*)

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

Assessed by COSSARO as Special Concern

October 2024

Final

Executive summary

Prairie-dock (*Silphium terebinthinaceum*) is taxonomically distinct and is a member of the family Asteraceae (Aster family). This long-lived perennial has a “vase-like” rosette of basal leaves that emerge from a taproot system. Prairie-dock flowers are borne in a panicle on long green or reddish-purple stalks that can reach between 1 to 3 meters in height (Illinois Wildflowers Information 2024). Flowers are composite, 5-6 cm across, with 15-30 ray florets. Prairie-dock blooms from late August to October.

Prairie-dock is typically found growing in mesic to wet-mesic prairies, fens, roadsides, railway embankments, thickets, and dry woods (COSEWIC 2024, IN PRESS). It occurs in tallgrass prairies, mineral meadows, cultural meadows and cultural thicket communities where sun exposure is high and woody plant cover is low.

Prairie-dock is a native species to North America with a range from Arkansas and Georgia in the southern states to Michigan, Wisconsin and Iowa and Ohio and Ontario in the north (NatureServe 2024). In Ontario its range is limited to the Carolinian Zone from Essex and Lambton Counties in southwest Ontario to Brant and Norfolk Counties in the central part of southern Ontario (COSEWIC 2024, IN PRESS). Its range does not extend to other parts of Canada. The greatest concentration of the species is in Michigan, Wisconsin, Iowa, Ohio, Illinois, Indiana, Kentucky, and Missouri. For most of its range in the United States it is not ranked, including in the states adjacent to Ontario (Michigan and Ohio).

Prairie-dock experiences continued threats primarily related to the diminishing tallgrass prairie habitat in Ontario (COSEWIC 2024, IN PRESS). The threats assessment conducted by COSEWIC (2023) assigned an overall threat impact of High to Medium based on i) natural system modifications, ii) residential and commercial development, transportation and service corridors, and pollution.

Prairie-dock is classified as Special Concern in Ontario based on meeting the following criteria: c) “the wildlife species is near to qualifying, under any criterion, for Threatened status”. The species is near to qualifying for Threatened status under criteria C1 as there are estimated to be less than 10,000 mature seed-producing individuals, and there is an estimated continuing decline in total number of mature individuals. Prairie-dock was not previously assessed by COSSARO.

1. Eligibility for Ontario status assessment

1.1. Eligibility conditions

1.1.1. Taxonomic distinctness

Prairie-dock is taxonomically distinct and is a member of the family Asteraceae (Aster family).

1.1.2. Designatable units

The Ontario population of Prairie-dock occurs as a single Designatable Unit in the Carolinian Zone of southern Ontario and does not occur naturally in any other parts of Canada (COSEWIC 2024, IN PRESS). The subpopulations of Prairie-dock are not discrete, occupying similar habitats, and they do not show evidence of evolutionary divergence.

1.1.3. Native status

Prairie-dock is native to Ontario and Canada (COSEWIC, 2024 IN PRESS).

1.1.4. Occurrence

Prairie-dock is a native species to North America with a range from Arkansas and Georgia in the southern states to Michigan, Wisconsin, Iowa, Ohio and Ontario in the north (NatureServe 2024). In Ontario, its range is limited to the Carolinian Zone from Essex and Lambton Counties in southwest Ontario to Brant and Norfolk Counties in the central part of southern Ontario (COSEWIC 2024, IN PRESS). Its range does not extend to other parts of Canada.

1.2. Eligibility results

Prairie-dock is taxonomically distinct and eligible for status assessment in Ontario.

2. Background information

2.1. Current designations

- GRANK: G4: Apparently Secure (NatureServe, 2024)
- IUCN: No Status
- NRANK Canada: N1 (NatureServe, 2024)
- COSEWIC: Special Concern (IN PRESS, 2024)
- SARA: Not Listed (Schedule 1 in 2024 Under consideration for addition)
- ESA 2007: Not Listed
- SRANK: S1 (ranked in 2024)

2.2. Distribution in Ontario

In Ontario, Prairie-dock is found only in the Carolinian Zone of southern Ontario, from Windsor, Walpole Island and Grand Bend to Brantford (COSEWIC 2024, IN PRESS). There are currently nine subpopulations known to occur in Ontario. These include: the Ojibway Prairie Complex, Upper Big Creek Woods, St. Clair College, Central Avenue, Tecumseh Road West, Northwood Street, South Cameron, Near Victory Park, LaSalle, Walpole Island First Nation (COSEWIC 2024, INPRESS).

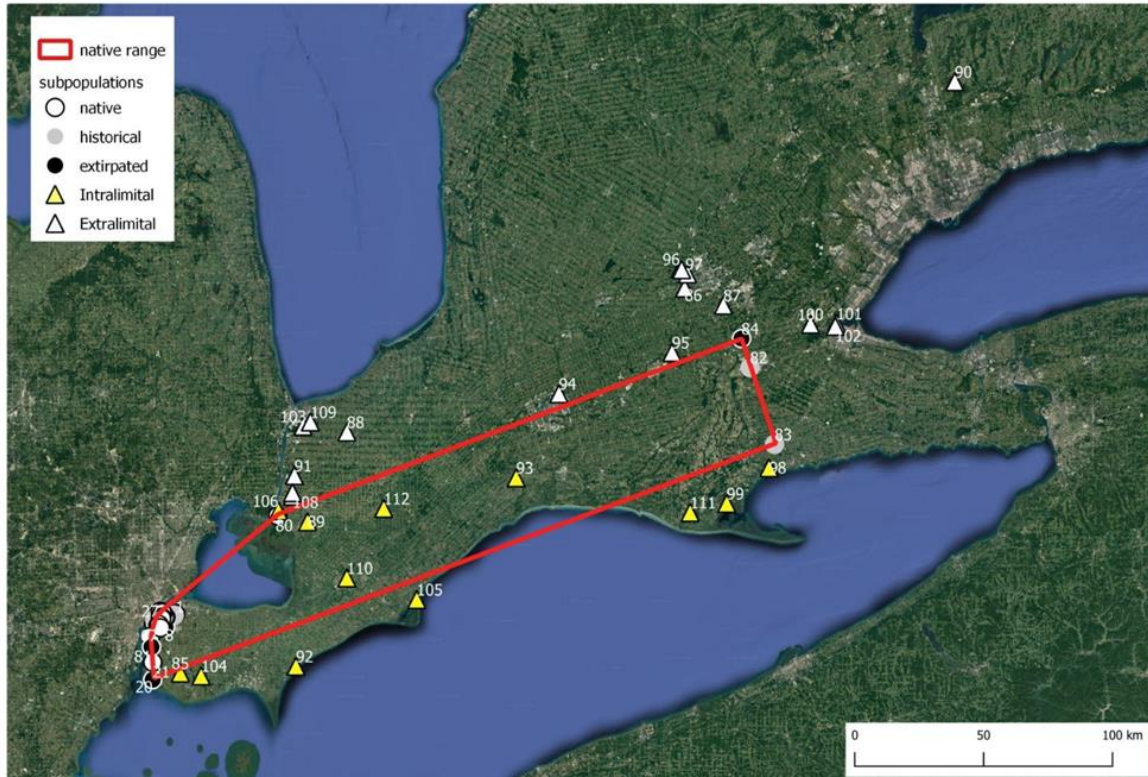


Figure 1. Subpopulations distribution of Prairie-dock in Ontario (COSEWIC 2024, IN PRESS).

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

Within Canada, Prairie-dock is only found in Ontario. Outside of Ontario, the distribution of Prairie-dock extends west, southwest and south into Michigan, Wisconsin, Iowa, Ohio, Illinois, Indiana, Kentucky, Missouri, Tennessee, Alabama, South Carolina, North Carolina, Mississippi, Georgia, and Virginia. The greatest concentration of the species is in Michigan, Wisconsin, Iowa, Ohio, Illinois, Indiana, Kentucky, and Missouri. For most of its range in the United States it is not ranked, including in the states adjacent to Ontario (Michigan and Ohio).

Prairie-dock is typically found growing in mesic to wet-mesic prairies, fens, roadsides, railway embankments, thickets, and dry woods (COSEWIC 2024, IN PRESS). It occurs

in tallgrass prairies, mineral meadows, cultural meadows and cultural thicket communities where sun exposure is high and woody plant cover is low.

Migration of the subpopulations between the adjacent states and Ontario is limited given the fragmentation of suitable habitats, distance between subpopulations and barriers, including waterbodies (lakes Erie, St. Clair, Huron and the Detroit and St. Clair rivers) (COSEWIC 2024, IN PRESS). Prairie-dock seed dispersal by natural means is limited to short distances by direct seed rain and long-distance dispersal by seed-eating birds (COSEWIC 2024, 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
Michigan	Yes	No Rank	NatureServe 2024
Ohio	Yes	No Rank	NatureServe 2024
Wisconsin	No	No Rank	NatureServe 2024
Iowa	No	No Rank	NatureServe 2024
Illinois	No	No Rank	NatureServe 2024
Indiana	No	No Rank	NatureServe 2024
Missouri	No	No Rank	NatureServe 2024
Arkansas	No	No Rank	NatureServe 2024
Tennessee	No	S2 Imperilled	NatureServe 2024
Kentucky	No	No Rank	NatureServe 2024
Virginia	No	S1 Critically Imperilled	NatureServe 2024
North Carolina	No	S2 Imperilled	NatureServe 2024
Mississippi	No	S3 Vulnerable	NatureServe 2024
Alabama	No	No Rank	NatureServe 2024
Georgia	No	S3 Vulnerable	NatureServe 2024
South Carolina	No	S1 Critically Imperilled	NatureServe 2024

2.4. Ontario conservation responsibility

Ontario's conservation responsibility is low. Less than 1% of the species' Global Range occurs in Canada (COSEWIC 2024, IN PRESS).

2.5. Direct threats

Prairie-dock experiences continued threats primarily related to the diminishing tallgrass prairie habitat in Ontario (COSEWIC 2024, IN PRESS).

The threats assessment conducted by COSEWIC (2023) assigned an overall threat impact of High to Medium. The assigned overall threat impact was based on the following known threats:

- Natural system modifications (High-Medium): Other Ecosystem Modifications (Invasive species) (High-Medium), and Fire and Fire Suppression (Medium)
- Residential and commercial development (Low): Housing & Urban Areas (Low), and Commercial and Industrial Development (Low)
- Transportation and service corridors (Low): Roads & Railroads
- Pollution (Low): Industrial and Military Effluents (Low)

2.6. Specialized life history or habitat use characteristics

Prairie-dock is typically found growing in mesic to wet-mesic prairies, fens, roadsides, railway embankments, thickets, and dry woods (COSEWIC 2024, IN PRESS). In Ontario, it is present in tallgrass prairies, mineral meadows, cultural meadows and cultural thicket communities where sun exposure is high and woody plant cover is low. These community types are rapidly declining in Ontario putting Prairie-dock at risk due to habitat loss.

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. Insufficient data to reliably infer total number of individuals.

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

Does not apply. The extent of occurrence (EOO) of 531 km² and the index of area of occupancy (IAO) of 60 km² are below the thresholds for Endangered. There is also an observed continuing decline in the EOO, IAO, area and quality of habitat, the number of subpopulations and locations and an inferred continuing decline in the number of mature individuals (COSEWIC 2024, IN PRESS). The population is not severely fragmented, occurs at >10 locations, and does not experience extreme fluctuations.

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

Does not apply. Number of mature individuals is likely below the threshold for Threatened of 10,000, and there is an inferred continuing decline; however, there are believed to be more than 1,000 mature individuals in at least three subpopulations.

3.1.4. Criterion D – Very small or restricted total population

Does not apply. The number of mature individuals is unknown but presumed to be greater than 1,000.

3.1.5. Criterion E – Quantitative analysis

Does not apply as this analysis has not been conducted.

3.2. Application of Special Concern in Ontario

The status modifier of Special Concern applies to Prairie-dock. Prairie-dock is a long-lived perennial that inhabits tallgrass prairie communities in southern Ontario. This species occurs within nine subpopulations from Windsor and Walpole Island to Brant County. Individual plants likely exceed 10,000, but the number of seed producing plants is presumed to be closer to 1,000. Prairie-dock continues to experience threats due to invasive species competition, fire and fire suppression, land development, road and rail expansion, and pollution. Prairie-dock's presence in Ontario would benefit from on-going monitoring and habitat management and restoration.

The classification of Special Concern is based on c) "the wildlife species is near to qualifying, under any criterion, for Threatened status". The species is near to qualifying for Threatened status under criteria C1 as there are estimated to be less than 10,000 mature seed-producing individuals, and there is an estimated continuing decline in total number of mature individuals.

3.3. Status category modifiers

3.3.1. Ontario's conservation responsibility

Ontario's conservation responsibility is low. Less than 1% of the Global Range for the species occurs in Canada and the species has a global ranking of G4 – Apparently Secure (COSEWIC 2024, IN PRESS).

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

Does not apply.

3.3.3. Rescue Effect

Rescue from subpopulations in adjacent states (Michigan and Ohio) is unlikely due to the long distances between US subpopulations and suitable habitat in Ontario (COSEWIC 2024 IN PRESS). Seeds are not suitable for wind or water dispersal and are unlikely to be dispersed by birds over long distances.

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

Prairie-dock (*Silphium terebinthinaceum*) is classified as Special Concern in Ontario based on meeting criterion c) “the wildlife species is near to qualifying, under any criterion, for Threatened status”. The species is near to qualifying for Threatened status under criteria C1 as there are estimated to be less than 10,000 mature seed-producing individuals, and there is an estimated continuing decline in total number of mature individuals.

5. Information sources

COSEWIC. 2024. IN PRESS. COSEWIC assessment and status report on the Prairie-dock *Silphium terebinthinaceum* in Canada. Committee on the Status of Endangered Wildlife in Canada. Ottawa. xiv + 68 pp. <https://www.canada.ca/en/environment-climate-change/services/species-risk-public-registry.html>

Illinois Wildflowers Information. 2024. <https://illinoiswildflowers.info> [Accessed March 2024].

NatureServe. 2024. NatureServe Explorer. *Silphium terebinthinaceum*. https://explorer.natureserve.org/Taxon/ELEMENT_GLOBAL.2.151316/Silphium_terebinthinaceum [accessed October 2024].

Appendix 1: Technical summary for Ontario

Species: Prairie-dock (*Silphium terebinthinaceum*)

Demographic information

Demographic attribute	Value
<p>Generation time. Based on average age of breeding adult: age at first breeding = X year; average life span = Y years.</p>	<p>At least 25 years. No studies have been completed that identify a specific generation time. It is a slow-to-establish plant that may not flower until at least the second or third year. The species is very long-lived and therefore a minimum average age of 25 years for mature plants is a reasonable estimate.</p>
<p>Is there an observed, inferred, or projected continuing decline in number of mature individuals?</p>	<p>Yes. A decline in mature individuals has been inferred for the Ojibway Prairie Complex subpopulation based on 2022 survey results, the surveyor’s recollection of sites in previous years, and input provided by local naturalists. Census data are unavailable for Walpole Island. Data for other subpopulations is descriptive only (e.g., “locally common”) or is unknown.</p>
<p>Estimated percent of continuing decline in total number of mature individuals within 5 years or 2 generations.</p>	<p>Unknown. There are no data to calculate percentages.</p>
<p>Observed, estimated, inferred, or suspected percent reduction or increase in total number of mature individuals over the last 10 years or 3 generations.</p>	<p>Unknown. There are no data to calculate percentages.</p>
<p>Projected or suspected percent reduction or increase in total number of mature individuals over the next 10 years or 3 generations.</p>	<p>Unknown. There are no data to calculate percentages. The threat calculation projects 3 to 70% decline.</p>
<p>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.</p>	<p>Unknown. There are no data to calculate percentages.</p>
<p>Are the causes of the decline (a) clearly reversible, and</p>	<p>a. Unknown. Decline due to invasive non-native species and fire suppression are</p>

Demographic attribute	Value
(b) understood, and (c) ceased?	<p>reversible. Reproductively suppressed plants have shown to respond positively to removal of brush and prescribed burns. It appears the Ojibway Prairie Complex subpopulation may also be experiencing a decline on account of drought and/or water table fluctuation. This may not be reversible but may be temporary.</p> <p>b. Yes. The species requires open conditions. Encroachment of trees and shrubs results in a decline in mature plants and recruitment. Any influence of drought or water table fluctuation is inferred and not clearly understood.</p> <p>c. No. The most prevalent invasive species that pose a threat to Prairie-dock, European Common Reed and to a lesser extent Autumn Olive, are increasing at most subpopulations where they are present.</p>
Are there extreme fluctuations in number of mature individuals?	No. This is a long-lived plant that is not expected to undergo population fluctuations.

Extent and occupancy information in Ontario

Extent and occupancy attributes	Value
Estimated extent of occurrence (EOO).	531 km² Based on the range of all extant or presumed extant (Historical) subpopulations
Index of area of occupancy (IAO).	60 km² Based on extant or presumed extant (Historical) subpopulations
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 (b) separated from other habitat patches by a distance larger than the species can be expected to disperse?	<p>a. No.</p> <p>b. Yes.</p> <p>With the exception of the "Near Victory Park" subpopulation, which is only 2 plants and may not be viable, all extant subpopulations contain sufficient mature and immature plants to support viable subpopulations. The distance between known Canadian subpopulations ranges from 1.2 km to 190 km and the seeds are large and likely regularly disperse only metres from mature plants.</p>
Number of locations.	16-18

Extent and occupancy attributes	Value
	<p>There are nine native extant subpopulations of Prairie-dock in Ontario. There are also two subpopulations that are presumed extirpated. The number of locations is based on land ownership because the effects of threats are expected to differ at each site based on land management practices. Of the nine extant subpopulations, separate sites within the Ojibway Prairie Complex represent five locations while separate sites at South Cameron are considered four locations. Intra-limital manipulated subpopulations if included, would add additional locations.</p>
<p>Number of NHIC Element Occurrences</p>	<p>N/A</p>
<p>Is there an observed, inferred, or projected continuing decline in extent of occurrence?</p>	<p>Yes. There is an observed decline in the extent of occurrence. Historical range including all extirpated subpopulations is 9,839 km² (94.6% decrease); a decline from 8,767 km². (93.9%) based on the loss since 1975 (< 3 generations).</p>
<p>Is there an observed, inferred, or projected continuing decline in index of area of occupancy?</p>	<p>Yes. There is an observed decline in the area of occupancy as the Knapps Island, River Canard, and Paris subpopulations are extirpated. Surveys of the Brantford and Townsend subpopulations could not locate plants. The historical IAO including all extirpated subpopulations is 84 km² (31% decline). There has been a decline from 80 km² (decline of 25%) since 1975 (<3 generations).</p>
<p>Is there an observed, inferred, or projected continuing decline in number of sub-populations or EOs?</p>	<p>Yes. There is an observed decline in the number of subpopulations as Knapps Island, River Canard, and Paris subpopulations are extirpated with the Brantford and Townsend subpopulations presumed to be extirpated.</p>
<p>Is there an observed, inferred, or projected continuing decline in number of locations?</p>	<p>Yes. There is an observed decline in the number of locations as Knapps Island, River Canard, and Paris locations are extirpated with the Brantford and Townsend locations presumed to be extirpated</p>
<p>Is there an observed, inferred, or projected continuing decline in [area, extent and/or quality] of habitat?</p>	<p>Yes. There is an observed decline in the area and quality of habitat for the species. The encroachment of invasive non-native species as well as succession occurring in the absence of fire is reducing the area and</p>

Extent and occupancy attributes	Value
	quality of habitat each year. A single site within the Ojibway Prairie Complex has undergone periodic management of invasive shrubs. Regular maintenance of hydro line and rail corridors acts as surrogate for fire to control woody vegetation but generally does not result in a reduction in invasive species presence.
Are there extreme fluctuations in number of populations?	No. The species is long-lived and can persist for some time as reproductively suppressed plants when conditions become unsuitable.
Are there extreme fluctuations in number of locations?	No.
Are there extreme fluctuations in extent of occurrence?	No. The known subpopulations are long-established and new subpopulations are not likely to establish due to limited seed dispersal ability.
Are there extreme fluctuations in index of area of occupancy?	No. The known subpopulations are long-established and new subpopulations are not likely to establish due to limited seed dispersal ability. As the potential for subpopulation extirpation is largely associated with degradation of suitable habitat over a long period, extirpation would occur slowly over time.

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

Sub-population (or total population)	Number of mature individuals
Ojibway Prairie Complex	24 (3674)
South Cameron	29 (91)
St. Clair College	9 (217)
Tecumseh Road West	35 (4488)
Northwood Street	12 (34)
Central Avenue	7 (47)
near Victory Park	0 (2)
Upper Big Creek Woods	17 (4250)
Brantford	0 (0)
Townsend	0 (0)
Walpole Island	Unknown
Based on NRSI field surveys (2022-2023). The number of flowering plants is followed by the total number of plants in parentheses. This species is sometimes planted in conservation plantings and 12	

	intralimital plantings were examined for possible inclusion as subpopulations. However, none met guidelines for inclusion as subpopulations, for reasons explained in the report.
Total	133 –12,803+ It is uncertain how many of the non-flowering plants may be mature. There are thought to be more than 10,000 mature individuals.

Quantitative analysis (population viability analysis conducted)

Probability of extinction in the wild is unknown; analysis was not completed.

Threats

Was a threats calculator completed for this species? Yes.

Overall estimated threat impact: High to Medium (2023)

Key threats were identified as:

- i. Other ecosystem modifications (7.3) – high-medium impact
- ii. Fire and fire suppression (7.1) – medium impact
- iii. Housing and urban areas (1.1) – low impact
- iv. Commercial and industrial areas (1.2) – low impact
- v. Roads and railroads (4.1) – low impact
- vi. Industrial & military effluents (9.2) – low impact

What limiting factors are relevant?

At most subpopulations, only a very small proportion of plants flower in a given year
 Long-tongued bees are a main pollinator, and some species are in decline
 Poor seed dispersal in a fragmented landscape limits the spread of plants
 The large seeds are favoured by some seed-eating birds and rodents selectively consume seeds.

Rescue effect

Rescue effect attribute	Value
Does the broader biologically relevant geographic range for this species extend beyond Ontario?	Unknown. Prairie-dock is not ranked (SNR) in Michigan and Ohio and occurs throughout the western end of Lake Erie from north of Detroit toward Cleveland in the east.
Status of outside population(s) most likely to provide immigrants to Ontario	Not Ranked in adjacent states.
Is immigration of individuals and/or propagules between Ontario and outside populations known or possible?	No. Natural seed dispersal is localized and immigration therefore is unlikely. The nearest extant U.S. Subpopulations are in the vicinity of the River Raisin in Monroe County south of Detroit at least 30 km from Ontario and are

Rescue effect attribute	Value
	separated by the west end of Lake Erie and the Detroit River. Cultivated or otherwise introduced plants are present in both Detroit and Niagara Falls, New York; similarly, these are unlikely to immigrate.
Would immigrants be adapted to survive in Ontario?	Yes. Immigrants from states at similar latitudes would likely be cold-adapted to survive in Ontario.
Is there sufficient suitable habitat for immigrants in Ontario?	No. There is not sufficient habitat for immigrants in Ontario.
Are conditions deteriorating in Ontario?	Yes. Suitable natural habitat conditions are deteriorating in Ontario due to habitat loss and habitat degradation caused by European Common Reed, woody species succession, and habitat declines due to development. Anthropogenic maintained habitats including hydro corridors and rail lines, where regular vegetation management occurs, contribute to maintaining suitable conditions for existing stands of plants.
Is the species of conservation concern in bordering jurisdictions?	Unknown. Tallgrass prairie habitat in the adjacent states of Michigan and Ohio faces similar threats to Ontario prairies. Many U.S. conservation agencies.
Is the Ontario population considered to be a sink?	No. There is no evidence of immigration from the United States.
Is rescue from outside populations likely?	No. Rescue is unlikely to change status.

Sensitive species

Prairie-dock is not a data sensitive species.

Acronyms

BBRGR: Broader Biological Relevant Geographic Range
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
MNR: Ministry of Natural Resources
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