



The Species Status Advisory Committee

Status Review of
Rattlesnakeroot

Nabalus racemosus
(formerly *Prenanthes racemosa*)

in Newfoundland and Labrador



Department of Fisheries and Land Resources
Forestry and Wildlife Research Division

Available in alternate formats.

Please contact the Department of Fisheries and Land Resources
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Cover Photographs

Rattlesnakeroot, Wild Cove Fen. Photos by Claudia Hanel.

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SSAC Status Review Summary

Date of Status Review: March 8, 2019

Common Name

Rattlesnakeroot

Scientific name

Nabalus racemosus (formerly *Prenanthes racemosa*)

Status

Endangered

Reasons for Recommendation

COSEWIC criteria B1 (a),(b) (iii), and B2 (a),(b) (iii)

B1. Extent of occurrence <5,000 km²

(a) Known to exist at < 5 locations

(b) Continuing decline projected in (iii) area, extent and/or quality of habitat

B2. Index of area of occupancy <500 km²

(a) Known to exist at < 5 locations

(b) Continuing decline projected in (iii) area, extent and/or quality of habitat

Range in Newfoundland and Labrador

Newfoundland only; one known location

Status History

In April 2006, the species was assessed as Endangered by the Species Status Advisory Committee, in the document entitled: "The Status of Rattlesnakeroot (*Prenanthes racemosa*) in Newfoundland and Labrador" (2006)

www.flr.gov.nl.ca/wildlife/endangeredspecies/ssac/Rattlesnake_Root_SSAC.pdf

[This Web version may be abridged].

In August 2010, the species was listed as Endangered in Newfoundland and Labrador under the Newfoundland and Labrador Endangered Species Act.

Because the species is not rare nationally, it has not been assessed by COSEWIC and is not protected under the federal Species at Risk Act.

Overview

Wildlife Species Description and Significance

General Description of the Species:

Nabalus racemosus is a perennial vascular plant of the aster family. It flowers in early August – September. It is 30-75(-175) cm tall (although plants above 70 cm are rare in Newfoundland), and has a tuberous taproot. Lower stem smooth; upper stem bristly. Leaves with long-winged petioles (1-15 cm broad). Leaf blades oblanceolate to spatulate with entire (untoothed) to lightly dentate margins. Bases of the leaves clasp the stem. Flowering heads arranged in elongated racemes or panicle-like arrays which nod at anthesis (when flower is fully open and functional) but become more erect in later flowering. Flowering heads each with 9-29 florets. Rays of florets 7-13 mm long, pinkish-purple, or sometimes white. Phyllaries and calyculi (respectively the inner and outer series of bracts subtending the flowering heads) green-purple. Fruits about 5 mm long and golden brown.

Adapted from Bogler (2006).

Taxonomy and Designatable Units:

Nabalus racemosus (Michaux) Hooker (formerly *Prenanthes racemosa* Michaux)

Rattlesnakeroot (or the variant “rattlesnake-root”)
Glaucous Rattlesnakeroot
Purple Rattlesnakeroot
Smooth Rattlesnakeroot
Glaucous White Lettuce
prenanthe à grappe.

Family: Asteraceae (Composites)

Synonyms:

Chondrilla racemosa (Michaux) Poirier
Harpalyce racemosa (Michaux) D. Don ex Beck
Nabalus racemosus (Michaux) Hooker
Nabalus racemosus (Michaux) de Candolle
Nabalus racemosus var. *pinnatifidus* (A. Gray) Britton

Nabalus racemosus var. *racemosus* (Michaux) Hooker
Prenanthes racemosa Michaux (basionym)
Prenanthes racemosa subsp. *racemosa* Michaux
Prenanthes racemosa var. *racemosa* (Scoggan)
Prenanthes racemosa forma *racemosa* Michaux
Prenanthes racemosa subsp. *multiflora* Cronquist
Prenanthes racemosa var. *multiflora* (Cronquist) Dorn
Prenanthes racemosa var. *pinnatifida* A. Gray
Prenanthes racemosa forma *rollandii* Victorin and J. Rousseau

In NL, there is one designatable unit.

Social, Cultural and Economic Significance:

There is no known scientific or cultural significance of the species in Newfoundland and Labrador (Species Status Advisory Committee 2006).

Distribution

Global:

Nabalus racemosus occurs in boreal and sub-boreal North America. It is found as far south as Kentucky, but is relatively rare and localized in the southern half of its range.

National:

The species has been found, historically, in every province. However, it may now be extirpated in British Columbia. It is not found in the Yukon, Northwest Territories, or Nunavut (Canadian Endangered Species Conservation Council 2016).

Provincial:

In Newfoundland and Labrador, the species has been found only at Wild Cove Fen, between Corner Brook and Hughes Brook (see Figures 4 and 5).

Between 2000 and 2017, a number of additional calcareous fens on the Great Northern Peninsula, and between St. George's Bay and Bonne Bay further to the south, were surveyed for its presence (see Figure 6; Wild

Cove Fen Recovery Team, in progress). No new populations were discovered, indicating the general scarcity of the plant. Reports of this species from Labrador need to be confirmed, but likely refer to the Côte-Nord in far eastern Quebec (Meades et al. 2000).

The Extent of Occurrence is 1.03 km², and the Indexed Area of Occurrence is 4 km².

Habitat

Throughout its range, the species' primary habitats are sandy alluvial soils of stream banks, wet meadows, tall-grass prairies, fens, marshy flats, bogs (mainly calcicolous, at least in the north) (Bogler 2006; Species Status Advisory Committee 2006). Fernald (1950) identified "shores" as an additional habitat. In Wild Cove Fen the species is found in open areas interspersed with small larch and black spruce of a rich calcareous fen. The catchment basin of this fen is relatively small, and its hydrology is sensitive to changes. Sub-surface seepage water from the surrounding mountains affects the soil moisture of the fen.

Biology

Nabalus racemosus is a perennial herb that flowers in August and September (Fernald 1950). The pappus of the fruit suggests wind dispersal of the achene, but given its habitat in Maine, water dispersal is also likely (St. Hilaire 2002). Not much is known about its lifecycle characteristics. Age of maturity, and generation time, are unknown but are >1 year (Adapted, by Claudia Hanel, from the 2006 status report).

Parasitic fungi recorded on *Nabalus racemosus* in Wisconsin include *Septoria nabali* (infected plant structure unspecified) and an *Ascochyta* species (infecting the leaves) (Greene 1945, 1952, respectively). *Puccinia nabali*, a rust fungus, was reported on *N. racemosus* at Sept-Îles, Quebec (Arthur 1910). According to Louise Lefebvre (Assistant Curator, National Mycological Herbarium, pers. comm. 2006) neither *S. nabali* nor *P. nabali* is known from Newfoundland, but two other species which are known from the province, *P. variabilis* and *P. orbiculata*, could occur on the same host as *P. nabali*.

Population Size and Trends

In 2009, ~20% of Wild Cove Fen population of *N. racemosus* was surveyed by transect (Wild Cove Fen Recovery Team, in progress). An extrapolated total population number of ~6600 was derived.

Additionally, two 5m x5m plots were established in the Wild Cove population in 2013. However, these plots were sampled only twice – in 2013 and 2016. Table 1 shows the resulting data (Claudia Hanel, pers. comm. 2018).

Table 1: Monitoring data for *N. racemosus* at two plots in Wild Cove Fen. Data provided by Claudia Hanel 2018. See Figure 3.

No. of Plants	2013				2016			
	Flowering	Vegetative	Total	V/F Ratio	Flowering	Vegetative	Total	V/F Ratio
Plot 1	12	20	32	1.7	3	12	15	4.0
Plot 2	7	10	17	1.4	2	15	17	7.5
Total	19	30	49	1.6	5	27	32	5.4

Plot 1 exhibited a dramatically smaller total number of plants present in 2016, while plot 2 exhibited little change in 2016. Plot 1 and plot 2 both exhibited a smaller ratio of flowering plants to vegetative plants present in 2016.

Further monitoring of these two plots during future years may begin to show a trend.

Threats and Limiting Factors

Wild Cove Fen falls within the municipal boundary of the City of Corner Brook and is located approximately 3 km from the built-up area of the city. However, the wetness of the habitat and the absence of residential areas nearby have kept human usage of the fen relatively low. Wild Cove Fen receives its moisture from sub-surface seepage from the surrounding slopes and mountains. Therefore, the habitat is sensitive to activities uphill of the fen in the surrounding area.

A threats assessment for *Nabalus racemosus* in Wild Cove Fen, employing the protocol of Salafsky et al. (2008), is presented below:

1. Residential & Commercial Development

1.2 Commercial and Industrial Area

In the 2006 status report, the Genesis Organics composting facility was a

cause of concern. The construction of the facility decreased the area of open fen. Issues of water quality were also raised. Since the 2006 report, Genesis Organics has ceased its activities in the area, but compost is still being made at the site by Hi-Point Industries (Claudia Hanel, pers. comm. 2018). In 2009 the owner of the business did not anticipate any need for spatial expansion the facility.

There is also an active landfill in the immediate vicinity, which has been implicated in further habitat degradation of the fen (Claudia Hanel, pers. comm. 2018). In 2011 an expansion of the existing landfill into the fen area was proposed. This regional waste disposal issue has not yet been settled. Nevertheless, in recent years, the footprint of the landfill has been expanded on its western side (towards the highway) and new buildings have been constructed.

3. Energy Production and Mining

3.2 Mining and Quarrying:

One of the quarries in the Wild Cove Fen watershed is currently being expanded downstream. If the quarry activities upstream of the fen continue to expand, a significant threat to Wild Cove Fen may result. Subtle long-term impacts of hydrological changes are not easily separated from impacts of climate change or natural fluctuations in ecological processes. It is possible that further quarry or road development in the area will result in increased concentration of the water flow into existing channels, which could lead to the drying out of some areas and localized flooding in others. Only a detailed hydrological study of the area will confirm this (Claudia Hanel, pers. comm. 2018).

5. Biological Resource Use

5.1 Hunting & Collection of Terrestrial Animals:

Hunting occurs in the area, but its extent and impact on Wild Cove Fen is not known.

5.3 Logging & Wood Harvesting

Domestic woodcutting is allowed in the Wild Cove Operating Area of Forest Management District 15 (Department of Natural Resources Forestry Services Branch, 2013). Evidence of past wood harvesting has been observed on the slopes surrounding the fen, but not in the stunted

forest islands of the fen itself. It is not known to what extent the activity is ongoing, but the proposed domestic harvest from 2014-2018 is 1,275 m³ of wood. In the appendix to the Crown Districts 14 and 15 Five Year Operating Plan the listed Species at Risk present in this area are not mentioned under “Non Timber Considerations”.

6. Human Intrusions and Disturbance

6.1 Recreational Activities

A groomed snowmobile trail bisects the western part of the Wild Cove Fen. It could potentially pose a threat to any individuals located on the trail. Between Corner Brook and Wild Cove the trail runs in a roadside ditch along a section of Route 440. This section melts out fairly early in the spring, essentially reducing or eliminating snowmobile traffic to and from Corner Brook in low snow conditions.

11. Climate Change and Severe Weather

11.4 Storms and Flooding

A severe rainfall event accompanied by substantial snowmelt in January 2018 caused many localized road washouts at stream crossings in the Bay of Islands Area. The Wild Cove Fen has not been revisited since then to determine if it has been affected (Claudia Hanel, pers. comm. 2018).

Additional threats:

Additional threats include the fact that the population of *Nabalus racemosus* in Wild Cove Fen is so small that it is prone to any number of natural or anthropogenic chance events, including demographic stochasticity.

Protection, Status and Ranks

All ranks listed below for *Nabalus racemosus* are based on the “Wild Species 2015: The General Status of Species in Canada” (Canadian Endangered Species Conservation Council 2016) and NatureServe (2017).

Category	Rank
Global	
G-rank:	G5
IUCN:	Not listed
National	
N-rank:	N5
COSEWIC:	Not assessed
Provincial	
Newfoundland:	S1, critically imperiled
Labrador:	Not present
Adjacent Jurisdictions:	
Nova Scotia S-Rank	S1, critically imperiled
New Brunswick S-Rank	S3, vulnerable
Quebec S-Rank	S4, apparently secure

N. racemosus was designated as Endangered under the Newfoundland and Labrador Endangered Species Act in August 2010.

The whole Wild Cove Fen and some adjacent habitats harboring rare plants (including the endangered Northern Bog Aster (*Symphyotrichum boreale*; SSAC 2019) are designated as Sensitive Wildlife Areas (SWAs) in the Provincial Land Use Atlas. An SWA is a non-legal habitat protection mechanism that functions to trigger a review process by the Wildlife Division or Forestry and Wildlife Research Division when new land development or use proposals are brought forward (J. Humber, pers. comm.,

2018). During this review process, the proposed developments can be denied, there may be conditions placed on the development activities, and/or mitigations may be developed to address the negative effects on species at risk (J. Humber, pers. comm., 2018). Though SWAs have no legislation associated to them, they are an important habitat protection mechanism (J. Humber, pers. comm. 2018).

A part of Wild Cove Fen is zoned for Environmental Conservation in the Corner Brook Municipal Land Use Plan, but the area adjacent to the landfill is not included under that designation (Claudia Hanel, pers. comm. 2018). On December 17, 2018, the City of Corner Brook signed a Municipal Habitat Stewardship Agreement with the provincial government, aimed at protecting the same area of the fen from any future development.

Status Review Report

Rattlesnakeroot
prenanthe à grappe
Nabalus racemosus

Range of occurrence in NL (NF/ LB): Newfoundland only: Wild Cove Fen

Existing SSAC Assessment:

Status category:

XT E T SC

Date of last assessment: April 12, 2006

Reason for designation at last assessment:

- Only 1 confirmed population in the province
- Restricted to a small valley within the boundaries of the City of Corner Brook
- Adjacent industrial activities and development potentially affecting habitat quality
- Recent decline of approximately 3% in extent of habitat due to development was probably accompanied by a corresponding decline in population
- Rescue effect unlikely

Criteria applied at last assessment:

- Qualified as Endangered under the SSAC/COSEWIC criteria B1, B2.(a) and B 2.(b) (i), (ii) and (iii)

SSAC Recommendation:

- No change in status and criteria
 No change in status, new criteria

Evidence supporting this Status Review:

Wildlife species:	
Change in eligibility, taxonomy or designatable units: Explanation: The accepted name has changed from <i>Prenanthes racemosa</i> to <i>Nabalus racemosus</i> as part of a new circumscription of the genus <i>Prenanthes</i> .	Yes <input checked="" type="checkbox"/> No <input type="checkbox"/>
Range:	
Change in Extent of Occurrence (EO):	Yes <input checked="" type="checkbox"/> No <input type="checkbox"/> Unk <input type="checkbox"/>
Change in Index of Area of Occupancy (IAO): Explanation: More properly, "n/a". "AO", not "IAO", was used in the 2006 report.	Yes <input checked="" type="checkbox"/> No <input type="checkbox"/> Unk <input type="checkbox"/>
Change in no. of known or inferred current locations*	Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> Unk <input type="checkbox"/>
Significant new survey information: Explanation: Surveys in Wild Cove Fen itself have extended the previously known population area.	Yes <input checked="" type="checkbox"/> No <input type="checkbox"/> Unk <input type="checkbox"/>
Population Information:	
Change in number of mature individuals:	Yes <input checked="" type="checkbox"/> No <input type="checkbox"/> Unk <input type="checkbox"/>
Change in population trend: [pre-2011 data is deficient]	Yes <input type="checkbox"/> No <input type="checkbox"/> Unk <input checked="" type="checkbox"/>
Change in severity of population fragmentation:	Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> Unk <input type="checkbox"/>
Change in trend in area and/or quality of habitat:	Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> Unk <input type="checkbox"/>

<p>Significant new survey information:</p> <p>Explanation:</p> <p>New surveys have shown that the population is somewhat larger than was originally estimated.</p>	<p>Yes <input checked="" type="checkbox"/> No <input type="checkbox"/></p>
<p>Threats:</p>	
<p>Change in nature and/or severity of threats:</p> <p>Explanation:</p> <p>The recent (December 2017) approval to expand the quarry downstream may lead to further habitat encroachments and disturbances to the hydrology of the fen. Plastic bags and other lightweight garbage blown out of the landfill are reducing habitat quality at the western edge of the fen.</p>	<p>Yes <input type="checkbox"/> No <input type="checkbox"/> Unk <input checked="" type="checkbox"/></p>
<p>Protection:</p>	
<p>Change in effective protection:</p> <p>Explanation:</p> <p>The species was listed as Endangered under the Newfoundland and Labrador Endangered Species Act in 2010. The fen area is now included in a Sensitive Wildlife Area (SWA) in the Provincial Land Use Atlas, and part of the fen is zoned for Environmental Conservation in the Corner Brook Municipal Land Use Plan. On December 17, 2018, the City of Corner Brook signed a Municipal Habitat Stewardship Agreement with the provincial government, aimed at protecting the same area of the fen from any future development.</p>	<p>Yes <input checked="" type="checkbox"/> No <input type="checkbox"/></p>

Rescue Effect:	
Change in evidence of rescue effect:	Yes <input type="checkbox"/> No <input checked="" type="checkbox"/>
Quantitative Analysis:	
Change in estimated probability of extirpation:	Yes <input type="checkbox"/> No <input type="checkbox"/> Unk <input checked="" type="checkbox"/>
Details:	
A quantitative analysis was not performed.	

Summary and Additional Considerations:

The habitat of the Wild Cove population of *Nabalus racemosus* is expected to decline due to stochastic effects, human activities and, potentially, climatic conditions. As there are no known populations nearby to provide a rescue effect, this could result in the loss of the species on the Island of Newfoundland.

Acknowledgements and authorities contacted:

Claudia Hanel – Ecosystem Management Ecologist – Botanist, Forestry and Wildlife Research Division, Government of Newfoundland and Labrador

Jessica Humber – Ecosystem Management Ecologist – Biodiversity, Forestry and Wildlife Research Division, Government of Newfoundland and Labrador

Adam Durocher - Data Manager, Atlantic Canada Conservation Data Centre

Author of Status Review:

Sander Bennett Boisen

Technical Summary

Nabalus racemosus

Rattlesnakeroot

Prenanthe à grappe.

Range of occurrence in the province:

Occurs only in a fen near Wild Cove Brook in western Newfoundland

Demographic Information

1. Generation time (usually average age of parents in the population)	Unknown, >1 year
2. Is there an [observed, inferred, or projected] continuing decline in number of mature individuals?	Projected
3. Estimated percent of continuing decline in total number of mature individuals within [5 years or 2 generations]	Unknown
4. [Observed, estimated, inferred, or suspected] percent [reduction or increase] in total number of mature individuals over the last [10 years, or 3 generations].	Unknown
5. [Projected or suspected] percent [reduction or increase] in total number of mature individuals over the next [10 years, or 3 generations].	Unknown
6. [Observed, estimated, inferred, or suspected] percent [reduction or increase] in total number of mature individuals over any [10 years, or 3 generations] period, over a time period including both the past and the future.	Unknown
7. Are the causes of the decline a. clearly reversible and b. understood and c. ceased?	n/a
8. Are there extreme fluctuations in number of mature individuals?	Unknown

Extent and Occupancy Information

9. Estimated extent of occurrence	1.03 km ²
10. Index of area of occupancy (IAO) (Always report 2x2 grid value).	4 km ²
11. Is the population “severely fragmented” i.e., >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 large distance?	No
12. Number of locations ¹ (use plausible range to reflect uncertainty)	1
13. Is there an [observed, inferred, or projected] continuing decline in extent of occurrence?	No
14. Is there an [observed, inferred, or projected] continuing decline in index of area of occupancy?	No (already at minimum value)
15. Is there an [observed, inferred, or projected] continuing decline in number of subpopulations?	No
16. Is there an [observed, inferred, or projected] continuing decline in number of locations*?	No (already at minimum value)
17. Is there an [observed, inferred, or projected] continuing decline in [area, extent and/or quality] of habitat?	Yes, projected decline in quality of habitat
18. Are there extreme fluctuations in number of subpopulations?	No
19. Are there extreme fluctuations in number of locations?	No
20. Are there extreme fluctuations in extent of occurrence?	No

¹ See Definitions and Abbreviations on [COSEWIC website](#) and [IUCN 2010](#) for more information on this term.

21. Are there extreme fluctuations in index of area of occupancy?	No
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Number of Mature Individuals (in each subpopulation)

22. Subpopulation (give plausible ranges)	N Mature Individuals
Wild Cove	3000-12,000
Total	3000-12,000

Quantitative Analysis

23. Probability of extinction in the wild is at least [20% within 20 years or 5 generations, or 10% within 100 years].	Unknown
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Threats (actual or imminent, to populations or habitats)

<p>24. Threats and IUCN categories summary:</p> <ul style="list-style-type: none"> 1.2 Commercial and Industrial Area <ul style="list-style-type: none"> • Habitat degradation from composting facility and landfill 3.2 Mining and Quarrying: <ul style="list-style-type: none"> • Expansion of quarrying activity in the area poses a threat to the habitat. 5.1 Hunting & Collection of Terrestrial Animals: <ul style="list-style-type: none"> • There is active hunting in the area 5.3 Logging & Wood Harvesting <ul style="list-style-type: none"> • There is evidence of logging in the surrounding area 6.1 Recreational Activities <ul style="list-style-type: none"> • There is evidence of an active snowmobile trail in the area 11.4 Storms and Flooding <ul style="list-style-type: none"> • Potential habitat degradation due to large amount of snow melt, severity unknown. <p>The habitat is under threat from a number of human leisure and commercial activities. Extreme weather events pose a threat to the habitat due to flooding and wash out from the landfill, composting facility, roads and quarries. Small population size of the single known population leads to vulnerability due to demographic stochasticity.</p>

Rescue Effect (immigration from outside Newfoundland)

25. Status of outside population(s) most likely to provide immigrants to NL?	Closest population is likely La Romaine, on the Quebec north shore (Côte-Nord). Species is considered secure in Quebec.
26. Is immigration known or possible?	Unknown
27. Would immigrants be adapted to survive in NL?	Probably
28. Is there sufficient habitat for immigrants in NL?	Probably
29. Is rescue from outside populations likely?	No

Data Sensitive Species

30. Is this a data sensitive species? No, publication of specific information related to where this species occurs is not likely to negatively affect its survival or recovery.
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Current Status

31. Status History (COSEWIC or SSAC)

In April 2006, the species was assessed as Endangered by the Species Status Advisory Committee, in the document entitled: "The Status of Rattlesnakeroot (*Prenanthes racemosa*) in Newfoundland and Labrador"

In August 2010, the species was listed as Endangered in Newfoundland and Labrador under the Newfoundland and Labrador Endangered Species Act.

Because the species is not rare nationally, it has not been assessed by COSEWIC and is not protected under the federal Species at Risk Act.

32. Criteria (old):

B1. Extent of occurrence <5,000 km²

B2. Area of occupancy <500 km²

(a) Known to exist at < 5 locations

(b) Continuing decline observed, inferred or projected in i) extent of occurrence, ii) area of occupancy, and iii) area, extent and/or quality of habitat

33. Year Assessed: 2006

34. Reasons for Designation:

Qualified as Endangered under the SSAC/COSEWIC criteria B1, B 2.(a) and B 2.(b) i), ii) and iii):

- Only 1 confirmed population in the province
- Restricted to a small valley within the boundaries of the City of Corner Brook
- Adjacent industrial activities and development potentially affecting habitat quality
- Recent decline of approximately 3% in extent of habitat due to development was probably accompanied by a corresponding decline in population
- Rescue effect unlikely

35. Author of Technical Summary: Sander Bennett Boisen

36. Additional Sources of Information: n/a

Recommended Status and Reasons for Designation

37. Recommended Status: Endangered	38. Alpha-numeric Code: B1 a, b(iii) B2 a, b(iii)
39. Reasons for Designation: Qualifies as Endangered under COSEWIC criteria B1 (a),(b)(iii), and B2 (a),(b)(iii)	

Applicability of Criteria

40. Criterion B (Small Distribution Range and Decline or Fluctuation): B1. Extent of occurrence estimated to be < 5000 km ² a. known to exist at <5 locations b. continuing decline projected in iii. in area, extent, and/or quality of habitat B2. Index of area of occupancy estimated to be < 500 km ² a. known to exist at <5 locations b. continuing decline projected iii. in area, extent, and/or quality of habitat
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[This Web version may be abridged]

Species Status Advisory Committee. 2019. Status Review for Northern Bog Aster *Symphyotrichum boreale* in Newfoundland and Labrador. Forestry and Wildlife Research Division, Department of Fisheries and Land Resources, Government of Newfoundland and Labrador, Corner Brook, Newfoundland and Labrador, Canada.

Additional Sources of Information

Claudia Hanel, March 5, 2018, unpublished report: “Rattlesnakeroot Data Update for Assessment”, Forestry and Wildlife Research Division, Department of Fisheries and Land Resources, Government of Newfoundland and Labrador.

Jessica Humber – Ecosystem Management Ecologist – Biodiversity, Forestry and Wildlife Research Division, Government of Newfoundland and Labrador

Wild Cove Fen Recovery Team. (In progress). Recovery Plan. Northern Bog Aster (*Symphyotrichum boreale*) and Rattlesnakeroot (*Prenanthes racemosa*).

Figures

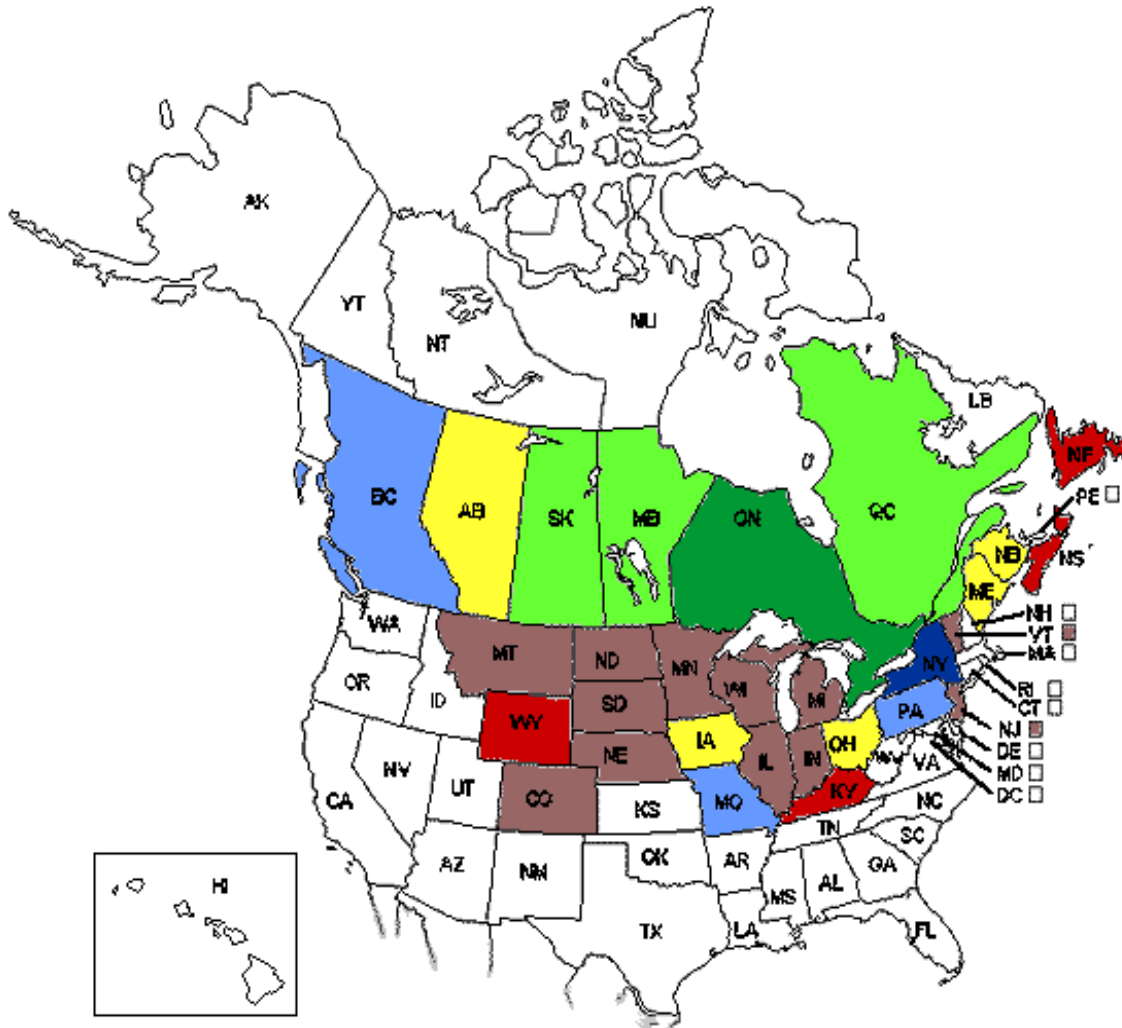


Figure 1: Global distribution of *Nabalus racemosus*. Color indicates conservation status with the following key: Red – Critically imperiled, Orange – Imperiled, Yellow – Vulnerable, Light Green – Apparently secure, Dark Green – Secure, Light Blue – Possibly Extirpated, Dark Blue – Presumably extirpated, Grey – unranked or under review. Source (NatureServe Explorer 2017)

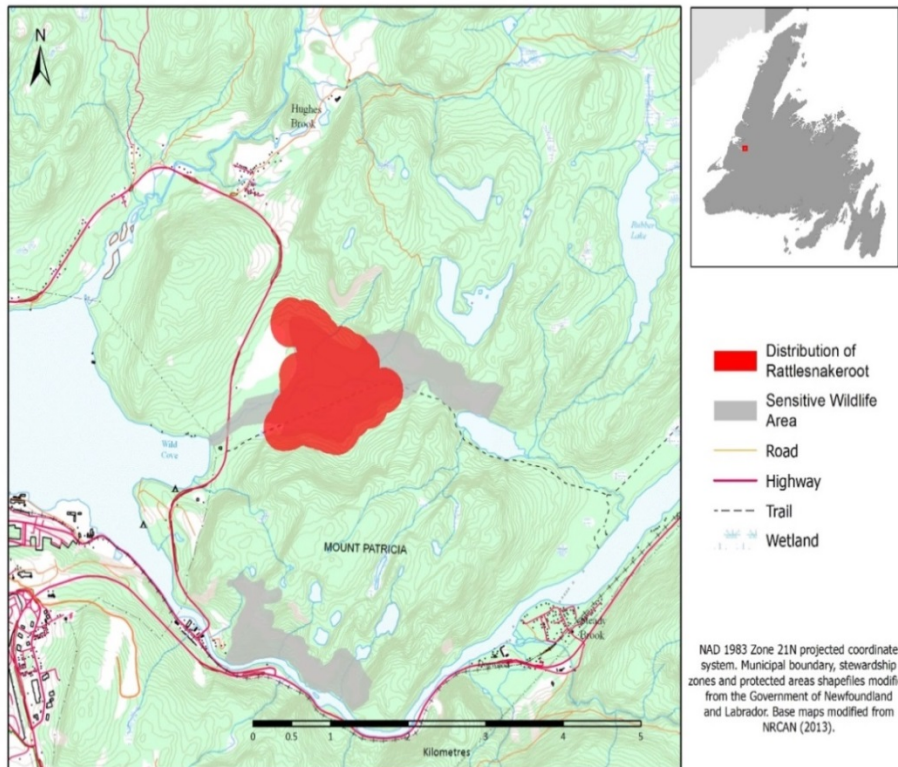


Figure 2: The critical habitat map for Rattlesnakeroot (*Nabalus racemosus*) in Newfoundland. The species is found only in one location; a fen near Wild Cove northeast of Corner Brook. Note that the dotted line trail on the map does not accurately track the present road. All occurrences of *N. racemosus* occur north of that present road. Figure prepared by Adam Durocher 2018.

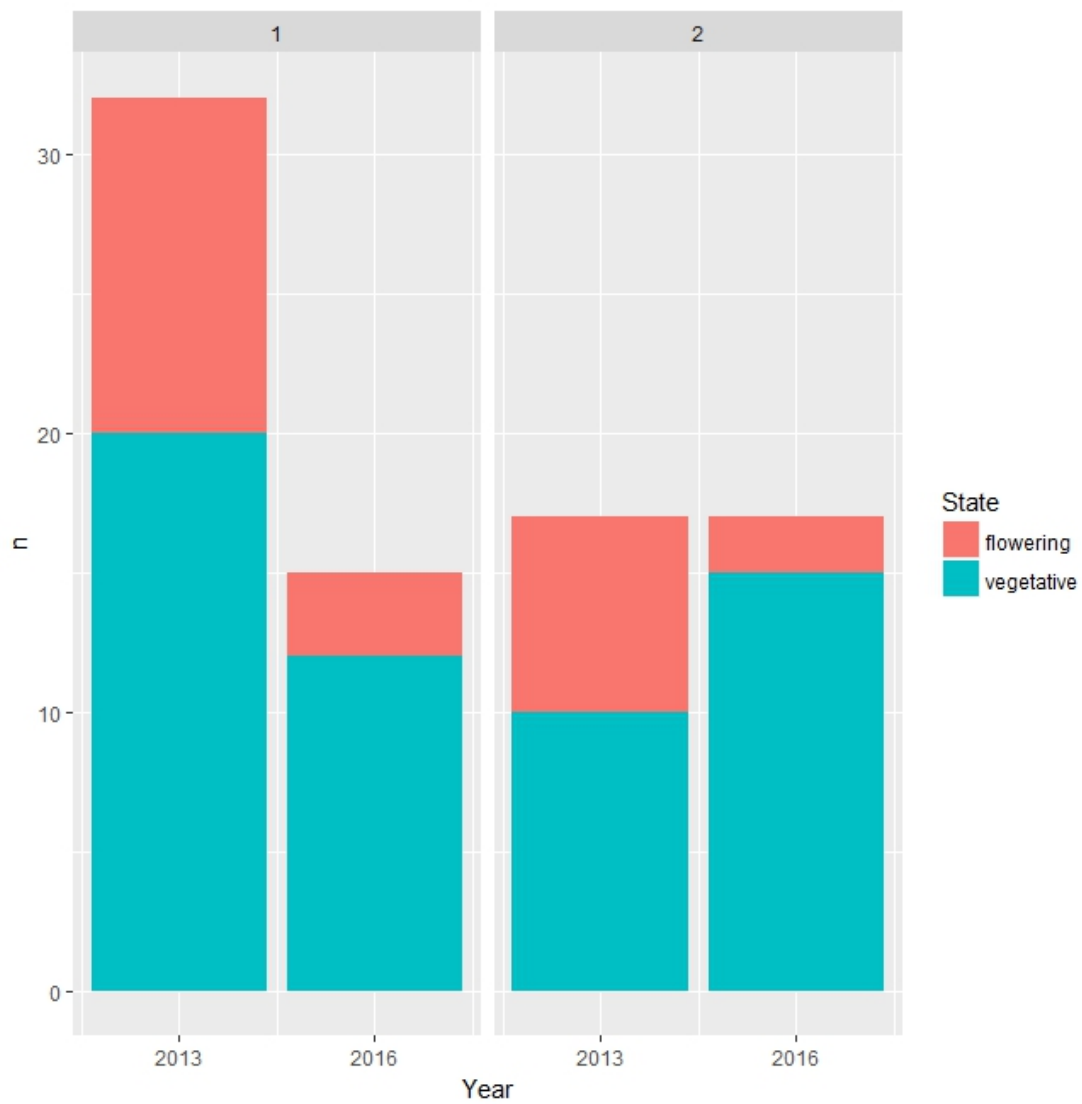


Figure 3: A visual representation of the main results found in Table 1, showing the number of individuals (n), and their state as “flowering” or “vegetative”, for plots 1 and 2 in years 2013 and 2016.

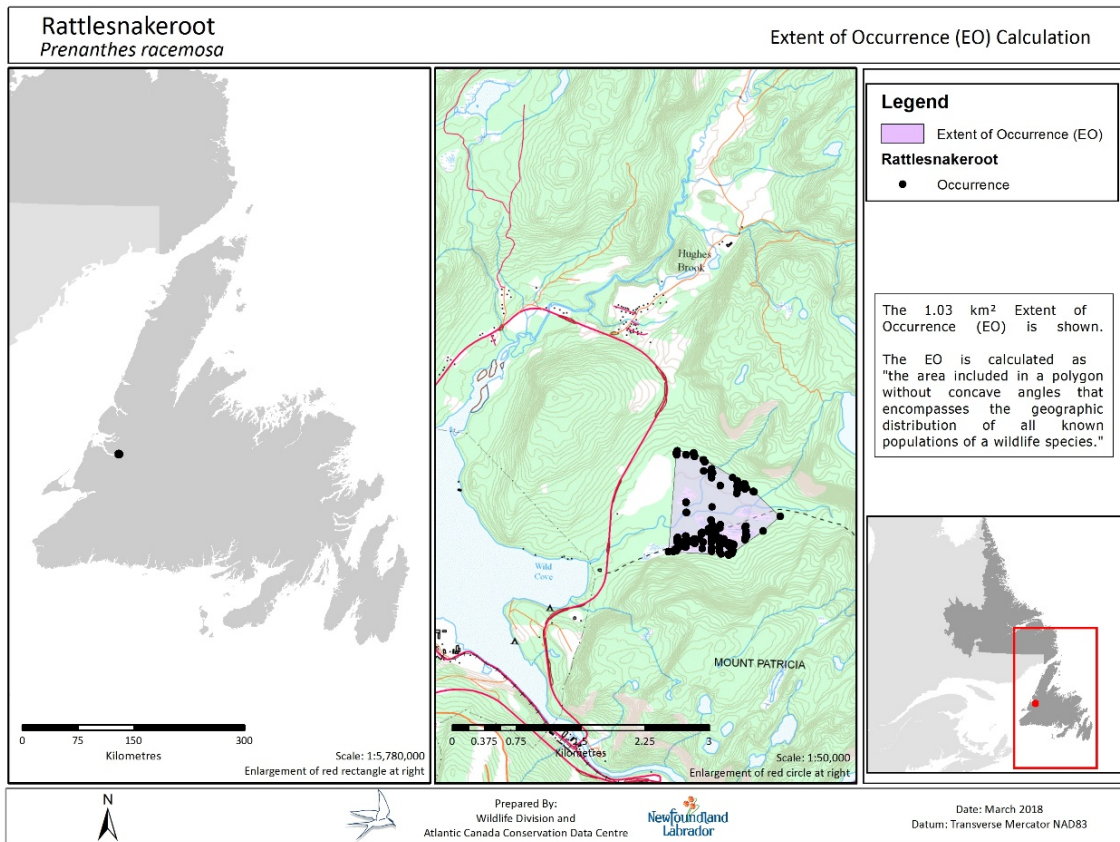


Figure 4: The extent of occurrence of *Nabalus racemosus* within the Wild Cove Fen in western Newfoundland. Note that the dotted line trail on the map does not accurately track the present road. All occurrences of *N. racemosus* occur north of that present road. Prepared by Adam Durocher, Atlantic Canada Conservation Data Centre.

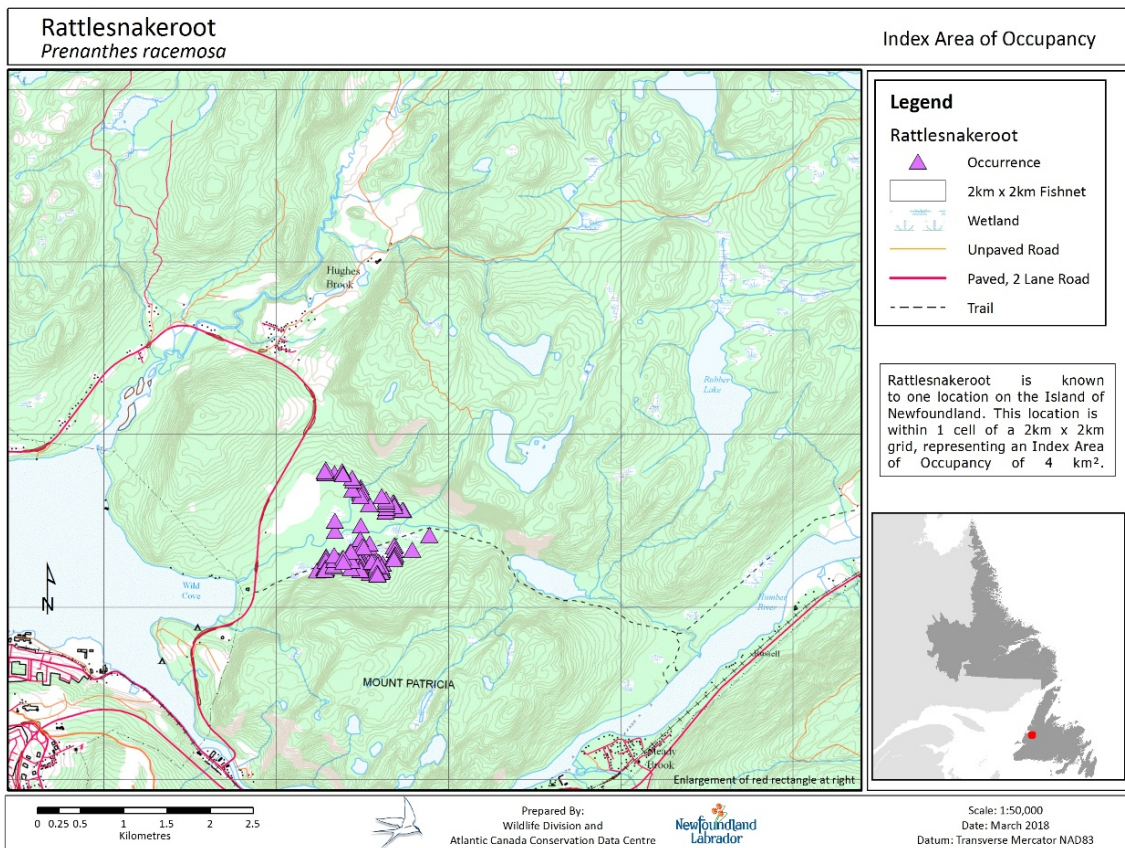


Figure 5: The occurrences of *Nabalus racemosus* within a 2x2km reference grid used to calculate the Index of Area of Occupancy. Note that the dotted line trail on the map does not accurately track the present road. All occurrences of *N. racemosus* occur north of that present road. Prepared by Adam Durocher, Atlantic Canada Conservation Data Centre.

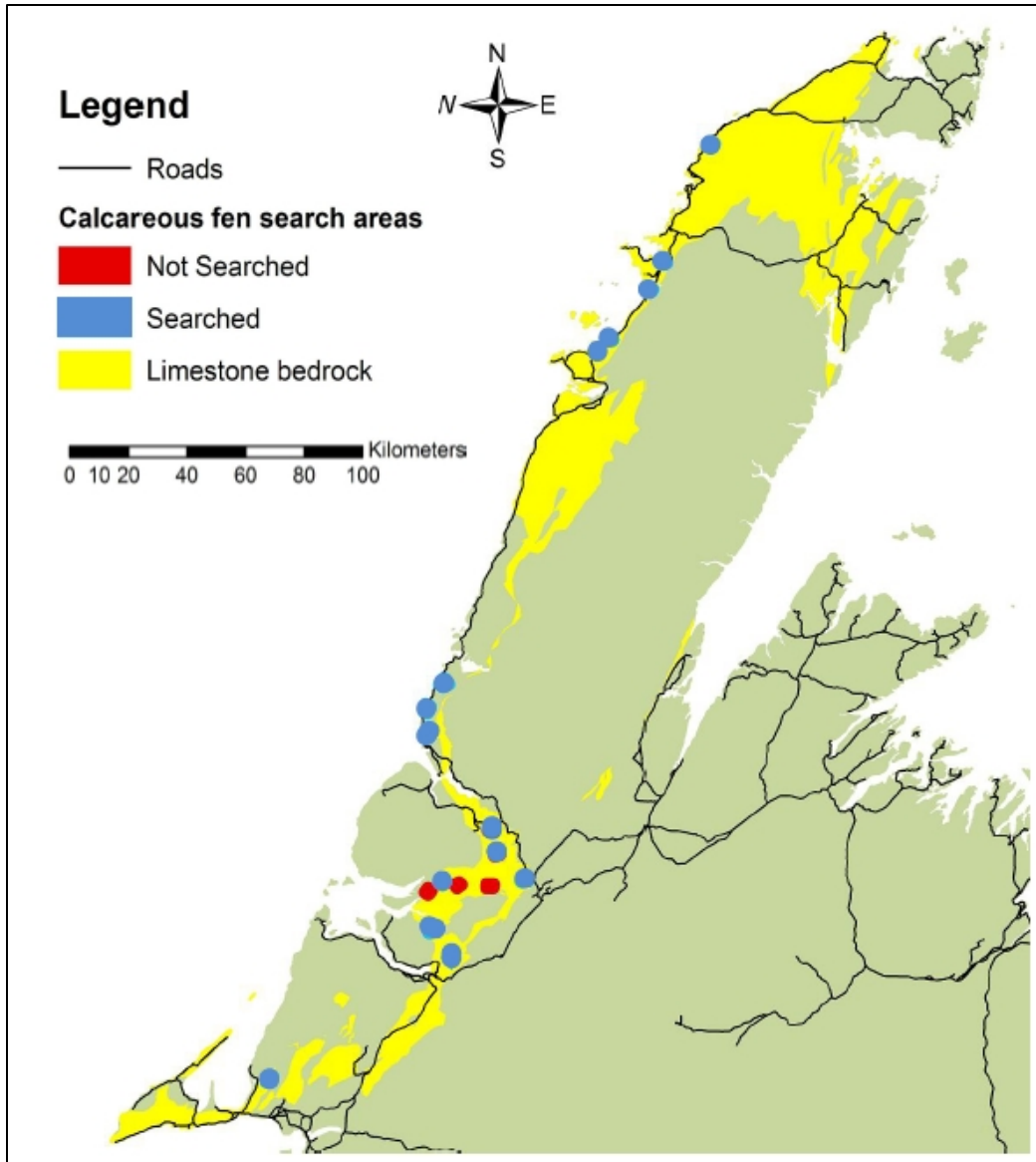


Figure 6: Location of completed searches and potential habitat not searched in Newfoundland for Northern Bog Aster (*Symphyotrichum boreale*) and Rattlesnakeroot (*Nabalus racemosus*) (Wild Cove Fen Recovery Team, in progress).