



The Status Review of
Low Northern Rockcress
Braya humilis
in Newfoundland and Labrador

The Species Status Advisory Committee



Department of Environment and Climate Change

COVER PHOTOGRAPHS

Table Mountain. Dr. Susan Squires

Low Northern Rockcress. Dr. Susan Squires

RECOMMENDED CITATION

Species Status Advisory Committee Status Review No. 1. 2016. Status Review for Low Northern Rockcress (*Braya humilis*) in Newfoundland and Labrador. Wildlife Division, Department of Environment and Climate Change, Government of Newfoundland and Labrador, Corner Brook, Newfoundland and Labrador, Canada.

AUTHORS

The initial draft of this preliminary status review was prepared by Dr. Susan Squires.

SSAC STATUS REVIEW SUMMARY

Date of Status Review - October 2016

Common Name

Low Northern Rockcress

Scientific name

Braya humilis

Status

Endangered

Reasons for Recommendation

A limestone barrens species occurring at only one small site on the island of Newfoundland. The species has previously suffered habitat loss and degradation; this has slowed over the past 10 years. Since its original assessment in 2004 there has been a decline in the number of mature individuals.

Range in Newfoundland and Labrador

Newfoundland only, 1 location

Status History

Low Northern Rockcress was designated as Endangered by the Species Status Advisory Committee in 2004 and was subsequently listed under the provincial *Endangered Species Act*. The species has not been designated by COSEWIC and therefore is not protected under the federal *Species at Risk Act*.

EXECUTIVE SUMMARY

Wildlife Species Description and Significance

The Low Northern Rockcress is a small (<80 mm) herbaceous perennial plant of the Brassicaceae family which bears four-petalled white flowers in early June. It is currently described in Canada as four subspecies (VASCAN, 2016). The only subspecies known to exist in Newfoundland and Labrador is *Braya humilis* (C. A. Meyer) B. L. Robinson subsp. *humilis* (VASCAN, 2016), found on limestone barrens.

Distribution

Global: Asia, Canada, Greenland, Siberia, and USA (Alaska, Colorado, Michigan, Montana, Vermont, and Wyoming).

National: Disjunct populations in the Arctic islands (Baffin, Banks, Ellesmere, Perry Islands, and Victoria), Alberta, British Columbia, Manitoba, Newfoundland and Labrador, Northwest Territories, Nunavut, Ontario, Québec, and Yukon.

Provincial: Table Mountain, Port-au-Port Peninsula (Appendix A, Figure 1).

The Extent of Occurrence of the Low Northern Rockcress is 0.87 km² (Appendix A, Figure 2) and the Indexed Area of Occupancy is 12 km² [*confidential map removed from public version of document*].

Habitat

Limestone barrens are found on the Great Northern Peninsula from Bellburns to Burnt Cape Ecological Reserve, on the Port-au-Port Peninsula, and on Table Mountain (Burzynski et al., 2016). This unique ecosystem is restricted to exposed coastal and upland locations that are characterized by an Arctic-like climatic (low temperatures, high winds, and frost action). Frost action disturbs the substrate leaving patches of weathered bedrock, sorted substrate, and unsorted substrate, which controls the number of germination sites and seedlings as well as plant growth.

Low Northern Rockcress is found on limestone barrens near the 340-m-high summit of Table Mountain (Appendix A, Figure 1). Table Mountain lies within the Western Newfoundland Forest Ecoregion (Port-au-Port Subregion). Its summit is part of the Catoche Formation of the St. George geological group – a formation characterized by grey limestone, minor glacial deposits, and dolomite-mottled and bioturbated lime mudstones (Knight and Boyce, 2002; Palmer et al. 2002; Dickson, 2003). This habitat supports a rare plant community, including Dwarf Arctic Ragwort (*Packera cymbalaria*), Newfoundland Pussetoes (*Antennaria eucosma*), Hyssopleaf Fleabane (*Erigeron*

hyssopifolius), and willows (*Salix ballii*, *S. uva-ursi*, *S. vestita*) (Meades et al., 2000).

Biology

Information on the closely related Long's Braya and Fernald's Braya suggest that the age-to-maturity of the Low Northern Rockcress is approximately a decade and that its lifespan can be several decades, increasing the importance of adult survival and seedling recruitment for population trends (Hermanutz et al., 2002). Based on known information about species of the genus *Braya*, flowers can be self- or cross-pollinated (Parsons, 2002; Parsons and Hermanutz 2006). Seeds need to be cold and physically scarified to germinate and can survive for several years (Tilley, 2002).

Population Size and Trends

Low Northern Rockcress was first collected on Table Mountain in 1914. Population surveys for the species in 1999 found 55 individuals (Hermanutz, unpublished data). More extensive surveys in 2004 and 2005 estimated the population at approximately 250 reproductive individuals (Tilley *et al.* 2005).

Population monitoring using permanent plots was initiated in 2004. The density of flowering plants within these plots increased slightly from 2004 to 2006, but then severely declined for reasons that are not clearly understood (Squires and Hermanutz, unpublished data). Between 2004 and 2015, the density of mature (flowering) individuals declined by 94% (24 to 2) within the permanent monitoring plots and the number of individuals in all age classes combined declined by 91% (171 to 16).

No thorough population survey has been completed for the species in Newfoundland and Labrador. Survival estimates and projections have also not been determined.

Threats and Limiting Factors

The distinctiveness of limestone barrens makes habitat specificity the most significant biological factor limiting the distribution of the Low Northern Rockcress in Newfoundland and Labrador (Tilley et al., 2005). Its population is also limited by its small size and the amount of suitable habitat within dispersal distance (Tilley et al., 2005). Threats to this population include:

Residential and Commercial Development

Suitable habitat within the known range of the Low Northern Rockcress has been degraded by the creation of buildings and the installation of communication towers (Tilley et al., 2005). Habitat quality decreased in the early 1950s when a radar station was erected on the summit of Table Mountain as part of the "Pine Tree Line", a Canada-

wide system used during the Cold War. The station was closed in 1971 and subsequently demolished (Tilley et al., 2005). Current infrastructure includes various federal agency communication towers dispersed throughout the distribution of the Low Northern Rockcress (Tilley et al., 2005). Further development of the site, including regular maintenance and upgrading operations of existing infrastructure and remediation of areas following the removal of infrastructure and site decommissioning procedures, may threaten the population (Tilley et al., 2005).

Transportation and Service Corridors

The development of the Pine Tree Property included the creation of roadways and the installation of transmission lines which are currently used and maintained. The property is gated; therefore, vehicle access is restricted.

Climate Change and Severe Weather

The impact of climate change on the long-term persistence of the Low Northern Rockcress is unknown; however, limestone barrens are a climate-driven ecosystem that is predicted to experience an overall increase in mean annual air temperature of approximately 4°C over the next century (Slater, 2005). Table Mountain defines the southern limit of the Limestone Barrens in Newfoundland and Labrador (Burzynski et al., 2016).

Invasive and Other Problematic Species and Genes

Diamondback Moth (*Plutella xylostella*) eggs have been documented on the Low Northern Rockcress (Tilley et al., 2005), but this invasive agricultural pest does not appear to be significant in limiting its distribution (Squires, unpublished data). It does cause a high annual loss in leaf biomass and seed output of the closely related Long's Braya and Fernald's Braya (Squires et al., 2009). Increasing temperature (i.e. climate change) can result in shorter insect generation times (Talekar and Shelton, 1993). Any increase in the population size of the Diamondback Moth in the area of Table Mountain may be a threat (Tilley et al., 2005).

Protection, Status and Ranks

Low Northern Rockcress is designated:

- Globally as G5 Secure (Nature Serve)
- Nationally as Secure (2012 *General Status*) and N5 Secure (*NatureServe*)
- Provincially as S1 Critically Imperiled (*General Status 2015*)

The Low Northern Rockcress is protected under the provincial *Endangered Species Act*. The species has not been designated by COSEWIC and, therefore, is not protected under the federal *Species at Risk Act*.

Currently no legal habitat protection exists within the known range of the Low Northern

Rockcress (e.g., protected area, critical habitat order). However, the majority of its habitat is under the management of Public Works and Government Services Canada as part of Table Mountain is a federally owned site (Figure 1). Smaller properties, leased by Transport Canada, Department of Fisheries and Oceans, the Royal Canadian Mounted Police, and the Canadian Broadcasting Corporation, are nested within the main property (Tilley et al., 2005). Public Works and Government Services Canada is aware that the species occurs on its property and is required by the federal *Species at Risk Act* section 60(1) to guarantee that on-site work does not threaten the species or its habitat.

Habitat occupied by the Low Northern Rockcress on Table Mountain, outside of the area under the management of Public Works and Government Services Canada, is provincially designated as a Sensitive Wildlife Area (Figure 1). Sensitive Wildlife Areas are a Crown Lands designation that ensures the chosen area is flagged for special consideration under registered development applications.

TABLE OF CONTENTS

SSAC STATUS REVIEW SUMMARYi

EXECUTIVE SUMMARY ii

STATUS REVIEW REPORT1

SSC Recommendation1

Wildlife species2

Range2

Population Information.....2

Threats4

Protection4

Rescue Effect4

Quantitative Analysis4

Summary and Additional Considerations.....5

TECHNICAL SUMMARY6

INFORMATION SOURCES.....11

Appendix A13

STATUS REVIEW REPORT

Braya humilis subsp. *humilis*

Low Northern Rockcress

Braya Délicat

Range of occurrence in NL (NFNF/ LB): NF - Table Mountain, Port-au-Port Peninsula

Status category:

XT E T SC

Date of last assessment: SSAC 2004; never assessed by COSEWIC

Reason for designation at last assessment:

- Single population in province;
- Arctic-alpine disjunct;
- Population is very small with less than 50 mature adults;
- Population is highly threatened by adjacent road, communication towers and contaminated soils which are located within a few metres of the population;
- Site is highly degraded and under threat suggesting that the quality of the habitat has declined since it was discovered in 1914 (prior to present installation), but no data exist to confirm the decline in the habitat quality; and
- Data pertaining to the rate of decline or fluctuations in number of mature individuals is not known at this time.

Criteria applied at last assessment: D1 (< 250 mature individuals), with supporting evidence from B2ab(iii).

If the earlier version of criteria was applied, provide correspondence to current version of the criteria: N/A

SSC Recommendation:

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

Evidence (indicate as applicable):

of 2015 the density of mature (flowering) individuals with the permanent monitoring plots had declined by 94% (24 to 2) and the number of individuals in all age classes combined had declined by 91% (171 to 16) (Figure 1).

This trend suggests an overall population decline. A complete population count has never been completed. In 1999, 55 individuals were located (20 juveniles and 35 flowering individuals) over approximately 800 m² (Hermanutz, unpublished data). More extensive surveys in 2004 and 2005 of an undefined area estimated the population at approximately 250 reproductive individuals (Tilley *et al.* 2005).

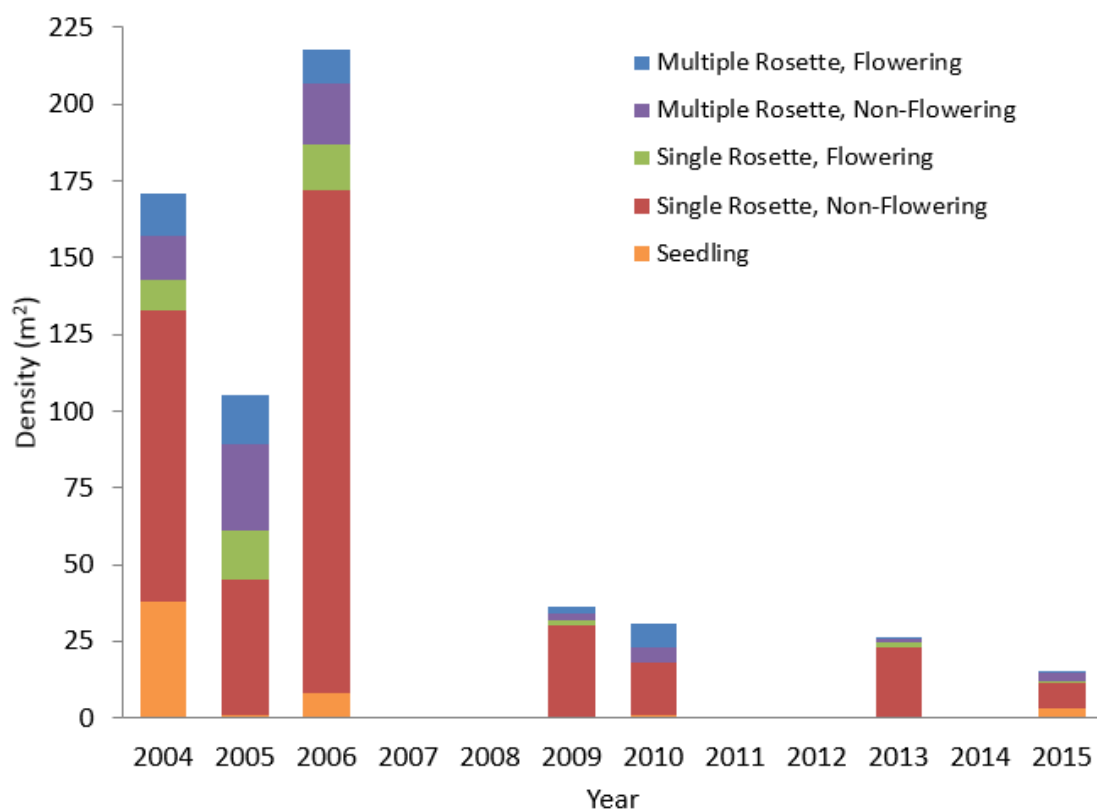


Figure 1. Change in the density of Low Northern Rockcress, by size and reproductive class, in permanent plots from 2004 to 2015.

Threats:

Change in nature and/or severity of threats: yes no unk

Explanation: There has been no change in the threats impacting the Low Northern Rockcress since the last assessment.

Protection:

Change in effective protection: yes no

Explanation: Since 2006 the Low Northern Rockcress has been protected under the *Endangered Species Act*. While Sensitive Wildlife Areas, a Crown Lands designation that ensures the chosen area is flagged for special consideration under registered development applications, have been designated for the area occupied by Low Northern Rockcress on Table Mountain (Appendix A, Figure 1), no legal habitat protection exists.

Rescue Effect:

Change in evidence of rescue effect: yes no

Explanation: The likelihood of rescue effect from the closest populations of Low Northern Rockcress in Canada is still extremely low.

Quantitative Analysis:

Change in estimated probability of extirpation:
yes no unk

Details: Survival estimates and projections have not been determined for the Low Northern Rockcress.

Summary and Additional Considerations: [e.g., recovery efforts]

The Limestone Barrens Species-at-Risk Recovery Team is responsible for defining recovery objectives and actions for the Low Northern Rockcress with the support of the Wildlife Division (Department of Environment and Climate Change).

Efforts to recover the species since the last assessment in 2004 include the creation of a recovery plan, additional survey efforts, the identification of critical habitat, the establishment of long-term monitoring plots and the monitoring of those plots seven times in the last 13 years, informing land owners of its presence and working with them to mitigate the impacts of onsite maintenance and construction, the addition of Low Northern Rockcress to educational and stewardship initiatives of the Limestone Barrens Habitat Stewardship Program, and the addition of Low Northern Rockcress to the *ex situ* collection of seeds and living plants at the MUN Botanical Garden (St. John's, NL).

Acknowledgements and authorities contacted:

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TECHNICAL SUMMARY

Braya humilis
 Low Northern Rockcress
 Braya Délicat

Range of occurrence in the province: Table Mountain, Port-au-Port Peninsula

Demographic Information

1. Generation time (usually average age of parents in the population; indicate if another method of estimating generation time indicated in the IUCN guidelines(2011) is being used)	1 decade
2. Is there an [observed, inferred, or projected] continuing decline in number of mature individuals?	Yes, observed
3. Estimated percent of continuing decline in total number of mature individuals within [5 years or 2 generations]	Observed 94% reduction over 11 years (2004-2015) in monitored plots
4. [Observed, estimated, inferred, or suspected] percent [reduction or increase] in total number of mature individuals over the last [10 years, or 3 generations].	Observed 94% reduction over 11 years (2004-2015) in monitored plots
5. [Projected or suspected] percent [reduction or increase] in total number of mature individuals over the next [10 years, or 3 generations].	Suspected reduction over the next 10 years, based on current trend.
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.	Observed reduction (see #4) over 10 years but unknown for 3 generations.

7. Are the causes of the decline a. clearly reversible, b. understood, and c. ceased?	a. No b. Some (e.g. habitat destruction) c. No
8. Are there extreme fluctuations in number of mature individuals?	No

Extent and Occupancy Information

9. Estimated extent of occurrence (EOO)	0.87 km ²
10. Index of area of occupancy (IAO) (Always report 2x2 grid value).	12 km ²
11. Is the population “severely fragmented” i.e., is >50% of its total area of occupancy in habitat patches that are (a) smaller than would be required to support a viable population, and (b) separated from other habitat patches by a distance larger than the species can be expected to disperse?	a. No b. Yes
12. Number of “locations”* (use plausible range to reflect uncertainty if appropriate)	1
13. Is there an [observed, inferred, or projected] decline in extent of occurrence?	No
14. Is there an [observed, inferred, or projected] decline in index of area of occupancy?	No
15. Is there an [observed, inferred, or projected] decline in number of subpopulations?	No subpopulations exist
16. Is there an [observed, inferred, or projected] decline in number of “locations”**?	No

* See Definitions and Abbreviations on [COSEWIC website](#) and [IUCN](#) (Feb 2014) for more information on this term

17. Is there an [observed, inferred, or projected] decline in [area, extent and/or quality] of habitat?	Yes, when the Pine Tree Property was developed, but it has slowed.
18. Are there extreme fluctuations in number of subpopulations?	No subpopulations exist
19. Are there extreme fluctuations in number of "locations"*?	No
20. Are there extreme fluctuations in extent of occurrence?	No
21. Are there extreme fluctuations in index of area of occupancy?	No

Number of Mature Individuals (in each subpopulation)

22. Subpopulations (give plausible ranges)	Number of Mature Individuals
Table Mountain	250 (2004)
Total	250

Quantitative Analysis

23. Is the probability of extinction in the wild at least [20% within 20 years or 5 generations, or 10% within 100 years]?	Undetermined
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Threats (direct, from highest impact to least, as per IUCN Threats Calculator)

Was a threats calculator completed for this species? No

24.

- i. *Residential and Commercial Development* - communication tower maintenance, site decommissioning
- ii. *Transportation and Service Corridors* - roadways, transmission lines
- iii. *Invasive and Other Problematic Species and Genes* - Diamondback Moth
- iv. *Climate Change and Severe Weather* – changes in freeze thaw cycles, extreme temperatures, and improved ability for predator insect survival.

What additional limiting factors are relevant? Limiting by habitat specificity and rarity

Rescue Effect (immigration from outside Newfoundland and Labrador)

25. Status of outside population(s) most likely to provide immigrants to Newfoundland and Labrador.	Not present in the Maritime Provinces; present but not ranked in Québec (SNR)
26. Is immigration known or possible?	Likelihood extremely low; disjunct
27. Would immigrants be adapted to survive in Newfoundland and Labrador?	Yes
28. Is there sufficient habitat for immigrants in Newfoundland and Labrador?	Yes
29. Are conditions deteriorating in Newfoundland and Labrador?+	No
30. Are conditions for the source population deteriorating?+	No source population
31. Is the Newfoundland and Labrador population considered to be a sink?+	No
32. Is rescue from outside populations likely?	No

+ See [Table 3](#) (Guidelines for modifying status assessment based on rescue effect)

Data Sensitive Species

33. Is this a data sensitive species?	No
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Status History

34. SSAC/COSEWIC: SSAC
35. Year Assessed: 2004
36. Status History: Low Northern Rockcross was designated as Endangered by the Species Status Advisory Committee in 2004 and was subsequently listed under the provincial <i>Endangered Species Act</i> . The species has not been designated by COSEWIC and, therefore, is not protected under the federal <i>Species at Risk Act</i> .
37. Previous Criteria: D1, with supporting evidence from B 2. (a) and B 2.(b) iii)
38. Reasons for Previous Designation: An endemic species of the Limestone Barrens, occurring at only one small site on the island of Newfoundland that has suffered habitat loss and degradation since its original discovery.

Recommended Reviewed Status and Reasons for Current Designation:

39. Recommended Status: Endangered	40. Alpha-numeric Codes: B1&2 ab(v); C2a(i, ii); D1
41. Reasons for Current Designation: A Limestone Barrens species occurring at only one small site on the island of Newfoundland. The species has previously suffered habitat loss and degradation; this has slowed over the past 10 years. Since its original assessment in 2004, there has been a decline in the number of mature individuals.	

Applicability of Criteria

42. Criterion A (Decline in Total Number of Mature Individuals): This criterion requires a “reduction in total number of mature individuals over the last 10 years or 3 generations, whichever is the longer”. While there has been an observed decrease of over 90% in the last 10 years, a generation for the Low Northern Rockcross is one decade meaning three generations (approximately 30 years) is a longer timeframe and a trend over this period is unknown.

43. Criterion B (Small Distribution Range and Decline or Fluctuation):
B1a,b(v), and B2 a,b(v) both apply as the Low Northern Rockcress in Newfoundland and Labrador has an EO of less than 5000 km², and an IAO of less than 500 km², and is known to exist in less than five locations, and there is an observed decline in the number of mature individuals.

44. Criterion C (Small and Declining Number of Mature Individuals):
C2a(i) and a(ii) both apply as the Low Northern Rockcress in Newfoundland and Labrador has an observed decline in the number of mature individuals, no population estimate has recorded more than 250 mature individuals, and there is only one population.

45. Criterion D (Very Small or Restricted Population):
D1 applies as no population estimate for the Low Northern Rockcress in Newfoundland and Labrador has recorded more than 250 mature individuals.

46. Criterion E (Quantitative Analysis):
Undetermined

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Personal Communications

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Additional Sources of information

N/A

Appendix A – Low Northern Rockcress Location Maps

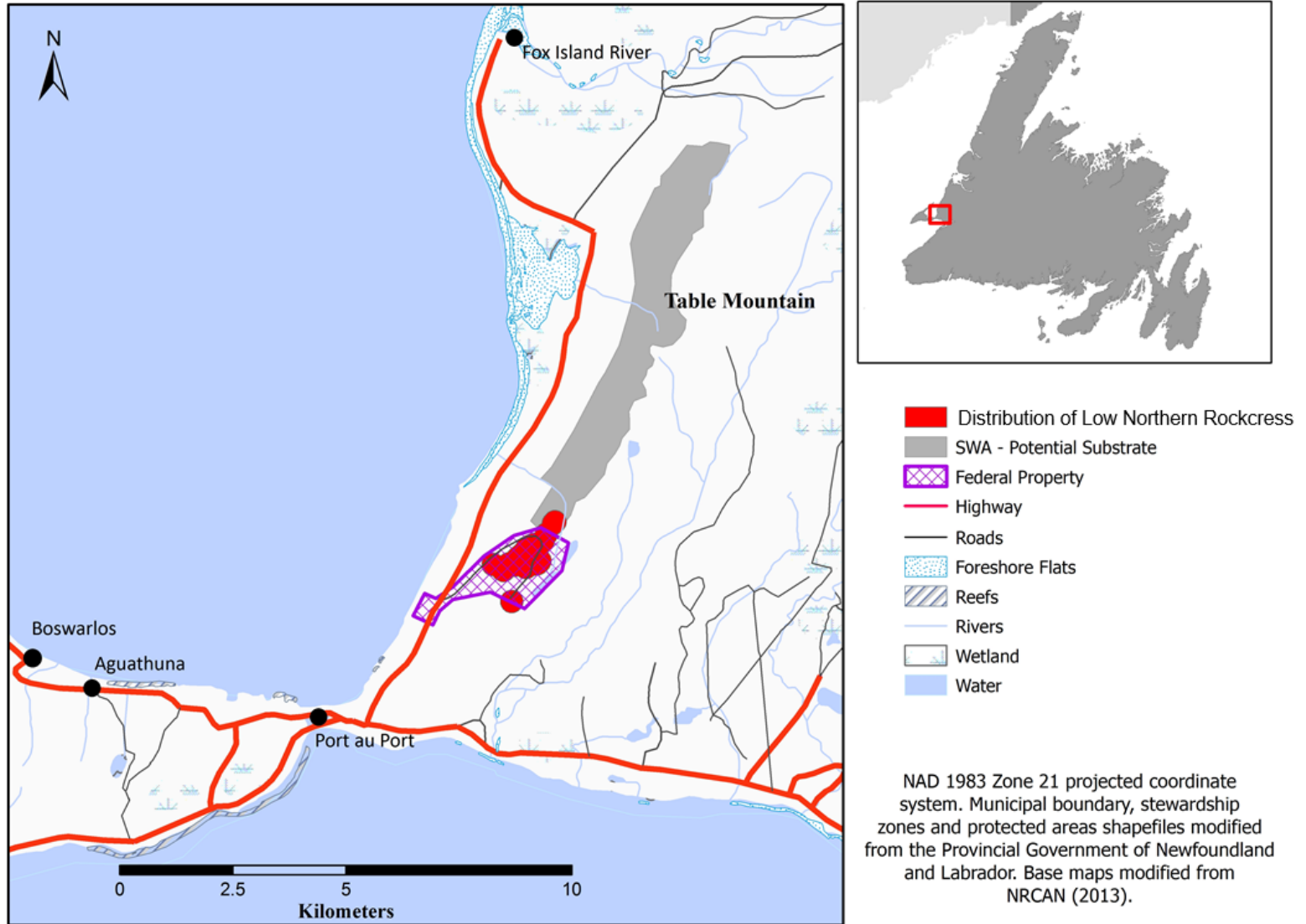


Figure 1. Location of Low Northern Rockcress in Newfoundland and Labrador.

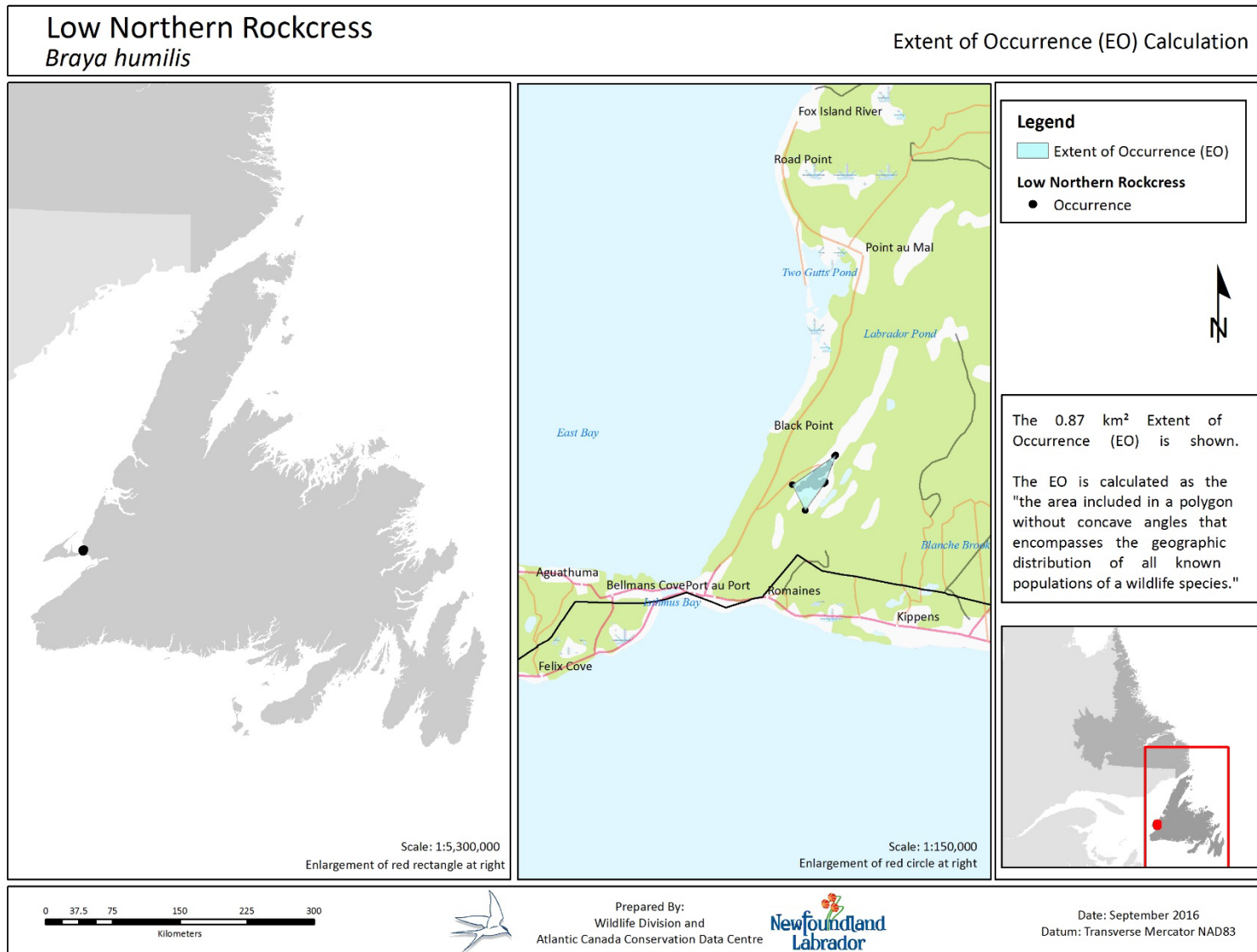


Figure 2. The Extent of Occurrence of the Low Northern Rockcress in Newfoundland and Labrador.