

Management Plan for the Fernald's Milk-vetch (*Astragalus robbinsii* var. *fernaldii*) in Canada

Fernald's Milk-vetch



2011

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PREFACE

The federal, provincial, and territorial government signatories under the Accord for the Protection of Species at Risk (1996) agreed to establish complementary legislation and programs that provide for effective protection of species at risk throughout Canada. Under the *Species at Risk Act* (s.c. 2002, c.29) (SARA), the federal competent ministers are responsible for the preparation of management plans for listed Special Concern species and are required to report on progress within five years.

The Minister of the Environment is the competent minister for the management of Fernald's Milk-vetch, listed as a Special Concern species under Schedule 1 of SARA, and has prepared this plan, as per section 65 of SARA. It has been prepared in cooperation with the Government of Quebec (Ministère du Développement durable, de l'Environnement et des Parcs) and the Government of Newfoundland and Labrador (Department of Environment and Conservation), as per section 66 (1) of SARA.

Success in the management of this species depends on the commitment and cooperation of many different constituencies that will be involved in implementing the directions set out in this plan and will not be achieved by Environment Canada, or any other jurisdiction alone. All Canadians are invited to join in supporting and implementing this strategy for the benefit of Fernald's Milk-vetch and Canadian society as a whole. Implementation of this management plan is subject to appropriations, priorities, and budgetary constraints of the participating jurisdictions and organizations.

Important notice : Recent genetic analyses conducted by Sokoloff (2010) indicate that Fernald's Milk-vetch should no longer be considered a distinct variety of Robbin's Milk-vetch (*Astragalus robbinsii*). The author of this study recommends that the *fernaldii* variety be lumped with the Elegant Milk-vetch (*A. eucosmus*), a more widespread species not considered to be at risk. Although this recommendation has yet to be peer-reviewed or formally adopted in federal and provincial legislation, the Committee on the Status of Endangered Wildlife in Canada (COSEWIC) and provincial authorities have been made aware of the situation and will act in due time.

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EXECUTIVE SUMMARY

Fernald's Milk-vetch, or Robbins's Milk-vetch variety *fernaldii* (*Astragalus robbinsii* var. *fernaldii*), is an herbaceous perennial endemic to the Strait of Belle Isle region in Quebec and in Newfoundland and Labrador. It is a pioneer species that establishes itself in areas where the plant cover is interrupted and where the limestone substrate is exposed (i.e. mainly on the limestone hillock sides on top of hills). The species was designated Special Concern by the Committee on the Status of Endangered Wildlife in Canada in November of 2001 and listed in Schedule 1 of the *Species at Risk Act* in June 2003.

There are only six known occurrences of this species, four in Quebec near the border with Labrador (Strait of Belle Isle), one in Labrador and one in northwestern Newfoundland.

The main threats to this species are surface limestone extraction and anthropogenic development. Recreational activities (all-terrain vehicles and snowmobile traffic), archaeological digs, erection of snow fences, climate change and rust infection are secondary threats.

The management objective for Fernald's Milk-vetch is to maintain population numbers at each of the six known occurrences of Fernald's Milk-vetch. Broad strategies and actions for the management of the species are presented in the document. Since recent genetic analyses indicate that Fernald's Milk-vetch should no longer be considered a distinct variety of Robbin's Milk-vetch (*Astragalus robbinsii*) but rather as Elegant Milk-vetch (*Astragalus eucosmus*) – a more widespread species not considered to be at risk - the primary focus of the management plan is to resolve these taxonomic issues and determine if delisting the species from Schedule 1 of the *Species at Risk Act* is necessary.

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1. COSEWIC SPECIES ASSESSMENT INFORMATION

Date of Assessment: November 2001

Common Name (population): Fernald's Milk-vetch

Scientific Name: *Astragalus robbinsii* var. *fernaldii*

COSEWIC Status: Special Concern

Reason for Designation: Highly restricted endemic of limestone habitats found only in one small area in southeastern Quebec and an adjacent site on the Great Northern Peninsula of Newfoundland. Populations in Quebec have experienced some losses and are subject to ongoing risks such as limestone extraction, trampling and ATV use.

Canadian Occurrence: Quebec, Newfoundland and Labrador

COSEWIC Status History: Designated Special Concern in April 1997. Status re-examined and confirmed in November 2001.

2. SPECIES STATUS INFORMATION

Fernald's Milk-vetch was listed as a species of Special Concern in Schedule 1 of the *Species at Risk Act* (SARA) (S.C. 2002, c.29) in June 2003. The taxon is designated as threatened in Quebec under the *Act respecting threatened or vulnerable species* (ARTVS) (R.S.Q. c. E-12.01), and vulnerable in Newfoundland and Labrador under its *Endangered Species Act* (ESA) (S.N.L. 2001, c. E-10.1).

NatureServe (2007) has ranked Fernald's Milk-vetch globally as G5T1 (species not at risk but variety is critically imperilled), N1 (critically imperilled) in Canada and S1 (critically imperilled) in the provinces of Quebec and Newfoundland and Labrador.

3. SPECIES INFORMATION

3.1 Description of the Species

Fernald's Milk-vetch, or Robbins's Milk-vetch variety *fernaldii*, *Astragalus robbinsii* (Oakes) Gray var. *fernaldii* (Rydb.) Barneby, is a herbaceous perennial endemic to the Strait of Belle Isle region in Quebec and in Newfoundland and Labrador. The stems (length: 15–30 cm) generally number from two to eight and the leaves (length: 4–8 cm) are alternate along the stem and comprised of 9 to 17 leaflets (length: 10–20 mm), pubescent¹ on both surfaces. The inflorescence

¹ Pubescent: Covered with soft hair.

is made up of one to three pedunculate² racemes³, arising from the upper leaf axils; petals are purple to lilac, seldom white. The pod stands on a stem (length: 0.5 to 3.0 mm), which is shorter than the calyx tube; it is oval and measures from 10 to 18 mm in length (COSEWIC, in press).

The genus *Astragalus* includes a very large number of taxa, most of which are difficult to tell apart. For example, Fernald's Milk-vetch has at various times been considered to be a separate species, *Atelophragma fernaldii* (Rydberg, 1928) or *Astragalus fernaldii* (Rousseau, 1933), a subspecies of Robbins's Milk-vetch, *Astragalus robbinsii* var. *fernaldii* (Barneby, 1964) and a subspecies of the Elegant Milk-vetch, *Astragalus eucosmus* var. *fernaldii* (Boivin, 1967). There is no single distinctive characteristic that can be used to clearly distinguish variety *fernaldii* from *Astragalus eucosmus* and from other varieties of Robbins's Milk-vetch (COSEWIC, in press). Morphological comparisons of occurrences⁴ of milk-vetch near the Strait of Belle Isle, which are clearly part of this species complex, cast doubt on the validity of Fernald's Milk-vetch as a taxonomic entity as well as its association with Robbins's Milk-vetch. Furthermore, even if the variety is confirmed, whether all of the Canadian occurrences actually belong to this variety may also be called into question. Recent genetic analysis has indicated that *Astragalus robbinsii* var. *fernaldii* is better lumped with Elegant Milk-vetch (*A. eucosmus*) (Sokoloff, 2010). This author conducted specific analyses on amplified fragment length polymorphisms (AFLPs), chloroplast DNA analysis, and morphometric data to determine that the taxonomic recognition of *Astragalus robbinsii* var. *fernaldii* is not warranted. He recommended that the variety be merged with the Elegant Milk-vetch. These results await peer-review by scientific authorities.

3.2 Populations and Distribution

The primary area of distribution of Robbins's Milk-vetch is in the mountains of western North America, from Alaska to Nevada and Colorado (Barneby, 1964). It has a disjunct range in eastern North America, where it is represented by some 20 narrowly localized occurrences: in New England (Vermont, New Hampshire, Maine) and eastern Canada (Nova Scotia, Newfoundland and Labrador, Quebec). In New England, it is represented by variety *minor*, also present in the Rockies and in the Maritimes, and by two endemic varieties: var. *jesupii* and var. *robbinsii* (now extinct). Variety *fernaldii* is found only in the Quebec-Labrador border region and in northwestern Newfoundland (COSEWIC, in press). There are no data to estimate the abundance and historic distribution in Canada.

In Quebec, recent population estimates of Fernald's Milk-vetch range from 45 000 to 50 351 individuals (Parenteau, 2005; Jolicoeur et al., 2008). This number is higher than the estimate in the COSEWIC report (in press), probably owing to the greater surface area covered by recent surveys, conducted after the COSEWIC report was drafted (e.g. Parenteau, 2005; Jolicoeur et al., 2008). In Quebec, Fernald's Milk-vetch is found in four occurrences in the Blanc-Sablon region (Figure 1, numbers 1-4), in the Basse-Côte-Nord Regional County Municipality (RCM)

² Pedunculate: Growing from a peduncle. Peduncle: A primary flower stalk, supporting either a cluster or a solitary flower.

³ Raceme: An inflorescence composed of stemmed flowers arranged along the axis which elongates for an indefinite period.

⁴ An occurrence consists of one or more individuals in a circumscribed location. It may be current or historical and vary in terms of area.

(Jolicoeur et al., 2008). These occurrences are identified as Mount Bonenfant, Lourdes-de-Blanc-Sablon, Mount Parent and Île-au-Bois.

In Labrador, the first records of Fernald's Milk-vetch were based on specimens collected east of the Blanc-Sablon River (Figure 1, number 5). Approximately 4600 individuals comprise the Labrador border occurrence (Hanel and Keeping, 2006).

In insular Newfoundland, the only known occurrence of Fernald's Milk-vetch is on Barr'd Harbour Hill (Figure 1, number 6), where it was first collected in 1925. This occurrence was not seen again until 2002, when it was relocated as part of a rare plant inventory (Hanel and Keeping, 2006). The size of this occurrence is estimated at several hundred individuals. However, there have been serious doubts in the past regarding its taxonomic identity, since it shares morphological similarities with variety *minor* of Robbins's Milk-vetch (Hanel and Keeping, 2006). These doubts have been substantiated by Sokoloff (2010) but the results await peer-review.



Figure 1. Known occurrences of Fernald's Milk-vetch

3.3 Needs of Fernald's Milk-vetch

3.3.1 Habitat and biological needs

Fernald's Milk-vetch is an obligate calciphile⁵ that grows only on friable⁶ limestone. It is a pioneer plant that establishes itself in areas where the vegetative cover is interrupted and where the limestone substrate is exposed (i.e. mainly on the limestone hillock sides on top of hills). It also grows between limestone hillocks, but only on top of cliffs, where exposure to the wind prevents the accumulation of snow and allows the action of the freeze-thaw cycle to expose the limestone rock, inhibiting vegetative cover.

In these environments, Fernald's Milk-vetch is accompanied mainly by arctic-alpine species, such as saxifrages (*Saxifraga oppositifolia*, *S. paniculata*, *S. aizoides*), Viviparous Fescue (*Festuca vivipara* ssp. *hirsuta*), Alpine Bistort (*Polygonum viviparum*), Alpine Meadow Grass (*Poa alpina*) and Alpine Chickweed (*Cerastium alpinum*). Once established, Milk-vetch can also survive on the barrens, where the plant cover is more closed and dominated by creeping shrubs, such as Black Crowberry (*Empetrum nigrum*), Arctic willows (*Salix uva-ursi*, *S. glauca*), and heaths (*Vaccinium uliginosum*, *Arctostaphylos alpina*).

Finally, the local distribution of Fernald's Milk-vetch also appears to be linked to proximity to the sea. In fact, although suitable limestone formations extend up to 15 km inland, all known occurrences are located less than 1 km from the coast (COSEWIC, in press).

3.3.2 Limiting factors

Since Fernald's Milk-vetch is an obligate calciphile that is intolerant of competition, its distribution is restricted by the availability of exposed limestone substrates comprised of fine particles. This type of habitat, which is rare in the area of distribution of the variety, appears to be necessary for seed germination and establishment of plantlets (COSEWIC, in press).

Fernald's Milk-vetch also appears to be very shade intolerant at all stages in its life cycle. If the plant cover is too dense or higher than 30–50 cm, the plant is etiolated⁷, often attacked by a fungus of the genus *Uromyces* and fruit development is aborted (COSEWIC, in press).

⁵ Obligate calciphile: plant that requires soil rich in lime or other calcium salts.

⁶ Friable: Easy to break, or crumbling naturally.

⁷ Etiolated: The condition of a green plant that has not received sufficient light or is attacked by certain diseases, typified by long, attenuated stems having insufficient supporting tissue and small yellowish or whitish leaves.

4. THREATS

4.1 Threat Assessment

Table 1. Threat assessment table

Threat	Level of Concern ¹	Extent	Occurrence	Frequency	Severity ²	Causal Certainty ³
Habitat loss or degradation						
Surface limestone extraction	High	Localized	Current	Recurring	High	High
Incompatible anthropogenic activity	Medium	Localized	Anticipated	One-time	High	High
Disturbance or harm						
Incompatible recreational activities	Medium	Localized	Current	Seasonal	Moderate	Medium
Archaeological digs	Low	Localized	Unknown	Unknown	Low	Unknown
Climate and natural disasters						
Climate change	Low	Widespread	Anticipated	Continuous	Low	Medium
Changes in ecological dynamics or natural processes						
Erection of fences	Low	Localized	Historic	Seasonal	Low	Medium
Natural processes or activities						
Rust infection	Unknown	Widespread	Current	Seasonal	Unknown	Low

¹ *Level of Concern: signifies that managing the threat is of (high, medium or low) concern for the recovery of the species, consistent with the population and distribution objectives. This criterion considers the assessment of all the information in the table).*

² *Severity: reflects the population-level effect (High: very large population-level effect, Moderate, Low, Unknown).*

³ *Causal certainty: reflects the degree of evidence that is known for the threat (High: available evidence strongly links the threat to stresses on population viability; Medium: there is a correlation between the threat and population viability e.g. expert opinion; Low: the threat is assumed or plausible).*

4.2 Description of Threats

The threats are presented in order of decreasing level of concern.

Surface limestone extraction

Limestone extraction as a source of gravel for roadwork is the most serious threat to Fernald's Milk-vetch (Hanel and Keeping 2006; Jolicoeur et al., 2008; COSEWIC, in press;). During this

activity, the vegetation and soil are removed with a bulldozer, and the most friable superficial part of the limestone layer is removed to a depth of up to 2 m. These operations completely eliminate the occurrences of Milk-vetch as well as potential germination and establishment sites. The unaltered and harder rock located at the level where the bulldozer stops its digging is not sufficiently friable and broken up to permit the establishment of Fernald's Milk-vetch (COSEWIC, in press). In addition to being subject to a mining moratorium, the Mount Parent and Labrador border occurrences are, respectively, designated as plant habitat by the ARTVS and sensitive wildlife area. Both sites have been subject to illegal limestone removals in recent years (Hanel and Keeping, 2006; Jolicoeur et al., 2008).

Incompatible anthropogenic activity

Specific human development activities are identified as threats to the species in the Plan de conservation de l'astragale de Robbins variété de Fernald au Québec [version préliminaire] (Jolicoeur et al., 2008). They include possible residential development in the area of the Lourdes-de-Blanc-Sablon occurrence and the construction of a communications tower and power line near the Mount Parent occurrence. Such development could result in the direct loss of individuals as well as habitat loss and fragmentation.

Incompatible recreational activities

According to the COSEWIC status report (in press), there is All Terrain Vehicle (ATV) traffic near at least one of the occurrences of Fernald's Milk-vetch (Mount Parent), but to date, the areas where the majority of the occurrence is located have been avoided. An increase in ATV activity could eventually lead to the disappearance of Fernald's Milk-vetch on the hillocks where it is rarer. Intense trampling at Lourdes-de-Blanc-Sablon and snowmobile traffic at Île-au-Bois are other threats related to recreational activities mentioned in the Plan de conservation de l'astragale de Robbins variété de Fernald au Québec [version préliminaire] (Jolicoeur et al., 2008). Trampling at the Lourdes-de-Blanc-Sablon site appears to have a moderately beneficial impact by exposing the substrate, allowing the germination and establishment of Milk-vetch (COSEWIC, in press).

Archaeological digs

Jolicoeur et al. (2008) identify archaeological digs as a potential threat to the Fernald's Milk-vetch occurrence on Île-au-Bois, but whether or not this work will proceed and its actual impact on the species remain unknown. This threat is not mentioned in the COSEWIC report.

Climate change

Climate change is a threat to Fernald's Milk-vetch. Climatic warming could result in an increase in plant cover, making the habitat less suitable for the species and could also allow for colonisation by pathogens and harmful insects from further south. Changes in temperature and in the precipitation regime could also have major consequences for the species by affecting the snow cover and/or the availability of water during the growing season.

Erection of fences

The COSEWIC status report (COSEWIC, in press) indicates that the erection of snow fences at the summit of Mount Bonenfant constitutes a threat to Fernald's Milk-vetch. The purpose of the installation of snow fences at this location is to prevent the accumulation of snow on the mountain escarpment and the resulting threat of avalanches. Since Fernald's Milk-vetch is essentially present only on the summit of Mount Bonenfant, the increase in snow cover at this location could reduce the effects of the freeze-thaw cycle and promote colonization of this site by normally frost-intolerant species. This could eventually result in gradual closure of the vegetative cover, thereby reducing the number of sites suitable for the establishment of milk-vetch. However, fences of this type were used for only a brief period in the 1990s and appear to have had only a minor impact on the Milk-vetch population (Jolicoeur et al., 2008).

Rust infection

A rust-causing fungus (genus *Uromyces*) has been observed on Fernald's Milk-vetch, but has not been identified to the species and its potential effect on the survival and reproduction of individuals is not known (Hanel and Keeping, 2006).

5. MANAGEMENT OBJECTIVE

The management objective for Fernald's Milk-vetch is to maintain population numbers at each of the six known occurrences (four in Quebec, one in Labrador and one in Newfoundland) of Fernald's Milk-vetch. Due to the taxonomic uncertainties associated with Fernald's Milk-vetch, this objective remains conditional on the results obtained from ongoing taxonomic studies.

6. BROAD STRATEGIES AND ACTIONS

6.1 Actions Already Completed or Underway

Following the designation of Fernald's Milk-vetch as a threatened species in Quebec in February 2001, it is now legally protected under the ARTVS. The species has also been protected since 2002 by the Newfoundland and Labrador ESA. The species is the subject of two provincial recovery planning documents (Quebec: Jolicoeur et al., 2008; Newfoundland and Labrador: Hanel and Keeping, 2006). All the Quebec sites with occurrences have already been legally designated as plant habitat under the ARTVS. The Labrador site was designated a sensitive wildlife area in 2003 and a moratorium on limestone extraction operations was introduced by the Mineral Lands Division of the Department of Natural Resources.

Local stakeholders are involved in the preservation of Fernald's Milk-vetch habitat. From 2004 to 2006, the *Comité de la zone d'intervention prioritaire de la Côte-Nord du Golfe* (Committee for the Priority Intervention Area of the Northern Shore of the Gulf) carried out inventories and stewardship work which helped update knowledge on the Mount Parent occurrence and raise awareness of local residents in order to mitigate the threats to the species (Jolicoeur et al., 2008).

Habitat restoration work has also been carried out on Mount Parent, the site of an illegal gravel pit and ATV trails. An interpretation trail was constructed.

Signs indicating the presence of Fernald's Milk-vetch and providing information on activities that adversely affect the species have been erected near the Labrador border occurrence (Hanel and Keeping, 2006). These signs, intended to discourage illegal limestone removals, mention the provincial prohibitions in effect and the possible fines for offenders.

The *Limestone Barrens Habitat Stewardship Program* is very active in the region of the insular Newfoundland occurrence. The aim of this program is to conserve the distinctive Limestone Barrens landscape through local stewardship activities and public involvement. The focus is on habitat protection, awareness, interpretation and the identification of sustainable eco-tourism opportunities.

Studies on the taxonomy of the species have been completed by the Canadian Museum of Nature and the University of Ottawa. The Fernald's Milk-vetch occurrences were sampled in 2008 and the results indicate that the variety is not distinct from the Elegant Milk-vetch (Sokolof, 2010).

6.2 Broad Strategies

There are four management strategies for Fernald's Milk-vetch. Due to the taxonomic uncertainties associated with Fernald's Milk-vetch, strategies 2, 3 and 4 remain conditional on the confirmation that Fernald's Milk-vetch is a distinct variety (strategy 1).

1. Confirm or refute the information suggesting that Fernald's Milk-vetch is not a distinct variety from the Elegant Milk-vetch;
2. Ensure the conservation and management of the six known occurrences;
3. Mitigate the threats, in particular the threat associated with surface limestone extraction operations;
4. Gather knowledge on the species' population dynamics.

6.3 Actions and Implementation Schedule

Activities related to each of the management strategies are presented in the following paragraphs.

Confirm or refute the information suggesting that Fernald's Milk-vetch is not a distinct variety from the Elegant Milk-vetch

Consult the scientific and governmental authorities to confirm or refute merging the variety *fernaldii* within the Elegant Milk-vetch.

Planned actions:

- Obtain a scientific peer-review of Sokoloff's (2010) results;
- If results are confirmed (i.e., Fernald's Milk-vetch is not a distinct variety), obtain a reassessment of the *fernaldii* variety from the COSEWIC plant sub-committee.
- If the results are refuted (i.e., Fernald's Milk-vetch is a distinct variety), the following management strategies will be taken.

Ensure the conservation and the management of the six known occurrences

The four sites harbouring the occurrences in Quebec have already been legally designated as plant habitat (Jolicoeur et al., 2008), which protects them under the Quebec ARTVS. The Labrador site was designated a sensitive wildlife area in 2003 and a moratorium on limestone extraction operations was introduced by the Mineral Lands Division of the Department of Natural Resources (Hanel and Keeping, 2006). The Newfoundland population has no formal protection and the option of designating it as a sensitive wildlife area should be explored.

Should new occurrences be discovered following the examination of suitable habitat, they should also be conserved and managed to ensure their preservation and viability.

A local awareness program on Fernald's Milk-vetch and its management should be implemented. Although the majority of the Canadian occurrences of Fernald's Milk-vetch already benefit from some level of legal protection since they have been designated as plant habitat in Quebec or as sensitive wildlife area in Newfoundland and Labrador, these habitats must nevertheless be managed and special vigilance exercised concerning the use of the environment (Jolicoeur et al., 2008). It is from this perspective that Jolicoeur et al. (2008) have emphasized the need to involve local stakeholders (municipalities and organizations) in the management of the species' habitats.

These activities will be carried out through programs aimed at involving local stakeholders in habitat management. The development of specific management plans for each occurrence, in cooperation with local stakeholders, will consolidate this effort.

Planned actions:

- Designation of the Barr'd Harbour Hill site in Newfoundland as a sensitive wildlife area.
- Raise local awareness about the species and protection of its habitat.
- Raise awareness of local stakeholders (municipalities and NGOs).
- Develop a specific management plan for each occurrence.

Mitigate the threats, in particular the threat associated with surface limestone extraction operations

From the perspective of threat mitigation, it is essential to halt gravel pit expansion, supervise their operation and prevent the opening of new gravel pits near the species occurrences (Jolicoeur et al., 2008). Since most gravel pits in Quebec are operated for road construction or repair, it will be essential to secure the collaboration of the provincial department of transport

(Ministère des Transports). The Ministère de la Culture, des Communications et de la Condition féminine du Québec (provincial ministry of culture, communications and the status of women) will also have to be informed of the delimitation of the plant habitat in the vicinity of archaeological dig sites. The Newfoundland Department of Natural Resources is aware of the illegal operation of a gravel pit at the Labrador border site and has planned actions aimed at enforcing the moratorium on operations at this site (Hanel and Keeping, 2006). It is also essential to limit incompatible recreational activities in the vicinity of the occurrences.

Planned actions:

- Halt expansion of gravel pits.
- Supervise the operation of existing gravel pits in the vicinity of the occurrences.
- Prevent the opening of new gravel pits in the vicinity of the occurrences.
- Prevent incompatible development activity in the vicinity of the occurrences.
- Inform the Ministère de la Culture, des Communications et de la Condition féminine du Québec (MCCCFQ) of the location of the Île-au-Bois plant habitat.
- Limit incompatible recreational activities in the vicinity of the occurrences.

Gather knowledge on population dynamics

A monitoring program will have to be established in order to determine the population trends of the occurrences and determine the effectiveness of the threat mitigation efforts. The Lourdes-de-Blanc-Sablon, Mount Parent and Labrador border occurrences are specifically targeted since they are exposed to the greatest anthropogenic pressure. A count of all occurrences should be carried out every five years, together with a reassessment of the threats present for each occurrence.

Planned actions:

- Develop a monitoring protocol.
- Conduct counts and demographic monitoring.
- Study the impact of rust infection (genus *Uromyces*) on the survival and reproduction of the species.

Table 2. Implementation Schedule

Action	Priority	Threats or knowledge gaps*	Responsibility **		Time-frame
			Lead	Other	
Strategy 1: Confirm or refute the information suggesting that Fernald's Milk-vetch is not a distinct variety of the Elegant Milk-vetch					
Obtain a scientific peer-review of Sokoloff's (2010) results	Urgent	-	P. Sokoloff	-	2011
If results are confirmed, obtain a reassessment of the <i>fernaldii</i> variety from the COSEWIC plant sub-committee.	Urgent	-	EC	COSEWIC	2011
Strategy 2***: Ensure the conservation and management of the six known occurrences					
Designation of the Barr'd Harbour Hill site in Newfoundland as a Sensitive Wildlife Area	Urgent	1, 2, 3, 4, 6	NLDEC		2011-2016
Raise local awareness about habitat protection	Urgent	3	NGOs	Municipalities	2011-2016
Raise awareness of local stakeholders (municipalities and NGOs)	Urgent	1, 2, 3, 4, 6	MDDEP, NLDEC	Municipalities, NGOs	2011-2012
Develop a specific management plan for each occurrence	Urgent	1, 2, 3, 4, 6	MDDEP, NLDEC	Municipalities, NGOs	2011-2012
Strategy 3***: Mitigate the threats, in particular the threat associated with surface limestone extraction operations					
Halt expansion of gravel pits in designated habitats	Urgent	1	Municipalities, NGOs	MTQ, DNR	2011-2016
Supervise the operation of existing gravel pits	Urgent	1	Municipalities, NGOs	MTQ, DNR	2011-2016
Discourage the opening of new gravel pits in the vicinity of the occurrences	Urgent	1	Municipalities, NGOs	MTQ, DNR	2011-2016
Discourage incompatible development in the vicinity of the occurrences	Urgent	2	Municipalities	RCM	2011-2016
Inform the MCCCCFQ about the location of the Île-au-Bois plant habitat	Necessary	4	MDDEP	MCCCCFQ	2011
Restrict incompatible recreational activities in the vicinity of the occurrences	Urgent	3	Municipalities	NGO	2011-2016
Strategy 4***: Gather knowledge on population dynamics					
Develop a monitoring methodology	Necessary	Knowledge gaps	MDDEP, NLDEC		2011
Conduct counts and demographic monitoring	Necessary	Knowledge gaps	MDDEP, NLDEC	NGOs	2012
Study the impact of rust infection (genus <i>Uromyces</i>) on the survival and reproduction of the species	Beneficial	Knowledge gaps	Universities		2012-2016

*1: Surface limestone extraction, 2: Incompatible anthropogenic activity, 3: Incompatible recreational activities, 4: Archaeological digs, 5: Climate change, 6: Erection of fences, 7: Rust infection

** DNR: Newfoundland and Labrador Department of Natural Resources; MCCCCF: Ministère de la Culture, des Communications et de la Condition féminine du Québec; CMN: Canadian Museum of Nature, Ottawa; MDDEP: Ministère du Développement durable, de l'Environnement et des Parcs; MTQ: Ministère des Transports du Québec

NLDEC: Newfoundland and Labrador Department of Environment and Conservation

*** Actions associated with Strategies 2-4 are contingent on the confirmation of Fernald's Milk-vetch as a distinct variety

7. MEASURING PROGRESS

If Fernald's Milk-vetch is confirmed as a distinct variety, the performance indicator presented below will provide a way to define and measure progress toward achieving the management objective:

- the population numbers are maintained at each of the six known occurrences (four in Quebec, one in Labrador and one in Newfoundland) of Fernald's Milk-vetch.

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APPENDIX A. EFFECTS ON THE ENVIRONMENT AND OTHER SPECIES

A strategic environmental assessment (SEA) is conducted on all SARA recovery planning documents, in accordance with the *Cabinet Directive on the Environmental Assessment of Policy, Plan and Program Proposals*. The purpose of a SEA is to incorporate environmental considerations into the development of public policies, plans, and program proposals to support environmentally sound decision-making.

Recovery planning is intended to benefit species at risk and biodiversity in general. However, it is recognized that strategies may also inadvertently lead to environmental effects beyond the intended benefits. The planning process based on national guidelines directly incorporates consideration of all environmental effects, with a particular focus on possible impacts upon non-target species or habitats. The results of the SEA are incorporated directly into the strategy itself, but are also summarized below in this statement.

This management plan will clearly benefit the environment by encouraging the conservation of Fernald's Milk-vetch. The potential for the plan to inadvertently lead to adverse effects on other species was considered. Seeing as recommended actions are limited to non-intrusive activities, such as inventories and monitoring, it is possible to conclude that this plan will not result in significant adverse effects. The effects of this plan on other species are anticipated to be relatively minor since, apart from a few species of arctic-alpine plants, Fernald's Milk-vetch is found in a habitat rarely used by other species. For the few species that share the Milk-vetch's habitat, the legal protection of the known occurrences and the threat mitigation efforts will only be beneficial.

The SEA concluded that this plan will clearly benefit the environment and will not entail any significant adverse effects. The reader should refer to the following sections of the document in particular: Habitat and Biological Needs, Limiting Factors and Broad Strategies and Actions.