***Species at Risk Act***
Recovery Strategy Series

# Recovery Strategy for the Anticosti Aster (*Symphyotrichum anticostense*) in Canada

## Anticosti Aster

**2012**

Canada

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For copies of the recovery strategy, or for additional information on species at risk, including COSEWIC Status Reports, residence descriptions, action plans, and other related recovery documents, please visit the Species at Risk (SAR) Public Registry (www.sararegistry.gc.ca).

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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 recovery strategies for listed Extirpated, Endangered, and Threatened species and are required to report on progress within five years.

The Minister of Environment is the competent minister for the recovery of the Anticosti Aster and has prepared this strategy, as per section 37 of SARA. It has been prepared in cooperation with the Government of Québec and the Government of New Brunswick.

Success in the recovery 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 strategy 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 the Anticosti Aster and Canadian society as a whole.

This recovery strategy will be followed by one or more action plans that will provide information on recovery measures to be taken by Environment Canada and other jurisdictions and/or organizations involved in the conservation of the species. Implementation of this strategy is subject to appropriations, priorities, and budgetary constraints of the participating jurisdictions and organizations.

# ACKNOWLEDGMENTS

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# EXECUTIVE SUMMARY

The Anticosti Aster (*Symphyotrichum anticostense*) is a perennial flowering plant. It is listed as Threatened under Schedule 1 of the *Species at Risk Act*. The current Canadian distribution is restricted to coastal areas of south-central Anticosti Island, the rivers feeding into the north shore of Baie des Chaleurs in the Gaspé Peninsula and Lac Saint-Jean (one location, at Mashteuiatsh) in Québec and along several large fast-flowing rivers in northern, central and southern New Brunswick. The Anticosti Aster is confirmed or is thought to be present at 31 locations in Canada, along 26 rivers and five lakes in the provinces of New Brunswick and Québec.

It was determined recently that there are difficulties associated with identification of Anticosti Aster in the field using morphological features, particularly in New Brunswick (Mazerolle and Blaney 2011) and thus there are uncertainties regarding the distribution of the species and abundance estimates. Prior to proceeding with all recovery approaches and with the identification of critical habitat, a genetic analysis must be conducted to determine the presence of the Anticosti Aster, particularly in New Brunswick, and determine its distribution and abundance, and the population structure of the species. Given these uncertainties, critical habitat is not identified in this recovery strategy. Critical habitat will be identified after completion of the schedule of studies.

Threats to the Anticosti Aster include shoreline development, recreational activities, dam construction and riparian zone development, woody debris, grazing by white-tailed deer, hybridization and invasive species. All these threats affecting the Anticosti Aster species are localized in nature and none appear to jeopardise the persistence of the species on a national level.

The recovery of Anticosti aster has been determined to be technically and biologically feasible. The population and distribution objectives for the Anticosti Aster are to maintain the Canadian population at its current known size, distribution and area of occupancy.

These objectives will be achieved through implementation of several broad strategies and general approaches, including research, surveys and monitoring, and education/outreach. Implementing the measures outlined in Québec's *Plan de conservation de l'aster d'Anticosti* will help achieve the population and distribution objectives within Quebec.

One or more action plan(s) will be published within five years of the posting of the recovery strategy on the SAR public registry.

# RECOVERY FEASIBILITY SUMMARY

Based on the following four criteria outlined in the SARA Policies (Government of Canada, 2009), the recovery of the Anticosti Aster is considered technically and biologically feasible:

*1. Individuals of the wildlife species that are capable of reproduction are available now or in the foreseeable future to sustain the population or improve its abundance.*

Yes. In general, the species will likely have a high reproductive rate through rapid clonal growth, except in marginal habitat.

*2. Sufficient suitable habitat is available to support the species or could be made available through habitat management or restoration.*

Yes. Suitable habitat is plentiful and most is still in a largely natural state. A continuing challenge throughout the aster's range is the ephemeral and shifting nature of its habitat (i.e., gravel banks periodically produced or exposed and scoured in varying locations through large river systems). Provided natural hydrological processes are maintained, however, this habitat should remain available within the range of the aster.

*3. The primary threats to the species or its habitat (including threats outside Canada) can be avoided or mitigated.*

Yes. The main threats to the species and its habitat are generally minor, localized, and can be avoided or mitigated.

*4. Recovery techniques exist to achieve the population and distribution objectives or can be expected to be developed within a reasonable timeframe.*

Yes. For locations threatened by development, effective recovery techniques exist. For those threatened by white-tailed deer grazing (i.e., on Anticosti Island), deer removal is not a viable option, and existing approaches to reducing or mitigating grazing will have to be researched and tested.

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# 1. COSEWIC SPECIES ASSESSMENT INFORMATION

**Date of Assessment:** May 2000

**Common Name (population):** Anticosti Aster

**Scientific Name:** *Symphyotrichum anticostense*

**COSEWIC Status:** Threatened

**Reason for Designation:** Some populations have been lost from this highly localized Gulf of St. Lawrence endemic that occurs in specialized river-edge habitat at only a few sites in New Brunswick and Québec.

**Canadian Occurrence:** QC, NB

**COSEWIC Status History:** Designated Threatened in April 1990. Status re-examined and confirmed in May 2000.

# 2. SPECIES STATUS INFORMATION

The Anticosti Aster is listed as threatened under Schedule 1 of the *Species at Risk Act* (SARA). In Quebec, it is listed as Threatened under the *Québec Act respecting threatened or vulnerable species*. In New Brunswick, it is designated as Endangered and protected by provisions of the provincial *Endangered Species Act*.

The global status of Anticosti Aster is G3 (vulnerable) and in Canada is has a status of N3; S3 (Vulnerable) in New Brunswick and S3 (vulnerable) in Québec (NatureServe, 2006).

In the United States it has a status of N1 (critically imperilled) and S1 in Maine (critically imperilled) where it was thought to be extinct but has been recently rediscovered (Haines, 2000 and NatureServe, 2006). The Anticosti Aster is known from only one site in Maine and is therefore highly vulnerable to extirpation. The species is considered to be at the southern extent of its range in the state.

# 3. SPECIES INFORMATION

## 3.1 Species Description

The Anticosti Aster (*Symphyotrichum anticostense*; formerly known as *Aster anticostensis*, which is synonymous with *Aster gaspensis*) is a perennial, herbaceous plant about 25–75 cm in height. It is similar in appearance to certain more widespread and familiar aster species, such as the New York Aster (*S. novi-belgii*), but is distinctive in its combination of stiff stems with stiff, leathery, linear-lanceolate leaves and the long pedicels that support its purple, lilac, or (sometimes) white flowers.

Anticosti Aster is believed to have evolved through the hybridization of New York Aster (*Symphyotrichum novi-belgii*) and Boreal Aster (*Symphyotrichum boreale*) and can often bear a strong resemblance to either parent species as well as other aster species common in New Brunswick, but absent from Gaspésie and Île d'Anticosti such as the Panicled Aster *(Symphyotrichum lanceolatum*). It can be particularly difficult to distinguish from the morphologically plastic and very common New York Aster which can often occur in similar habitats. The potential hybridization between *Symphyotrichum* species also contributes to the difficulties of identification based on morphology alone. Given the variability of Anticosti Aster and its morphological resemblance to several other taxa, genetic analysis is often required to ascertain the identity of collected specimens through examining chromosome numbers (Mazerolle and Blaney, 2011).

## 3.2 Population and Distribution

The population size and distribution of Anticosti aster are not thoroughly known at this time because it was determined recently that there are difficulties associated with identification of Anticosti Aster in the field using morphological features, particularly in New Brunswick (Mazerolle and Blaney 2011). As a result, there is uncertainty around the reliability of current available data that were used to determine the distribution of the species and estimate its abundance. There is additional uncertainty regarding the population structure with research from 2008 on the origin of *S. anticostense* suggesting that three distinct population segments may exist: 1) Lac Saint-Jean; 2) Gaspé Peninsula, New Brunswick and Maine; and 3) Anticosti Island (Vaezi 2008).

Within Quebec, the species is restricted to coastal areas of south-central Anticosti Island, Lac Saint-Jean (one location, at Mashteuiatsh) and the rivers feeding into the north shore of Baie des Chaleurs in the Gaspé Peninsula. The species has been recorded at 17 locations (13 rivers and four lakes) in Québec; 11 locations hold significant populations and 6 have smaller populations (Jolicoeur and Couillard 2007, G. Jolicoeur pers. comm., P. Désilets pers. comm). Counts of individual stems total about 200 000 in Québec (Jolicoeur and Couillard 2007, P. Désilets, pers. comm.). It should be kept in mind that the species can reproduce by cloning, therefore while the number of stems is equivalent to the number of individuals as defined by COSEWIC, it is likely to greatly overestimate the number of genetic individuals.

Within New Brunswick, Anticosti Aster was recorded from two sites on the Restigouche River, three sites on the upper Saint John River, two extant and one presumed extirpated (since 1945 near Woodstock) (COSEWIC, 2000). Fieldwork since 2000 documented asters, resembling Anticosti Aster, on river and lakeshores from a much wider area, extending over much of western, central and northern New Brunswick, (Mazerolle and Blaney, 2011). These asters were identified as Anticosti Aster based on morphology, although some uncertainty regarding species identification was noted.

As a result of this uncertainty a genetic analysis using chromosome counts was attempted on 15 potential Anticosti Aster specimens from 9 locations spread over the range within New Brunswick,. Precise chromosome counts could not be obtained, but results showed that only two of the 15 specimens were potentially Anticosti Aster (Blaney and Mazerolle 2011). The 13 non-Anticosti specimens came from throughout the potential range in New Brunswick,, including the Saint John and Restigouche Rivers where occurrences had previously been

considered confirmed. Although Anticosti Aster may well occur in New Brunswick,, these results indicate New Brunswick,specimens cannot be definitively identified based on morphology and that identification of all provincial records is uncertain. In Québec, these morphological identification problems are less frequent.

## 3.3 Needs of the Anticosti Aster

Anticosti Asters are strictly associated with calcareous (i.e., calcium-rich, alkaline; in this region, limestone) outcrops or gravel along rivers (except for five lakeside locations at Grand Lake in New Brunswick and Lac Saint-Jean, Lac Smith, Lac Creux and Lac Rat-Musqué in Québec) (Labrecque and Brouillet 1988, 1990). They usually occupy areas above the riverbed but below the high water mark (i.e., in the geolittoral zone) that have a shallow slope (typically 2–3%, usually less than 5%; Dietz and Bishop 2002). Periodic scouring of the bank by high water and ice appears to be essential for their persistence, most likely because this scouring arrests the succession of vegetation that can shade and crowd out the aster. Substrates that are too loose (e.g., sand) are unsuitable, perhaps because when flooded they bury the plant or promote competitive species (Labrecque and Brouillet 1988). The aster's restriction to particular latitudes suggests that, like other plants with similar distributions, it can tolerate only a climate with 2 300–2 500 degree-days. Although the Anticosti Aster can be found within estuarine environments, they are commonly found in the upper reaches of river ecosystems, often 20 km from the river mouth. This suggests that it may be intolerant of saline environments.

Anticosti Aster plants are perennial, and most reproduction is clonal, via underground rhizomes. The lifetime of individual plants is unknown. Seeds likely germinate in early spring; flowering extends from mid-July to September, and seeds are likely distributed between mid-August and late fall (Labrecque and Brouillet 1988).

The aster is a pioneer species of newly exposed sandy or gravelly areas, mainly along rivers but also, locally, along railroad beds or gravel roads. Other plant species found in the same areas include widespread species of open areas and wet habitats, as well as species more restricted to calcium-rich (calcicole) soils. Because the plants with which it most frequently associates are widespread, locations of the aster cannot be pinpointed by searching for a particular plant community (Dietz and Bishop 2002). As a pioneer species, the aster is superseded by secondary species if the growth of those species is not disrupted. Under natural conditions, spring flooding, rockslides or slumping of substrate along riverbanks and lake shorelines provides that disruption, which is presumably why the aster occurs mainly along large rivers or lakes that experience similar conditions.

Anecdotal observations suggest that the Anticosti Aster, like other asters (Mani and Saravanan 1999), is pollinated by a broad range of pollinators. White-tailed deer are known to forage on the plants, especially on Anticosti Island (see section 4, Threats, below). Otherwise, the plant's predators, parasites, and diseases are undocumented.

Anticosti aster may be limited by their restrictive habitat needs and poor competitive ability in the presence of other plants.

# 4. THREATS

## 4.1 Threat classification

**Table 1. Threat classification table**

| Threat | Level of Concern[1] | Extent | Occurrence | Frequency | Severity[2] | Causal Certainty[3] |
|---|---|---|---|---|---|---|
| **Habitat loss or degradation** | | | | | | |
| **Dam construction, water level and riparian zone management** | Medium | Widespread | Ongoing | One-time | Moderate | Medium |
| **Shoreline development** (cottages, campsites, and trailer parks) | Medium | Widespread | Current / Anticipated | Continuous / Recurring | High / Moderate | High / Medium |
| **Industrial activities** | Medium | Widespread | Potential | One-time | Moderate | Medium |
| **Recreational activities** | Medium | Widespread | Current | Continuous | Moderate | Medium |
| Woody debris | Low | Local | Current | Recurring | Unknown | Unknown |
| **Changes in ecological dynamics and natural processes** | | | | | | |
| **Grazing** | Medium | Local | Current / Unknown | Continuous / Recurring | High / Low | High / Low |
| **Hybridization** | Medium | Widespread | Current / Unknown | Continuous / Recurring | Unknown | High / Low |
| **Exotic, invasive, or introduced species/genome** | | | | | | |
| **Invasive species** | Low | Local | Current | Continuous | Moderate / Low | Medium |
| **Climate and Natural Disasters** | | | | | | |
| **Climate change** | Low | Widespread | Unknown | Unknown | Unknown | Unknown |

[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

*1) Dam construction, water level and riparian zone management*

Anticosti Asters rely on periodic scouring of riverbanks and lake shorelines, which removes competing species. In nature, such scouring occurs every spring, but damming of rivers and construction of rock or other solid walls associated with dam construction or built for other purposes can interrupt that natural cycle. Dam construction might account for the small size of the aster population in Somerville, New Brunswick (Labrecque and Brouillet 1990). Damming can also flood aster habitat, an effect that accounts for destruction of at least one location (near the Tinker Dam on the Aroostook River, Maine; Haines 2000) and that may have reduced the available habitat at another (at Mashteuiatsh, Lac Saint-Jean, Québec; COSEWIC 1999). Construction of rock or concrete structures to stabilize riverbanks and lake shorelines permanently changes habitat characteristics resulting in habitat loss and also may destroy plants if they are present in the area. A change in water management regime may lead to rock slides which can also change local habitat characteristics and lead to mortality of individuals and extirpation of local populations.

Of the rivers with aster habitat in Canada, only the Saint John has dams (at Grand Falls, Beechwood, and Mactaquac). It is unclear if aster populations are affected by the regulating effects of damming as the aster is established both above and below the Mactaquac Dam, as well as occurring along the dam's headpond (NBDNR unpublished data). A dam also exists on Lac Saint-Jean, resulting in higher and more stable water levels than would have been present prior to construction of the water control structure. Changes in the current water level management regime at Lac Saint-Jean resulting in higher than normal water levels over an extended period of time, particularly during the flowering season, could result in loss of the local Anticosti Aster population.

*2) Shoreline development*

Disruption of the aster’s riverbank and lake shoreline habitat as a result of human activity ranges from habitat destruction, to trampling which can destroy individuals as well as create conditions that favour competing plant species. Such disruption is not thought to be widespread, based on visits to known sites (Dietz and Bishop 2002). Nonetheless, habitat disruption has been observed in the form of cottage construction, campsites and trailer parks, and associated activities (boat ramps, picnic areas, docks, trails along the rivers, mowing to the water's edge) on the Bonaventure River (Jolicoeur and Couillard 2007), one picnic area on the Restigouche River, and erosion control measures at Somerville (Dietz and Bishop 2002) and Lac Saint-Jean (Jolicoeur and Couillard 2007). Development near aster habitat would also likely increase the risk of introducing non-native invasive species that may negatively impact established Anticosti Aster populations.

### *3) Industrial activities*

Erosion from gravel mining, construction, and logging or other clearing may increase runoff and siltation (Haines 2001). A study of the Saint John River in New Brunswick determined that 42% of the shoreline has undergone some form of development (NTNB 2005). On the Petit Pabos River, restoration of a bridge for forest harvesting activities lead to the loss of part of a population of Anticosti Aster. On other rivers with Anticosti Aster the extent of this factor has not been quantified.

### *4) Recreational activities*

The use of all-terrain vehicles (ATV) on rivers where the aster occurs has been observed. When ATVs are driven through aster habitat, they can crush plants and compact the substrate so that recolonization is unlikely. ATVs could also potentially carry seeds or other propagules of plants that might compete or hybridize with *S. anticostense*. This threat occurs at low levels at all Québec locations, but is considered intense on the Bonaventure River (Jolicoeur and Couillard 2007). In New Brunswick it has been noted at only 3 of 25 locations found in the province (Dietz and Bishop 2002).

Recreational fishing activities can lead to construction of multiple access points to gain entry to rivers and lakes. Development of trails along rivers and lakes either for pedestrian or ATV use can disturb or destroy habitat of the Anticosti Aster.

### *5) Woody debris*

The presence of logs and woody debris in the habitat is specific to the population of Lac Saint-Jean, Quebec. This threat is related to historical logging on certain tributaries of the lake. During heavy storms, submerged logs sometimes wash ashore. This reduces available habitat for the species and has the potential to physically crush individual plants (Conseil des Montagnais du Lac-Saint-Jean, 2012).

### *6) Grazing*

White-tailed deer (*Odocoileus virginianus*), introduced to Anticosti Island in 1896–1897, are now abundant, with white-tailed deer hunting constituting an important component of the island's economy. White-tailed deer grazing has had dramatic effects on the island's flora that continue today, even though the deer population is near the island's carrying capacity (Viera 2003; Tremblay et al. 2005). Grazing appears to have reduced the height of most aster populations on the island (Jolicoeur and Couillard 2007). It seems likely that flowering rates would also be reduced, both through direct grazing of flowers and through the effect of grazing on the growth pattern of individual plants (Coté et al. 2004), although these effects have not been documented in detail.

### *7) Hybridization*

Anticosti Asters hybridize readily with the widespread generalist species New York Aster (*S. novi-belgii*) and may occasionally hybridize with other species of aster, where those species

occur abundantly alongside Anticosti Aster (*S. anticostense*). Hybrids are morphological and cytological intermediates that complicate identification of *S. anticostense* and are believed to be particularly frequent along the Saint John River (Dietz and Bishop 2002), but are also found on Grande-Rivière, Brick, and Bonaventure rivers (COSEWIC 1999; Jolicoeur and Couillard 2007). With the close proximity of *S. novi-belgii* at most sites, it is possible that the genetic distinctiveness of *S. anticostense* is threatened, especially where *S. novi-belgii* may be at higher than natural population levels where it benefits from human-disturbed habitats.

*8) Invasive species*

Non-native plant species that readily invade disturbed habitats have been cited as a potential threat to native plants occupying the aster's habitat in eastern Maine and eastern Québec (Labrecque and Brouillet 1988; Haines 2001; see also St. Hilaire 2003). Such species, which include Reed Canary-grass (*Phalaris arundinacea*), Cow Vetch (*Vicia cracca*), Japanese Knotweed (*Fallopia japonica*), and White Sweet-clover (*Melilotus albus*), are sufficiently rapid colonizers that they might readily outcompete Anticosti Asters should they be allowed to spread (Haines 2001).

*9) Climate Change*

The aster's habitat is so tightly linked to seasonal flooding and scouring that, although not documented as a threat *per se*, recent climate-driven changes in flood and ice flow patterns are worth noting as a possible perturbation to the aster's habitat that should be watched.

# 5. POPULATION AND DISTRIBUTION OBJECTIVES

The population and distribution objectives for the Anticosti Aster are to maintain the Canadian population at its current known size, distribution and area of occupancy. Due to uncertainties associated with the genetics of Anticosti Aster, this objective remains conditional on the results obtained from urgent research approaches identified in Table 2 of Section 6.2.

# 6. BROAD STRATEGIES AND GENERAL APPROACHES TO MEET OBJECTIVES

## 6.1 Actions Already Completed or Currently Underway

- In 1997, the Regional County Municipality of Rocher-Percé, on the Gaspé Peninsula, adopted the Anticosti Aster as its floral emblem, thereby increasing the profile of the species in the region.
- In 2001–2002, the Nature Trust of New Brunswick and the Atlantic Canada Conservation Data Centre surveyed the upper Saint John River for Anticosti Asters along with other rare plants.
- In 2002, as part of a project funded by the Habitat Stewardship Program, the New Brunswick Department of Natural Resources (NB DNR) commissioned a survey to revisit known locations and look for new occurrences of the Anticosti Aster in New Brunswick.

- In 2006, the Ecological Heritage and Parks Branch of the Québec Department of Sustainable Development, Environment and Parks developed a conservation plan for the Anticosti Aster (Jolicoeur and Couillard, 2007).
- In 2006, the NB DNR developed a draft recovery strategy for the Anticosti Aster.
- In 2006 and 2007, the Government of Canada's Aboriginal Fund for Species at Risk provided funding for two Anticosti Aster projects for the Lac Saint-Jean population. These projects resulted in the completion of a site survey and focused on increasing awareness of property owners, vacationers, and the Mashteuiatsh community, as well as developing recommendations for protecting habitat.
- In 2007 and in 2008, the Atlantic Canada Conservation Data Centre completed rare plant surveys with particular emphasis on confirming the presence and abundance of the Anticosti Aster along the Restigouche River and other rivers in central and southern New Brunswick (Blaney et al. 2007, Blaney and Mazerolle 2009). This survey resulted in identification of *S. anticostense* populations from previously unknown locations, initially suggesting that the Anticosti Aster is common and widespread along central New Brunswick river systems. However, a genetic chromosome count analysis was conducted because of uncertainties regarding morphological characteristics and the results indicate that all sites previously identified as Anticosti Aster are now uncertain
- A rare plant survey was conducted along 11 rivers and four lakes on Anticosti Island in 2008. Although new occurrences of the Anticosti Aster were found along three new rivers (Rivière Martin, Rivière aux Plats and Rivière aux Rats) and three new lakes (Lac Creux, Lac Smith and Lac Rat Musqué), these populations are relatively small, ranging from several hundred to several thousand plants (G. Jolicoeur pers. comm.).
- Research on the origin of *S. anticostense* was completed in 2008 (Vaezi 2008). This work provides evidence that *S. anticostense* is a hybrid derivative of *S. novi-belgii* and *S. boreale*. The research further suggests that distinct population segments exist at: 1) Lac Saint-Jean; 2) Gaspé Peninsula, New Brunswick and Maine; and 3) Anticosti Island. These results will have important implications for future evaluations of the status of the species and for its management.
- In 2009, funding provided to the Mashteuiatsh community by Environment Canada was used to develop a monitoring protocol, monitor the Lac Saint-Jean population and conduct searches for new populations in the area.
- Under a project funded through the Aboriginal Fund for Species at Risk, surveys of three rivers (the Dartmouth, Douglastown and Saint-Jean rivers) carried out by the Gespeg First Nation, led to the discovery of a new population on the shores of the Saint-Jean River.
- Targeted surveys along five rivers in the Gaspé Peninsula (the Petit Pabos, Grand Pabos, Grande Rivière, Bonaventure and Resticouche rivers) carried out in 2009 by Quebec's Ministère du Développement durable, de l'Environnement et des Parcs as part of the status report update revealed that the populations in Gaspé rivers were higher than previously reported to the Centre de données sur le patrimoine naturel du Québec (P. Désilets, pers. comm.).
- The Interdepartmental Recovery Fund (IRF) has also made it possible to fund two phases of a conservation project (2008–2009 and 2009–2010) on the Anticosti Aster in the community of Masheuiatsh. The goal of this project was to develop a conservation plan for the Anticosti Aster population at Mashteuiatsh and to conduct population monitoring.

## 6.2 Strategic Direction for Recovery

Prior to proceeding with all recovery approaches in Table 2 and with the identification of critical habitat (Section 7), a genetic analysis must be conducted to determine the presence of the Anticosti Aster, particularly in New Brunswick, and determine its distribution and abundance, and the population structure of the species. Recent genetic work on Anticosti Aster, described above, has revealed that the morphological features used to distinguish Anticosti Aster from other similar species of aster in the field are not completely reliable for species identification, particularly in New Brunswick. As a result, there is uncertainty regarding the species' occurrence at previously documented sites and thus its distribution and abundance and the structure of the populations is unclear. Note, however, that in the absence of results from the genetic analysis, urgent recovery approaches identified in Table 2 should continue to occur, particularly in Quebec.

**Table 2. Recovery planning table**

| Threat or Limitation | Priority | Broad Strategy to Recovery | General Description of Research and Management Approaches |
|---|---|---|---|
| A. Research | | | |
| Knowledge Gap | Urgent | Conduct research | ▪ conduct genetic analysis to determine the presence of the species, its distribution and abundance and population structure (also needed in order to identify critical habitat) |
| Grazing, Hybridization, Invasive species, Woody debris | Necessary | Conduct research | ▪ genetic research regarding hybridization<br>▪ impact of white-tailed deer grazing, of invasive species and woody debris<br>▪ habitat needs (substrate, competition, and pollinators, as they affect colonization and persistence)<br>▪ population persistence and population viability |
| B. Surveys | | | |
| All | Necessary | Conduct inventories, and monitor populations and habitat | ▪ develop protocols for inventories and monitoring<br>▪ survey population and habitat<br>▪ collect information on threats<br>▪ implement a monitoring protocol, including monitoring of threats |
| C. Education / Outreach | | | |
| Shoreline development, Industrial activities, Recreational activities | Urgent | Protect the species and its habitat | ▪ Ensure consistent enforcement and implementation of existing protection measures and regulations. |
| Shoreline development, Recreational vehicles | Beneficial | Education/ outreach | ▪ Promote community involvement and awareness regarding the species and its habitat. |

## 6.3 Narrative to Support the Recovery Planning Table

### *Research*

As described above, the urgent priority is in the area of genetics: population structure, hybridization, morphological expression of genetic differences, population genetics. Additional areas of importance include: population persistence, habitat needs, impacts of white-tailed deer grazing, and the potential impact of invasive non-native plant species and woody debris.

### *Surveys*

Once there is an understanding of the distribution, abundance and population structure of the species then, in order to estimate population trends, which are currently unknown, locations must be resurveyed on a regular basis. The methodology, including the number of locations that should be resurveyed, how to select them, and how often to revisit them will need to be determined. A long-term monitoring plan should be developed and the approach should be two-tiered, including a broad-based, randomized survey for trend information, and a more detailed assessment of a subset of locations, for reproductive information. Information on population size and distribution should be kept in a centralized database (e.g., Conservation Data Centres), to provide data for tracking the effectiveness of recovery actions, for correlating habitat features with aster presence and density (see Research, below), and for documenting threats.

For Anticosti Island additional surveys could be done in areas that might have high concentrations and be under immediate threat (Jolicoeur and Couillard 2007). A better understanding of population size and distribution is essential information for refining key elements of the recovery planning process (broad strategies and general approaches, threats, and habitat).

### *Protection*

Currently, the aster's habitat is regulated by various measures in both Québec and New Brunswick. Effective communication between departments and agencies should take place to ensure regulations for the protection of aster habitat are applied. Various mechanisms are available for ensuring adequate protection of habitat at known locations, including legal tools, voluntary or stewardship agreements.

### *Education/Outreach*

A broad-based educational effort may help raise awareness of the aster and its habitat across the public in general. Such awareness will lead to greater appreciation of a habitat that otherwise has little ecological significance in the public view, and thus greater self-policing of activities that might disrupt it. Such education could be accomplished through interpretative signs at scenic and recreational access points and by distributing brochures at public information centres (including parks, libraries, community centres, and highway rest stops) along rivers where the aster occurs.

At heavily used locations with particularly large concentrations of asters (e.g., Rivière Bonaventure), landowners along the locations and just upstream of them should be contacted to ensure that they are aware of the regulations that protect aster habitat and natural hydrology. Some landowners, especially those owning longer stretches of riverside, may be encouraged to develop conservation plans and even donate conservation easements. In areas under heavy recreational use (e.g., those with frequent ATV traffic), fencing or signing populations should be considered.

# 7. CRITICAL HABITAT

## 7.1 Identification of the Species' Critical Habitat

Critical habitat is not identified at this time because recent genetic work on Anticosti Aster revealed that the morphological features used to distinguish Anticosti Aster from other similar species of aster in the field are not completely reliable for species identification. As a result, there is uncertainty regarding the species' occurrence at previously documented sites and thus its distribution and abundance and the structure of the populations is unclear.

## 7.2 Schedule of Studies to Identify Critical Habitat

The activity included in the schedule of studies is the same as the urgent research approach indicated in Table 2.

**Table 3. Schedule of studies**

| Description of Activity | Outcome/Rationale | Timeline |
|---|---|---|
| Conduct genetic analysis to determine the presence of the species, its distribution and abundance, and its population structure | Known occurrence of the species, and a clear understanding of the population structure of the species across its range | 2016 |

# 8. MEASURING PROGRESS

The performance indicators presented below provide a way to define and measure progress toward achieving the population and distribution objectives.

- the size of the Anticosti Aster population has been maintained;
- the distribution and area of occupancy of the Anticosti Aster has been maintained.

# 9. STATEMENT ON ACTION PLANS

One or more action plans will be completed within five years of the posting of the recovery strategy on the Species at Risk Public Registry. Provincial action plans may be completed to address the distinct needs and challenges in each province.

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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.

The implementation of this recovery strategy is unlikely to result in any negative effects on other species within the habitat occupied by Anticosti aster. Several rare plant species, notably the endangered Furbish's Lousewort, rely on similar habitat and hydrological conditions within the range of the Anticosti Aster, and thus might benefit from recovery actions directed at the aster.

The possibility that the present recovery strategy inadvertently generates negative effects on the environment and on other species was considered. The majority of recommended actions are non-intrusive in nature, including surveys and outreach. We conclude that the present recovery strategy is unlikely to produce significant negative effects.