

Management Plan for the
Anticosti Aster
(Symphyotrichum anticostense)
in Canada



2026

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¹ www.canada.ca/en/environment-climate-change/services/species-risk-public-registry.html

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« Plan de gestion de l'aster d'Anticosti (*Symphyotrichum anticostense*) au Canada »

Preface

The federal, provincial, and territorial government signatories under the [Accord for the Protection of Species at Risk \(1996\)](#)² agreed to establish complementary legislation and programs that provide for effective protection of species at risk throughout Canada³. Under the [Species at Risk Act \(S.C. 2002, c.29\)](#)⁴(SARA), the federal competent ministers are responsible for the preparation of management plans for listed species of special concern and are required to report on progress within five years after the publication of the final document on the Species at Risk Public Registry.

The Minister of the Environment, Climate Change and Nature is the competent minister under SARA for the Anticosti Aster and has prepared this management plan, as per section 65 of SARA. To the extent possible, it has been prepared in cooperation with the Province of New Brunswick, the Province of Quebec and the Pekuakamiulnuatsh Takuhikan (Mashteuiatsh) as per section 66(1) of SARA.

Success in the conservation 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 and Climate Change Canada, or any other jurisdiction alone. All members of the public are invited to join in supporting and implementing this plan for the benefit of the species and society as a whole. Implementation of this management plan is subject to appropriations, priorities, and budgetary constraints of the participating jurisdictions and organizations.

² www.canada.ca/en/environment-climate-change/services/species-risk-act-accord-funding.html#2

³ The Government of Quebec is not signatory to the Accord for the Protection of the Species at Risk (1996). However, the Government of Quebec does cooperate with the federal government in the conservation of species at risk of common interest.

⁴ <https://laws.justice.gc.ca/eng/acts/S-15.3/index.html>

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Executive Summary

The Anticosti Aster (*Symphyotrichum anticostense*) is a perennial, herbaceous plant about 25–75 cm in height. It is endemic to northeastern North America, with a few individuals documented in Maine and the remainder of the global population in the provinces of Québec and New Brunswick, where there are 22 subpopulations distributed in three distinct regions of occurrence. The total population size in Canada is estimated to be between 410,000 and 1,063,000 stems. The species is particularly difficult to distinguish from New York Aster (*Symphyotrichum novi-belgii*) with which it can often co-occur. The potential hybridization between aster species also contributes to the difficulties of identification based on morphology alone.

The species is found on open shorelines of large rivers, and locally on similar lakeshores. Plants are most often found on wide, low gradient rock, cobble, gravel and sand shores in sparsely vegetated areas between the highest and lowest water marks.

Anticosti Aster was initially assessed by COSEWIC as Threatened in 1990 and listed as such on Schedule 1 of the *Species at Risk Act* (SARA) in 2003. The species was reassessed as Special Concern in 2017 and its status under SARA was changed accordingly in 2021.

The primary threats to Anticosti Aster are invasive plant species and recreational activities, both of which can degrade habitat and cause loss of plants.

The management objective for the Anticosti Aster is to maintain the three distinct regions of occurrence by maintaining a stable population within the occupied habitat on the rivers and lakeshores that currently support the 22 subpopulations of the species.

The high priority broad strategies outlined in this management plan are outreach and communications with landowners with residential or cottage properties having Anticosti Aster, and better products and management practices through the sharing of the locations and significance of Anticosti Aster with municipal planning agencies and managers of road and rail crossings.

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1. COSEWIC* Species Assessment Information

Date of Assessment: April 2017

Common Name (population): Anticosti Aster

Scientific Name: *Symphyotrichum anticostense*

COSEWIC Status: Special Concern

Reason for Designation: This clonal plant is restricted to calcareous shores of larger rivers (and occasionally lakes) in Eastern Québec and New Brunswick. At least 95% of its small global range occurs in Canada. Invasive species threaten habitat quality and there is some evidence that localized hybridization and deer browsing may minimally affect population persistence at local scales. Since the species' last assessment of Threatened in 2000, extensive searching resulted in the documentation of several new populations. The subpopulations appear to be stable.

Canadian Occurrence: Québec, New Brunswick

COSEWIC Status History: Designated Threatened in April 1990. Status re-examined and confirmed in May 2000. Status re-examined and designated Special Concern in April 2017.

* COSEWIC (Committee on the Status of Endangered Wildlife in Canada)

2. Species Status Information

Anticosti Aster (*Symphyotrichum anticostense*) was initially assessed by COSEWIC as Threatened in 1990 and listed as such on Schedule 1 of the *Species at Risk Act* (SARA) in 2003. The species was reassessed as Special Concern in 2017 and its status under SARA was changed in 2021. In 2022, Anticosti Aster was assessed by the New Brunswick Committee on the Status of Species at Risk (COSSAR) as a species of Special Concern, with changes made to its status under their *Species at Risk Act* in 2023. Also in 2022, the Province of Québec down-listed the species from Threatened to Vulnerable under their *Act respecting threatened or vulnerable species* (Éditeur officiel du Québec 2022). NatureServe conservation status ranks for Canada are provided in Table 1. Greater than 95% of the global range and population occurs in Canada, with only a single, small extant occurrence outside of Canada just across the border in Maine (COSEWIC 2017).

Table 1. Conservation Status Ranks for Anticosti Aster in Canada (NatureServe 2022).

Global (G) Rank	National (N) Rank	Subnational (S) Rank
G3	N3	New Brunswick – S3 Québec – S3

Global (G), National (N) and Subnational (S) NatureServe alphanumerical ranking: 3 – Vulnerable.

3. Species Information

3.1. Species Description

The following description is taken largely from Environment Canada (2012).

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.

Anticosti Aster evolved through the hybridization of New York Aster (*S. novi-belgii*) and Boreal Aster (*S. boreale*). It has stiff stems with stiff, leathery, linear-lanceolate leaves and long pedicels⁵ that support purple, lilac or (rarely) white flowers. There are some narrow-leaved forms of New York Aster in New Brunswick and Nova Scotia, to which the name *Symphyotrichum novi-belgii* var. *elodes* likely applies, that are almost indistinguishable from Anticosti Aster by morphological means. Identification of these plants is most reliably accomplished by measuring DNA content using flow cytometry⁶. Anticosti Aster, with 80 chromosomes has more DNA than New York Aster with 48 chromosomes (Mazerolle and Blaney 2010).

3.2. Species Population and Distribution

Anticosti Aster is a rare, northeastern North American endemic species that occurs only in Québec, New Brunswick and Maine. In Canada, there are 22 subpopulations occurring in three distinct regions of occurrence (Figure 1; Appendix A):

1. Lac Saint-Jean, Québec (1 subpopulation)
2. Anticosti Island, Québec (10 subpopulations), and
3. the Gaspé Peninsula, Québec and western New Brunswick (11 subpopulations).

Three occurrences found at lakeshore sites on Anticosti Island in 2008 are considered questionable due to atypical morphology; they have not been confirmed genetically and are not included as subpopulations in this management plan. Four additional subpopulations were identified following the publication of the COSEWIC status report, one in 2020 and three in 2021, increasing the number of subpopulations from 18 to 22.

In Maine, the species has only been reported near the Canadian border along the Aroostook River, a tributary of the Saint John River, where one extant and one historical site are known (Haines 2000). Identification of the Maine population, however, has not been confirmed via genetic analysis.

⁵ The stalk of a flower.

⁶ Flow cytometry is a process in which cell samples are suspended in a fluid stream and analyzed by a device (cytometer) equipped with high precision optical sensors that measure DNA content, which allows inference of ploidy level and the detection of interspecific hybrids (Doležel 1991, Negrón-Ortiz 2007).

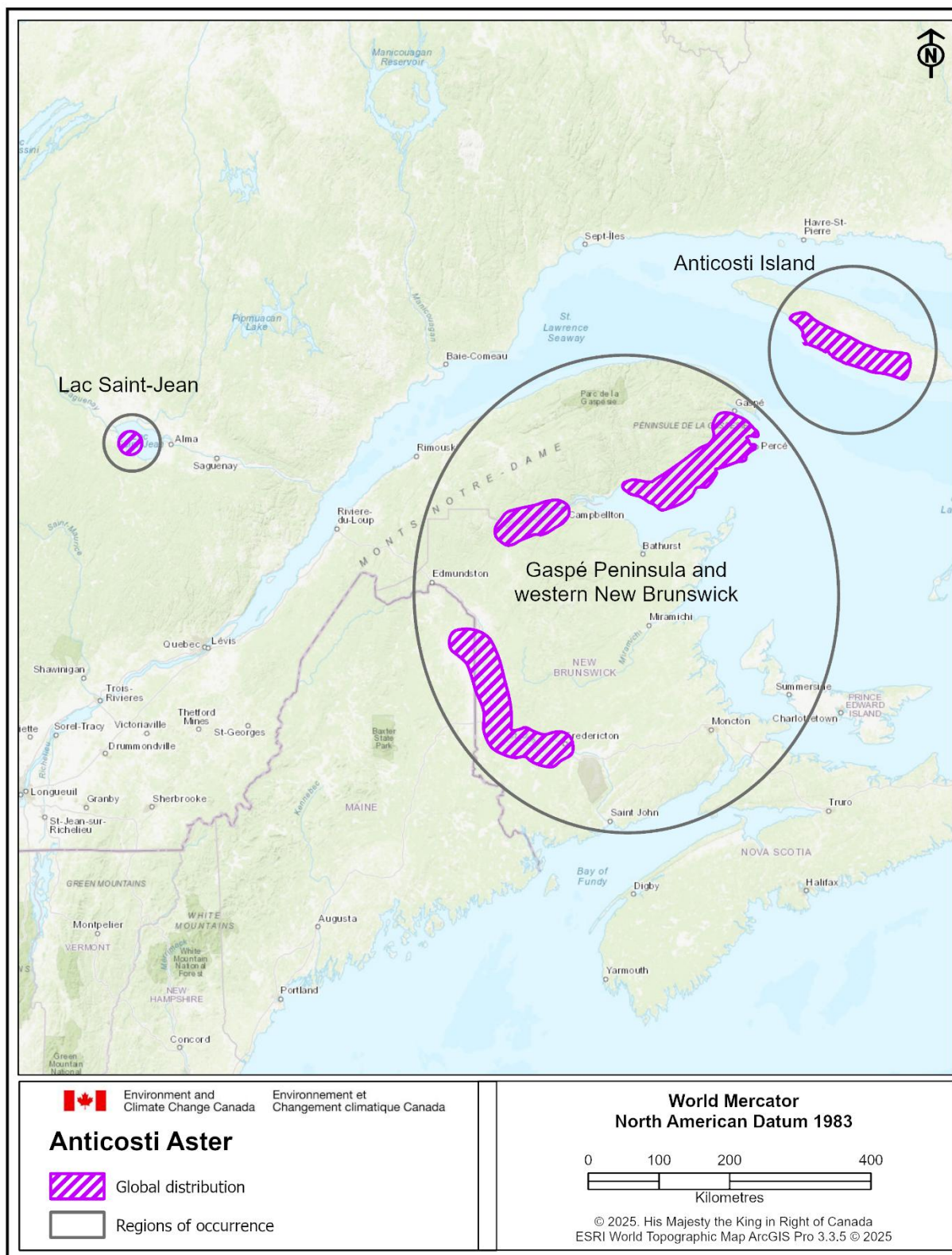


Figure 1. Global distribution (hatched purple areas) of the Anticosti Aster, showing the three regions of occurrence (grey circles) in Canada (adapted from COSEWIC 2017).

The total population of Anticosti Aster in Canada is roughly estimated at 410,000 to 1,063,000 stems. Subpopulations in the Gaspé Peninsula / New Brunswick region of occurrence contain at least 95% of the total known global population, with populations on the Restigouche River being the largest (hundreds of thousands of stems over roughly 80 km of river). Gaspé Peninsula's Grande Rivière, Bonaventure and Petit Pabos rivers support the next largest subpopulations (>68,000, >20,000 and >5000, respectively). All other known subpopulations are estimated at a few thousand stems or fewer. Subpopulations are not believed to have changed significantly since the last status assessment in 2000.

3.3. Needs of the Anticosti Aster

The following description is largely taken from COSEWIC (2017).

Anticosti Aster is found on the open shores of larger rivers within the zone of annual flooding, and sometimes on similar lakeshores. It is strongly associated with underlying calcareous sedimentary bedrock and surface materials (mainly limestone). Plants are most often found on wide, low gradient rock, cobble, gravel and sand shores in sparsely vegetated areas between the highest and lowest water marks. At one site, Anticosti Aster has extensively colonized the gravelly roadside and railroad bed adjacent to a river, indicating potential to take advantage of disturbed habitats.

It is likely dependent on insect pollination. It flowers from late July to late September and disperses seed from mid-August to late fall. Transport by water flow is likely the most significant mode of dispersal. Plants can probably produce flowers within the first year, but in the field, time to sexual maturity is likely greater.

3.4 Limiting Factors

Anticosti Aster is found almost exclusively on calcareous rivers and lakeshores where sparsely vegetated, flat areas of gravel or cobble and rock outcrops occur due to seasonal flooding and ice scouring. These ideal environmental conditions are uncommon and localized within the species' range (COSEWIC 2017).

4. Threats

4.1. Threat Assessment

The Anticosti Aster threat assessment (Table 2) is based on the IUCN-CMP (International Union for the Conservation of Nature – Conservation Measures Partnership, version 2.0) unified threats classification system. For purposes of threat assessment, only present and future threats are considered. Threats are defined as the proximate activities or processes that have caused, are causing, or may cause in the future the destruction, degradation, and/or impairment of the entity being assessed (population, species, community, or ecosystem) in the area of interest (global, national, or subnational). Limiting factors are not considered during this assessment process. Historical threats, indirect or cumulative effects of the threats, or any other relevant information that would help understand the nature of the threats are presented in the Description of Threats section. The calculated overall threat impact for the Anticosti Aster is Low.

Table 2. Threat calculator assessment (COSEWIC 2017).

Threat #	Threat description	Impact ^a	Scope ^b	Severity ^c	Timing ^d	Detailed threats
1	Residential & commercial development	Negligible	Negligible (<1%)	Negligible (<1%)	High (Continuing)	
1.3	Tourism & recreation areas	Negligible	Negligible (<1%)	Negligible (<1%)	High (Continuing)	Dock infrastructure
4	Transportation & service corridors	Negligible	Negligible (<1%)	Unknown	High (Continuing)	
4.1	Roads & railroads	Negligible	Negligible (<1%)	Unknown	High (Continuing)	Maintenance of roads and railways at river crossings
6	Human intrusions & disturbance	Low	Small (1-10%)	Slight (1-10%)	High (Continuing)	
6.1	Recreational activities	Low	Small (1-10%)	Slight (1-10%)	High (Continuing)	Trampling, ATVs
6.3	Work & other activities	Negligible	Negligible (<1%)	Negligible (<1%)	Moderate (Possibly in the short-term, <10 yrs)	Plant collection

Threat #	Threat description	Impact ^a	Scope ^b	Severity ^c	Timing ^d	Detailed threats
7	Natural system modifications	Not calculated (outside assessment timeframe)	Restricted – Small (1-30%)	Extreme (71-100%)	Low (possibly in the long-term, >10 yrs)	
7.2	Dams & water management/use	Not calculated (outside assessment timeframe)	Restricted – Small (1-30%)	Extreme (71-100%)	Low (possibly in the long-term, >10 yrs)	Hydroelectric dams
8	Invasive & other problematic species & genes	Medium – Low	Restricted (11-30%)	Serious – Moderate (11-70%)	High (Continuing)	
8.1	Invasive non-native/alien species	Medium – Low	Restricted (11-30%)	Serious – Moderate (11-70%)	High (Continuing)	White-tailed Deer and invasive, exotic plants (Reed Canary Grass)
8.2	Problematic native species	Negligible	Negligible (<1%)	Negligible (<1%)	High (Continuing)	Hybridization with co-occurring asters
11	Climate change & severe weather	Unknown	Small (1-10%)	Unknown	High - Moderate	
11.4	Storms & flooding	Unknown	Small (1-10%)	Unknown	High - Moderate	More frequent and severe flooding events

^a **Impact** – The degree to which a species is observed, inferred, or suspected to be directly or indirectly threatened in the area of interest. The impact of each threat is based on Severity and Scope rating and considers only present and future threats. Threat impact reflects a reduction of a species population or decline/degradation of the area of an ecosystem. The median rate of population reduction or area decline for each combination of scope and severity corresponds to the following classes of threat impact: Very High (75% declines), High (40%), Medium (15%), and Low (3%). Unknown: used when impact cannot be determined (e.g., if values for either scope or severity are unknown); Not Calculated: impact not calculated as threat is outside the assessment timeframe (e.g., timing is insignificant/negligible or low as threat is only considered to be in the past); Negligible: when scope or severity is negligible; Not a Threat: when severity is scored as neutral or potential benefit.

^b **Scope** – Proportion of the species that can reasonably be expected to be affected by the threat within 10 years. Usually measured as a proportion of the species' population in the area of interest. (Pervasive = 71–100%; Large = 31–70%; Restricted = 11–30%; Small = 1–10%; Negligible < 1%).

^c **Severity** – Within the scope, the level of damage to the species that can reasonably be expected to be affected by the threat within a 10-year or three-generation timeframe. Usually measured as the degree of reduction of the species' population. (Extreme = 71–100%; Serious = 31–70%; Moderate = 11–30%; Slight = 1–10%; Negligible < 1%; Neutral or Potential Benefit ≥ 0%).

^d **Timing** – High = continuing; Moderate = only in the future (could happen in the short term [< 10 years or 3 generations]) or now suspended (could come back in the short term); Low = only in the future (could happen in the long term [> 10 years or 3 generations]) or now suspended (could come back in the long term); Insignificant/Negligible = only in the past and unlikely to return, or no direct effect but limiting.

4.2. Description of Threats

The primary threats to Anticosti Aster are invasive plant species and recreational activities (Table 2). All other threats identified are assessed as negligible or unknown. Threats with unknown impacts on the population could be important drivers of decline. For the Anticosti Aster, the threat of increased storms and flooding associated with climate change is an unknown threat. Threats are discussed below in order of Level 1 threat category; the information is taken directly from the most recent COSEWIC status report (COSEWIC 2017). A narrative for the Level 1 threat of residential and commercial development has been added as it is missing from the COSEWIC status report.

IUCN Threat 1. Residential & commercial development

1.3 Tourism & recreation areas (Negligible impact)

The threat of tourism and recreational areas is understood as the physical footprint of such development (e.g., docks, boat launches or trails). It is distinguished from the related threat of recreational activities that are activities that cause disturbance to the species or its habitat (e.g., boating, ATV use or hiking), generally related to the presence of the infrastructure.

In the Gaspé Peninsula, recreation-related development is considered a threat on the Bonaventure River, where cottage and boat ramp construction have caused habitat degradation and loss of plants near the site where the road to Saint-Elzéar crosses the river (Labrecque and Brouillet 1999). Serious site degradation had occurred there between surveys in 1985 and 1988 and some plants had been destroyed (Labrecque and Brouillet 1988). Overall, recent impacts on Anticosti Aster at the Bonaventure River and elsewhere in the Gaspé Peninsula appear rather local, limited to small sections of shoreline.

Dock infrastructure along the waterfront on Lac Saint-Jean could affect the plants that are present at this subpopulation. Overall, the threat of recreational development is considered negligible across subpopulations. Most Anticosti Aster habitat is frequently flooded and is thus less susceptible to conversion for human infrastructure development than adjacent areas above the zone of frequent flooding (COSEWIC 2017).

IUCN Threat 4. Transportation & service corridors

4.1 Roads & railroads (Negligible impact)

The construction and maintenance of roads, railroads and bridges can cause localized degradation of Anticosti Aster habitat, typically only affecting small portions of shorelines where embankments are built or strengthened following erosion.

The construction of a new bridge has destroyed an approximately 50-m-long section of habitat at the Petit Pabos River in the Gaspé Peninsula (Labrecque pers. obs.).

1987-2010 in COSEWIC 2017). Likewise, small portions of habitat have been affected along the Brick, Galiote, and Chicotte rivers on Anticosti Island.

On the lower Restigouche River, small portions of habitat have been lost following the construction and strengthening of road and bridge embankments in the vicinity of Runnymede and Matapédia. No direct impacts to Anticosti Aster were observed and affected areas represent an insignificant portion of habitat on the river.

IUCN Threat 6. Human intrusions and disturbance

6.1 Recreational activities (Low impact)

Most Anticosti Aster habitat is frequently flooded and is thus less susceptible to conversion for human infrastructure development than adjacent areas above the zone of frequent flooding. Impacts from development are thus primarily secondary and fall under the category of recreational activities as they relate to increases in foot traffic and off-road vehicle traffic. These have caused very localized declines in Anticosti Aster subpopulations and habitat at a few sites.

On the Restigouche River, development is mainly concentrated on the lower 25 km section, from the confluence with the Upsalquitch River to Tidehead. Along the remaining 55 km of the range of occurrence on the river, development is limited to a few fishing camps and cabins. At salmon fishing camps and some other access points, large numbers of canoes are often stored on Anticosti Aster habitat, vehicles frequently access the shore for boat delivery and vegetation is sometimes managed using gas-powered string trimmers over distances up to about 100 m (Blaney and Mazerolle pers. obs. 2007-2015 in COSEWIC 2017). The impact is, however, probably small for the very large Restigouche River subpopulation as a whole. Similar disturbances may be more important for very localized occurrences, most significantly at Mashteuiatsh, site of the only known occurrence in the Lac Saint-Jean region. Since the status of Anticosti Aster was last assessed in 2000, nearly all of the available waterfront land adjacent to the species' habitat has been developed at this site. Although minor shoreline disturbances have certainly increased at Mashteuiatsh, there is no clear evidence of subpopulation decline.

Subpopulations on the Saint John River in western New Brunswick are within an area having significant residential and agricultural development, with frequent shoreline use by fishers, walkers and all-terrain vehicles (Blaney and Mazerolle pers. obs. 2007-2015 in COSEWIC 2017). There have, however, been no observed direct impacts to colonies (Labrecque pers. obs. 1987-2010 and Blaney and Mazerolle pers. obs. 2007-2015 in COSEWIC 2017).

The wide, sparsely vegetated low-gradient beaches and strands typically favoured by Anticosti Aster are attractive to some recreational all-terrain vehicle (ATV) users. Crushing of plants and compaction of soils caused by ATV traffic is known at several sites, most notably on Anticosti Island and along the Gaspé Peninsula's Bonaventure

River, and Grande Rivière. In New Brunswick, off-road vehicle use has been observed in the vicinity of occurrences on the Saint John River and at a few sites on the lower Restigouche River, but is only causing minor and localized habitat degradation. ATV damage is not known to affect a meaningful portion of any subpopulation and does not presently appear to be a significant threat.

IUCN Threat 7. Natural system modifications

7.2 Dams and water management / use (Not calculated – outside assessment timeframe)

Water-level fluctuations play an essential role in maintaining species richness and habitat zonation patterns on shorelines (Dynesius and Nilsson 1994) and four New Brunswick dams regulate flow within Anticosti Aster range. The Grand Falls, Beechwood and Mactaquac dams, built in 1920, 1955 and 1967 respectively, impact water levels over more than 200 km and alter water level fluctuations over a much larger distance of the river's lower basin. Confirmed Anticosti Aster occurrences on the river are restricted to areas above and below the large headponds of the Mactaquac and Beechwood dams, strongly suggesting that flooding eliminated undocumented subpopulations. Additionally, the Tinker Dam on the Aroostook River in New Brunswick, constructed in 1923, flooded an Anticosti Aster occurrence at Fort Fairfield, Maine, a few kilometres upstream, and may have affected undocumented occurrences on the Canadian portion of the river.

Water-level fluctuations constitute a key factor in the success of Anticosti Aster occurrences. Disruption or loss of these natural disturbances on river shores can lead to encroachment by riparian and forest edge species that crowd out pioneer species specializing in more dynamic shoreline habitats (Nilsson and Jansson 1995, Hill et al. 1998, Nilsson and Berggren 2000). Encroachment by weedy and more competitive plants has been observed at two confirmed Anticosti Aster subpopulations (Bristol and Bath) and several sites between the Beechwood Dam and Woodstock, where river shores are much more densely vegetated than is typical at sites with unaltered water flow (Labrecque and Brouillet 1990a, b, Blaney and Mazerolle pers. obs. 2007-2015 in COSEWIC 2017). The encroachment of shrubs and other woody and herbaceous vegetation has also been observed at the Mashteuiatsh lakeside population on Lac Saint-Jean (Pekuakamiulnuatsh Takuhikan (Mashteuiatsh), pers. comm.). The extent to which this is a consequence of water level management or other human influences in this comparatively heavily settled region is unclear. Severe flood events have been more frequent in all New Brunswick portions of the Saint John River since the 1967 construction of the Mactaquac Dam (Cunjak et al. 2011), suggesting increased flood frequency is unrelated to the dam. The Beechwood Dam, immediately upstream of the region of densest occurrence on the Saint John River (from Bath to Wakefield) has, however, reduced the frequency of extreme low flow events (Cunjak et al. 2011). Both Mactaquac and Beechwood dams cause significant unnatural daily fluctuations. Culp et al. (2007, in Cunjak et al. 2011) state that water level "...was found to fluctuate

by ~1.5m daily and large portions (sometimes greater than 50%) of the river bottom and the benthic community was exposed daily.”

The construction of the Grande Décharge Dam at the Lac Saint-Jean outflow in the late 1920s, flooded a significant portion of the limestone outcrop shoreline on the lake and is believed to have had a negative impact on the Lac Saint-Jean subpopulation (COSEWIC 2000). Currently, the water levels on the lake are maintained between 14 and 16 feet during the growing season, which is believed to at least partly explain the shrub and tree encroachment (Pekuakamiulnuatsh Takuhikan (Mashteuiatsh), pers. comm.).

Long-term artificial water-level regulation has not affected other rivers known to support Anticosti Aster. No new hydroelectric projects are known to be contemplated on rivers where Anticosti Aster occurs, although some rivers may have hydroelectric development potential.

IUCN Threat 8. Invasive & other problematic species & genes

8.1. Invasive non-native/alien species (Medium-Low impact)

Although many non-native species co-occur with Anticosti Aster throughout its range on the Saint John River and collectively may be having modest impacts on its abundance, Reed Canary Grass (*Phalaris arundinacea*) is the only one for which there is strong evidence of local impacts. This tall, rhizomatous grass is a well-documented invasive species of wetlands and shorelines (Lavergne and Molovsky 2004, IPANE 2011) and is common throughout the Saint John River range of Anticosti Aster. This threat is most significant on the Saint John River, where extensive human alteration of the landscape has promoted non-native species occurrence and nutrient-rich farmland runoff may be further facilitating the encroachment of exotic invasives along shorelines. Anticosti Aster appears somewhat protected from Reed Canary Grass in severely flood and ice-scoured sites and rock outcrop sites with limited soil, but Reed Canary Grass abundance has visibly increased within some known Anticosti Aster sites since 1988 and appears associated with reduced subpopulation size (Labrecque pers. obs. 1987-2010 in COSEWIC 2017). Other recently discovered occurrences in broad cobble shorelines involve very sparse, apparently suppressed Anticosti Aster within dense, overtopping stands of Reed Canary Grass (Blaney and Mazerolle pers. obs. 2007-2015 in COSEWIC 2017).

Introduced ruderal (growing on waste ground) species are fairly common to abundant throughout Anticosti Aster's range on the Restigouche River, especially along the lowermost 25 km of river length (Blaney and Mazerolle pers. obs. 2007-2015 in COSEWIC 2017) where permanent human settlement and Reed Canary Grass are locally present. Invasive species are considered a future threat at this and possibly other Gaspé Peninsula occurrences but are not believed to be having major effects at present (Labrecque pers. obs. 1987-2010; Blaney and Mazerolle pers. obs. 2007-2015 in COSEWIC 2017).

Browsing on Anticosti Aster by White-tailed Deer (*Odocoileus virginianus*) is included under threats from non-native species because it is only considered a meaningful threat on Anticosti Island, where deer are an introduced species. Deer affect a high proportion of plants at all Anticosti Island subpopulations (Labrecque and Brouillet 1988, 1999, Labrecque 2009) and may be responsible for small subpopulation sizes observed on the island, although aster numbers appear to have been stable over the last 20 years. Since their introduction to the island in 1896, White-tailed Deer have proliferated in the absence of natural predators to an average density of approximately 20 deer / km² (Potvin et al. 2003, Potvin and Breton 2005), with local densities in the Jupiter region (a key area for Anticosti Aster) reaching 56 deer / km² in the summer and up to 80 deer / km² in the winter (Tremblay et al. 2006). The carrying capacity of the island is estimated at less than 7.5 deer / km² (Tremblay et al. 2006). Deer use open wetland habitats such as river and lakeshores on Anticosti Island to an especially large extent because these areas have higher quality forage, and in the absence of predators, there is no additional exposure to predation in open habitats (Massé and Côté 2009). Over-browsing by the deer population now represents a significant challenge for forest resource and biodiversity managers on the island (Potvin et al. 2003, Tremblay et al. 2006). Apparent repeated browsing of Anticosti Aster is evident on river shores, where most Anticosti Aster plants are grazed to a height of a few centimeters (Labrecque and Brouillet 1999) except for occasional individuals protected from deer by fallen logs or occurrence between boulders (Labrecque pers. obs. 1987-2010 in COSEWIC 2017).

Browsing by White-tailed Deer is unlikely to be a threat for other Anticosti Aster subpopulations, as deer density is significantly lower on the mainland, particularly in the Gaspé Peninsula where densities were estimated at much less than one per square kilometer (Potvin et al. 2004).

8.2. Problematic native species (Negligible impact)

Hybridization with New York Aster has been documented on the Bonaventure, Grande, Restigouche and Saint John Rivers (COSEWIC 2000, Bouillé 2011, Labrecque pers. obs. 1987-2010 and Whitton pers. comm., 2013 in COSEWIC 2017). This hybridization of two native species is considered a potential threat rather than a limiting factor because Labrecque and Brouillet (1988) suggest that human disturbance had allowed New York Aster (a species widely associated with roadside disturbances) to establish, spread and subsequently hybridize with Anticosti Aster at the Bonaventure and Jupiter rivers, resulting in a higher frequency of putative hybrids (Labrecque pers. obs. 1987-2010 in COSEWIC 2017). However, along the shores of the Saint John and Restigouche rivers in New Brunswick, river-associated forms of New York Aster are naturally common and there is no evidence that their abundance is influenced by anthropogenic disturbance (New Brunswick Department of Natural Resources and Energy Development 2022).

The extent of hybridization is difficult to assess in the field because of identification difficulties. Introgressive hybridization, however, probably does not represent a major

threat because backcrossing is typically limited between first generation hybrids and their parent species when their chromosome numbers differ.

IUCN Threat 11. Climate change & severe weather

11.4 Storms & flooding (Unknown impact)

Flooding from exceptionally large precipitation events can remove plants and might thus represent a threat to very small and localized Anticosti Aster subpopulations, though this type of disturbance is crucial to the natural persistence of the species in general. The probability of occurrence of these stochastic events may become greater with ongoing climate change and projected increases in storm frequency and severity (Houghton et al. 1996, Shaw and the CCAF project team 2001, Environment Canada 2006).

5. Management Objective

The management objective for the Anticosti Aster in Canada is to maintain the three distinct regions of occurrence (Figure 1) by maintaining a stable population⁷ within the occupied habitat on the rivers and lakeshores that currently support the 22 subpopulations of the species (Appendix A).

The Anticosti Aster was originally assessed by COSEWIC as Threatened in 1990 (confirmed in 2000) and added to Schedule 1 of SARA with the same status in 2003. It was re-assessed as Special Concern in 2017 and subsequently downlisted under SARA in 2021. The downlisting of the status from Threatened to Special Concern was due to extensive searching resulting in the documentation of several new subpopulations; the subpopulations appear to be stable (COSEWIC 2017). Maintaining the conditions currently supporting the population through outreach, better practices and monitoring should allow the subpopulations to remain stable.

6. Broad Strategies and Conservation Measures

6.1. Actions Already Completed or Currently Underway

- 1997: Regional County Municipality of Rocher-Percé, on the Gaspé Peninsula, adopted the Anticosti Aster as its floral emblem, increasing the profile of the species in the region.
- 2001–2002: Nature Trust of New Brunswick and Atlantic Canada Conservation Data Centre surveyed the upper Saint John River for Anticosti Aster and other rare plants.

⁷ A stable population in this case is one that is neither increasing nor decreasing (within the bounds of estimate uncertainty), i.e., a zero growth rate with fertility and mortality rates that offset each other over time. It is also known as a stationary population.

- 2002: New Brunswick Department of Natural Resources and Energy Development (NB DNRED) organized surveys to search for new occurrences of Anticosti Aster in New Brunswick, as well as revisiting known sites. This work was funded by Environment and Climate Change Canada's (ECCC) Habitat Stewardship Program.
- 2006: Ecological Heritage and Parks Branch of the Québec Department of Sustainable Development, Environment and Parks developed a conservation plan for the Anticosti Aster in Québec (Jolicoeur and Couillard 2007).
- 2006 – 2007: Projects to conduct site surveys, develop recommendations for habitat protection and promote efforts to increase awareness of property owners, vacationers, and the community of Mashteuiatsh were completed through support from ECCC's Aboriginal Fund for Species at Risk.
- 2007 – 2022: Atlantic Canada Conservation Data Centre completed extensive rare plant surveys, many with particular emphasis on Anticosti Aster, along the Restigouche and Saint John rivers and other rivers throughout New Brunswick (Blaney et al. 2007, Blaney and Mazerolle 2009). This identified Anticosti Aster populations from previously unknown locations and found that all Anticosti-like asters from outside the known New Brunswick range on the Restigouche and Saint John rivers were New York Aster.
- 2008: A rare plant survey on 11 rivers and four lakes on Anticosti Island in 2008 found relatively small, new occurrences on three rivers (Martin Brook, Aux Plats River and Aux Rats River). New occurrences on three lakes (Lac Creux, Lac Smith and Lac du Rat Musqué) were also documented but are questionable due to atypical morphology.
- 2008: Research on the genetic origin of Anticosti Aster was completed (Vaezi 2008, Vaezi and Brouillet 2022). This work provides evidence that it is a hybrid derivative of New York Aster and Boreal Aster and that distinct population segments exist at: 1) Lac Saint-Jean; 2) Gaspé Peninsula, New Brunswick and Maine; and 3) Anticosti Island.
- 2008-2010: Funding was provided to the community of Mashteuiatsh by ECCC to develop a monitoring protocol and management plan for the Lac Saint-Jean subpopulation, and conduct searches for new subpopulations in the area.
- 2009: The Gespeg First Nation in Québec completed surveys of the Dartmouth, Douglastown and Saint-Jean rivers, the latter of which had a new subpopulation. This work was supported by Environment and Climate Change Canada's Aboriginal Fund for Species at Risk.
- 2009: Québec's Ministère du Développement durable, de l'Environnement et des Parcs documented numbers at several sites in the Gaspé region that were higher than was previously known; records were submitted to the Centre de données sur le patrimoine naturel du Québec (P. Désilets, pers. comm.).
- 2020-21: Three additional subpopulations were discovered on Anticosti Island (unnamed tributary of the Dauphine River, Dauphine River and Box Creek) and one in the Gaspé region (Goose River).

6.2. Broad Strategies

To achieve the management objective, the following broad strategies are recommended and are intended to serve as guidance to the jurisdictions and authorities responsible for the management of the Anticosti Aster. Conservation measures are organized under five broad strategies⁸:

1. Awareness Raising
2. Livelihood, Economic & Moral Incentives
3. Research & Monitoring
4. Species Management
5. Land / Water Management

6.3. Conservation Measures

The following table outlines conservation measures and an implementation schedule that, if undertaken, would support achieving the overall management objective.

Table 3. Conservation Measures and Implementation Schedule

Conservation Measure	Priority ^c	Threats or Concerns Addressed	Timeline
Broad Strategy: Awareness Raising			
<i>Outreach & Communications:</i> Conduct outreach with landowners with residential or cottage properties having Anticosti Aster, particularly at Mashteuiatsh and along the Saint John River, to promote awareness and encourage stewardship.	High	1.3 Tourism & recreation areas 6.1 Recreational activities	By 2027
Broad Strategy: Livelihood, Economic & Moral Incentives			
<i>Better Products & Management Practices:</i> Share locations of Anticosti Aster with relevant municipal planning agencies and managers of road and rail crossings, and provide advice for best management practices.	High	1.3 Tourism & recreation areas 4.1 Roads & railroads 6.1 Recreational activities	By 2027
Broad Strategy: Research & Monitoring			
<i>Basic Research & Status Monitoring:</i> Design and implement a systematic monitoring strategy to understand population changes across Anticosti Aster range, including any changes in threats (e.g., hybridization and dam/water level management).	High	All threats	By 2027

⁸ The broad strategy categories follow the International Union for Conservation of Nature – Conservation Measures Partnership (IUCN-CMP) [Conservation Actions Classification v 2.0](#).

<i>Basic Research & Status Monitoring:</i> Survey for additional areas of occurrence with further flow cytometry to confirm identity of Saint John River subpopulations.	Low	All threats	By 2030
Broad Strategy: Species Management			
<i>Ex-Situ Conservation:</i> Collect seeds from all regions of occurrence, with a focus on those regions away from the Restigouche River, especially on Lac Saint-Jean and Anticosti Island where subpopulations are smaller, more isolated and threatened. Preserve of seeds in long-term <i>ex situ</i> seed bank facility.	Medium	All threats	By 2030
Broad Strategy: Land / Water Management			
<i>Site/Area Stewardship:</i> Pilot a research project controlling Reed Canary Grass and potentially other invasive species at select Saint John River subpopulation(s).	Low	8.1 Invasive non-native alien species	By 2030
<i>Site/Area Stewardship:</i> If necessary to attain the management objective, conduct a pilot research project aimed at lowering the impact of the White-tailed Deer at selected Anticosti Island subpopulation(s).	Low	8.1 Invasive non-native alien species	By 2030

^e “Priority” reflects the degree to which the measure contributes directly to the conservation of the species or is an essential precursor to a measure that contributes to the conservation of the species. High priority measures are considered those most likely to have an immediate and/or direct influence on attaining the management objective for the species. Medium priority measures may have a less immediate or less direct influence on reaching the management objective, but are still important for the management of the population. Low priority conservation measures will likely have an indirect or gradual influence on reaching the management objective, but are considered important contributions to the knowledge base and/or public involvement and acceptance of the species.

6.4. Narrative to Support Conservation Measures and Implementation Schedule

Outreach & Communications (High Priority)

Restart or continue outreach to landowners with residential or cottage properties having Anticosti Aster, informing them of the species’ significance and beneficial management practices to promote awareness and encourage stewardship. This action will address impacts from recreational activities and potential impacts associated with adjacent residential development (e.g., trampling and ATVs). The action is a high priority to undertake because the subpopulation at Mashteuiatsh is small and comparatively threatened, and it has been shown to be genetically distinct from other subpopulations of the species. Additional general outreach with hunters, guides and tourists could be pursued alongside outreach for other species at risk.

Better Products & Management Practices (High Priority)

A targeted sharing of the locations of Anticosti Aster and provision of information on the species' ecology and significance, best management practices and relevant contact information could improve decision making regarding infrastructure work and development that impacts Anticosti Aster. Target audiences would be relevant municipal planning agencies and managers of road and rail crossings. This action would address threats from roads and railroads and from recreation activities, via improvements to cottage or home construction and maintenance activities.

Basic Research & Status Monitoring (High and Low Priority)

Population monitoring is fundamental to understanding what management actions are needed and to assessing the success of any actions undertaken. Monitoring threats and changes in habitat is integral to identifying drivers of population trends. A systematic monitoring strategy to understand population changes across Anticosti Aster's Canadian range should be designed and implemented. Only small portions of the extensive occurrences along the Restigouche and Saint John rivers will be feasible to sample, so careful consideration of sampling design will be especially important in those areas. It will be feasible to sample larger portions of the smaller subpopulations elsewhere. This action helps address all identified threats and is foundational to other conservation actions.

Additionally, field surveys to further understand Anticosti Aster distribution are needed. Anticosti Aster distribution on the Saint John River is incompletely understood because of identification difficulties. Further effort to refine the known extent of occurrence on the Saint John River system, including the Tobique River where a single potential occurrence is known, should be undertaken; the effort should include flow cytometry to confirm identifications. Assessment of the locations of previous field surveys relative to available potential habitat should be undertaken in Québec to determine if there are any priority areas for new surveys; this would include rivers with known populations and previously not surveyed or under-surveyed sites. This action helps address all identified threats but it is not expected that the overall population estimates will be substantially changed by new occurrences.

Ex-situ Conservation (Medium Priority)

Collection and secure long-term storage of seeds from all regions of occurrence will protect a representative sample of the species' total genetic diversity and provide insurance against unexpected loss of local subpopulations. The action therefore helps address all identified threats. The three genetically distinct regions of occurrence (Lac Saint-Jean, Anticosti Island, Gaspé Peninsula – New Brunswick) should each be represented, and representation of the Gaspé Peninsula – New Brunswick region of occurrence should include sites from Gaspé Peninsula, Restigouche River and Saint John River. Appropriate institutions with expertise in protocols for seed collection and

seed storage facilities include: Canadian Forest Service at Fredericton, New Brunswick, Acadia University at Wolfville, Nova Scotia, and Agriculture Canada at Saskatoon, Saskatchewan.

Site/Area Stewardship (Low Priority)

Controlling Reed Canary Grass is difficult and labour-intensive and it is unclear if it would be feasible at a meaningful scale on the Saint John River where Reed Canary Grass is impacting Anticosti Aster. Before any major efforts toward controlling Reed Canary Grass and other invasive introduced plants are undertaken, a local pilot research project at one or a few carefully selected sites on the Saint John River should be undertaken to assess the feasibility of further efforts. This effort addresses the threat of invasive non-native species. Although invasive species are the most significant threat to Anticosti Aster, this action is not given a high priority because Anticosti Aster is unlikely to be completely eliminated on the Saint John River by invasive species, there are extensive healthy populations on the Restigouche River, and chances of successful broad-scale management of invasive species on the Saint John River are low.

The same logic applies for the White-tailed Deer on Anticosti Island: although it constitutes the major threat for that subpopulation, no easy and/or apparent solution seems to exist. Because the management objective is to maintain the three regions of occurrence, a pilot project to determine the potential actions to minimize this threat should be undertaken if the Anticosti Aster becomes at risk of disappearing from Anticosti Island because of the White-tailed Deer, a situation that would be put to light by the third conservation measure (i.e., research and monitoring) listed above. Lethal control of White-tailed Deer is unlikely to be effective alone; approaches like enclosures could be evaluated.

7. Measuring Progress

The performance indicators presented below provide a way to measure progress towards achieving the management objectives and monitoring the implementation of the management plan.

- The three regions of occurrence are maintained,
- The occupied habitat that currently supports the 22 subpopulations is maintained (i.e., the area of occupancy⁹ is at least 504 km²), and
- A stable population, at a minimum, is maintained within the area of occupancy.

The current size of the population is estimated at 410,000 to 1,063,000 stems. Given the large range in the estimate, and that some sites currently do not have a reliable stem count, an appropriate index of abundance in occupied habitat (e.g., density estimates in 1 km river/lakeshore segments) will be used to estimate population size

⁹ The area within 'extent of occurrence' that is occupied by a taxon, excluding cases of vagrancy. The measure reflects the fact that the extent of occurrence may contain unsuitable or unoccupied habitats.

and trend. The appropriate index and monitoring interval will be determined through the completion of the research and monitoring conservation measure related to designing a monitoring strategy. One option to consider for measuring progress could be element occurrence ranks¹⁰, which provide a composite index of several variables that would be important to include in the monitoring plan, such as population trend, changes in habitat and occupied habitat, and presence of threats.

¹⁰ These ranks provide an estimation of the likelihood that, if current conditions prevail, a species occurrence will persist for a period of time; the ranks consider factors such as size (including population size and/or occupied area), abiotic and biotic conditions, and landscape context (Hammerson et al. 2020).

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Appendix A: Anticosti Aster Subpopulations in Canada

No.	Subpopulation Name (year last observed)	Region of Occurrence	Stem Count
1	Mashteuiatsh (2014)	Lac Saint-Jean	~2,000 to 14,826
2	Jupiter River (2008)	Anticosti Island	30
3	Brick River (2008)	Anticosti Island	~700
4	Galiote River (2008)	Anticosti Island	>2,000
5	Aux Rats River (2008)	Anticosti Island	6
6	Chicotte River (2008)	Anticosti Island	~300
7	Aux Plats River (2008)	Anticosti Island	>1,100
8	Martin Brook (2008)	Anticosti Island	>500
9	Box Creek (2021)	Anticosti Island	No reliable count available
10	Dauphine River (2021)	Anticosti Island	No reliable count available
11	Unnamed tributary of the Dauphine River (2021)	Anticosti Island	No reliable count available
12	Grand Rivière (2010)	Gaspé Peninsula / NB	>68,000
13	Goose River (2020)	Gaspé Peninsula / NB	No reliable count available
14	Petit Pabos River (2009)	Gaspé Peninsula / NB	>5,000
15	Bonaventure River (2010)	Gaspé Peninsula / NB	>20,000
16	Saint-Jean River (2009)	Gaspé Peninsula / NB	~200
17	Restigouche River (2015)	Gaspé Peninsula / NB	310,000 to 950,000
18	Aroostook, Saint John River (2010)	Gaspé Peninsula / NB	No reliable count available
19	Bristol and Bath, Saint John River (2010)	Gaspé Peninsula / NB	No reliable count available
20	Stickney, Saint John River (2010)	Gaspé Peninsula / NB	No reliable count available
21	Wakefield, Saint John River (2010)	Gaspé Peninsula / NB	No reliable count available
22	McKeens Corner, Saint John River (2015)	Gaspé Peninsula / NB	No reliable count available