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Management Plan Series

Management Plan for the Swamp Rose-mallow (*Hibiscus moscheutos*) in Canada

Swamp Rose-mallow

2013

Canada

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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 and the Minister responsible for the Parks Canada Agency is the competent minister for the management of the Swamp Rose-mallow and has prepared this plan, as per section 65 of SARA. It has been prepared in cooperation with the Government of Ontario.

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, the Parks Canada Agency, or any other jurisdiction alone. All Canadians are invited to join in supporting and implementing this plan for the benefit of the Swamp Rose-mallow 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.

ACKNOWLEDGMENTS

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EXECUTIVE SUMMARY

Swamp Rose-mallow (*Hibiscus moscheutos*) is a robust perennial of shoreline marshes that grows up to two metres in height. It occurs in clumps of flowering stems, with each clump sharing a common root system. The leaves are large (8 to 22 cm long and 8 to 15 cm wide), toothed, and egg-shaped or three-lobed; the upper surface is greyish-green and the underside is hairy-white. Flowering occurs between the end of July and the middle of September. The flowers consist of five pink or occasionally white petals and usually have a deep red or burgundy centre. In Canada, Swamp Rose-mallow is listed as a species of Special Concern under Schedule 1 of the *Species at Risk Act*.

Swamp Rose-mallow occurs in most of the eastern United States north of Florida and east of the Mississippi River with disjunct populations in southern Ontario, northern New York, Michigan, Wisconsin, Ohio, and Illinois. It is the only extant native member of the genus *Hibiscus* to occur in Canada. It is endemic only in southern Ontario, where it tends to be restricted to the coastal marshes and remnant wetlands of Lakes Erie, Ontario, and St. Clair and some of the connecting waterways. The northern limit of the distribution of Swamp Rose-mallow includes two populations on the north edge of Lake Ontario in Prince Edward County and Frontenac County.

In Ontario, Swamp Rose-mallow is most commonly found in two types of wetlands: deep-water *Typha* marsh, where it occurs along the open water – cattail mat interface; and meadow marsh. The species requires early successional habitat.

Threats to Swamp Rose-mallow include alteration or suppression of the natural disturbance regime, drainage and development of coastal wetlands and shorelines, and alteration of local hydrological processes, all of which reduce or remove habitat or habitat suitability. Other threats include invasive species, especially European Common Reed (*Phragmites australis* ssp. *australis*) and Hybrid Cattail (*Typha* X *glauca*), which can out-compete Swamp Rose-mallow where they occur together and parasitism and herbivory by insects.

The objective of this management plan is to maintain the current distribution and area of occupancy of extant Swamp Rose-mallow populations in Canada. Broad strategies and conservation measures to meet the management objective have been identified. Broad strategies include direct management and stewardship efforts, assessment and monitoring of populations and habitats, and outreach and communication activities.

A number of conservation measures to achieve the management objectives are proposed in this management plan. There are no expected significant negative effects on other species, and maintenance of the species' habitat is likely to benefit a number of other species at risk found in these locations, including Eastern Prairie Fringed-orchid (*Platanthera leucophaea*), King Rail (*Rallus elegans*), Least Bittern (*Ixobrychus exilis*), Blanding's Turtle (*Emydoidea blandingii*), Eastern Foxsnake (*Elaphe gloydi*), Spotted Turtle (*Clemmys guttata*), Eastern Musk Turtle (*Sternotherus odoratus*), Climbing Prairie Rose (*Rosa setigera*), Common Snapping Turtle (*Chelydra serpentina*), and Northern Map Turtle (*Graptemys geographica*).

TABLE OF CONTENTS

PREFACE I
ACKNOWLEDGMENTS II
EXECUTIVE SUMMARY III
1. COSEWIC SPECIES ASSESSMENT INFORMATION 1
2. SPECIES STATUS INFORMATION 1
3. SPECIES INFORMATION 2
3.1. Description of the Species 2
3.2. Populations and Distribution 2
3.3. Needs of the Swamp Rose-mallow 5
3.3.1. Habitat and biological needs 5
3.3.2. Limiting factors 6
4. THREATS 7
4.1 Threat Assessment 7
4.2 Description of threats 8
5. MANAGEMENT OBJECTIVES 10
6. BROAD STRATEGIES AND CONSERVATION MEASURES 10
6.1. Broad Strategies 10
6.2. Conservation Measures 11
6.3. Actions Already Completed or Underway 12
7. MEASURING PROGRESS 13
8. REFERENCES 14
APPENDIX A: SUBNATIONAL CONSERVATION RANKS OF SWAMP ROSE-MALLOW 17
APPENDIX B: EFFECTS ON THE ENVIRONMENT AND OTHER SPECIES 18

1. COSEWIC* SPECIES ASSESSMENT INFORMATION

Date of Assessment: November 2004

Common Name (population): Swamp Rose-mallow

Scientific Name: *Hibiscus moscheutos*

COSEWIC Status: Special Concern

Reason for Designation: A robust, perennial herb of shoreline marshes of the Great Lakes present in Ontario at many localities, in very small areas, and generally in low numbers. The total Canadian population is estimated to consist of fewer than 10,000 plants with some, including two of the largest populations, in protected sites. The species has been subjected historically to habitat loss and several populations have been lost recently. Populations are also at risk from habitat degradation and impact due especially to invasive exotic plants. Evidence of the spread of plants through rafting of floating clumps indicates that recolonization of extirpated sites may be possible.

Canadian Occurrence: Ontario

COSEWIC Status History: Designated Special Concern in April 1987. Status re-examined and confirmed in November 2004.

*Committee on the Status of Endangered Wildlife in Canada

2. SPECIES STATUS INFORMATION

Swamp Rose-mallow (*Hibiscus moscheutos*) is ranked Secure[1] both globally (G5) and nationally in the United States (N5). It is considered Critically Imperilled[2] (S1) in New Hampshire and Vulnerable[3] to Apparently Secure[4] (S3S4) in Michigan, but is ranked Secure (S5) in four states and has not been ranked (SNR) in the remaining 28 states in which it occurs[5] (Appendix A; NatureServe 2010). In Canada, Swamp Rose-mallow is found only in the province of Ontario; the national conservation rank is Vulnerable (N3) and the subnational conservation rank for Ontario is Vulnerable (S3) (NatureServe 2010).

[1] Common; widespread and abundant
[2] Critically imperiled in the jurisdiction because of extreme rarity or because of some factor(s) such as very steep declines making it especially vulnerable to extirpation from the jurisdiction
[3] Vulnerable in the jurisdiction due to a restricted range, relatively few populations, recent and widespread declines, or other factors making it vulnerable to extirpation
[4] Uncommon but not rare; some cause for long-term concern due to declines or other factors
[5] Note that Kartesz (2011) shows Swamp Rose-mallow occurring (as an adventive species) in Washington and North Dakota, while NatureServe does not report Swamp Rose-mallow to be occurring in these states. Kartesz (2011) also indicates that Swamp Rose-mallow is adventive in Utah and Wisconsin, while the NatureServe ranking is SNR in these states

Swamp Rose-mallow is listed as Special Concern[6] on Schedule 1 of the federal *Species at Risk Act* (SARA). In Ontario, Swamp Rose-mallow is listed as Special Concern under the provincial *Endangered Species Act, 2007* (ESA 2007). It is estimated that less than 1% of the species' range is within Canada.

3. SPECIES INFORMATION

3.1. Description of the Species

Swamp Rose-mallow is a robust perennial of shoreline marshes that grows up to two metres in height (COSEWIC 2004). It occurs in clumps of up to 70 flowering stems, with each clump sharing a common root system. The leaves are large (8 to 22 cm long and 8 to 15 cm wide), toothed, and egg-shaped or three-lobed; the upper surface is greyish-green and the underside is hairy-white. Flowering occurs between the end of July and the middle of September, with up to eight blooms being found in the axils of upper leaves. The hollyhock[7]-like flowers are large and consist of five pink or, occasionally, white petals; each petal is 6-10 cm long. Flowers typically have a deep red or burgundy centre, but may have a light pink or white centre. Swamp Rose-mallow seed pods are brown, 2 to 3.5 cm long, pointed, and sparsely hairy. The seeds are dark brown, oval, and slightly sticky. When not in flower, the combination of leaf texture and shape, seed pods, and tall stature make this plant distinctive year-round (COSEWIC 2004; Haggeman pers. comm. 2011).

There is some uncertainty surrounding the taxonomy of Swamp Rose-mallow, and populations in Ontario can be found with variable leaf colours and shapes; however, this management plan follows the COSEWIC (2004) report and treats them all as *H. moscheutos*.

3.2. Populations and Distribution

Swamp Rose-mallow occurs in most of the eastern United States north of Florida and east of the Mississippi River, with disjunct populations in southern Ontario, northern New York, Michigan, Wisconsin, Ohio, and Illinois (COSEWIC 2004; NatureServe 2010). Since 1987, this species has expanded its range westward as far as Utah and California (COSEWIC 2004; NatureServe 2010; see Figure 1). Swamp Rose-mallow is also present in parts of western Europe, including northern Portugal, southwestern France, and northern Italy, where its native range is uncertain (see Tutin et al. 1968; COSEWIC 2004; GRIN 2011) and has also been reported in Africa along the Algerian coast (COSEWIC 2004; African Plants Database 2009).

[6] A wildlife species that may become a threatened or an endangered species because of a combination of biological characteristics and identified threats

[7] Hollyhocks are vascular plants of the genus *Alcea*. Flowers tend to be large, often with a ruffled appearance, and arranged on tall stems.

Figure 1: North American Distribution of Swamp Rose-mallow. Adapted from COSEWIC (2004) with recent occurrence information from NatureServe (2011)[8].

Swamp Rose-mallow is the only extant native member of the genus *Hibiscus* to occur in Canada. It is endemic only in southern Ontario, where it tends to be restricted to the coastal marshes and remnant wetlands of Lakes Erie, Ontario, and St. Clair and some of the connecting waterways.

[8] Note that Kartesz (2011) also indicates Swamp Rose-mallow is present (as an adventive species) in Washington and North Dakota.

It is found mainly in cattail marshes and meadow marshes[9]. However, there are three populations reported at inland sites (in Kingsville, St. Thomas, and Welland, respectively; see Figure 2), all of which are believed to have been introduced in fill transported from coastal areas (COSEWIC 2004).

In 2004, there were a total of 73 known occurrences within Ontario, 51 of which were considered extant (Table 1). The species is most commonly found along the western end of Lake Erie, especially within Essex County (COSEWIC 2004; Figure 2). Information on land ownership and protection where Swamp Rose-mallow occurs is presented in COSEWIC (2004).

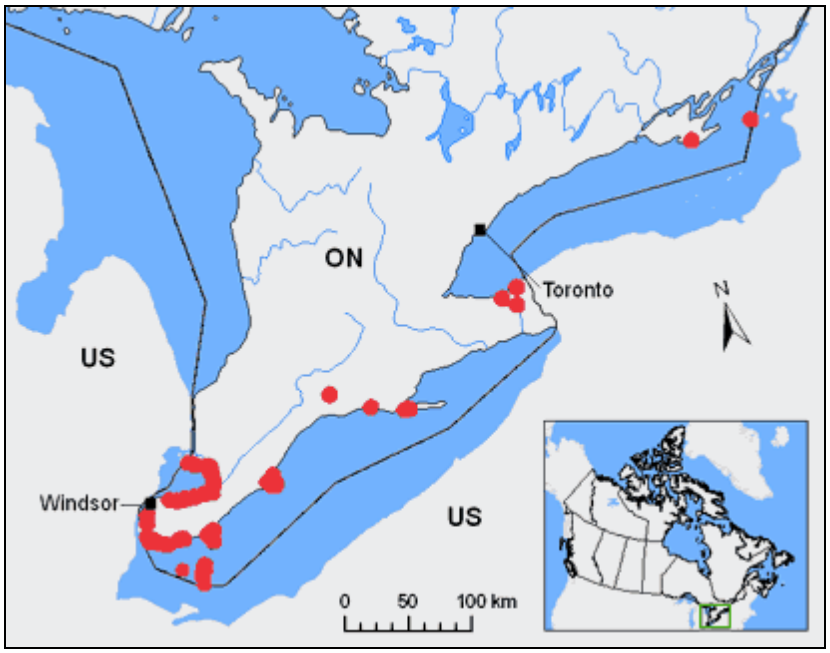

Figure 2: Canadian Distribution of the Swamp Rose-mallow (Canadian Wildlife Service 2004).

Table 1. Counties with occurrences of Swamp Rose-mallow (COSEWIC 2004).

County	Number of Populations*
Essex	30 extant/10 extirpated
Chatham-Kent	10 extant/2 extirpated/1 historical
Lambton	2 extant/2 extirpated
Elgin	2 extant
Norfolk	2 extant/2 extirpated/1 historical
Niagara	3 extant/4 extirpated
Prince Edward	2 extant

* Extant – population still known to be in existence; Extirpated – population considered eradicated or destroyed; Historical – there is a lack of recent field information verifying the continued existence of the population and as such it is unclear whether the population is extant or extirpated.

Swamp Rose-mallow appears to have expanded its range northeast within Ontario over the past 20-25 years. Prior to the 1980s, the Niagara Region represented the northern limit of Swamp Rose-mallow's range in Ontario. New populations have since been discovered in Prince Edward

[9] Meadow marshes are ecological communities found at the wetland-upland interface. Because these communities are often subject to seasonal flooding (i.e., soils flooded in the spring, but moist to dry by mid-summer), vegetation is dominated by grasses and other herbaceous species that are less tolerant of prolonged flooding.

County (Sandbanks Provincial Park and St. Lawrence Islands National Park) (Ontario Parks 2008). The extent of occurrence in Canada was estimated at 22,000 km^2 in 2004 (Bowles 2004; COSEWIC 2004; Ontario Parks 2008). Two other potentially new sites have been reported in Niagara along the Lake Erie and Niagara River shorelines in 2010 (Dodsworth pers. comm. 2011), and one other potentially new population has been reported in Lambton County south of Mooretown (Woodliffe pers. comm. 2011).

The apparent range expansion of Swamp Rose-mallow has probably occurred naturally though ramets[10] floating across Lake Ontario from the coastal New York populations. The species also appears to be expanding northeast in the United States (COSEWIC 2004; Hoy and Burdick 2006). The species has narrow habitat tolerances, however, and drainage of wetlands has resulted in loss of habitat in some areas. As a result, while the range of Swamp Rose-mallow appears to be expanding, the area of occupancy in Ontario, estimated at 9.5 km^2 in 2004, is believed to have declined overall (COSEWIC 2004).

It is difficult to determine with certainty whether populations have declined or fluctuated in the long term, as little quantitative data was available for this species prior to 1985. Although the area of occupancy is believed to be declining, changes in species abundance, last estimated at 25,000 flowering stems (<10,000 individuals) total based largely on surveys in the early 2000s (COSEWIC 2004), are not well-known. At some sites, the species has been found to occur in high abundance in recent years. For example, although Ford (1985) reported only "scattered" occurrences of Swamp Rose-mallow at a marsh in Point Pelee National Park, Oldham (2002) estimated hundreds of clumps (plants) at that location and Jalava et al. (2008) found over 300,000 flowering stems in 2007. Recent searches have also found it to be common at a site on Pelee Island (Dodsworth pers. comm. 2011).

3.3. Needs of the Swamp Rose-mallow

3.3.1. Habitat and biological needs

Swamp Rose-mallow usually grows on organic or clay soils in open, coastal marshes, but it is also sometimes found in open wet woods, thickets and drainage ditches. In Canada, it is most common in two types of early successional wetland habitats: deep-water *Typha* marshes, where it occurs along the open water – cattail mat interface, and meadow marshes. Swamp Rose-mallow populations are most common in shoreline marshes that are protected by dykes (with frequent water level drawdowns) or barrier beaches rather than marshes open to the lake. These environments allow for the periodic water level fluctuations that reduce competition for the species while protecting it from high levels of natural disturbance (wave and ice action) (COSEWIC 2004). Swamp Rose-mallow is most commonly found growing in association with Reed Canary Grass (*Phalaris arundinacea*), Bluejoint Grass (*Calamagrostis canadensis*), Bald Spikerush (*Eleocharis erythropoda*), River Bulrush (*Bolboschoenus fluviatilis*), Common Cattail (*Typha latifolia*), Broadfruit Bur-reed (*Sparganium eurycarpum*), Tussock Sedge (*Carex stricta*), and Lake Sedge (*Carex lacustris*) (COSEWIC 2004).

[10] Ramets are vegetative stems with the potential to exist independently from the original plant.

Periodic water level fluctuations that flood then expose the soil are necessary to control European Common Reed (*Phragmites australis* ssp. *australis*), shrubs and small trees, thereby maintaining open early successional wetland habitat that Swamp Rose-mallow prefers. Historically, natural fire, storms and beaver activity would have helped to maintain this habitat (COSEWIC 2004).

Timing, depth, and velocity of flooding events are important, particularly at the time of seed maturation, and have been found to affect frequency, distance, and geographic scale of seed dispersal as well as dispersal of seeds to microhabitats suitable for germination and survival (Shimamura et al. 2007). Kudoh and Whigham (1997) found that water dispersal of seeds (hydrochory) influences gene flow and genetic diversity within and between populations and minimizes inbreeding.

3.3.2. Limiting factors

Establishment and growth of Swamp Rose-mallow may be limited by its requirement for open, disturbed wetland habitats. This species is likely dependent on periodic burning, flooding, drought, or anthropogenic disturbance to create and maintain habitat, and appears to prefer short periods of water level fluctuation (COSEWIC 2004).

The only known method of seed dispersal for Swamp Rose-mallow is via water (Shimamura et al. 2007). As a result, seeds only germinate in areas of suitable habitat that are hydrologically connected[11] to their site of origin, and Swamp Rose-mallow seeds do not spread "unassisted" more than a few hundred meters inland from the Great Lakes (COSEWIC 2004; Shimamura et al. 2007).

Because pollen grains are sticky and tend to clump together, insect pollination appears to be necessary for sexual reproduction to occur (i.e., wind is not an effective dispersal mechanism) (COSEWIC 2004). The primary pollinator of Swamp Rose-mallow in the United States as documented by Blanchard (1976) and Spira (1989) is the Rose-mallow Bee (*Ptilothrix bombiformis*), a non-social species of bee which is not known to occur in Canada (Mitchell 1962, in COSEWIC 2004). In addition to the Rose-mallow Bee, bumble bees (*Bombus* spp.) have also been documented as pollinators in Maryland (Snow et al. 2000). The Western Honey Bee (*Apis mellifera*) and bumble bees were observed visiting flowers in Ontario during site visits in the early 1980s, but pollinator activity was low, possibly due to the timing of the visits (COSEWIC 2004). Several species of moths, butterflies, small bees, and flies have been observed visiting Swamp Rose-mallow flowers, but none appeared to be effective pollinators (Blanchard 1976; Spira 1989; Spira et al. 1992; COSEWIC 2004). Based on the apparent need for specific pollinator species, it is possible that the range of Swamp Rose-mallow in Canada may be partially limited by the range of its pollinators.

[11] A hydrologic connection results when water flows from one area (e.g., an upstream site) to another area (e.g., a downstream site).

4. THREATS

4.1 Threat Assessment

Table 2. Threat Assessment Table

Threat	Level of Concern[1]	Extent	Occurrence	Frequency	Severity[2]	Causal Certainty[3]
Changes in Ecological Dynamics or Natural Processes						
Alteration or suppression of natural disturbance regime	High	Widespread	Current	Continuous	High	Medium
Habitat Loss and Degradation						
Drainage and development of coastal wetlands and shorelines	High	Widespread	Historic, Current, Imminent	Recurrent	Medium	High
Alteration of local hydrological processes	Medium	Unknown	Historic, Current, Anticipated	Continuous	Medium	Medium
Exotic, Invasive, or Introduced Species/ Genome						
European Common Reed, Hybrid Cattail, and other invasive plants	High	Widespread	Current	Continuous	High	High
Varietal introductions	Low	Widespread	Unknown	Unknown	Unknown	Low
Pollution						
Chemicals from agriculture, industry, cosmetic lawn / garden maintenance	Low	Widespread	Historic, Current	Continuous	Unknown	Low
Natural Processes or Activities						
Parasitism and herbivory by insects	Low	Unknown	Historic, 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

Alteration or suppression of natural disturbance regime
Historically, early successional coastal habitats were maintained by storm events, fluctuating water levels, natural fire and beaver activity. Natural fire has been suppressed for the last 100 years or more, and beaver populations have only recently re-established themselves in the watersheds draining into Lake St. Clair (Robinson pers. comm. 2011)[12]. A gradual decline in quality of habitat has occurred due to the reduction in frequency of natural disturbance and continuing succession in open marsh habitats (COSEWIC 2004). This can lead to shading and competition, particularly with European Common Reed and Hybrid Cattail (*Typha* X *glauca*) (see threat description below). The decline in habitat quality may lead to reduced growth and / or germination, reduced population size and local extirpations.

Drainage and development of coastal wetlands and shorelines
Drainage and development of the coastal wetlands that Swamp Rose-mallow inhabits can lead to habitat fragmentation and isolation of populations, which in turn can reduce population size and viability. Drainage and development is not likely to be a threat for populations occurring on private hunt clubs or publicly owned protected areas (e.g., St. Clair, Big Creek and Long Point National Wildlife Areas; Point Pelee National Park). However, it should be noted that some of the publicly owned protected areas (e.g., Point Pelee National Park) were once part of much more extensive wetland areas, portions of which were drained and converted to agriculture in the past (Parks Canada 2011). Development of coastal wetlands for industrial or recreational use appears to have contributed to the extirpation of some populations (e.g., in Sarnia, Niagara-on-the-Lake, Queenston, and City of Welland) (COSEWIC 2004). Additionally, development of subdivisions and estate homes along the south shore of Lake St. Clair has lead to the loss of some subpopulations, and shoreline development along the Detroit River has greatly reduced the transitional edge habitat for Swamp Rose-mallow at many sites (COSEWIC 2004).

Wetland habitat loss to development for housing and marinas, and reclamation for agriculture, is continuing, but probably at a much lower rate than in the past, due at least in part to improved legislative protection for wetlands (e.g., Provincial Policy Statement) (COSEWIC 2004).

European Common Reed, Hybrid Cattail, and other invasive plants
Swamp Rose-mallow requires early successional habitat and can be out-competed by invasive species such as European Common Reed and Hybrid Cattail (COSEWIC 2004). European Common Reed and Hybrid Cattail do well when habitat is altered by high nutrient levels and succession, and likely out-compete Swamp Rose-mallow in such conditions. Proliferation of these species can result in increased mortality, reduced fitness and seed production, and local extirpations of Swamp Rose-mallow.

The prevalence and abundance of European Common Reed have undergone a dramatic increase in wetlands throughout the lower Great Lakes since the 1990s, particularly in Essex County and at Long Point (COSEWIC 2004). It now dominates many Swamp Rose-mallow sites, including

[12] Beavers were considered extirpated in Essex and Chatham-Kent at the time the COSEWIC Assessment and Update Status Report was written (COSEWIC 2004). However, they are present in at least the Lake St. Clair Watersheds in 2011 (Robinson pers. comm. 2011)

those on the Canard River, the Detroit River, the south shore of Lake St. Clair, and the Big Creek (Amherstburg) system, and has probably caused the extirpations of several populations or sub-populations. A study at Long Point National Wildlife Area (Wilcox and Petrie, undated, cited in COSEWIC 2004) found that the main wetland communities in which European Common Reed has replaced native species were meadow marsh and cattail marsh, the habitat types preferred by Swamp Rose-mallow. In that study, the abundance of European Common Reed was negatively correlated with lake water depth and positively correlated with ambient temperature, suggesting that if climate change predictions are realized this invasive species will continue to expand. This species is also found at Lake St. Clair and in Point Pelee National Park.

Hybrid Cattail is dominant or co-dominant (usually with European Common Reed) at a number of Swamp Rose-mallow sites, including Big Creek National Wildlife Area, Point Pelee National Park, and the wetlands around Lake St.Clair (COSEWIC 2004). It was observed to be out-competing Swamp Rose-mallow at St. Clair National Wildlife Area (Haggeman pers. comm. 2009).

At Bush Pond (Point Pelee National Park), Purple Loosestrife occupies the pond edge habitats where Swamp Rose-mallow typically occurs elsewhere in the Park (Minelga pers. comm. 2011), suggesting that Purple Loosetrife may in some areas out-compete Swamp Rose-mallow.

Other invasive species noted to occur within Swamp Rose-mallow populations include Flowering Rush (*Butomus umbellatus*), Common Thistle (*Cirsium vulgare*), Scot's Pine (*Pinus sylvestris*), Teasel (*Dipsacus fullonum*), and Black Alder (*Alnus glutinosa*), but the effects of these species on Swamp Rose-mallow require investigation (COSEWIC 2004). The impact of Scot's Pine (*Pinus sylvestris*) and Black Alder (*Alnus glutinosa*) is probably similar to other tree species and could be mitigated by controlled burns and water level manipulation to maintain open wetland habitats.

Alteration of local hydrological processes

Housing development and associated infrastructure such as groynes, berms, and underground service corridors in addition to the construction of roads and railways adjacent to or bisecting wetlands, alter the hydrology of the wetland habitat required by Swamp Rose-mallow. Alteration of shoreline hydrology and sedimentation, for example through the construction of docks, retaining walls and other structures, has also had an impact on some populations, particularly those that consist of only a few plants (COSEWIC 2004). It has also been speculated that the species requires water cover over its roots in winter. Changes to hydrological processes that support the wetlands inhabited by the species can lead to reduced growth, germination and seed and ramet dispersal as well as to increased competition from other wetland species with different hydrologic requirements (Kudoh and Whigham 1997; COSEWIC 2004; Shimamura et al. 2007).

Varietal introductions

The large, showy blooms make *Hibiscus* species popular in horticultural circles (COSEWIC 2004). Native and horticultural varieties are widely planted throughout southern Canada, the United States and around the world. Cultivated *Hibiscus* plants have been observed adjacent to homes in southern Ontario (COSEWIC 2004). It is probably impossible to discern native plants from similar-looking horticultural stock without genetic analysis.

There are reports of Swamp Rose-mallow hybridizing with other *Hibiscus* species (Blanchard 1976; Stout 1917 *in* COSEWIC 1994; Wise and Meznel 1971 *in* COSEWIC 1994; Klips 1999 *in* COSEWIC 2004). Some of these hybridizations have led to the commercial cultivars seen today (Blanchard 1976). The only known naturally occurring hybrids are produced by *H. grandiflorus* and *H. laevis*; however, such hybrids are very rare (COSEWIC 2004). Because Swamp Rose-mallow is the only known extant member of the *Hibiscus* genus occurring naturally in Canada, it is unlikely that hybridization with other species in the genus *Hibiscus* would occur. The presence of *Hibiscus* species used in horticulture does provide the possibility for hybridization with commercially available cultivars, but the likelihood is low given what is known about dispersal mechanisms.

Chemicals from agriculture, industry, cosmetic lawn / garden maintenance
Swamp Rose-mallow is adversely affected by pollution (Stuckey 1968 *in* COSEWIC 2004). The amount of agriculture and industry within its range in Ontario result in high inputs of nutrients, herbicides, pesticides and heavy metals to Swamp Rose-mallow habitat (COSEWIC 2004). Cosmetic lawn and/or garden maintenance also increase inputs of these pollutants. These pollutants degrade habitat for Swamp Rose-mallow and can lead to the species being out-competed by invasive species such as European Common Reed, which exploit the artificially high nutrients entering the system (COSEWIC 2004).

Parasitism and herbivory by insects
Several species of insect are known to parasitize Swamp Rose-mallow seeds and to infest other parts of the plant. Additionally, damage by seed predators has been found to dramatically reduce the reproductive output of the Swamp Rose-mallow (Spira 1989; Baumen et al. 2001; COSEWIC 2004). The prevalence and abundance of the various insect parasites of Swamp Rose-mallow in Ontario populations, as well as their level of impact on the reproduction and survival of local populations and across its range, are unknown (COSEWIC 2004). The impact of other insect species on wild populations of Swamp Rose-mallow is also unknown.

5. MANAGEMENT OBJECTIVE

The management objective for the Swamp Rose-mallow is to maintain the current distribution and area of occupancy of extant Swamp Rose-mallow populations in Canada. This objective should be attainable by maintaining habitat requirements at current locations, which can be achieved through: management and stewardship; research, assessment and monitoring; and outreach and communications.

6. BROAD STRATEGIES AND CONSERVATION MEASURES

6.1. Broad Strategies

The broad strategies of this management plan are as follows:

1. Use management and stewardship activities to mitigate threats to, and maintain habitat at Swamp Rose-mallow locations.

2. Assess and monitor the species' distribution and habitat, population sizes and trends, and conduct research to evaluate the extent and impact of threats for extant Canadian populations.

3. Through outreach and communications, increase awareness and knowledge of Swamp Rose-mallow and the need for maintaining it on the landscape in its natural state.

6.2. Conservation Measures

The conservation measures and implementation schedule proposed to meet the broad strategies outlined in section 6.1 are presented in Table 3.

Table 3. Conservation Measures and Implementation Schedule

Conservation Measure	Priority	Threats or concerns addressed	Timeline
Management and Stewardship			
Investigate the need for and feasibility of creating varying land elevations at microsites within known Swamp Rose-mallow locations, and promote implementation where feasible	High	Alteration of local hydrological processes	2013-2018
Investigate the feasibility of employing best management practices/ known methods of controlling European Common Reed and Hybrid Cattail, and implement these practices where feasible	High	European Common Reed and Hybrid Cattail	2013-2018
Encourage / facilitate conservation of sites where Swamp Rose-mallow occurs on private and First Nation lands, as appropriate (e.g., through stewardship, partnerships with conservation agencies, acquisition, easements, etc.); Develop site-specific management plans where possible and promote implementation of these plans	High	All threats	2013-2018
Incorporate the needs of Swamp Rose-mallow into site-specific management plans for protected areas and promote implementation of those plans	Medium	All threats	2013-2018
Investigate the feasibility and effectiveness of different techniques for maintaining and creating open wetland areas, including prescribed burns or other artifical disturbance, within the Canadian range of Swamp Rose-mallow; Implement the appropriate techniques where feasible	Medium	Alteration or suppression of natural disturbance regime	2013-2018
Research, Assessment and Monitoring			
Develop a standardized monitoring protocol for the species that includes monitoring of plant abundance (including area of occupancy and density of stems) and pollinators as well as an optimal schedule for recurrent monitoring; Begin monitoring populations	High	Knowledge gap (required for accurate population information); All threats	2013-2018
Conduct research at selected locations within Ontario to investigate the extent and impacts of insect parasitism, other known invasive species, collection, cross-breeding with cultivated *Hibiscus*	Low	Knowledge gaps; Varietal introductions; Chemicals from agriculture, industry, cosmetic lawn / garden	2013-2018

Conservation Measure	Priority	Threats or concerns addressed	Timeline
species, and pollution; Determine the need for mitigation measures and implement as necessary		maintenance; Parasitism and herbivory by insects	
Outreach and Communication			
Promote awareness in key audiences and community involvement regarding species at risk and their habitats, including Swamp Rose-mallow; Encourage transfer and archiving of Traditional Ecological Knowledge (e.g., with respect to populations on Walpole Island First Nation)	High	All threats	2014 / ongoing
Include information on Swamp Rose-mallow and its habitat on relevant (e.g., federal and provincial agency and park-specific, CA[2], NGO[3]) websites	Medium	All threats	2014 / ongoing

[1] Lowercase letter threat descriptors refer to specific threats from section 4.2 Description of Threats

[2] Conservation Authority

[3] Non-governmental Organization

6.3. Actions Already Completed or Underway

Point Pelee National Park, St. Lawrence Islands National Park, St. Clair National Wildlife Area, Big Creek National Wildlife Area, Long Point National Wildlife Area and Sandbanks Provincial Park are currently managed to support a number of species at risk, including Swamp Rose-mallow (Jalava 2008; Ontario Parks 2008; Parks Canada 2010).

At Point Pelee National Park, Purple Loosestrife removal is conducted on an annual basis in Bush Pond where it occurs. In addition, the Draft Integrated Vegetation Management Plan for Point Pelee National Park has identified European Common Reed as a high priority invasive alien plant species. Objectives call for its removal from, or control in marsh and meadow communities to reduce its impact. National Park staff have mapped the extent of European Common Reed via air photos and field work.

Recovery actions described in the Draft Walpole Island Ecosystem Recovery Strategy (Bowles 2005) include raising awareness in the community about species at risk, including Swamp Rose-mallow. Promotional materials have been distributed to raise awareness of this species, along with other species at risk, on Walpole Island First Nation.

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The Management Plan for the St. Clair National Wildlife Area is currently being updated, and will reflect a continued effort to conserve and restore habitats for the benefit of wildlife, with emphasis on species at risk.

Rondeau Provincial Park has an approved Park Management Plan (Ontario Ministry of Natural Resources 1991) in place that deals with species at risk. Research priorities identified in the plan include management and population dynamics of rare species and species at risk. Vegetation management (e.g., removal of harmful plant species) may be employed to protect these species.

7. MEASURING PROGRESS

Every five years, success of this management plan implementation will be measured against the following performance indicator:

- No decline in the distribution and area of occupancy of the Canadian populations of Swamp Rose-mallow.

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APPENDIX A: SUBNATIONAL CONSERVATION RANKS OF SWAMP ROSE-MALLOW

Table 4. Subnational Conservation Status Ranks (S-Ranks) for the Swamp Rose-mallow in North America (NatureServe 2011)

Country	State/Province and NatureServe status ranks
Canada	Ontario (S3S4)
United States	Alabama (SNR), Arkansas (SNR), California (SNR), Connecticut (SNR), Delaware (SNR), District of Columbia (SNR), Florida (SNR), Georgia (SNR), Illinois (SNR), Indiana (SNR), Kansas (SNR), Kentucky (S5), Louisiana (SNR), Maryland (SNR), Massachusetts (SNR), Michigan (S3S4), Mississippi (SNR), Missouri (SNR), New Hampshire (S1), New Jersey (SNR), New Mexico (SNR), New York (SNR), North Carolina (S5), Ohio (SNR), Oklahoma (SNR), Pennsylvania (SNR), Rhode Island (SNR), South Carolina (SNR), Tennessee (SNR), Texas (SNR), Utah (SNR), Virginia (S5), West Virginia (S5), Wisconsin (SNR)

S1: Critically Imperiled; S2: Imperiled; S3: Vulnerable; S4: Apparently Secure; S5: Secure; S#S#: Range Rank; SNR: Unranked – Status not yet assessed; SU: Unrankable; SX: Presumed Extirpated.

APPENDIX B: 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.

Management planning is intended to benefit species at risk and biodiversity in general. However, it is recognized that plans 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 plan itself, but are also summarized below in this statement.

Management plan activities that protect deep-water *Typha* marshes and meadow marshes near the Great Lakes will positively affect numerous other species requiring similar habitats, including species at risk (see Table 5). Wetlands also provide numerous benefits in terms of water filtration, catchment and storage, and storm-water and run-off control that benefit human populations as well as wildlife.

Table 5. Species expected to benefit from recovery techniques directed at the Swamp Rose-mallow in Canada.

Common Name	Scientific (Latin) Name	SARA Status
Eastern Prairie Fringed-orchid	*Platanthera leucophaea*	Endangered
King Rail	*Rallus elegans*	Endangered
Eastern Foxsnake	*Elaphe gloydi*	Endangered
Spotted Turtle	*Clemmys guttata*	Endangered
Least Bittern	*Ixobrychus exilis*	Threatened
Blanding's Turtle	*Emydoidea blandingii*	Threatened
Eastern Musk Turtle	*Sternotherus odoratus*	Threatened
Climbing Prairie Rose	*Rosa setigera*	Special Concern
Common Snapping Turtle	*Chelydra serpentina*	Special Concern
Northern Map Turtle	*Graptemys geographica*	Special Concern

Swamp Rose-mallow habitat is shared by many other species including other species at risk. While some of the proposed measures will benefit the environment in general and are expected to positively affect other sympatric native species, there could be consequences to those species whose requirements differ from those of the Swamp Rose-mallow. Consequently, it is important that habitat management activities for the Swamp Rose-mallow be considered from an ecosystem perspective through the development, with input from responsible jurisdictions, of multi-species plans, ecosystem-based recovery programs or area management plans that take into account the needs of multiple species, including other species at risk.