Photo: Melinda Thompson-Black

Virginia Mallow

(Sida hermaphrodita) in Ontario

Ontario Recovery Strategy Series

Recovery strategy prepared under the *Endangered Species Act, 2007*

February 2011

Natural. Valued. Protected.

Ministry of Natural Resources

Ontario

About the Ontario Recovery Strategy Series

This series presents the collection of recovery strategies that are prepared or adopted as advice to the Province of Ontario on the recommended approach to recover species at risk. The Province ensures the preparation of recovery strategies to meet its commitments to recover species at risk under the Endangered Species Act, 2007 (ESA, 2007) and the Accord for the Protection of Species at Risk in Canada.

What is recovery?

Recovery of species at risk is the process by which the decline of an endangered, threatened, or extirpated species is arrested or reversed, and threats are removed or reduced to improve the likelihood of a species' persistence in the wild.

What is a recovery strategy?

Under the ESA, 2007, a recovery strategy provides the best available scientific knowledge on what is required to achieve recovery of a species. A recovery strategy outlines the habitat needs and the threats to the survival and recovery of the species. It also makes recommendations on the objectives for protection and recovery, the approaches to achieve those objectives, and the area that should be considered in the development of a habitat regulation. Sections 11 to 15 of the ESA, 2007 outline the required content and timelines for developing recovery strategies published in this series.

Recovery strategies are required to be prepared for endangered and threatened species within one or two years respectively of the species being added to the Species at Risk in Ontario list. There is a transition period of five years (until June 30, 2013) to develop recovery strategies for those species listed as endangered or threatened in the schedules of the ESA, 2007. Recovery strategies are required to be prepared for extirpated species only if reintroduction is considered feasible.

What's next?

Nine months after the completion of a recovery strategy a government response statement will be published which summarizes the actions that the Government of Ontario intends to take in response to the strategy. The implementation of recovery strategies depends on the continued cooperation and actions of government agencies, individuals, communities, land users, and conservationists.

For more information

To learn more about species at risk recovery in Ontario, please visit the Ministry of Natural Resources Species at Risk webpage at: **www.ontario.ca/speciesatrisk**

RECOMMENDED CITATION

Bickerton, H.J 2011. Recovery strategy for the Virginia Mallow (*Sida hermaphrodita*) in Ontario. Ontario Recovery Strategy Series. Prepared for the Ontario Ministry of Natural Resources, Peterborough, Ontario. vi + 16 pp.

Cover illustration: Melinda Thompson-Black

ISBN 978-1-4435-4961-5 (PDF)

Cette publication hautement spécialisée Recovery strategies prepared under the *Endangered Species Act, 2007*, *n'est disponible qu'en anglais en vertu du Règlement 411/97 qui en exempte l'application de la Loi sur les services en français. Pour obtenir de l'aide en français, veuillez communiquer avec Pamela Wesley au ministère des Richesses naturelles au 705-755-5217.*

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ACKNOWLEDGMENTS

Many thanks to Melinda Thompson-Black for providing helpful information, as well as figures for this report. Karine Beriault, Donald Kirk and Tony Zammit also provided information on populations known to them.

DECLARATION

The recovery strategy for the Virginia Mallow was developed in accordance with the requirements of the *Endangered Species Act, 2007* (ESA). This recovery strategy has been prepared as advice to the Government of Ontario, other responsible jurisdictions and the many different constituencies that may be involved in recovering the species.

The recovery strategy does not necessarily represent the views of all of the individuals who provided advice or contributed to its preparation, or the official positions of the organizations with which the individuals are associated.

The goals, objectives and recovery approaches identified in the strategy are based on the best available knowledge and are subject to revision as new information becomes available. Implementation of this strategy is subject to appropriations, priorities and budgetary constraints of the participating jurisdictions and organizations.

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.

RESPONSIBLE JURISDICTIONS

Ontario Ministry of Natural Resources
Environment Canada – Canadian Wildlife Service, Ontario

EXECUTIVE SUMMARY

Virginia Mallow (*Sida hermaphrodita*) is a tall, distinctive, perennial herb in the mallow family (Malvaceae). The species ranges across eastern North America and is globally rare (G3). It is considered extremely rare within the Great Lakes watershed at the northern edge of its range. There are only two populations known in Canada, both occurring in Ontario where the species has been listed as endangered under Ontario's *Endangered Species Act, 2007*. One lies in Haldimand County within a Conservation Area and is managed by the Grand River Conservation Authority. Another occurs within a licensed quarry and along a gas pipeline corridor in Niagara Region. There have been no documented declines at either location: the population has increased recently within Haldimand County, and is believed to be stable at the Niagara Region site.

Virginia Mallow grows in moist riparian areas and in floodplains. It grows in full sun and partial shade, and appears to be tolerant of a wide range of physical and chemical soil conditions. The species has been cultivated in the past and is most often found in disturbed habitats, such as along roadsides and other corridors. Seeds are thought to be dispersed by water. Although some populations throughout the species' range were likely adventive, both Ontario populations are believed to be native.

Virginia Mallow is limited by a narrow habitat preference for riparian and floodplain habitats, which have been developed and altered across eastern North America. In Ontario, dominant threats to Virginia Mallow in Ontario are habitat destruction, competition from non-native invasive species (e.g., European Common Reed) and site maintenance.

The recovery goal for this species is to protect and maintain all extant populations of Virginia Mallow in southern Ontario and to ensure the species' long-term persistence within its current range. Protection and recovery objectives are: to protect extant populations of Virginia Mallow; to regularly assess and report on the species' status at all sites and search suitable habitat for additional populations; to manage sites to reduce threats, and to address knowledge gaps, especially at the northern edge of the species' range. A table outlining specific approaches to achieve the objectives and recovery goal is included in this report.

It is recommended that the area prescribed as habitat in a regulation for Virginia Mallow include the contiguous Ecological Land Classification (ELC) ecosite polygon(s) (Lee et al. 1998) within which the species is found. If a population (including sub-populations) occupies more than one ecosite type, then all contiguous ecosite polygons should be included. Ecosites that are anthropogenic in origin (e.g., cultural meadows and thickets) may be prescribed as habitat. It is recommended that habitat be mapped for all sub-populations of this species, especially if this process engages landowners and land managers in the conservation of the species.

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1.0 BACKGROUND INFORMATION

1.1 Species Assessment and Classification

COMMON NAME: Virginia Mallow
SCIENTIFIC NAME: *Sida hermaphrodita*
SARO List Classification: Endangered
SARO List History: Endangered (March 2010)
COSEWIC Assessment History: Endangered (April 2010)
SARA Schedule 1: n/a
CONSERVATION STATUS RANKINGS: GRANK: G3 NRANK: N1 SRANK: S1

The glossary provides definitions for the abbreviations above.

1.2 Species Description and Biology

Species Description

Virginia Mallow (*Sida hermaphrodita*) is a tall herbaceous perennial that can reach a height of one to three metres. The leaves, which are arranged alternately along the stem, have three to seven pointed, irregularly toothed lobes that resemble maple leaves. The central lobe of each leaf is characteristically elongated. Stems of Virginia Mallow plants may have small star-shaped hairs when young, but become smooth as they age (Gleason and Cronquist 1991). White flowers bloom in stalked clusters from the upper leaf axils (Spooner et al. 1985). The flowers are “perfect” (i.e., have both male and female parts) and have five petals, each about eight mm long (Gleason and Cronquist 1991). Detailed species descriptions, taxonomic keys, and technical illustrations can be found in Gleason and Cronquist (1991) and Holmgren (1998).

This species is unusual and distinctive within the mallow family (Malvaceae) and the genus *Sida*. There are no similar species growing in Canada with which this species might easily be confused.

Species Biology

All scientific publications identified below describe studies of American populations of Virginia Mallow. No research on the species’ biology published to date has been carried out on Canadian populations, and it is possible that significant differences may exist in the Canadian populations at the northern limit of the species’ range. However, the

research below is outlined because it represents the best available scientific study to date on Virginia Mallow.

At sites in Ohio and West Virginia, the perennial shoots of Virginia Mallow emerge from the soil in late April or early May, from buds at the base of the previous year's stems (Spooner et al. 1985). Plants can also produce large numbers of rhizomes, and many populations appear to be clonal. This makes the number of individuals in a population difficult to discern (COSEWIC in press).

In the American populations studied, plants began flowering in early August and continued until a hard frost (Spooner et al. 1985). No information on pollinators of this species could be found. However, flowers of the closely related Glade Mallow (*Napaea dioica*) were pollinated mostly by insects in the orders Hymenoptera (ants, bees, and wasps), Diptera (flies) and Hemiptera (true bugs) (Iltis 1963).

Fruiting generally occurs in September and October (NatureServe 2009). Large Virginia Mallow plants, at least those from studied populations in Ohio and West Virginia, may produce several thousand seeds, and germination studies have shown that most of these are viable (Spooner et al. 1985). However, pre-treatment of the hard seeds by mechanical scarification or soaking in hot water is required to increase germination rates in cultivation (Kujawski et al. 1997). New plants have also been successfully propagated from rhizomes (Kujawski et al. 1997).

Seeds are released throughout the winter and it is suspected that they are dispersed by water, perhaps in the spring. The age at which plants first flower in their natural habitat is not known, but garden-grown plants have produced seeds in their first year (Spooner et al. 1985). Generation time in nature is also not well understood, but cultivated plants can live up to 15 years (Krzaczek et al. 2006 cited in COSEWIC in press).

1.3 Distribution, Abundance and Population Trends

Virginia Mallow is known from two locations in Ontario: one within a Conservation Area in Haldimand County, and the other from a quarry and adjacent hydro corridor in the Niagara Region (Figure 1). The two locations are approximately 35 km apart. The actual area occupied by the species is less than one square kilometre. There are no documented declines at either population. Unless otherwise referenced, the population information below was obtained from the COSEWIC status report (in press).

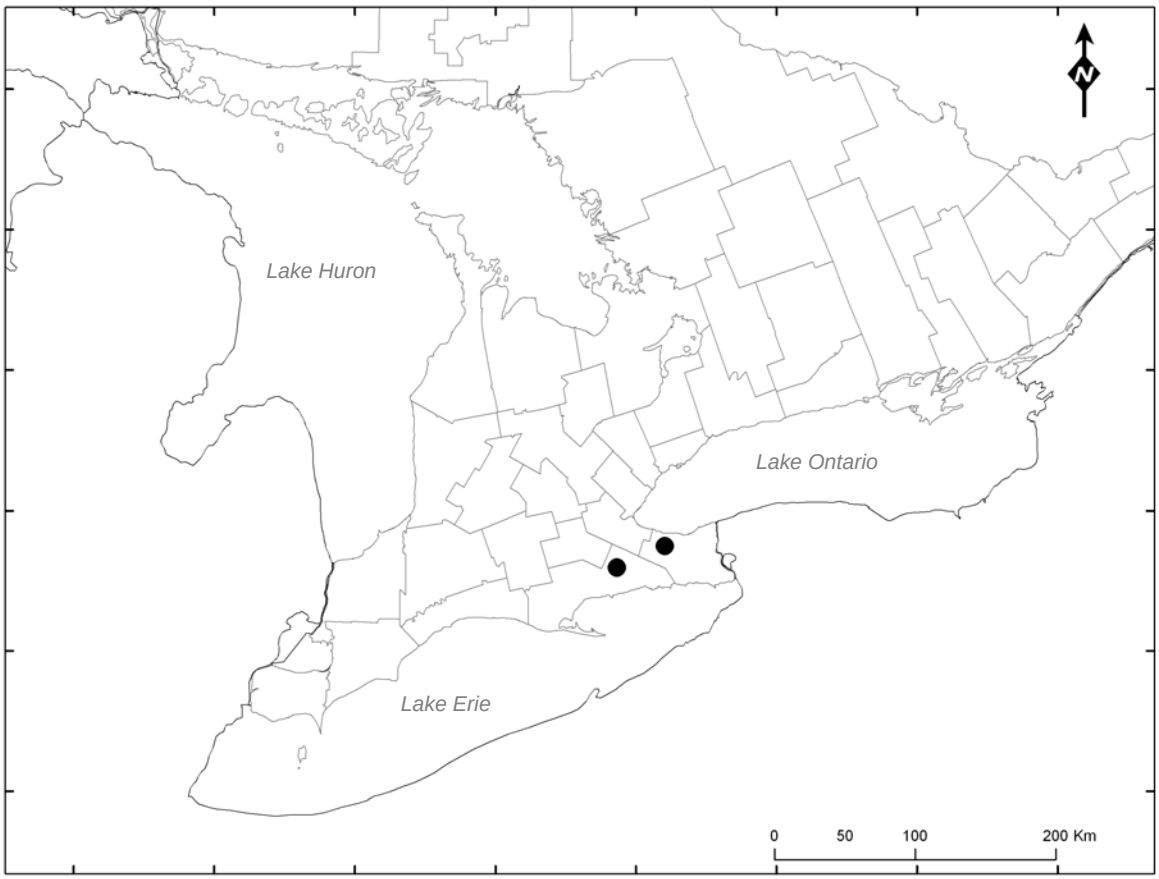

Figure 1. Known distribution of Virginia Mallow in Ontario (M. Thompson-Black 2009).

Due to the clonal nature of the species and the difficulty in identifying individuals, stem counts were used to assess abundance at both Ontario sites. The population in Haldimand County appears to have increased between field visits in 2001 and 2010. In 2001, only one sub-population was known, with a total population estimated at 83 stems. Two sub-populations were documented in 2008, with an estimated total stem count of 2300 stems. In July 2010, ecologists from the GRCA estimated the total size of the Haldimand County population by counting the number of stems within individual patches. At least 24 individual patches were identified, ranging from a few stems to greater than 1000 stems. The estimated total population size is over 5000 stems (T. Zammit, pers. comm. 2010).

The recent increase in population may be due to the 2006 decommissioning of a reservoir at the site. The former reservoir was dewatered in order to restore a coldwater stream running through the property, and this may have created new habitat for Virginia Mallow to colonize (T. Zammit pers. comm. 2010). Most sub-populations occur within a large wetland and it is possible that other small sub-populations are also present.

The second population in Niagara Region is much smaller, totaling 210 stems in two sub-populations. Trends are not possible to assess, since stem counts were not made during the earlier 2001 site visit. However, the number of clumps remained constant, and the population as a whole appeared to be stable. This population occurs partly within a licensed quarry and along a pipeline corridor.

Virginia Mallow is also rare and local throughout its North American range (NatureServe 2009). The species' distribution is centred in the Appalachian Mountains and ranges west to the Mississippi watershed, east to the Atlantic, and north to the Great Lakes watershed, where natural populations are considered "extremely rare" (Spooner et al. 1985; also see COSEWIC in press). Although the species can be locally common along floodplains in Ohio, West Virginia and Kentucky, many American populations throughout the range are being lost to development, flood control, and maintenance (e.g., mowing, herbicide use) (NatureServe 2009).

Virginia Mallow has been cultivated in North American gardens since the 18th century (Iltis 1963). Some populations throughout the species' range are believed to have been introduced (NatureServe 2009). Although botanical opinion has been divided on the origin of Virginia Mallow in Canada (see, for example, Brouillet et al., 2006; NatureServe 2009), both Ontario populations are believed to be native.

1.4 Habitat Needs

Virginia Mallow is a species of riparian areas, floodplains and bottomlands. Although it prefers open, sunny settings, the species is also found in partial shade (Thomas 1979; NatureServe 2009). Periodic flooding occurs at many sites (Thomas 1979). Throughout its range, Virginia Mallow occurs in many disturbed habitats, such as along railroad banks, roadsides and infrastructure corridors, especially where these intersect a floodplain or riparian area (NatureServe 2009). Because Virginia Mallow appears to require disturbance due to periodic flooding within openings along floodplains, NatureServe (2009) characterizes the species as having a "very narrow habitat specificity."

Soils do not appear to limit the distribution of this species, which grows in a wide range of soil textures (silt loam, sandy clay loam, clay loam) and pH values (5.4 to 7.5), with a medium to high organic content (Spooner et al. 1985). Thomas (1979) found at his American study sites that soil structure was loose, allowing for good aeration. Given its tolerance for disturbance and for a wide range of soil conditions, it is not entirely clear why Virginia Mallow is absent from many apparently suitable habitats.

The dominant vegetation at both Ontario sites has been generally described in COSEWIC (in press) and further described by ecologists at the GRCA. Most plants in the Haldimand County population occur within a Forb Mineral Meadow Marsh (MAM 2-10) marsh dominated by Broad-leaved Cattail (*Typha latifolia*), European Common Reed (*Phragmites australis* ssp*. australis*), Purple Loosestrife (*Lythrum salicaria*),

Jewelweed (*Impatiens capensis*), Teasel (*Dipsacus fullonum*) Bulrushes (*Scirpus* spp.) and Rushes (*Juncus* spp.) (T. Zammit, pers.comm., 2010). Riparian vegetation is also present at the site and is dominated by Black Walnut (*Juglans nigra*), Red-osier Dogwood (*Cornus stolonifera*) and Staghorn Sumac (*Rhus typhina*). The habitat at this site appears relatively natural, although much of the population occurs next to the outflow of a reservoir, indicating that the area has been disturbed in the past.

The second Ontario population occurs in a much more disturbed area, on shallow soils over limestone. One sub-population occurs along a rarely used quarry access road. The second sub-population occurs along a gas pipeline corridor dominated by open meadow species such as Teasel (*Dipsacus fullonum*), Queen Anne's Lace (*Daucus carota*), Grey Dogwood (*Cornus racemosa*), Staghorn Sumac and goldenrods (*Solidago* spp.) (COSEWIC in press). The shallow limestone offers poor drainage and the area is thought to be moist to wet in spring, but dry though the balance of the season.

1.5 Limiting Factors

To some degree, Virginia Mallow is limited by its narrow habitat preference for increasingly rare riparian and floodplain habitats within the heavily developed Carolinian zone in Canada and the United States. Other biological factors that were previously thought to limit the species (i.e., low germination rates and specific soil requirements) have now been largely dismissed (Spooner et al. 1985; Kujawski et al. 1997). However, because Virginia Mallow often does not occupy apparently suitable habitat, it is possible that other limiting factors may be identified in the future.

1.6 Threats to Survival and Recovery

Habitat destruction

Habitat destruction is probably the primary threat to this species. Historically, riverine terraces and floodplains have been developed for both housing and agriculture, and altered to control flooding. In 2008, the area next to one Ontario sub-population was being prepared for aggregate extraction: clearing and topsoil removal had occurred within five metres of plants. However, the Virginia Mallow plants at this quarry site occur next to an access road (possibly along a road allowance) where no quarrying is planned, and are not believed to be under immediate threat (M. Thompson-Black pers.comm. 2010).

Invasive species

Invasive species threaten Virginia Mallow throughout its range. At the Haldimand County site, European Common Reed has increased in abundance with the lowering of water levels related to the decommissioning of the former dam and may be competing with Virginia Mallow for light, space and nutrients. Although it does not occupy the same area as Virginia Mallow at the moment, it is believed to be spreading (T. Zammit pers.comm. 2010). Purple Loosestrife (*Lythrum salicaria*) was found in 2010 to be more

common within the former reservoir than previously thought. However, it does not appear to be affecting Virginia Mallow plants.

Site maintenance

Site maintenance may threaten the species at both Ontario populations. The population in Haldimand County occurs next to a grassy picnic area that is maintained by the GRCA, and mowing occurs to the base of plants (COSEWIC in press). It is possible that this damages existing plants or prevents further establishment of new plants. Regular maintenance (slashing, cutting of vegetation) along the gas pipeline corridor may also be detrimental to the species, especially if herbicides are used to keep vegetation low (COSEWIC in press). However, some populations in the United States flourish in regularly disturbed areas, especially where late-season mowing controls woody shrubs and saplings, allowing Virginia Mallow to set seed (NatureServe 2009).

Although Virginia Mallow has been popular as a garden plant in the past (Iltis 1963), collection is not believed to pose a threat to the species.

1.7 Knowledge Gaps

Population and Habitat Status

Sites have been surveyed sporadically only since 2001, and a longer-term understanding of both populations would be beneficial. The suitability of habitat on adjacent properties is also unknown, and it is considered likely that there may be additional populations downstream from the Haldimand County site (M. Thompson-Black pers. comm. 2010). Current threats at the Niagara region quarry site require clarification.

Description of Ontario Habitat

Vegetation communities for the two extant Ontario sites have not been described to the ecosite level using the Ecological Land Classification (ELC) methods (Lee et al. 1998). This information would be useful for consideration in developing a habitat regulation for the species under the ESA.

Species Ecology

Several fundamental ecological questions remain regarding this globally rare species. For example, the demographics of Virginia Mallow (age of plants at first flowering, generation time) are not well understood. The minimum viable population size has not been identified, and it is not known whether Ontario populations are likely to persist indefinitely. Little published information on the pollination biology (e.g. pollinators, self-fertilization studies) of the species could be found. Because many areas of apparently suitable habitat remain unoccupied by this species, as-yet unidentified ecological factors may be limiting its establishment. Research on the species at the northern edge of Virginia Mallow's range in the Great Lakes basin would be especially beneficial, and could assist in population management and recovery.

1.8 Recovery Actions Completed or Underway

Staff from the Ministry of Natural Resources (MNR) have completed surveys and informal monitoring at the Haldimand County site (K. Beriault pers. comm. 2010). Ecologists at the GRCA also monitor this population and completed population surveys of Virginia Mallow in July 2010.

In summer 2010, the GRCA also began controlling European Common Reed in the former reservoir by cutting stems before flowering. The success of this method will be monitored in the future. Conservation Authority staff are also in the process of developing an invasive species strategy for this and other key properties in the watershed (T. Zammit pers. comm. 2010).

2.0 RECOVERY

2.1 Recovery Goal

The goal of this recovery strategy is to protect and maintain all extant populations of Virginia Mallow in southern Ontario and to ensure the species' long-term persistence within its current range.

2.2 Protection and Recovery Objectives

Table 1. Protection and recovery objectives

No.	Protection or Recovery Objective
1	Protect extant populations of Virginia Mallow.
2	Regularly assess and report on the species' status at all known sites, and search suitable habitat for additional populations.
3	Manage sites to reduce threats.
4	Address knowledge gaps, especially at the northern edge of the species' range.

2.3 Approaches to Recovery

Table 2. Approaches to recovery of the Virginia Mallow in Ontario

Relative Priority	Relative Timeframe	Recovery Theme	Approach to Recovery	Threats or Knowledge Gaps Addressed
1. Protect extant populations of Virginia Mallow.				
Critical	Short-term	Protection	**1.1** Define the extent of existing populations and clarify land ownership and management	• All threats • Description of Ontario habitat
Necessary	Short-term	Protection	**1.2** With landowners, consider options for long-term protection at both sites (e.g., easements or securement for private lands, additional designations or zoning on public lands if considered necessary)	• Habitat destruction
Necessary Beneficial	Short-term	Protection, Education and Outreach	**1.3** Develop a habitat regulation for Virginia Mallow under the ESA – Work with landowners to identify and map habitat at both sites using Ecological Land Classification Methods	• Habitat destruction • Description of Ontario habitat
2. Regularly assess and report on the species' status at all sites.				

Relative Priority	Relative Timeframe	Recovery Theme	Approach to Recovery	Threats or Knowledge Gaps Addressed
Necessary	Ongoing	Inventory, Monitoring and Assessment	**2.1** Monitor extant sites: – Develop a standard monitoring approach (methods, timing) and complete regular monitoring	• Population and habitat status
Beneficial	Long-term	Education and Outreach	**2.2** Inform adjacent landowners, naturalists and local consultants of the species' presence to increase the likelihood of reports of new populations.	• Population and habitat status
Beneficial	Ongoing	Inventory, Monitoring and Assessment	**2.3** Identify areas of potentially suitable habitat and complete surveys	• Population and habitat status
3. Manage sites to reduce threats.				
Critical	Long-term	Management	**3.1** Control invasive species that threaten Virginia Mallow – Develop and implement invasive species management plans for Haldimand County site – Control and monitor European Common Reed at the Haldimand County site – Control other invasive species if necessary	• Invasive species
Critical	Long-term	Management, Education and Outreach, Research	**3.2** Manage sites to protect populations – Clarify landownership and land management for both Niagara sub-populations – Work with landowners and land managers at both sites to identify current site management practices, and develop guidelines to protect plants at all sites – Monitor population(s) following any changes to site management and adapt methods if necessary	• Site management
4. Address knowledge gaps, especially at the northern edge of the species' range.				

Relative Priority	Relative Timeframe	Recovery Theme	Approach to Recovery	Threats or Knowledge Gaps Addressed
Necessary	Long-term	Research	**4.1** Undertake research to address many remaining questions regarding the species' ecology: – Species demographics – Minimum viable population requirements – Genetic structure and risk of inbreeding depression (if any) – Limiting factors	• Species Ecology

Supporting Narrative
Population enhancement and site restoration at the two known Virginia Mallow populations is not currently considered necessary. Although the number of populations is extremely limited, both are regarded as naturally occurring. Of the two Ontario populations, one has recently increased, and the other appears to be stable (COSEWIC in press, T. Zammit, pers.comm.. 2010).

It is not known whether the current number of plants at the two Ontario populations will be sufficient to permit the Virginia Mallow's long-term viability (see Knowledge Gaps). However, until further information is available on minimum viable population size, the priority for recovery of Virginia Mallow is to protect and monitor extant sites.

2.4 Area for Consideration in Developing a Habitat Regulation

Under the ESA, a recovery strategy must include a recommendation to the Minister of Natural Resources on the area that should be considered in developing a habitat regulation. A habitat regulation is a legal instrument that prescribes an area that will be protected as the habitat of the species. The recommendation provided below by the author will be one of many sources considered by the Minister when developing the habitat regulation for this species.

It is recommended that the area prescribed as habitat in a regulation for Virginia Mallow include the contiguous Ecological Land Classification (ELC) ecosite polygon(s) (Lee et al. 1998) within which natural populations of the species are found. If a population (including sub-populations) occupies more than one ecosite type, then all contiguous ecosite polygons should be included. Basing the prescribed area on the surrounding vegetation community (rather than on an arbitrary distance from the population) is preferred, as it will help to maintain the ecological conditions required for the persistence and long-term sustainability of Virginia Mallow. However, it is recommended that this ecosite approach to identifying habitat be tested prior to regulation.

Because Virginia Mallow may establish in disturbed areas, ecosites that are anthropogenic in origin (e.g., Cultural Meadows and Cultural Thickets) may also be included in a habitat regulation.

Areas containing Virginia Mallow plants that are believed to be horticultural specimens (i.e., those planted in landscaped gardens) should not be prescribed as habitat in a regulation.

GLOSSARY

Carolinian Zone[1]: The forest zone found in the most southerly parts of Ontario (immediately north of Lake Erie). It is characterized by deciduous trees, and harbours many species at or close to their northern distribution limits.

Clonal[2]: a group of genetically identical individuals, derived from a single parent as a result of asexual reproduction (e.g. spreading rhizomes in plants)

Committee on the Status of Endangered Wildlife in Canada (COSEWIC): The committee responsible for assessing and classifying species at risk in Canada.

Committee on the Status of Species at Risk in Ontario (COSSARO): The committee established under section 3 of the *Endangered Species Act, 2007* that is responsible for assessing and classifying species at risk in Ontario.

Conservation status rank: A rank assigned to a species or ecological community that primarily conveys the degree of rarity of the species or community at the global (G), national (N) or subnational (S) level. These ranks, termed G-rank, N-rank and S-rank, are not legal designations. The conservation status of a species or ecosystem is designated by a number from 1 to 5, preceded by the letter G, N or S reflecting the appropriate geographic scale of the assessment. The numbers mean the following:

1 = critically imperilled
2 = imperilled
3 = vulnerable
4 = apparently secure
5 = secure

Endangered Species Act, 2007 (ESA): The provincial legislation that provides protection to species at risk in Ontario.

Perfect flower[2]: A flower having both stamens (male parts) and carpels (female parts).

Rhizome[2]: A horizontal underground stem.

Species at Risk Act (SARA): The federal legislation that provides protection to species at risk in Canada. This act establishes Schedule 1 as the legal list of wildlife species at risk to which the SARA provisions apply. Schedules 2 and 3 contain lists of species that at the time the act came into force needed to be reassessed. After species on Schedule 2 and 3 are reassessed and found to be at risk, they undergo the SARA listing process to be included in Schedule 1.

[1] Source: Wake, W. (1997)
[2] Source: Raven et al. (1992) (some definitions with minor modifications)

Species at Risk in Ontario (SARO) List: The regulation made under section 7 of the *Endangered Species Act, 2007* that provides the official status classification of species at risk in Ontario. This list was first published in 2004 as a policy and became a regulation in 2008.

Scarification[2]: the process of cutting or softening a seed coat to hasten germination.

[2] Source: Raven et al. (1992) (some definitions with minor modifications)

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