

Photo: Michael J. Oldham



## False Hop Sedge (*Carex lupuliformis*) in Ontario

### Ontario Recovery Strategy Series

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

2017

*Natural. Valued. Protected.*

# 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) 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 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 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. 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 and Forestry Species at Risk webpage at:

[www.ontario.ca/speciesatrisk](http://www.ontario.ca/speciesatrisk)

## RECOMMENDED CITATION

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## **ACKNOWLEDGMENTS**

We thank Dave Jolly of EARTHQUEST and Eric Snyder of the Ontario Ministry of Natural Resources and Forestry for providing information that assisted in the development of this recovery strategy.

## **DECLARATION**

The recovery strategy for the False Hop Sedge 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 and Forestry  
Environment and Climate Change Canada – Canadian Wildlife Service, Ontario  
Parks Canada Agency

## **EXECUTIVE SUMMARY**

The *Endangered Species Act, 2007* (ESA) requires the Minister of Natural Resources and Forestry to ensure recovery strategies are prepared for all species listed as endangered or threatened on the Species at Risk in Ontario (SARO) List. Under the ESA, a recovery strategy may incorporate all or part of an existing plan that relates to the species.

The False Hop Sedge (*Carex lupuliformis*) is listed as endangered on the SARO List. The species is also listed as endangered under the federal *Species at Risk Act* (SARA). Environment Canada prepared the Recovery Strategy for the False Hop Sedge (*Carex lupuliformis*) in Canada in 2014 to meet its requirements under the SARA. This recovery strategy is hereby adopted under the ESA. With the additions indicated below, the enclosed strategy meets all of the content requirements outlined in the ESA.

The Critical Habitat section of the federal recovery strategy provides an identification of critical habitat (as defined under the SARA). Identification of critical habitat is not a component of a recovery strategy prepared under the ESA. However, it is recommended that the approach used to identify critical habitat in the federal recovery strategy be considered when developing a habitat regulation under the ESA.

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## ADOPTION OF FEDERAL RECOVERY STRATEGY

The *Endangered Species Act, 2007* (ESA) requires the Minister of Natural Resources and Forestry to ensure recovery strategies are prepared for all species listed as endangered or threatened on the Species at Risk in Ontario (SARO) List. Under the ESA, a recovery strategy may incorporate all or part of an existing plan that relates to the species.

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### Species Assessment and Classification

COMMON NAME: False Hop Sedge

SCIENTIFIC NAME: *Carex lupuliformis*

SARO List Classification: Endangered

SARO List History: Endangered (2004)

COSEWIC Assessment History: Endangered (2011, 2000), Threatened (1997)

SARA Schedule 1: Endangered (2003)

CONSERVATION STATUS RANKINGS:

GRANK: G4

NRANK: N1N2

SRANK: S1

The glossary provides definitions for technical terms, including the abbreviations above.

### Area for Consideration in Developing a Habitat Regulation

*Under the ESA, a recovery strategy must include a recommendation to the Minister of Natural Resources and Forestry 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 will be one of many sources considered by the Minister, including information that may become newly available following completion of the recovery strategy, when developing the habitat regulation for this species.*



The Critical Habitat section of the federal recovery strategy provides an identification of critical habitat (as defined under the SARA). Identification of critical habitat is not a component of a recovery strategy prepared under the ESA. However, it is recommended that the approach used to identify critical habitat in the federal recovery strategy be considered when developing a habitat regulation under the ESA.

Development of a habitat regulation under the ESA should also consider Ecological Land Classification of the species' habitat, which may aid biologically-based habitat delineation.

## Glossary

Committee on the Status of Endangered Wildlife in Canada (COSEWIC): The committee established under section 14 of the Species at Risk Act that is 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. Ranks are determined by NatureServe and, in the case of Ontario's S-rank, by Ontario's Natural Heritage Information Centre. 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
- NR = not yet ranked

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

*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. 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.

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.

**Appendix 1. Recovery Strategy for the False Hop Sedge (*Carex lupuliformis*) in Canada**

# Recovery Strategy for the False Hop Sedge (*Carex lupuliformis*) in Canada

## False Hop Sedge



2014

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For copies of the recovery strategy or for additional information on species at risk, including COSEWIC status reports, residence descriptions, action plans and other related recovery documents, please visit the Species at Risk Public Registry ([www.sararegistry.gc.ca](http://www.sararegistry.gc.ca)).

**Cover illustration:** © Matthew Wild, Environment Canada, Canadian Wildlife Service, Quebec Region

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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* (SARA) (S.C. 2002, c. 29), the federal competent ministers are responsible for the preparation of recovery strategies for listed Extirpated, Endangered and Threatened species and are required to report on progress within five years.

The Minister of the Environment is the competent minister for the recovery of the False Hop Sedge and has developed this strategy, as per section 37 of SARA. The recovery strategy was prepared in cooperation with the governments of Ontario (Ministry of Natural Resources) and Quebec (Ministère du Développement durable, de l'Environnement, de la Faune et des Parcs).

Success in the recovery of this species depends on the commitment and cooperation of the many different constituencies that will be involved in implementing the directions set out in this strategy and will not be achieved by Environment Canada or any other jurisdiction alone. All Canadians are invited to join in supporting and implementing this strategy for the benefit of the False Hop Sedge and Canadian society as a whole.

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

## ACKNOWLEDGMENTS

This recovery strategy was prepared by Vincent Carignan and Matthew Wild (Environment Canada, Canadian Wildlife Service – Quebec Region) and Kathy Saint-Laurent (Environment Canada, Canadian Wildlife Service – Ontario Region) based on a draft by Nicole Lavoie (consulting botanist). Many people contributed to the document, including members of the advisory committee for the recovery of False Hop Sedge in Canada [Patricia Désilets (Ministère du Développement durable, de l'Environnement, de la Faune et des Parcs du Québec), Kate MacIntyre and Allen Woodliffe (Ontario Ministry of Natural Resources) and Andrée Nault (research team of Montréal's Biodôme)], Alain Branchaud and Karine Picard (Environment Canada, Canadian Wildlife Service – Quebec Region), Kate Hayes (formerly with Environment Canada, Canadian Wildlife Service – Ontario Region), Angela Darwin, Madeline Austen, Graham Bryan, Lesley Dunn and Dalia Al-Ali (Environment Canada, Canadian Wildlife Service – Ontario Region), Marie-José Ribeyron (formerly with Environment Canada, Canadian Wildlife Service – National Capital Region), Tanys Uhmman (Environment Canada, Canadian Wildlife Service – National Capital Region), Jacques Labrecque, Nadia Cavallin, Jacques Cayouette, Guy Jolicoeur and Line Couillard (Ministère du Développement durable, de l'Environnement, de la Faune et des Parcs du Québec), Bree Walpole, Eric Snyder and Michael J. Oldham (Ontario Ministry of Natural Resources), Jacinthe Letendre and Stéphanie Pellerin (Institut de recherche en biologie végétale), as well as Diane Amirault-Langlais and Marjorie Mercure (formerly with Environment Canada, Canadian Wildlife Service – Quebec Region).

## EXECUTIVE SUMMARY

False Hop Sedge is an herbaceous perennial in the sedge family that grows in tufts on the margins of wetlands (e.g., swamps, marshes, floodplains). The species was assessed as Endangered by the Committee on the Status of Endangered Wildlife in Canada (COSEWIC) in 2000 and 2011, and has been listed as Endangered on Schedule 1 of the *Species at Risk Act* since 2003.

The False Hop Sedge has a sporadic distribution in eastern North America and is at the northern limit of its range in Canada, occurring solely in the southernmost part of Ontario and Quebec. In Canada, there are 20 known populations of which 14 are currently extant. Naturally occurring individuals have been detected in 12 of these since 2009. Transplantations have been conducted in 7 extant populations, and reintroductions have taken place in 3 formerly extirpated populations. In 2009–2010, there were approximately 361 tufts of False Hop Sedge in Canada, half of which were the result of reintroduction or transplantation efforts. Following a major flooding event in Quebec during the spring of 2011, only two naturally occurring tufts remained in that province. However, in 2012, the total had climbed back to 38 natural tufts.

The main threats to False Hop Sedge have been identified as alteration of the water regime, canopy closure, invasive alien plant species, recreational and landowner activities, parasites, garbage dumping and residential development. It should also be noted that a limited number of extant populations with low abundance distributed within a restricted geographic region poses a significant challenge for the long-term persistence of the species in Canada.

The recovery of False Hop Sedge is considered technically and biologically feasible. The population and distribution objective is to maintain or, where feasible, increase the abundance and the area of occupancy of False Hop Sedge in Canada. The broad strategies to be taken to address the threats to the survival and recovery of the species are presented in the section Strategic Direction for Recovery.

The critical habitat of False Hop Sedge in Canada is partially identified in this recovery strategy. It corresponds to the suitable habitat at 13 of the 20 locations where populations of the species are found or described, including all of the populations that have benefited from reintroduction or transplantation efforts or within which the existence of suitable habitat has been recently confirmed. A schedule of studies proposes to determine the necessity of identifying critical habitat at the Amherstburg and Galt locations in Ontario as well as to establish the boundaries of the critical habitat units at the Lambeth (Ontario) and Oka (Quebec) locations.

One or more action plans will be posted on the Species at Risk Public Registry by 2019.



## SUMMARY OF RECOVERY FEASIBILITY

In considering the criteria established by Government of Canada (2009), the competent minister must determine whether the recovery of the listed wildlife species is technically and biologically feasible. On the basis of the criteria established in the draft SARA Policies (Government of Canada 2009), recovery of False Hop Sedge is considered biologically and technically feasible, since the responses to the following statements are “yes” or “unknown”:

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

Yes. Inventories conducted since 2005 have located new False Hop Sedge populations and natural seed and seedling production has recently been observed at 11 extant populations in Canada. Seedlings were produced *ex situ* in Quebec (up until 2010) and Ontario.

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

Yes. In Ontario, suitable habitat is found at least at 7 of the 9 locations that are currently occupied by populations, and more than 35 wetlands showing similarities to habitats supporting extant populations have been identified elsewhere in the province. In Quebec, 9 potential wetlands have been identified along the Ottawa River and 3 along the Richelieu River (Bachand-Lavallée and Pellerin 2006). These wetlands are located near extant or historical populations along a 10-km stretch of the Ottawa River and a 20-km stretch of the Richelieu River.

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

Yes. The threats with the highest level of concern (e.g. canopy closure, alteration of water regime) can be avoided or mitigated through recovery activities such as habitat protection and stewardship. It should also be noted that a limited number of extant populations (14) with low abundance (< 400 individuals total) distributed within a restricted geographic region poses a significant challenge for the long-term persistence of the species.

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

Yes. Although habitat restoration (e.g. clearing competing vegetation) and reintroduction or transplantation of False Hop Sedge individuals have been successfully carried out in the field (Bachand-Lavallée and Pellerin 2006, Letendre et al. 2007), the outcome of such efforts can be moderated by the fact that the species is at the northern limit of its range in Canada. In 2010, the survival rate of transplanted individuals ranged from 17 to 82%, depending on the population, and the rate of survival of seed-producing individuals ranged from 15 to 60% (COSEWIC 2011).

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## 1. COSEWIC<sup>1</sup> SPECIES ASSESSMENT INFORMATION

**Date of Assessment:** November 2011

**Common Name:** False Hop Sedge

**Scientific Name:** *Carex lupuliformis*

**COSEWIC Status:** Endangered

**Reason for Designation:** In Canada, this rare sedge is found in southern Ontario and Quebec where fewer than 250 mature plants have been found. There have been substantial historical population losses attributed to residential development and other forms of land use. Continued declines are attributed to late season flooding, land drainage, invasive alien species, recreation, erosion, garbage dumping, water regime regulation, and residential and urban development. Recovery efforts have included reintroduction at three sites in Quebec.

**Canadian Occurrence:** Ontario, Quebec

**COSEWIC Status History:** Designated Threatened in April 1997. Status re-examined and designated Endangered in May 2000 and November 2011.

## 2. SPECIES STATUS INFORMATION

Less than 1% of the global False Hop Sedge population is found in Canada (Labrecque 1998). The species is listed as Endangered<sup>2</sup> on Schedule 1 of the *Species at Risk Act* (SARA) (S.C. 2002, c. 29). It is listed as Threatened<sup>3</sup> in Quebec under the *Act respecting threatened or vulnerable species* (R.S.Q. c. E-12.01) and as Endangered in Ontario under the *Endangered Species Act, 2007* (S.O. 2007, c. 6).

In the most recent NatureServe assessment (dating from 2000), the species was assigned a global conservation status rank of G4 (apparently secure), a national rank of N4 (apparently secure) in the United States and N2 (imperiled) in Canada, and a subnational rank of S1 (critically imperiled) in Ontario and Quebec (NatureServe 2010; see Appendix A for definitions of ranks).

<sup>1</sup> Committee on the Status of Endangered Wildlife in Canada.

<sup>2</sup> Endangered species: A wildlife species facing imminent extinction in Canada or globally.

<sup>3</sup> Threatened species: A species at risk of extinction.

### 3. SPECIES INFORMATION

#### 3.1 Species Description

Based on COSEWIC (2011) and references cited therein, False Hop Sedge is a perennial herbaceous plant in the Cyperaceae family that reaches a height between 50 and 130 cm. It grows in tufts comprising 5 to 30 stems arising from a sympodial rhizome<sup>4</sup>. The leaves (i.e., blades) are smooth, erect and 30 to 80 cm long. Flowering begins in late June with a flower measuring 6 to 40 cm across and bearing 1 to 6 elongated spikes. Fruiting occurs from mid-July to late October in Canada. The fruit casing is glossy. The plant's fruits contain a single seed, are trigonous (have a triangular cross-section). The fruit bears a prominent nipple-like knobs, a characteristic that can be used to distinguish it from Hop Sedge (*Carex lupulina*), which is otherwise virtually identical during the vegetative stage.

#### 3.2 Population and Distribution

False Hop Sedge is a species with a sporadic distribution in eastern North America and is at the northern limit of its distribution in Canada. Its range in the United States includes all states from Wisconsin, Iowa, Kansas, Oklahoma and Texas eastward to New York. In Canada, it occurs solely in the southernmost part of Ontario and Quebec (Figure 1).

According to COSEWIC (2011), the species' Canadian extent of occurrence is about 23,900 km<sup>2</sup> (~ 41,800 km<sup>2</sup> when including reintroduction sites). This area has declined by about 21,550 km<sup>2</sup> since the last report (Labrecque 1998), primarily owing to the extirpation of the populations in the Ottawa River sector in Quebec. When the sites where reintroduction has taken place are factored in, the reduction is 3,540 km<sup>2</sup>. The species' current area of occupancy in Canada is less than 0.01 km<sup>2</sup>.

There are 20 known populations in Canada of which 14 are currently extant. Naturally occurring individuals have been detected in 12 of these since 2009 (Appendix B). In Ontario, all populations are concentrated in Middlesex and Elgin counties. In Quebec, they are located along a 20-km stretch of the Richelieu River, near Saint-Jean-sur-Richelieu, and along a 10-km stretch of the Ottawa River.

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<sup>4</sup> Refers to the way the stems develop successively and remain connected.



**Figure 1: Distribution of False Hop Sedge in North America. Map by Y. Lachance, reproduced with permission of Ministère du Développement durable, de l'Environnement et des Parcs du Québec (in COSEWIC 2011).**

In order to increase the resilience of the species, individuals have been transplanted in 7 of the extant populations (2 in Quebec, 5 in Ontario) and reintroduced at 3 of the sites of extirpated populations (all 3 in Quebec). The necessity of such recovery measures became evident following the major flooding of the Richelieu River in Quebec during spring 2011, after which only 2 naturally occurring individuals were found (Stéphanie Pellerin, personal communication). Had this species not benefited from reintroduction efforts and augmentation of its numbers by transplantations since 2006, it would have been nearly extirpated in the Province of Quebec today. It should, however, be noted that the species tends to re-establish after such events. In fact, there were 38 tufts of sedge when inventories were conducted along the Richelieu in 2012 (Stéphanie Pellerin, personal communication).

In 2009–2010, there were 361 mature individuals (142, if transplants are excluded) in the extant populations. Population abundance can fluctuate from year to year and, despite recurrent monitoring of populations, no clear trend is discernable. A number of factors explain this situation. First, the data available prior to 2005 were primarily estimates and based solely on fruiting individuals which vary as a function of hydrological conditions (Letendre *et al.* 2007). Second, it is almost impossible to identify vegetative (seedless) individuals of the species. Hence, permanent marking of plants is essential for tracking population trends. This approach has been used since 2005 for

individuals in Quebec's populations where more than 180 individuals have been marked<sup>5</sup>, and the fluctuations observed indicate a downward trend (see Appendix B).

### 3.3 Needs of False Hop Sedge

The False Hop Sedge colonizes a transition zone along the natural shorelines of various types of wetland, some of which are subject to periodic short-term flooding or ice scouring (COSEWIC 2011). These types of habitat favour species that prefer high light exposure and, indeed, the vigour of the False Hop Sedge decreases as the woody vegetation grows more dense (Letendre et al. 2007). According to COSEWIC (2011), False Hop Sedge appears to have more specialized habitat requirements than most riparian species, which could partly account for its rarity.

In Ontario, wetlands that are currently colonized by False Hop Sedge are vernal pools as well as isolated marshes within wooded swamps that are unconnected to any major streams (Labrecque 1998; COSEWIC 2011). The wooded swamps within which these habitats are imbedded likely provide dispersal habitat and support the hydrological processes that maintain them (Eric Snyder, Ontario Ministry of Natural Resources, personal communication). At these locations, False Hop Sedge is found in areas with limited competition from herbaceous and shrubby plants. However, the most frequently observed associated species are Bog Hemp (*Boehmeria cylindrica*), Rice Cutgrass (*Leersia oryzoides*), Hop Sedge (*Carex lupulina*), Clearweed (*Pilea pumila*), Beggarticks (*Bidens* spp.), Knotweed (*Polygonum persicaria*), Cocklebur (*Xanthium strumarium*) as well as Red Ash (*Fraxinus pennsylvanica*), Red Maple (*Acer rubrum*) or Silver Maple (*Acer saccharinum*) (Labrecque, 1998). The soil is composed of a clay loam (Labrecque 1998).

In Quebec, False Hop Sedge has only been observed in Silver Maple swamps or shrub swamps in small isolated bays that are sheltered from currents but near a natural shoreline subjected to periodic flooding of short duration. Associated species include Red Ash, Black Willow (*Salix nigra*), Reed Canary Grass (*Phalaris arundinacea*), Bog Hemp, Rice Cutgrass, Water Parsnip (*Sium suave*), Prairie Cordgrass (*Spartina pectinata*) and Hop Sedge. Except in the case of the Lacolle population, which is located 50 m from a river, the tufts are very close to water (10–15 m) during low-flow periods. The soil is composed of a gleysol<sup>6</sup> of recent alluvia with textures ranging from sandy loam to clay loam (Labrecque 1998) with poor drainage (COSEWIC 2011).

The preceding habitat characteristics and species associations are based on a subset of locations occupied by the species and may not necessarily represent conditions that are optimal for this species, which has a very limited distribution in Canada and is at the northern limit of its distribution. The current distribution of the species could, in certain instances, be the result of historical artifacts related to landscape development.

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<sup>5</sup> In Quebec, all naturally occurring and transplanted individuals are currently marked. For transplanted individuals, stakes are removed after three years of absence whereas stakes are never removed for naturally occurring individuals (Stéphanie Pellerin, personal communication).

<sup>6</sup> <http://www.soilsofcanada.ca/orders/index.php>

A persistent seed bank (Templeton and Levin 1979) plays a crucial role in maintaining False Hop Sedge populations. Aside from the fact that the seeds are dispersed primarily by water, little is known about seed dispersal dynamics. It is nonetheless likely that mature seeds fall into the water and are carried over long distances during flooding, thereby ensuring local dispersal (Labrecque 1998) and colonization of suitable habitats that become available (COSEWIC 2011). Despite this, it is assumed that no genetic exchange takes place between the Ontario and Quebec populations since they are hydrologically isolated (COSEWIC 2011).

## 4. THREATS

### 4.1 Threat Assessment

Table 1. Threat Assessment.

Threat	Level of Concern <sup>1</sup>	Extent	Occurrence	Frequency	Severity <sup>2</sup>	Causal Certainty <sup>3</sup>
<b>Habitat loss or degradation</b>						
Alteration of water regime	High	Widespread	Current	Continuous	High/Moderate <sup>4</sup>	High
Recreational and landowner activities	Medium	Widespread	Current	Continuous	Moderate	Medium
Residential development	Low	Localized	Historical	Continuous	High/Moderate	High
<b>Changes in ecological dynamics or natural processes</b>						
Canopy closure	High	Localized	Current	Continuous	High/Moderate	High
<b>Alien, invasive or introduced species/genome</b>						
Invasive alien plant species	Medium	Widespread	Current	Continuous	Unknown	High
Parasites	Low	Widespread	Current	Continuous	Unknown	Low
<b>Pollution</b>						
Garbage dumping	Low	Localized	Current	Continuous	Low	Low

<sup>1</sup> 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. Threats with a low Level of Concern are listed and described but may not be specifically addressed in the recovery approaches.

<sup>2</sup> Severity: reflects the population-level effect (High: very large population-level effect, Moderate, Low, Unknown).



<sup>3</sup> 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).

<sup>4</sup> Each threat assessment criterion is assessed for each population and for the entire range. When two qualifiers are indicated in a box, it means the identified threat does not have the same impact at both levels (scale of populations/entire range).

## 4.2 Description of Threats

The threats listed below are presented in decreasing order of the level of concern. It should also be noted, however, that a limited number of extant populations (14) with low abundance (< 400 individuals total) distributed within a restricted geographic region poses a significant challenge for the long-term persistence of the False Hop Sedge.

### Alteration of the water regime

Natural fluctuations in water levels as well as drought periods appear to play a crucial role in the establishment and maintenance of False Hop Sedge and its habitat. Indeed, episodic high-water levels can provide suitable habitat by removing competing plant species and by eroding more forested riparian habitats, thereby creating openings that are suitable for the establishment of new individuals (Labrecque 1998; Bachand-Lavallée and Pellerin 2006; Jolicoeur and Couillard 2006; COSEWIC 2011). However, excessive water saturation of the substrate does not favour the expansion of Silver Maple swamps (Jean Morin, personal communication) and appears to impede the emergence of seedlings and reduce the vigour of individuals (Letendre et al. 2007). Indeed, it has been shown that high water levels such as those observed on the Richelieu River since the 2000s (and particularly during the spring 2011 floods) cause the loss of False Hop Sedge plants (Letendre *et al.* 2007; Stephanie Pellerin, personal communication). Locations where the suitable habitat consists solely of a narrow strip of vegetation hemmed in along the river by private residences (e.g., Sainte-Anne-de-Sabrevois, McGillivray Bay) are more at risk from this threat.

Dam construction can exacerbate the negative effects of high water levels. In Quebec, the construction of the Carillon Dam in the 1950s altered the hydrological regime of the Ottawa River. The shoreline has been eroded in areas upstream of the dam. The dam may have also caused the extirpation of the populations in the Lac des Deux-Montagnes region (Jolicoeur and Couillard 2006). The threat of dam construction remains along the Richelieu River in Quebec but is unlikely in Ontario since most populations are found in woodland vernal pools.

In several Ontario populations, surface or subsurface drains (agricultural and/or municipal) are situated right next to most extant populations and appear to have dried the soils at the West Lorne and London locations. In Quebec, the location of extant populations within 10–15 m of large watercourses suggests that drainage is not a threat. However, the sites of some extirpated populations where reintroductions are being considered are more vulnerable as they are further away from these watercourses. Changes in the hydrological conditions of the habitat can promote the growth of competing plant species in the shrub and herb layers, which can be detrimental to False Hop Sedge. The decline observed in several populations in Ontario and Quebec appears to be related to this factor (COSEWIC 2011).

### Canopy closure

False Hop Sedge is a shade-intolerant species and, as such, is threatened by vegetation succession (COSEWIC 2011). This appears to have been the cause of the extirpation of the Grande Baie d'Oka and Rigaud (Quebec) populations as well as the Amherstburg (Ontario) population (Labrecque 1998). As found in many other species of *Carex*, the seeds may nonetheless remain viable in the soil for more than 10 years (Leck and Shutz 2005) and germinate following disturbance of the soil or opening of the canopy. This situation was observed at the Mount Brydges (Ontario) population where forest harvesting created openings in the canopy, promoting a dramatic increase in the number of individuals at this location (from 25–30 in 1992 to 1,075 in 2003). However, competition by herbaceous vegetation and closing of the canopy in subsequent years reduced the number of individuals to 29 in 2009.

### Invasive alien plant species

Invasive alien plants can affect the survival of False Hop Sedge by competing with it for sunlight and nutrients as well as by acting as a barrier to seed dispersal (COSEWIC 2011). The absence of water level fluctuations or low water levels is conducive to the establishment of invasive plants (Hudon *et al.* 2005). Species that may be more problematic are Purple Loosestrife (*Lythrum salicaria*), Reed Canary Grass, Reed Manna Grass (*Glyceria maxima*) and Common Buckthorn (*Rhamnus cathartica*). All the individuals at the Pointe du Gouvernement sector of the Henryville (Quebec) population appear to have disappeared due to the establishment of a dense stand of Reed Canary Grass (COSEWIC 2011). European Water-chestnut (*Trapa natans*), although not currently present at False Hop Sedge populations, occurs in some areas along a tributary of the Richelieu River (Quebec) as well as upstream of the Carillon dam on the Ottawa River on the Ontario side. This species forms a dense carpet on the water surface that could eventually invade the False Hop Sedge's populations and inhibit its growth and dispersal.

### Recreational and landowner activities

A number of populations are located in areas where mortality through trampling of the plants is a threat because of public access or landowner activities (e.g., grazing, hunting, clearing of underbrush and tree harvesting). All-terrain vehicle (ATV) use has been observed near two populations in Quebec (Carillon Island and Henryville (Labrecque 1998)). Proximity of False Hop Sedge to residences or recreational areas also increases the risk of vandalism, as was observed in the Parc national d'Oka, where a number of transplanted tufts were pulled up by park users.

### Parasites

False Hop Sedge and other members of this plant family are hosts of a dipteran<sup>7</sup> parasite. The larvae of this parasite develop inside the fruit, causing a deformity that affects the position of the fruit casing. This phenomenon affects all extant Canadian populations, but more so the one at Saint-Blaise-sur-Richelieu (COSEWIC 2011). The effect this parasite has on the species is unknown (Labrecque 1998). In addition, an

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<sup>7</sup> Insects of the order Diptera, also known as the true flies, characterized by a single pair of wings; includes houseflies, mosquitoes and gnats.

alien aphid (*Ceruraphis eriophori*) has been observed on several plants in Quebec and may be present in Ontario. The presence of the aphids appears to be linked to premature drying of plants (Letendre *et al.* 2007) and appears to be correlated with the drying and mortality of a number of individuals transplanted in Quebec in 2006. It is possible the aphid could have a significant impact on the species' long-term survival (COSEWIC 2011). A sawfly (*Pachynematus corniger*) has also been observed feeding on the leaves of False Hop Sedge in Quebec. The impact of sawfly feeding on the survival of False Hop Sedge plants has not been studied, but it appears to reduce the plants' vigour (COSEWIC 2011).

#### Garbage dumping

Garbage or other waste/debris can impede the growth of False Hop Sedge. This has been observed around the population in London (Ontario) and the populations along the Richelieu River in Quebec, where debris consist of floating materials deposited along the shoreline by floodwaters and waves (COSEWIC 2011).

#### Residential development

Residential development affects populations through habitat loss and degradation. Nearly two thirds of the shoreline of the Richelieu River have been altered, mainly as a result of residential development and the construction of marinas. Shoreline development likely explains the extirpation of the Sainte-Anne-de-Sabrevois, Saint-Paul-de-l'Île-aux-Noix, Iberville and Saint-Blaise-sur-Richelieu populations (Labrecque 1998). This threat is more limited now because of various legislative measures that protect wetlands. The COSEWIC status report (COSEWIC 2011) mentions residential development near the London (Ontario) population; however, this does not appear to be a major threat at present because the city owns the site and is not likely to develop it.

## **5. POPULATION AND DISTRIBUTION OBJECTIVE**

The population and distribution objective is to maintain and, as far as possible, increase the abundance and area of occupancy of the False Hop Sedge in Canada. At the present time, it is not possible to establish a quantifiable objective regarding the appropriate abundance of individual populations or the overall population in Canada but this may become possible at a later point.

In the southernmost part of Ontario and Quebec, a high rate of wetland loss was observed during the last century along with significant alteration of riparian habitats colonized by False Hop Sedge. This has resulted in the persistence of very few individuals within a limited number of populations, therefore increasing the vulnerability of the species to catastrophic events. For example, during the spring of 2011, severe flooding took place along the Richelieu River, wiping out all but two of the naturally occurring individuals. Had reintroduction or transplantation efforts not been undertaken in previous years, the species would be nearly extirpated from the Province of Quebec today. At the same time, such events can generate suitable habitats that can be colonized by the species if sufficient seed-producing individuals survive. Extant sites

may also bounce back from such events if the seed banks are not flooded for an extended period.

The objective of the federal recovery strategy corresponds to those set out in the Government of Quebec's conservation plan for the False Hop Sedge (Jolicoeur and Couillard 2006), which are to 1) protect and ensure the long-term persistence of all extant populations; and 2) introduce or reintroduce the species, if feasible, in the physiographic units<sup>8</sup> where it has become extirpated. No similar conservation plan has yet been prepared by the Province of Ontario.

## 6. BROAD STRATEGIES AND APPROACHES FOR MEETING RECOVERY OBJECTIVES

### 6.1 Actions Already Completed or Currently Underway

#### Conservation of the Species, its Suitable Habitat and the Adjacent Riparian Zone

- Seeds were sent to Agriculture and Agri-Food Canada's seed bank in Saskatoon. More than 2,500 fruits obtained from nearly all the populations in Canada (except Ailsa Craig and Lambeth in Ontario) were also sent to the Millenium Seed Bank of the Royal Botanic Gardens in Kew (England) for long-term conservation. Seeds have been collected in Ontario since 2006 and seedlings have been grown to reintroduce individuals in certain populations in Quebec since 2010.
- Habitats have been restored and individuals were reintroduced in the sites of 3 extirpated populations in Quebec (Sainte-Anne-de-Sabrevois, Saint-Blaise-sur-Richelieu and Grande Baie d'Oka) and transplanted in 2 populations in Quebec (Henryville and McGillivray Bay) and 5 populations in Ontario (West Elgin, West Lorne, London and Mount Brydges). In 2010, the survival of transplanted individuals ranged from 17 to 82%, and the survival of seed-producing individuals ranged from 15 to 60% (COSEWIC 2011).
- A portion of the Henryville population is legally designated as the Marcel-Raymond Ecological reserve as well as a plant habitat<sup>9</sup> (Baie-des-Anglais) under the Quebec *Act Respecting Threatened and Vulnerable Species*.
- In revising their regional development plan, the Haut-Richelieu, Deux-Montagnes and Argenteuil regional county municipalities designated three suitable False Hop Sedge habitats as ecologically significant areas. In these areas, only developments devoted to education, such as interpretive trails, can be authorized.

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<sup>8</sup> According to the Cadre écologique de référence of Quebec's Ministère du Développement durable, de l'Environnement, de la Faune et des Parcs (Li *et al.* 1994), physiographic units correspond to landscape elements measuring in the order of 1000 km<sup>2</sup>.

<sup>9</sup> According to section 17 of the Act "No person may, in the habitat of a threatened or vulnerable plant species, carry on an activity that may alter the existing ecosystem, the present biological diversity or the physical or chemical components peculiar to that habitat. »

- The Samuel-de-Champlain biodiversity reserve in Quebec (*Natural Heritage Conservation Act* R.S.Q. c. C-61.01) was designated in 2011 to protect 487 ha of wetlands in the Richelieu River (Quebec) sector between Saint-Jean-sur-Richelieu and the United States border.
- In Ontario, the habitat of the False Hop Sedge is protected under the *Endangered Species Act, 2007*.

### Surveys and Monitoring

- Since 2005, the extant populations of Quebec have been surveyed and mapped every year or two and a stewardship approach has been recommended for each (Jolicoeur and Couillard 2006).
- Nine new locations suitable for the reintroduction of the species have been identified along the Ottawa River (Bachand-Lavallée and Pellerin 2006; Letendre *et al.* 2007).
- In 2009, surveys were conducted at all the extant populations in Ontario as well as the extirpated Amherstburg site.

### Communication and Partnerships

- Outreach activities directed at the general public and more specifically at owners of properties located near False Hop Sedge populations of the Richelieu River region have been carried out annually since 2006 (e.g. Bachand-Lavallée and Pellerin 2006; Letendre *et al.* 2007).

## 6.2 Strategic Direction for Recovery

**Table 2. Recovery Planning for the False Hop Sedge.**

Threat or Limitation	Broad Strategy to Recovery	Priority	General Description of Research and Management Approaches
All	Conservation of the species, its suitable habitat and the adjacent riparian zone	High	<ul style="list-style-type: none"> <li>• Apply legal and stewardship measures within the suitable habitat and in the adjacent areas in order to reduce the impacts of the main threats.</li> <li>• Continue or implement management approaches to increase the abundance of the species and the area of suitable habitat, where feasible:               <ul style="list-style-type: none"> <li>○ <i>ex situ</i> cultivation of the species using artificial propagation techniques;</li> <li>○ restoration of habitats;</li> <li>○ reintroductions in the sites of historical or extirpated populations;</li> <li>○ transplantations in extant populations.</li> </ul> </li> </ul>
Gaps in knowledge related to demographics and biology	Survey and monitoring	High	<ul style="list-style-type: none"> <li>• Develop and implement a standard inventory and monitoring protocol for collection of comparable data in Ontario and Quebec, including               <ul style="list-style-type: none"> <li>○ Marking of all naturally occurring individuals at extant populations as well as reintroduced or transplanted individuals in order to better monitor population dynamics and trends.</li> <li>○ Gather georeferenced data on individual tufts as well as on the area of occupancy for the tufts</li> </ul> </li> <li>• Conduct a regular inventory of suitable habitat outside of known localities.</li> </ul>
All; Gaps in knowledge related to demographics and biology	Research	High	<ul style="list-style-type: none"> <li>• Develop techniques to increase the vigour and persistence of transplants:               <ul style="list-style-type: none"> <li>○ Study the species' capacities to adapt to ecological conditions (e.g., availability of light, frequency and length of flooding events) at the northern edge of its distribution</li> </ul> </li> <li>• Study the species' population dynamics               <ul style="list-style-type: none"> <li>○ Investigate the viability of seeds in the soil</li> <li>○ Determine how seed dispersal influences population dynamics</li> <li>○ Conduct a population viability analysis</li> </ul> </li> <li>• Study genetic aspects that could limit our ability to recover the species (e.g., hybridization).</li> </ul>
All	Communication and partnerships	Medium	<ul style="list-style-type: none"> <li>• Develop and implement a communication strategy for partner agencies, interest groups, private landowners and the general public.</li> </ul>

## 7. CRITICAL HABITAT

### 7.1 Identification of the Species' Critical Habitat

The False Hop Sedge colonizes natural shorelines of various types of wetlands. In Canada, biophysical attributes of suitable habitat for this species include the following:

#### For all populations

- Sufficient light to ensure the optimal germination of seeds as well as the vigour and survival of individual plants
- Reduced competition from other species (herbaceous or shrubs) that impede the growth of individual plants
- Adequate water table so as not to encourage competition from other species or impede growth

#### For populations in Ontario

- Wooded swamps and wooded swamp edges, including the vernal pools and isolated marshes within them.
- Associated species such as Bog Hemp, Rice Cutgrass, Hop Sedge, Clearweed, Beggarticks, Knotweed, Common Burdock as well as Red Ash, Red Maple or Silver Maple.
- A soil composed of a clay loam.

#### For populations in Quebec

- Silver Maple swamps or shrub swamp in small isolated bays that are sheltered from currents but near a natural shoreline subjected to periodic flooding of short duration.
- Associated species such as Reed Canary Grass, Bog Hemp, Rice Cutgrass, Water Parsnip, Prairie Cordgrass or Hop Sedge.
- A soil composed of a gleysol with recent alluvia, with textures ranging from sandy loam to clay loam.

The critical habitat of False Hop Sedge in Canada is partially identified in this recovery strategy. It corresponds to the suitable habitat at 13 of the 20 locations where populations of the species are found or described, including all of the populations that have benefited from reintroduction or transplantation efforts or within which the existence of suitable habitat has been recently confirmed. Of the 7 remaining locations, 4 need further investigations to determine whether the species or suitable habitat is still present or to establish their area of occupancy (quality ranking codes E and H) and a schedule of studies is proposed to that effect in section 7.2. Three locations no longer provide suitable habitat (code X) and will not be identified as critical habitat unless restoration efforts are undertaken.



In Quebec, critical habitat is identified at 7 locations (6 with extant populations, 3 of which have benefited from transplantations efforts and 3 that have benefited from reintroductions; and 1 in which the population is extirpated but suitable habitat is still available). Six of these populations are identified as priority conservation targets in the Government of Quebec's conservation plan for the False Hop Sedge, plus the seventh population, the Sainte-Anne-de-Sabrevois population, which is included in the federal recovery strategy because successful reintroduction efforts started after the publication of the provincial conservation plan in 2006. In Ontario, critical habitat is identified at 6 of the 7 locations hosting extant False Hop Sedge populations. Greater accuracy regarding the boundaries of the Lambeth location is necessary for it to be identified as critical habitat. The presence of suitable habitat must also be verified at the Galt and Amherstburg locations to determine whether restoration and reintroduction efforts are warranted or feasible.

The boundaries of critical habitat units at each location correspond to the extent of the woodlot and associated wetlands containing suitable False Hop Sedge habitat. Any element contained within the boundaries that does not correspond to the biophysical attributes of suitable habitat (e.g., agricultural field, road) is not considered critical habitat. Appendix D lists the 13 critical habitat units identified for Quebec and Ontario, their status (extant, have benefited from reintroduction or transplantation efforts or not) as well as geographic coordinates (1 x 1 km resolution). No maps or specific coordinates are provided for this species' critical habitat as the data is considered to be sensitive in some jurisdictions.

## 7.2 Schedule of Studies to Identify Critical Habitat

**Table 3. Schedule of Studies.**

Description of Activity	Rationale	Timeline
Determine whether individuals and/or suitable habitat are still present at the Galt and Amherstburg (Ontario) populations; establish the boundaries of the critical habitat at the Lambeth (Ontario) and Oka (Quebec) populations.	Identification of additional critical habitat units	2014–2019

## 7.3 Examples of Activities Likely to Result in Destruction of Critical Habitat

Habitat destruction is determined on a case-by-case basis. Destruction would occur if an element of the critical habitat was permanently or temporarily deteriorated to the point that the habitat can no longer serve its purpose when the species needs it. Destruction can result from one or several activities occurring at a given point or from the cumulative effects of one or more activities over a prolonged period (Government of Canada 2009).

The critical habitat of False Hop Sedge may be destroyed through two main mechanisms associated with human activities.

#### Changes in the water regime

- Changes in water levels due to drainage, dam construction/regulation of watercourses or similar activities can cause shoreline erosion, drying or excessive saturation of the substrate, or can indirectly affect canopy closure. This can make a site unfavourable for the germination of seeds or the growth of individuals, which require soil with a suitable level of water saturation. In addition, plants may experience a reduction in vigour due to increased competition from other plant species. Drier sites are also more easily colonized by competing plants, especially invasive species, which can lead to closure of the vegetation and increased shading.

#### Habitat loss or degradation

- Infrastructure development (e.g., roads, trails, houses, wharves, bank stabilisation structures) and land use changes (e.g., wood harvesting, mowing, haying) can cause the direct destruction and/or fragmentation of habitat, thus leading to both a reduction in the quantity of available suitable habitat and of the connectivity between populations.
- Tree harvesting and recreational activities can, under some circumstances, alter the soil structure through compaction caused by the passage of machinery or by trampling, which can negatively affect the growth of individuals or lead to difficulties with seed germination.
- Garbage or waste dumping can prevent the production of seeds or affect the vigour of the plants.

These examples do not represent an exhaustive list of the activities likely to destroy the critical habitat of False Hop Sedge.

## **8. MEASURING PROGRESS**

The performance indicator presented below provides a way to define and measure progress in achieving the population and distribution objectives.

- The abundance of False Hop Sedge and the area of occupancy in Canada are maintained and, where feasible, increased.

## **9. STATEMENT ON ACTION PLANS**

One or more action plans will be posted on the Species at Risk Public Registry by 2019.

## 10 REFERENCES

- Bachand-Lavallée, V. and S. Pellerin. 2006. Conservation du carex faux-lupulina, une espèce en voie de disparition au Canada. Institut de recherche en biologie végétale, Montréal. 34 pp.
- CDPNQ. 2011. Données sur le carex faux-lupulina. Centre de données sur le patrimoine naturel du Québec. Ministère du Développement durable, de l'Environnement et des Parcs du Québec.
- COSEWIC. 2011. COSEWIC assessment and update status report on the False Hop Sedge *Carex lupuliformis* in Canada. Committee on the Status of Endangered Wildlife in Canada. Ottawa. vi + 36 pp. <http://www.sararegistry.gc.ca>.
- Government of Canada. 2009. Environment Canada. 2009. *Species at Risk Act* Policies. Environment Canada. 38 pp. [http://www.registrelep-sararegistry.gc.ca/virtual\\_sara/files/policies/pg\\_species\\_at\\_risk\\_act\\_policies\\_1209\\_e.pdf](http://www.registrelep-sararegistry.gc.ca/virtual_sara/files/policies/pg_species_at_risk_act_policies_1209_e.pdf)
- Hill, S.R. 2006. Conservation Assessment for the False Hop Sedge (*Carex lupuliformis* Sartwell ex Dewey). Illinois Natural History Survey, Center for Wildlife and Plant Ecology Technical Report 2006 (11), Champaign, Illinois. 40 pp.
- Hudon, C., P. Gagnon, and M. Jean. 2005. Hydrological factors controlling the spread of Common Reed (*Phragmites australis*) in the St. Lawrence River (Quebec, Canada). *EcoScience* 12 : 347-357.
- Jolicoeur, G. and L. Couillard. 2006. Plan de conservation du carex faux-lupulina (*Carex lupuliformis*), Espèce menacée au Québec. Gouvernement du Québec, Ministère du Développement durable, de l'Environnement et des Parcs, Direction du patrimoine écologique et des parcs, Québec. 12 pp.
- Labrecque, J. 1998. La situation du carex faux-lupulina (*Carex lupuliformis*) au Canada. Québec: Gouvernement du Québec, Ministère de l'Environnement et de la Faune, Direction de la conservation et du patrimoine écologique. 33 pp.
- Leck, M.A., and Schutz, W. 2005. Regeneration of Cyperaceae, with particular reference to seed ecology and seed banks. *Perspectives in Plant Ecology Evolution and Systematics* 7 (2) : 95-133.
- Letendre, J., Pellerin, S. and S. Bailleul. 2007. Conservation du carex faux-lupulina, une espèce en voie de disparition au Canada. Institut de recherche en biologie végétale. 31 pp.
- Li, T., J. Bissonnette, J.P. Ducruc, V. Gerardin and L. Couillard. 1994. Le cadre écologique de référence du Québec : les régions naturelles. Overview presentation. Ministère de l'Environnement et de la Faune du Québec. 20 pp.
- NatureServe. 2004. A Habitat-Based Strategy for Delimiting Plant Element Populations:

Guidance from the 2004 Working Group. 15 pp.

NatureServe. 2010. NatureServe Explorer: An online encyclopedia of life [web application]. Version 7.1. NatureServe, Arlington, Virginia. Available (<http://www.natureserve.org/explorer>) (accessed January 26, 2011).

Templeton, A.R. and D.A. Levin. 1979. Evolutionary consequences of seed pools. *American Naturalist* 114: 232-249.

## **APPENDIX A: DEFINITION OF NATURESERVE RANKS**

G4 and N4 (Apparently Secure) —Uncommon species but not a rare one; cause for long-term concern due to declines or other factors.

N2 (Imperiled) —Imperiled in the target jurisdiction because of the species' rarity due to a very restricted range, very few populations, steep declines, or other factors making it very vulnerable to extirpation from the target jurisdiction.

S1 (Critically Imperiled) —Critically imperiled in the target jurisdiction because of the species' extreme rarity or because of one or more factors such as very steep declines making it especially vulnerable to extirpation from the target jurisdiction.

## APPENDIX B. FALSE HOP SEDGE POPULATIONS IN CANADA

**Table B-1: False Hop Sedge Populations in Canada**

Name of Population (NHIC or CDPNQ ID) <sup>1</sup>	Province	County	Status of Population and Quality Rank <sup>2</sup>	Inventory Year	Number of Natural Plants (fruiting stems)	Number of Transplants (fruiting stems)
Mount Brydges (5803)	Ontario	Middlesex	Extant (A)	1992	25–30	
				2005	1075	
				2009	29 (43)	
West Lorne (5802)	Ontario	Elgin	Extant (A)	1993	~ 100	
				2005	63	
				2009	20 (59)	
West Elgin (92901)	Ontario	Elgin	Extant (A)	2005	? (~ 150)	
				2009	39 (132)	63 (91)
Ailsa Craig (NA)	Ontario	Middlesex	Extant (B)	2009	19	
London (5804)	Ontario	Middlesex	Extant (D)	1992	12 (~ 150)	
				2002	> 12	
				2005	28	
				2009	5 (4)	
Rodney (5805)	Ontario	Elgin	Extant (D)	1993	±93	
				2002	2	
				2005	26	
				2009	1 (2)	
Lambeth (NA)	Ontario	Middlesex	Extant (E)	2009	?	
Amherstburg (2938)	Ontario	Essex	Historical (H)	1985	~ 100	
				2002	0	
				2005	0	
				2009	0	
Galt (2937)	Ontario	Waterloo	Historical (H)	1902	Herbarium	
Grande Baie d'Oka (6867)	Quebec	Deux-Montagnes	Extant - reintroduction (Cr)	1935	Herbarium	
				1992	Herbarium	
				2006	0	
				2007	0	
				2008	0	
				2009	0	22 (1)
				2010	0	22 (121)
2011	0	51				
Sainte-Anne-de-Sabrevois (6872)	Quebec	Haut-Richelieu	Extant - reintroduction (Cr)	1938	Herbarium	
				1992	0	
				2007	0	61 (120)
				2008	0	19 (6)
				2009	0	15 (17)
2010	0	13 (20)				

Name of Population ( NHIC or CDPNQ ID) <sup>1</sup>	Province	County	Status of Population and Quality Rank <sup>2</sup>	Inventory Year	Number of Natural Plants (fruiting stems)	Number of Transplants (fruiting stems)
				2011	0	9
McGillivray Bay (6876)	Quebec	Haut-Richelieu	Extant (C)	1994	5	
				2001	25	
				2003	18	
				2005	> 10	
				2007	9 (?)	50 (16)
				2008	12(41)	16 (21)
				2009	6 (22)	26 (66)
				2010	4 (3)	24 (7)
				2011	1 (3)	8 (0)
Henryville <sup>3</sup> (6874)	Quebec	Haut-Richelieu	Extant (C)	1991	?	
				1992	~ 13	
				1997	19	
				2000	19	
				2004	3	
				2005	24	
				2006	18 (27)	
				2007	17 (33)	25 (1)
				2008	20 (178)	54 (1)
				2009	26 (175)	46 (44)
				2010	22 (148)	26 (55)
Saint-Blaise-sur-Richelieu (6873)	Quebec	Haut-Richelieu	Extant (D)	1992	5	
				2004	0	
				2005	0	
				2007	0	10 (24)
				2008	0	33 (99)
				2009	0	18 (88)
				2010	1 (2)	71 (102)
				2011	1 (1)	33 (0)
Lacolle (15349)	Quebec	Haut-Richelieu	Extant (D)	2005	7	
				2006	7	
				2007	1	
				2008	1 (2)	
				2009	2 (1)	
Oka (18675)	Quebec	Deux-Montagnes	Extant (E)	2008	?	
Carillon Island (6875)	Quebec	Argenteuil	Extirpated (X)	1992	2-10	
				2001	0	
				2002	0	
				2006	0	
				2007	0	
Rigaud (6868)	Quebec	Vaudreuil-Soulanges	Extirpated (X)	1934	Herbarium	
				2007	0	
Iberville (6869)	Quebec	Haut-Richelieu	Extirpated (X)	1938	Herbarium	
				1992	0	

Name of Population ( NHIC or CDPNQ ID) <sup>1</sup>	Province	County	Status of Population and Quality Rank <sup>2</sup>	Inventory Year	Number of Natural Plants (fruiting stems)	Number of Transplants (fruiting stems)
Saint-Paul-de-l'Île-aux-Noix (6871)	Quebec	Haut-Richelieu	Extirpated (X)	1972	Herbarium	
				1992	0	

Sources: Bachand-Lavallée and Pellerin (2006), Letendre et al. (2007), CDPNQ (2011) and COSEWIC (2011).

<sup>1</sup> CDPNQ (Centre de données sur le patrimoine naturel du Québec); NHIC (Natural Heritage Information Center)

<sup>2</sup> Provides an assessment of the estimated viability or probability of persistence of the population (see Appendix C).

<sup>3</sup> Following a review of the data by the CDPNQ in 2011, individuals from the Pointe du Gouvernement and Marcel-Raymond Ecological Reserve are considered to be part of the same population. No individuals have been detected in the Pointe du Gouvernement sector since 1992 and no individuals have been transplanted there.



## APPENDIX C: DEFINITION OF QUALITY RANKS OF FALSE HOP SEDGE POPULATIONS

Quality Rank	Definition
A (Excellent)	More than 25 tufts in a floodplain forest covering at least 400 ha that is not affected by artificial regulation of water levels and that is subject to only minimal disturbance from human activities.
B (Good)	From 12 to 25 tufts in a floodplain forest covering at least 400 ha that is subject to moderate disturbance from human activities, or a smaller habitat (more than 200 ha with little or no disturbance).
C (Fair)	From 6 to 11 tufts in a 200-ha habitat that is significantly disturbed by human activities and has an intact natural flooding regime.
D (Low)	From 1 to 5 tufts in a heavily degraded habitat of any size; major disturbances caused by erosion, forest clearing, marina construction or altered natural flooding regime, or drainage.
E (Recent)	Recent population; the observation of the population dates back less than 25 years, but no information on its demographics is available.
F (Not relocated)	Population not relocated during inventories conducted in the past 20 years (fail to find).
H (Historical)	The observation (inventories) of the population dates back more than 20 years.
X (Extirpated)	Extirpated population. No individuals of the species have been found for more than 20 years. The habitat may no longer be suitable. After three subsequent failures to find the population, it is classified as extirpated even if suitable habitat is still present.
r (Reintroduction)	Population resulting from the reintroduction of individuals into a location from which the population has officially been extirpated.

## APPENDIX D. CRITICAL HABITAT OF FALSE HOP SEDGE IN CANADA

**Table D-1: Description of the 1 x 1 km Standardized UTM Squares Containing Critical Habitat and Critical Habitat Units for the False Hop Sedge in Quebec.**

Name of the Critical Habitat Unit	1 x 1 km UTM Square ID <sup>1</sup>	UTM Square Coordinates <sup>2</sup>		Description	Land Tenure <sup>3</sup>
		Easting	Northing		
Henryville	18XR30_70 18XR30_71 18XQ39_79 18XQ39_89	637000 637000 637000 638000	5000000 5001000 4999000 4999000	Extant population where transplantation efforts have been undertaken (Marcel-Raymond Ecological Reserve sector); location is identified as a conservation target in the provincial conservation plan	Non-federal
McGillivray Bay	18XQ39_67 18XQ39_77 18XQ39_78 18XQ39_79	636000 637000 637000 637000	4997000 4997000 4998000 4999000	Extant population where transplantation efforts have been undertaken ; location is identified as a conservation target in the provincial conservation plan	Non-federal
Saint-Blaise-sur-Richelieu	18XR30_67 18XR30_68	636000 636000	5007000 5008000	Extant population where transplantation efforts have been undertaken; location is identified as a conservation target in the provincial conservation plan	Non-federal
Sainte-Anne-de-Sabrevois	18XR30_76	637000	5006000	Extant population with suitable habitat where reintroduction efforts have been undertaken	Non-federal
Lacolle	18XQ28_94 18XQ28_95	629000 629000	4984000 4985000	Extant population; location is identified as a conservation target in the provincial conservation plan	Non-federal
Grande Baie d'Oka	18WR73_65 18WR73_66 18WR73_76	576000 576000 577000	5035000 5036000 5036000	Extant population with suitable habitat where reintroduction efforts have been undertaken; location is identified as a conservation target in the provincial conservation plan (Oka national park)	Non-federal
Carillon Island	18WR53_59 18WR53_69 18WR54_50 18WR54_60	555000 556000 555000 556000	5039000 5039000 5040000 5040000	Extirpated population with suitable habitat; location is identified as a conservation target in the provincial conservation plan; suitable habitat covers part of the Carillon Island Migratory Bird Sanctuary situated on private lands	Non-federal

<sup>1</sup> Square ID is based on the standard Universal Transverse Mercator (UTM) Military Grid Reference System (see <http://www.nrcan.gc.ca/earth-sciences/geography-boundary/mapping/topographic-mapping/10098>), where the first two digits represent the UTM Zone, the following two letters indicate the 100 x 100 km standardized UTM grid, followed by two digits to represent the 10 x 10 km standardized UTM grid and two final digits to

represent the 1 x 1 km standardized UTM square containing all or a portion of the critical habitat unit. This unique alphanumeric code is based on the methodology produced from the Breeding Bird Atlases of Canada (See <http://www.bsc-eoc.org/> for more information on breeding bird atlases). Refer to section 7.1 for a description of how critical habitat is defined. Field verification may be required to determine the precise area of critical habitat.

<sup>2</sup> The listed coordinates represent the southwest corner of the 1 x 1 km standardized UTM squares containing all or a portion of the critical habitat unit. The coordinates may not fall within critical habitat and are provided as a general location only.

<sup>3</sup> Land tenure is provided as an approximation of land ownership of the critical habitat unit and should be used for guidance purposes only. Accurate land tenure will require cross referencing critical habitat boundaries with surveyed land unit information.

**Table D-2: Description of the 1 x 1 km Standardized UTM Squares Containing Critical Habitat and Critical Habitat Units for the False Hop Sedge in Ontario.**

Name of the Critical Habitat Unit	1 x 1 km UTM square ID <sup>1</sup>	UTM Square Coordinates <sup>2</sup>		Description	Land Tenure <sup>3</sup>
		Easting	Northing		
Rodney	17MH41_18 17MH41_19 17MH41_28 17MH41_29	441000 441000 442000 442000	4718000 4719000 4718000 4719000	Extant population	Non-federal
West Elgin	17MH41_57 17MH41_58 17MH41_67 17MH41_68 17MH41_77 17MH41_78	445000 445000 446000 446000 447000 447000	4717000 4718000 4717000 4718000 4717000 4718000	Extant population where transplantation efforts have been undertaken	Non-federal
West Lorne	17MH42_45 17MH42_54 17MH42_55 17MH42_64 17MH42_65	444000 445000 445000 446000 446000	4725000 4724000 4725000 4724000 4725000	Extant population	Non-federal
Mount Brydges	17MH54_18 17MH54_28	451000 452000	4748000 4748000	Extant population	Non-federal
Ailsa Craig	17MH58_50 17MH58_60	455000 456000	4780000 4780000	Extant population	Non-federal
London	17MH75_44	474000	4754000	Extant population	Non-federal

<sup>1</sup> Square ID is based on the standard Universal Transverse Mercator (UTM) Military Grid Reference System (see <http://www.nrcan.gc.ca/earth-sciences/geography-boundary/mapping/topographic-mapping/10098>), where the first two digits represent the UTM Zone, the following two letters indicate the 100 x 100 km standardized UTM grid, followed by two digits to represent the 10 x 10 km standardized UTM grid and two final digits to represent the 1 x 1 km standardized UTM squares containing all or a portion of the critical habitat unit. This unique alphanumeric code is based on the methodology produced from the Breeding Bird Atlases of Canada (See <http://www.bsc-eoc.org/> for more information on breeding bird atlases). Refer to section 7.1 for a description of how critical habitat is defined. Field verification may be required to determine the precise area of critical habitat.

<sup>2</sup> The listed coordinates represent the southwest corner of the 1 x 1 km standardized UTM squares containing all or a portion of the critical habitat unit. The coordinates may not fall within critical habitat and are provided as a general location only.

<sup>3</sup> Land tenure is provided as an approximation of land ownership of the critical habitat unit and should be used for guidance purposes only. Accurate land tenure will require cross referencing critical habitat boundaries with surveyed land unit information.

## APPENDIX E: EFFECTS ON THE ENVIRONMENT AND OTHER SPECIES

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

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

This recovery strategy will clearly benefit the environment by promoting the recovery of False Hop Sedge. The potential for the strategy to inadvertently lead to adverse effects on other species was considered. The SEA concluded that this strategy will clearly benefit the environment and will not entail any significant adverse effects.

The recovery activities recommended in this document should not have any negative impacts on other non-target indigenous species, natural communities and/or ecological processes. They may actually prove to be beneficial for the other species at risk that share the False Hop Sedge's habitat. These include four fish species: the Eastern Sand Darter (*Ammocrypta pellucida*) (COSEWIC status: Threatened), the Channel Darter (*Percina copelandi*) (COSEWIC status: Threatened), the River Redhorse (*Moxostoma carinatum*) (COSEWIC status: Special Concern), and the Grass Pickerel (*Esox americanus vermiculatus*) (COSEWIC status: Special Concern); two turtles: the Spiny Softshell (*Apalone spinifera*) (COSEWIC status: Threatened) and the Northern Map Turtle (*Graptemys geographica*) (COSEWIC status: Special Concern); and one bird: the Least Bittern (*Ixobrychus exilis*) (COSEWIC status: Threatened). Other threatened or vulnerable plant species as designated by the *Endangered Species Act, 2007* (Ontario) and the *Act respecting Threatened or Vulnerable Species* (Quebec) are likewise associated with False Hop Sedge habitats in Canada. The list for Ontario includes Palm Sedge (*Carex muskingumensis*), Frank's Sedge (*Carex frankii*), Narrow-leaved Cattail Sedge (*Carex squarrosa*), Ribbed Sedge (*Carex virescens*), Pumpkin Ash (*Fraxinus profunda*), and Short's Sedge (*Carex shortiana*). The list for Quebec is as follows: Swamp White Oak (*Quercus bicolor*); Lowland Yellow Loosestrife (*Lysimachia hybrida*); Yellow Water Buttercup (*Ranunculus flabellaris*), Small Beggarticks (*Bidens cf. discoidea*), Palegreen Orchid (*Platanthera flava* var. *herbiola*), and Golden Hedgehyssop (*Gratiola aurea*).