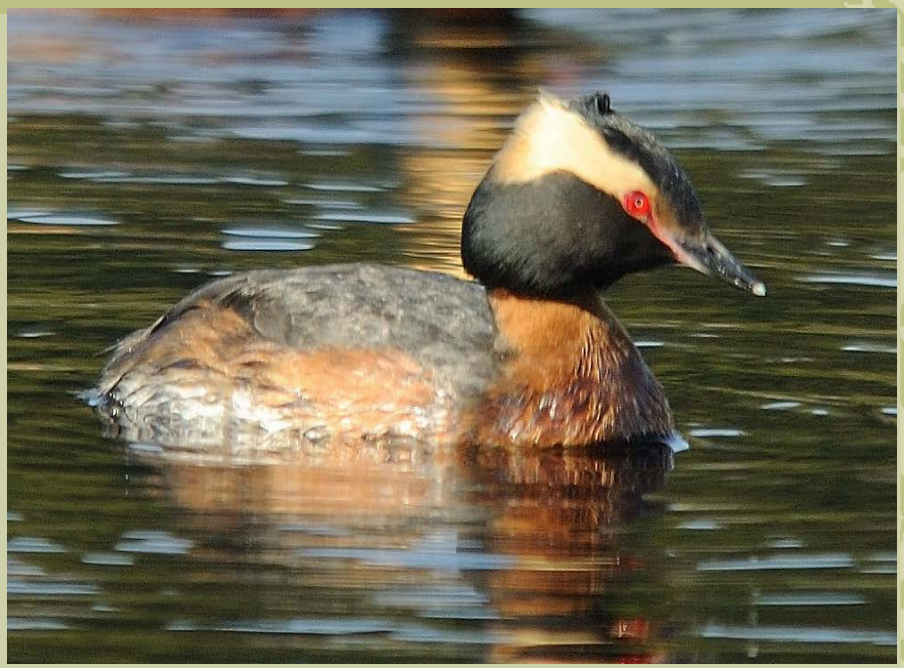
PROPOSED

Species at Risk Act
Recovery Strategy Series

Recovery Strategy for the Horned Grebe (*Podiceps auritus*), Magdalen Islands Population, in Canada

Horned Grebe, Magdalen Islands Population



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

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PREFACE

The federal, provincial and territorial government signatories under the Accord for the Protection of Species at Risk (1996) agreed to establish complementary legislation and programs that provide for effective protection of species at risk throughout Canada. Under the *Species at Risk Act* (S.C. 2002, c.29) (SARA), the federal competent ministers are responsible for the preparation of recovery strategies for listed Extirpated, Endangered and Threatened species and are required to report on progress within five years.

The Minister of the Environment is the competent minister for the recovery of the Horned Grebe, Magdalen Islands population, and has prepared this strategy, as per section 37 of SARA. It has been prepared in cooperation with the Government of Quebec (Ministère des Ressources naturelles et de la Faune du Québec [MRNF]).

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

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

ACKNOWLEDGMENTS

This strategy was drafted by François Shaffer (Environment Canada, Canadian Wildlife Service – Quebec Region). The following collaborators provided comments on the recovery strategy: Karine Picard, Caroline Bureau and Jean-François Rail (Environment Canada, Canadian Wildlife Service – Quebec Region), Marie-José Ribeyron (Environment Canada, Canadian Wildlife Service – National Capital Region), Alain Richard (Attention FragÎles), Jean-Sébastien Guénette and Pierre Fradette (Regroupement QuébecOiseaux); Claudel Pelletier, Réhaume Courtois and Pierre Bérubé (Ministère des Ressources naturelles et de la Faune du Québec).

EXECUTIVE SUMMARY

The Horned Grebe (*Podiceps auritus*) is a waterbird species found in Eurasia and North America. There are two populations in North America: the Western population and a small isolated population in the east (on the Magdalen Islands, to be exact). It is this population that is discussed in this recovery strategy. It breeds in small ponds in dune environments.

The Horned Grebe, Magdalen Islands population, was identified as Endangered by the Committee on the Status of Endangered Wildlife in Canada (COSEWIC) in 2009 and has been listed as such in Schedule 1 of the *Species at Risk Act* since 2011.

A follow-up conducted from 1993 to 2007 on the number of individuals in this population reveals that on average, about 15 individuals per year frequent the Magdalen Islands. During this period, never have more than 25 adults been observed in one season. The wintering area for the Horned Grebe, Magdalen Islands population, is not known.

The main threats affecting the Magdalen Islands Population are wetlands destruction, contaminant poisoning, accidental catches during the waterfowl hunt (incidental take), petroleum spills, recreational activities, the commercial fishery, adverse weather, predation and competition with the Pied-billed Grebe.

There are uncertainties regarding the recovery feasibility of the Horned Grebe, Magdalen Islands population. However, in accordance with the precautionary principle, this recovery strategy was prepared under subsection 41(1) of SARA, as it would be when recovery is deemed feasible. This recovery strategy deals with unknown factors surrounding the feasibility of the species' recovery.

The population and distribution objectives for the next five years are to maintain and, as far as possible, increase the current Horned Grebe, Magdalen Islands population, size and distribution. The long-term objectives (20 years) are to increase the size and distribution of the population so that it occupies all sectors that it occupied prior to 2005.

The broad strategies and approaches that will lead to achieving these objectives are presented in the section entitled "Strategic Direction for Recovery."

The critical habitat of the Horned Grebe, Magdalen Islands population, is identified in this recovery strategy based on the best information available and is sufficient for achieving short- and long-term population and distribution objectives. This habitat is identified as all potential nesting ponds and any pond where the species was observed feeding or is suspected of having nested between 1995 and 2011. A total of 52 ponds are identified as critical habitat.

One or more action plans for the Horned Grebe, Magdalen Islands population, will be developed within five years after the recovery strategy is published in the Species at Risk Public Registry.

RECOVERY FEASIBILITY SUMMARY

Based on the criteria established by the Government of Canada (2009), there are uncertainties regarding the recovery feasibility of the Horned Grebe, Magdalen Islands population. However, in accordance with the precautionary principle, this recovery strategy was prepared under subsection 41(1) of SARA, as it would be when recovery is deemed feasible. This recovery strategy deals with unknown factors surrounding the feasibility of the species' recovery.

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

Yes. Breeding individuals are found in small numbers on the Magdalen Islands. Elsewhere in North America, individuals from the Western Population are found in large numbers and could sporadically colonize the islands.

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

Yes. In the Magdalen Islands Population's distribution range, there is suitable habitat where the Horned Grebe can nest and moult. The number of suitable ponds would not enable the population to grow significantly, but it is enough to meet the objectives set by this strategy.

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

Unknown. Some threats affecting the Horned Grebe, Magdalen Islands population, could be mitigated (e.g. certain recreational activities near nesting sites and accidental catches during the waterfowl hunt [incidental take]). However, the geographic isolation of this population, the small size of the current population and competition with the Pied-billed Grebe (*Podilymbus podiceps*) are factors of uncertainty for which it may be difficult to provide appropriate solutions.

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

Unknown. There are no appropriate techniques to allow for breeding in captivity or for the reintroduction of individuals. The creation of ponds or modification of their features to make them more suitable for nesting is one technique for waterfowl that could likely be adapted to boost Horned Grebe habitat, if it is determined that number of ponds is a major limiting factor with regard to population. Moreover, the implementation of stewardship or land management actions is an appropriate method that could contribute to preserving ponds used for nesting.

TABLE OF CONTENTS

1. COSEWIC SPECIES ASSESSMENT INFORMATION

Date of Assessment: April 2009

Common Name (population): Horned Grebe, Magdalen Islands population

Scientific Name: *Podiceps auritus*

COSEWIC Status: Endangered

Reason for Designation: The small breeding population of this species has persisted on the Magdalen Islands for at least a century. It has recently shown declines in both population size and area of occupancy. The small size of the population (average of 15 adults) makes it particularly vulnerable to stochastic events.

Canadian Occurrence: Quebec

COSEWIC Status History: Designated Endangered in April 2009

2. SPECIES STATUS INFORMATION

The Horned Grebe ,Magdalen Islands population, is found only in the archipelago of the same name in Quebec. Since 2011, the population has been listed as Endangered in Schedule 1 of the *Species at Risk Act* (S.C. 2002, c. 29). In Quebec, the Horned Grebe has been listed as Threatened under the *Act respecting threatened or vulnerable species* (R.S.Q., c. E-12.01) since 2000.

Internationally, the Horned Grebe's conservation status rank is G5 (Secure); for the two populations in Canada, it is N5B (Secure – Breeding) (NatureServe 2011). The Horned Grebe, Magdalen Islands population, has an S1B conservation status rank in Quebec (Critically imperiled – Breeding) (CDPNQ 2011). See Appendix A for more details.

3. SPECIES INFORMATION

3.1 Species Description

The Horned Grebe is a water bird of average size. Its breeding plumage is characterized by a distinctive patch of bright yellow feathers behind the eye, which extends into tufts of the same colour. Its eyes are red and its neck and flanks are chestnut-red. Males and females are similar in colouration, although the plumage of the male tends to be brighter. In winter, the bird's back is black and its belly white. Its white cheeks contrast with its black crown. The chicks are precocial and semi-nidifugous (Cramp and Simmons 1977). They leave the nest hours after hatching and are looked after by the adults, who carry them on their backs (Stedman 2000).

3.2 Population and Distribution

The Horned Grebe is found in Eurasia and North America. There are two separate populations in North America: the Western Population and the Magdalen Islands Population. The latter is the subject of this recovery strategy (Figure 1). The Magdalen Islands Population's range is very limited because its extent of occurrence covers only 772 km^2 and its area of occupancy only 100 km^2. Before the end of the 1990s, birds were found in several areas of the Magdalen Islands, including Île de la Grande Entrée, Île de l'Est, Grosse Île, Île aux Loups, Île du Havre aux Maisons, Île du Cap-aux-Meules, Île du Havre-Aubert and Île Brion. During that decade, the area of occupancy gradually shrank to such an extent that, since 2005, the Horned Grebe has been found almost exclusively on Île Brion and Île de l'Est.

There are an estimated one million Horned Grebe individuals in North America (Wetlands International 2006). In Canada, the size of the Western Population is estimated at between 200 000 and 500 000 individuals. Between 1993 and 2007, no more than than 25 adults were observed in the Magdalen Islands Population in one nesting season. On average, 15 adults are found on the Islands every year (COSEWIC 2009).

An analysis of annual surveys conducted on the Magdalen Islands shows that the population size has decreased by about 22% in the last three generations (COSEWIC 2009).

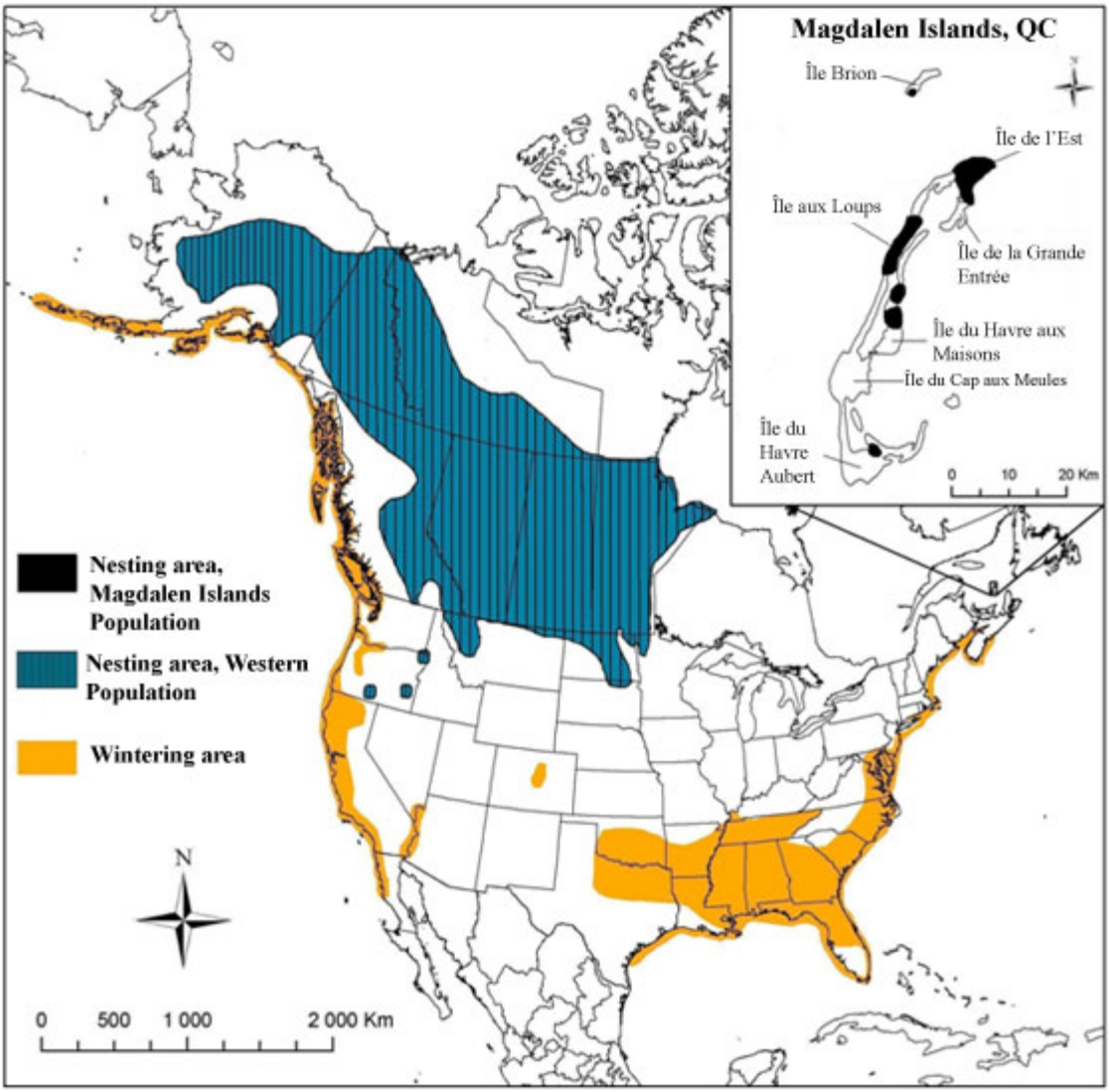

Figure 1. Range of the Western and Horned Grebe, Magdalen Islands populations, in North America. The wintering area shown is that of the Western Population. The wintering area of the Magdalen Islands Population is confined to the east coast of the continent.

3.3 Needs of the Horned Grebe, Magdalen Islands Population

Biological and habitat requirements, as well as limiting factors affecting the Horned Grebe, are described in detail in the COSEWIC Status Report (2009).

3.3.1 Biological and habitat requirements

Breeding season – The Horned Grebe is found only in aquatic environments. It has difficulty moving about on the ground and cannot fly away.

It arrives on the Magdalen Islands to nest beginning in late April. Egg laying does not start before May 19 (Shaffer and Laporte 2003).

During nesting, the Horned Grebe is generally found near small freshwater ponds, marshes and shallow bays of lakes. It nests occasionally in brackish water. More often, it occupies small ponds (less than one hectare) that are no more than 2 m deep (Shaffer et al. 1994). These ponds serve as feeding grounds, as the Horned Grebe rarely leaves its breeding pond to feed elsewhere. The ponds must therefore provide a habitat for abundant small fish and invertebrates to meet the grebes' food requirements. Almost all of these ponds are found in dune environments. They are characterized by the presence of a surrounding emergent vegetation strip. The most common plant species present are bulrush (*Scirpus* spp.), Sweet Gale (*Myrica gale*), bur-reed (*Sparganium* spp.), water lily (*Nuphar* spp.) and cattail (*Typha* spp.) (Shaffer et al. 1994). The presence of emergent vegetation is essential because the Horned Grebe uses it to build, secure and camouflage its nest. Chicks also use areas of emergent vegetation to camouflage themselves during their brood-raising period.

Moulting period – The Horned Grebe, Magdalen Islands population, is found in larger numbers in Étang de l'Est—a roughly 200-ha pond on Île de l'Est—late in the breeding season (August and September) than in any other season. It uses this pond as a moulting area to acquire its internuptial plumage before migrating to its wintering area in September (Shaffer and Laporte 2003).

Migration and wintering periods – Little is known about the migration and wintering of the Horned Grebe, Magdalen Islands population. However, information about the Western Horned Grebe population indicates that it migrates mainly at night (Stedman 2000). During the day, it stops at lakes and rivers along its migratory path. In winter, Western Population birds are found at sea, near coastlines and in bays along the Pacific and Atlantic coasts of North America (del Hoyo et al. 1992). They sometimes winter on lakes (Godfrey 1986). Where the Magdalen Islands Population winters is unknown, but it is likely along the North American east coast, as is the case for part of the Western Population.

In its wintering areas, the species eats mostly fish and crustaceans (Stedman 2000). A 500-g adult must consume about 100 g of fish per day to meet its needs (Piersma 1988). In summer, it mainly eats aquatic arthropods (Stedman 2000).

3.3.2 Limiting factors

On the Magdalen Islands, only a few dozen ponds were identified as suitable nesting sites for the Horned Grebe (Shaffer and Laporte 2003). This small number of suitable ponds limits the potential to increase the population size.

The Horned Grebe population size is quite reduced. It consists of fewer than 25 individuals, which also exposes it to risks of a demographic, environmental and genetic nature (COSEWIC 2009).

Such a small population could be subject to a reduced breeding rate, as the birds can have difficulty finding a partner. They can have difficulty being noticed and found and, as a result, mating will be an issue. The drop in social interactions can also affect imitation learning phenomena and make them less effective.

COSEWIC (2009) identifies predation as a limiting factor for the Horned Grebe, Magdalen Islands population, stating that any predation of adults, chicks or nests can affect the survival of this small population. Competition with the Pied-billed Grebe is also seen as a limiting factor; its effects can be considerable given the small size of the Horned Grebe, Magdalen Islands Population. For these reasons, predation and interspecific competition with the Pied-billed Grebe are considered threats that weigh on the species and are discussed as such under "Threats" (See section 4.).

More than 2500 km separate the two populations' nesting areas, making the Horned Grebe, Magdalen Islands population, geographically isolated. In order for the population's genetic variability to remain adequate, and for the population not to be affected by issues related to excessive consanguinity, there must be genetic exchanges with individuals in the Western Population. These exchanges can occur when individuals in that population come to the Magdalen Islands to breed. This phenomenon is plausible because certain indices obtained through studies suggest that there may be genetic exchanges with western North American populations (COSEWIC 2009). However, the frequency of the genetic exchanges required to reduce the risks related to consanguinity has not been established. Moreover, it is clear that the risks associated with the drop in genetic variability are magnified by the fact that the population size is quite reduced.

4. THREATS

4.1 Threat Assessment

Table 1. Threat Assessment Table

Threat	Level of Concern[1]	Extent	Occurrence	Frequency	Severity[2]	Causal Certainty[3]
Habitat loss or degradation						
Climate change	Low	Localized	Anticipated	Unknown	Medium	Low
Wetlands destruction	Medium	Localized	Anticipated	Unknown	Medium	Medium
Pollution						
Contaminant poisoning	Medium	Localized	Anticipated	Unknown	Medium	Medium
Accidental mortality						
Accidental catches during the waterfowl hunt (by-catches)	Medium	Localized	Anticipated	Recurrent	Medium	Medium

Petroleum spills	Medium	Localized	Anticipated	Recurrent	Medium	Medium
Disturbance or damage						
Recreational activities	Medium	Localized	Common	Recurrent	Medium	Medium
Commercial fishing	Medium	Localized	Common	Recurrent	Medium	Low
Climate and natural disasters						
Adverse weather	Medium	Localized	Anticipated	Recurrent	Medium	Low
Natural activities or processes						
Predation	Medium	Generalized	Common	Recurrent	Medium	Medium
Competition with the Pied-billed Grebe	Medium	Generalized	Common	Recurrent	Unknown	Medium
Disease	Low	Localized	Unknown	Recurrent	Low	Low

[1] *Level of Concern: signifies that managing the threat is of (high, medium or low) concern for the recovery of the species, consistent with the population and distribution objectives. This criterion considers the assessment of all the information in the table.*

[2] *Severity: reflects the population-level effect (High: very large population-level effect, Medium, Low, Unknown).*

[3] *Causal Certainty: reflects the degree of evidence that is known for the threat (High: available evidence strongly links the threat to stresses on population viability; Medium: there is a correlation between the threat and population viability [e.g. expert opinion]; Low: the threat is assumed or plausible).*

4.2 Description of Threats

The level of concern was assessed as medium for all threats except disease and climate change. These threats appear below in the same order as that in the table.

Wetlands destruction

The destruction or drying-out of wetlands and ponds is likely to cause loss of nesting sites (COSEWIC 2009). As the number of ponds that the Horned Grebe can use for nesting is limited, the loss of even a few of them is likely to have a negative impact on the population.

Contaminant poisoning

The Horned Grebe is a predator at the upper trophic level of the food chain and is therefore vulnerable to poisoning by bioaccumulative toxic substances. High concentrations of DDE[1] and PCBs[2] have been detected in this species' eggs in Manitoba (Forsyth et al. 1994). Moreover, high concentrations of dioxins and furans were found in individuals' livers in British Columbia (Vermeer et al. 1993).

[1] 1.1-Dichloro-2.2-bis(p-chlorophenyl)ethylene
[2] Polychlorinated biphenyls

A case of poisoning by lead shot was noted in a Horned Grebe on the Magdalen Islands in 1995 (Shaffer and Laporte 2003). It is difficult to know from only one case whether this occurs more frequently. However, since 1997, the enforcement of the regulation banning use of lead shot within less than 200 m of any watercourse during the waterfowl hunt has probably contributed to reducing this risk.

Accidental catches during the waterfowl hunt (incidental take)

The Horned Grebe can be found on the Magdalen Islands until late September or early October. At this time, it can be found mostly in Étang de l'Est, where the majority gather to moult. The Horned Grebe cannot fly while moulting. The waterfowl hunt on the Magdalen Islands generally starts on the last Saturday in September; there is therefore a risk of the Horned Grebe being shot by accident (Shaffer and Laporte 2003). Given the small population size, the loss of one individual is significant.

Petroleum spills

The Horned Grebe generally winters alone or in flocks of varying sizes. Petroleum product spills in its wintering areas are likely to affect it. The Horned Grebe is vulnerable to oil spills in aquatic environments because it spends most of its time in the water. Of the 34 717 birds that were oil-covered and killed by eight spills in the southern United States, 12.3% were Horned Grebes (del Hoyo et al. 1992; COSEWIC 2009; Stedman 2000). During nesting, the Magdalen Islands birds are mainly found on small ponds free of small craft, which reduces the risk.

Recreational activities

In the Magdalen Islands, Horned Grebes generally breed on small ponds (roughly 1 ha), so the presence of humans in the immediate vicinity is likely to cause a disturbance, especially during the nesting period. If humans are present for more than several minutes, reproductive success could be affected. Camping trailers have been seen several times near the small ponds used by the Horned Grebe on Dune du Nord between Pointe-aux-Loups and Grosse Île. The extended and repeated presence of photographers and birdwatchers along the edges of breeding ponds also causes a disturbance. Moreover, the use of off-road vehicles along the immediate edge of the ponds can disrupt drainage or destroy the ponds' emergent vegetation.

Commercial fishing

The Horned Grebe dives into the water to look for its prey. As a result, it could get caught in commercial fishing nets, either at sea or in large lakes. On the Magdalen Islands, the Horned Grebe seems unlikely to be affected by this threat because there is no commercial fishing on the ponds that the species frequents. However, it remains vulnerable during migration and in wintering areas.

Adverse weather

Heavy rain and waves combined with strong winds can contribute to submerging Horned Grebe nests (Shaffer and Laporte 2003). Conversely, long dry spells can reduce water levels and make ponds shallow and unsuitable for nesting. Later in the season, occupied nests are also more vulnerable to predation by land mammals during dry spells (Shaffer and Laporte 2003). During migration, storms or thunderstorms can cause the death of Horned Grebe individuals (Hodgdon 1979; Bell 1980; Eaton 1983).

Predation
Cases of egg and adult predation were noted among the Horned Grebe, Magdalen Islands population (Shaffer and Laporte 2003). The Great Blue Heron (*Ardea herodias*), the Northern Harrier (*Circus cyaneus*) and the American Mink (*Mustela vison*) are among the species' potential predators. Its main predators remain a mystery, however. The recent and accidental introduction of the American Mink is likely to harm the species. Given the small size of the population, any predation of adults, chicks or eggs will have a negative impact on its persistence.

Competition with the Pied-billed Grebe
The number of ponds that Magdalen Islands Horned Grebes can use for nesting is limited. Only a quarter (n=42) out of more than 161 ponds studied were identified as suitable (Shaffer and Laporte 2003). As most ponds are small, the presence of a competitive species such as the Pied-billed Grebe (*Podilymbus podiceps*) is likely to prevent the Horned Grebe from nesting. On the Magdalen Islands, the Pied-billed Grebe and the Horned Grebe use largely the same ponds. The Pied-billed Grebe, initially absent in the early part of 20th century, gradually established itself in the second half of that century; its population now outnumbers that of the Horned Grebe. As the Pied-billed Grebe tends to arrive on the breeding ponds earlier in the spring, it is likely to occupy those ponds that are most suitable, to the detriment of the Horned Grebe. Moreover, the Pied-billed Grebe's dominant territorial behaviour crowds out the Horned Grebe, so it must occupy less suitable ponds (Faaborg 1976; Riske 1976). Interspecific competition must be reduced to enable the Horned Grebe to breed on a pond.

Climate change
Climate change (increase in number and intensity of storms, rising sea levels, longer ice-free periods in winter), has resulted in coastal erosion on the Magdalen Islands. As most ponds are located in dune environments and near shorelines, there will be fewer ponds suitable for the Horned Grebe in the long term.

Disease
Type E botulism is known to have caused the death of Horned Grebe individuals (United States Geological Survey 2008). Type E *Clostridium botulinum* spores abound in the waters of several Canadian lakes and are often found in the gills and digestive tracts of fish living there. Type E botulism survives only when spores develop and produce the toxin that causes the disease. Wild birds that eat fish carrying the toxin then become affected (Campbell and Barker 1999).

5. POPULATION AND DISTRIBUTION OBJECTIVES

The population and distribution objectives for the next five years are to maintain and, as far as possible, increase the current Horned Grebe, Magdalen Islands population. The population objective is to maintain 15 adults per year and, if possible, increase this number. With regard to distribution, the species must be present on Île Brion and Île de l'Est and, if possible, must recolonize other islands in the archipelago.

Long-term objectives (20 years) are to increase the size and distribution of the population so that it occupies all areas in which it was present before 2005. The population objective is to reach an annual total of at least 30 adults. In terms of distribution, the species must be present on Île de l'Est and Île Brion and must recolonize Île de la Grande Entrée, Grosse Île, Île aux Loups, Île du Havre aux Maisons, Île du Cap-aux-Meules and Île du Havre-Aubert.

The Horned Grebe, Magdalen Islands population, consists of a very few individuals that breed only on that archipelago. This population's area of occupancy and numbers have recently declined, and its small size makes it especially vulnerable to stochastic events. Although the implementation of recovery measures could allow the species to be relisted under a lower-risk category, it is reasonable to believe that the population will likely remain listed as a species at risk.

6. BROAD STRATEGIES AND GENERAL APPROACHES TO MEET OBJECTIVES

6.1 Actions Already Completed or Currently Underway

Activities carried out under the guidance of the Canadian Wildlife Service of Environment Canada:

- annual nesting Horned Grebe pair count (since 1993)
- post-breeding Horned Grebe count (1994, 1995, 1996, and 2001–2007)
- characterization of Horned Grebe nesting habitats (1994–1995)
- population count of Pied-billed Grebe as a competitive species to Horned Grebe (1994, 1995, 2000 and 2007)
- management and enforcement of federal legislation in force at the Pointe-de-l'Est National Wildlife Area

Activities carried out by Quebec's Ministère des Ressources naturelles et de la Faune (MRNF):

- publication of a legal definition of Horned Grebe habitat in the *Regulation respecting threatened or vulnerable wildlife species and their habitats* (R.R.Q., c. E-12.01, r. 2(4))
- map of some 30 Horned Grebe nesting sites on the Magdalen Islands under the *Act respecting the conservation and development of wildlife* (R.S.Q., c. C-61.1) and its associated *Regulation respecting wildlife habitats* (R.S.Q., c. C-61.1, r. 18)
- special designation of areas soon to become legal habitats in the public land allocation plan for the Gaspésie–Îles-de-la-Madeleine region
- compilation of Horned Grebe occurrences at the Centre de données sur le patrimoine naturel du Québec (CDPNQ). This way, the MRNF can take this species into account during regional consultations related to this database

Activity carried out by the Canadian Wildlife Service of Environment Canada in collaboration with the Université Laval biology department:

- study comparing the Horned Grebe's genetic specificity to that of birds from Quebec, Manitoba, Alberta, British Columbia, Yukon, the Northwest Territories and Iceland (Boulet et al. 2005)

Activities carried out by Attention FragÎles, a conservation group on the Magdalen Islands:

- public awareness activities (videos, brochures, newspaper articles, radio messages, school activities, etc.) since the mid-1990s
- compilation and publication of a summary of historical surveys carried out before 1990 (Fradette 1992)

Activity carried out by Regroupement QuébecOiseaux, a conservation group, in collaboration with or through the financial support of Environment Canada:

- creation of two databases containing, among other things, historical mentions of Horned Grebes and inventory results from recent decades. These are SOS-POP databases (Suivi de l'occupation des stations de nidification, Population d'oiseaux en péril du Québec) [monitoring of nesting site occupation, Quebec population of birds at risk] and ÉPOQs (Études des populations d'oiseaux du Québec) [Quebec bird population studies]

Activity carried out by the Ministère du Développement durable, de l'Environnement et des Parcs du Québec :

- Management and enforcement of provincial legislation in force at the Réserve écologique de l'Île Brion

6.2 Strategic Direction for Recovery

Table 2. Recovery Planning

Threat or Limiting Factor	Broad Strategy to Recovery	Priority	General Description of Research and Management Approaches
Accidental killing in relation to waterfowl hunting (incidental take), recreational activities, oil spills, climate change, contaminant toxicity, wetland destruction	Encourage habitat conservation and stewardship	• Medium	• Develop a communication strategy targeting increased public awareness, participation and engagement with respect to the Horned Grebe • Work with landowners, decision makers and other stakeholders to promote sound management of important habitats (breeding, feeding, moulting) suitable for the Horned Grebe • Support actions targeting maintenance of the Western Population of the Horned Grebe to help ensure that the population remains abundant, thereby increasing the probability of exchanges with the Magdalen Islands Population
Accidental killing in relation to waterfowl hunting (incidental take), recreational activities, wetland destruction	Promote a higher survival rate and higher reproductive success	• High	• Reduce human threats likely to affect the survival rate and reproductive success of the Horned Grebe
Predation, knowledge gaps	Increase knowledge about demographics, genetics, biology and wintering areas	• High	• Determine the population size and annual reproductive success • Determine the locations of migration and wintering areas • Determine population viability • Assess the relevance of habitat restoration or improvement • Identify the types of predation affecting the species and possible solutions
Competition with the Pied-billed Grebe	Reduce interspecific competition	• High	• Assess the significance of competition between the Horned Grebe and the Pied-billed Grebe and implement appropriate measures in response
Oil spills, climate change, contaminant toxicity, commercial fishery	Improve species management	• Low	• Work with partners elsewhere in Canada and in the United States to pool efforts so as to take the species' habitat, migration and wintering requirements into account

7. CRITICAL HABITAT

7.1 Identification of the Species' Critical Habitat

SARA defines "critical habitat" as "the habitat that is necessary for the survival or recovery of a listed wildlife species and that is identified as the species' critical habitat in the recovery strategy or in an action plan for the species."

The critical habitat of the Horned Grebe, Magdalen Islands population, is identified in this recovery strategy and is sufficient for meeting long-term population and distribution objectives.

The critical habitat of the Horned Grebe, Magdalen Islands population, is identified as all potential nesting ponds and any pond where the species was observed feeding or is suspected of having nested between 1995 and 2011. A total of 52 ponds are identified as critical habitat. The limits of a pond are those defined by the presence of open water, emergent plants and aquatic plants around it. Appendix B lists the designated ponds and their area and provides information on their location.

This designation is based on Shaffer and Laporte's study (2003). In this study, which covers the vast majority of the Magdalen Islands, the authors establish a list of the ponds that the Horned Grebe can potentially use for nesting based on a probabilistic model. This model takes four criteria into account: area, depth, pH and emergent vegetation abundance around the ponds. It is 81% effective in predicting the presence or absence of the species. Of the 161 ponds studied, 42 were identified as suitable for Horned Grebe nesting. This study, published in 2003, was based on data gathered in 1994 and 1995. The critical habitat of the Horned Grebe, Magdalen Islands population, includes these 42 ponds. It also includes the 10 ponds where, after follow-up conducted by the Canadian Wildlife Service since the 1994–1995 study, the species was observed feeding or is suspected of having nested.

The biophysical characteristics of the critical habitat are as follows:
- shallow ponds in dunal areas
- ponds with a pH of about 6.2 ± 1.1
- pond bottoms of sand with a thin layer of organic matter
- emergent vegetation occupying close to half of the pond's area on average, the most common species consisting of bulrush, Sweet Gale, bur-reed, water lily and cattail.

Other plots of critical habitat could be designated if new data become available.

7.2 Examples of Activities Likely to Destroy Critical Habitat

Activities likely to destroy critical habitat of the Horned Grebe, Magdalen Islands population, include, but are not limited to the following:

1. Activities causing the permanent loss of ponds designated as critical habitat. These activities include backfilling (e.g. construction and development of road infrastructure), drainage, dredging and resource extraction.

2. Activities causing degradation of critical habitat or altering its functions to the point that this habitat is no longer suited for the Horned Grebe:

- Backfilling, dredging and channelization could alter the water level, thereby preventing nesting, feeding, raising chicks and using the site for moulting or resting.
- The use of off-road vehicles along the edge of ponds can modify drainage and the emergent vegetation strip that the Horned Grebe needs in order to nest.
- The dumping of toxic substances (e.g. chemical or petroleum products, wastewater or silt) directly into the pond or upstream in the watershed can affect the water quality of ponds and the quality of the prey that live there that grebes need to live, to the point of extermination, or render this prey toxic through bioaccumulation.
- Eutrophication caused by wastewater runoff or dumping can cause the growth of emergent aquatic plants, reducing open water surface on ponds and limiting the area where the Horned Grebe can go to feed itself. If the open water area is very limited, the grebe will not be able to fly away from the pond.

8. MEASURING PROGRESS

The performance indicators listed below will be used to measure progress in achieving the population and distribution objectives. Every five years, the indicators described below will be used to measure the success of this recovery strategy.

Short term (5 years)
1. The size of the Horned Grebe, Magdalen Islands population, stays at 15 adults per year and increases if possible.
2. The Horned Grebe, Magdalen Islands population, is found on Île de l'Est and Île Brion and extends to other islands in the archipelago.

Long term (20 years)
1. The size of the Horned Grebe, Magdalen Islands population, reaches at least 30 adults per year.
2. The Horned Grebe, Magdalen Islands population is found on Île de l'Est and Île Brion and has recolonized Île de la Grande Entrée, Île de l'Est, Grosse Île, Île aux Loups, Île du Havre aux Maisons, Île du Cap-aux-Meules and Île du Havre-Aubert.

9. STATEMENT ON ACTION PLANS

One or more action plans on the Horned Grebe, Magdalen Islands population, will be developed within five years after publication of this recovery strategy on the Species at Risk Public Registry.

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APPENDIX A: NATURESERVE CONSERVATION STATUS RANK DEFINITIONS

The table below lists the conservation status ranks assigned by NatureServe, along with their definitions. These status ranks are accompanied by the letter "G" (Global, applies to the entire distribution range), "N" (National, applies on a country scale) or "S" (Subnational, applies on a provincial or state scale). A numeric range rank (e.g. S1S2) is used to reflect uncertainty about the status of the species or community in question.

Rank	Definition
1	Critically Imperiled – Species or community that is extremely rare (often five or fewer occurrences) or is affected by very steep declines or other factors that could result in its extirpation.
2	Imperiled – Species or community that is rare because of its very restricted range, very few populations (often fewer than 20), steep population declines or other factors that could result in its extirpation.
3	Vulnerable – Species or community with a very restricted range and relatively few populations (often 80 or fewer) that has experienced recent and widespread declines and is affected by other factors that could result in its extirpation.
4	Apparently Secure – Species or community that is uncommon but not rare. There is some cause for long-term concern because of declines or other factors.
5	Secure – Species or community that is common, widespread and abundant in the jurisdiction.
B	Breeding – Conservation status refers to the breeding population of the species in the nation or state/province.
N	Nonbreeding – Conservation status refers to the non-breeding population of the species in the nation or state/province.
M	Migrant – Migrant species occurring regularly on migration at particular staging areas or concentration spots where the species might warrant conservation attention. Conservation status refers to the aggregating transient population of the species in the nation or state/province.
NR	Species or community that is unranked because its status has not yet been assessed.
NA	Not Applicable – The species or community is not a suitable target for conservation activities.
?	Inexact or Uncertain – Denotes inexact or uncertain numeric rank.

APPENDIX B: CRITICAL HABITAT FOR THE HORNED GREBE, MAGDALEN ISLANDS POPULATION

Sector	Pond	Latitude	Longitude	Area (ha)	Tenure*
Île Brion	GE-001-02	47.78140	-61.49281	0.41	Non-federal
Île Brion	GE-001-03	47.78127	-61.49176	0.82	Non-federal
Pointe de l'Est	GE-002-04	47.63028	-61.43643	0.14	Federal (EC)
Pointe de l'Est	GE-002-06	47.62559	-61.43724	0.81	Federal (EC)
Pointe de l'Est	GE-002-09	47.62689	-61.43538	1.76	Federal (EC)
Pointe de l'Est	GE-002-11	47.62799	-61.43178	0.56	Federal (EC)
Pointe de l'Est	GE-002-12	47.62679	-61.43108	0.92	Federal (EC)
Pointe de l'Est	GE-002-14	47.62694	-61.42795	0.68	Federal (EC)
Pointe de l'Est	GE-002-15	47.62997	-61.42842	1.20	Federal (EC)
Pointe de l'Est	GE-002-21 Étang de l'Est	47.62233	-61.41979	198.60	Federal (EC) Non-federal
Pointe de l'Est	GE-002-22	47.62079	-61.44448	0.21	Federal (EC)
Pointe de l'Est	GE-002-23	47.62364	-61.43683	0.63	Federal (EC)
Pointe de l'Est	GE-002-24	47.62459	-61.44138	0.11	Federal (EC)
Pointe de l'Est	GE-002-29	47.61866	-61.45029	0.65	Federal (EC)
Pointe de l'Est	GE-002-35	47.61369	-61.44648	0.52	Federal (EC)
Pointe de l'Est	GE-002-51	47.61005	-61.45115	1.76	Federal (EC)
Pointe de l'Est	GE-002-54	47.60844	-61.45308	0.07	Federal (EC)
Pointe de l'Est	GE-002-55	47.60759	-61.45430	0.22	Federal (EC)
Pointe de l'Est	GE-002-79	47.61713	-61.40986	17.60	Non-federal
Dune du Nord	GE-003-09	47.58096	-61.62040	0.21	Non-federal
Dune du Nord	GE-003-10	47.58409	-61.61470	0.36	Non-federal
Dune du Nord	GE-003-11	47.56983	-61.62952	0.31	Non-federal
Dune du Nord	GE-003-13	47.57069	-61.62778	0.40	Non-federal
Dune du Nord	GE-003-20	47.57255	-61.62248	0.15	Non-federal
Dune du Nord	GE-003-21	47.57271	-61.62159	0.17	Non-federal
Dune du Nord	GE-003-22	47.57319	-61.62058	0.12	Non-federal
Dune du Nord	GE-003-24	47.57363	-61.62398	0.19	Non-federal
Dune du Nord	GE-003-27	47.57461	-61.62263	0.32	Non-federal
Dune du Nord	GE-003-31	47.57644	-61.62534	0.13	Non-federal
Dune du Nord	GE-003-35	47.58146	-61.61634	0.23	Non-federal
Dune du Nord	GE-003-37	47.57994	-61.61272	1.77	Non-federal
Dune du Nord	GE-003-38	47.58289	-61.61347	0.28	Non-federal
Dune du Nord	GE-003-39	47.58499	-61.61008	1.59	Non-federal
Dune du Nord	GE-003-51	47.58739	-61.60608	0.20	Non-federal
Dune du Nord	GE-003-53	47.58989	-61.60318	2.68	Non-federal
Dune du Nord	GE-003-58	47.59029	-61.60018	0.53	Non-federal
Dune du Nord	GE-003-64	47.56551	-61.64044	0.70	Non-federal
Dune du Nord	GE-003-66	47.56689	-61.63848	0.31	Non-federal
Dune du Nord	GE-003-69	47.57999	-61.61968	0.07	Non-federal
Pointe-aux-Loups	GE-004-03	47.52255	-61.71295	0.75	Non-federal
Pointe-aux-Loups	GE-004-04	47.52430	-61.71198	0.04	Non-federal

Baie du Portage	GE-005-01	47.24909	-61.91828	13.84	Non-federal
Les Sillons (airport sector)	GE-006-01	47.43519	-61.76048	1.90	Non-federal
Les Sillons (airport sector)	GE-006-02	47.43559	-61.75968	3.09	Non-federal
Les Sillons (airport sector)	GE-006-03	47.43469	-61.75909	1.84	Non-federal
Les Sillons (airport sector)	GE-006-04	47.43819	-61.75768	1.06	Non-federal
Les Sillons (airport sector)	GE-006-05	47.43579	-61.75768	0.35	Non-federal
Les Sillons (wind turbine sector)	GE-007-01	47.48099	-61.73378	0.57	Non-federal
Les Sillons (wind turbine sector)	GE-007-02	47.48057	-61.73184	0.40	Non-federal
Grosse Île	GE-008-04	47.62198	-61.50310	1.47	Non-federal
Étang du Nord	GE-016-02	47.35189	-61.90858	1.02	Non-federal
Old Harry	GE-017-01	47.57174	-61.47765	0.40	Non-federal

* EC: Environment Canada

APPENDIX C: 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 an SEA is to incorporate environmental considerations into the development of public policies, plans and program proposals to support environmentally sound decision-making.

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

The Horned Grebe, Magdalen Islands population, nests on small ponds in dunal areas. Several recommended activities can help the Rusty Blackbird (*Euphagus carolinus*), a species of special concern in Canada. Moreover, the measures proposed can also help several secure bird species that nest in the same habitat. These species include water birds such as the Sora (*Porzana carolina*), the American Bittern (*Botaurus lentiginosus*), the American Black Duck (*Anas rubripes*) and the Northern Pintail (*Anas acuta*).

The potential for this recovery strategy to inadvertently lead to adverse effects on the environment and other species was considered. The Pied-billed Grebe, a water bird species that competes with the Horned Grebe for nesting ponds, could be put at a disadvantage by some of the activities recommended. This species aside, it may be concluded that this strategy will not result in any significant adverse effects.