PROPOSED

Species at Risk Act
Management Plan Series

Management Plan for the Short-eared Owl (*Asio flammeus*) in Canada

Short-eared Owl

2016

Government of Canada
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For copies of the management plan, or for additional information on species at risk, including the Committee on the Status of Endangered Wildlife in Canada (COSEWIC) Status Reports, residence descriptions, action plans, and other related recovery documents, please visit the Species at Risk (SAR) Public Registry[1].

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[1] www.sararegistry.gc.ca/default_e.cfm

Preface

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

The Minister of the Environment and Minister responsible for the Parks Canada Agency is the competent minister under SARA for the Short-eared Owl and has prepared this management plan as per section 65 of SARA. To the extent possible, it has been prepared in cooperation with the following as per section 66(1) of SARA.

- Parks Canada Agency
- Department of National Defence
- Governments of the Northwest Territories; Alberta; Manitoba; Quebec; New Brunswick; Newfoundland and Labrador; and Nunavut
- Tlicho Government
- Gwich'in Renewable Resources Board
- Nunavut Wildlife Management Board
- Sahtu Renewable Resources Board
- Wek'eezhii Renewable Resources Board
- Wildlife Management Advisory Committee (Northwest Territories)

Success in the conservation of this species depends on the commitment and cooperation of many different constituencies that will be involved in implementing the directions set out in this plan and will not be achieved by Environment Canada and/or the Parks Canada Agency, or any other jurisdiction alone. All Canadians are invited to join in supporting and implementing this plan for the benefit of the Short-eared Owl and Canadian society as a whole.

Implementation of this management plan is subject to appropriations, priorities and budgetary constraints of the participating jurisdictions and organizations.

[2] http://registrelep-sararegistry.gc.ca/default.asp?lang=En&n=6B319869-1%20

Acknowledgments

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Finally, we thank all other parties, including landowners, citizens and stakeholders who provided comments on this document or information used to produce the management plan, as well as Regroupement QuébecOiseaux, EC-CWS and Bird Studies Canada for providing us with the data from the second *Québec Breeding Bird Atlas*, and the thousands of volunteers who collected data for those projects.

Executive Summary

The Short-eared Owl is a bird found in natural and anthropogenic open habitats throughout Canada. The status of the species was designated Special Concern by the Committee on the Status of Endangered Wildlife in Canada (COSEWIC) in 1994 and 2008 and has been listed as such in Schedule 1 of the *Species at Risk Act* (SARA) since 2012.

Around 300,000 individuals and 63% of the Short-eared Owl's North American breeding range are in Canada. The species breeds in all provinces and territories, but is most common in the Prairies (Alberta, Saskatchewan and Manitoba) and along the Arctic coast. Short-eared Owl populations have shown a mean annual decline between 2.3% and 5.2% from the 1960s/1970s to 2012, but the population size seems to have stabilized between 2002 to 2012.

The main threats to the Short-eared Owl are habitat loss and degradation (agriculture, urban and commercial development, energy production and mining), activities and events that affect individuals, nests and eggs (grazing, mowing and harvesting, pesticide use, collisions), and climate change.

The management objectives for the Short-eared Owl in Canada are:

- In the short term: Stabilize or increase the population trend over the 2015-2025 period and maintain the area of occupancy at 1,500,000 km^2; and
- In the long term: Ensure a positive 10-year population trend starting in 2025, while promoting an increase in the area of occupancy, including the gradual recolonization of areas in the southern portion of the Canadian range.

The broad strategies that are required to achieve the management objectives include:

- Conservation and management of the species and its suitable habitat across the breeding, migrating and wintering ranges;
- Conducting surveys, monitoring and research on the species, its habitats and threats across the breeding, migrating and wintering ranges; and
- Promoting awareness and partnerships related to conservation priorities.

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1. COSEWIC* Species Assessment Information

Date of Assessment: April 2008

Common Name (population): Short-eared Owl

Scientific Name: *Asio flammeus*

COSEWIC Status: Special concern

Reason for Designation: This owl has suffered a continuing population decline over the past 40 years, including a loss of 23% in the last decade alone.[3] Habitat loss and degradation on its wintering grounds are most likely the major threat, while continuing habitat loss and degradation on its breeding grounds in southern Canada and pesticide use are secondary threats. This species nearly meets the criteria for Threatened status.

Canadian Occurrence: Yukon Territory, Northwest Territories, Nunavut, British Columbia, Alberta, Saskatchewan, Manitoba, Ontario, Quebec, New Brunswick, Prince Edward Island, Nova Scotia, Newfoundland and Labrador

COSEWIC Status History: Designated Special Concern in April 1994 and April 2008.

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

2. Species Status Information

Approximately 63% of the North American breeding range of the Short-eared Owl is in Canada (COSEWIC, 2008). The species was listed as Special Concern in Schedule 1 of the *Species at Risk Act* (S.C. 2002, c. 29) (SARA) in 2012. The Short-eared Owl is not protected under the *Migratory Birds Convention Act, 1994* (S.C. 1994, c. 22). Although it is protected under most provincial and territorial wildlife legislation, it is listed in only a few pieces of legislation pertaining to species at risk (Table 1).

NatureServe (2014) considers the global population of the Short-eared Owl to be Secure (G5 ; assessment as of January 2008). The Canadian population is considered Apparently Secure (N4) during the breeding season and Vulnerable (N3) during the non-breeding (wintering) season (assessments as of February 2012). The breeding and non-breeding populations in the United States are considered Secure (N5; assessment as of January 1997). Table 1 shows the subnational (S) rank for each province and territory. Booms et al. (2014) consider that the national status is inconsistent with state

[3] Calculated for the 1996-2006 period. See section 3.2 of this document for updated information on the most recent decade of data available (2002-2012), analyzed using a more precise method than that used in COSEWIC (2008).

and provincial ranks since 77% of scores fall in the Critically Imperiled (S1; 27%), Imperiled (S2; 22%) or Vulnerable (S3; 25%) categories.

Partners in Flight, a North American landbird conservation program, lists the Short-eared Owl as a “Common bird in steep decline” (Partners in Flight Science Committee, 2012).

Table 1. Short-eared Owl Rank and Designation in Endangered Wildlife Legislation by Province and Territory.

Province/Territory	NatureServe Subnational Rank[a]	Provincial/Territorial Designation
British Columbia	S3B, S2N	Not listed*;* *Identified Wildlife* and Blue List[b]
Alberta	S3	May Be at Risk[c]
Saskatchewan	S3B, S2N	Not listed
Manitoba	S2S3B	Threatened[d]
Ontario	S2N, S4B	Special Concern[e]
Quebec	S3S4	Likely to be Designated Threatened or Vulnerable[f]
New Brunswick	S3B	Special Concern[g]
Nova Scotia	S1S2	Not listed[h]
Prince Edward Island	S1S2B	Not listed
Newfoundland and Labrador	S3B (NF), S3S4B (L)	Vulnerable[i]
Yukon	S3B	Not listed
Northwest Territories	S3S4B	Not listed[j]
Nunavut	SNRB	Not listed

[a] S1 – Critically Imperiled; S2 – Imperiled; S3 – Vulnerable; S4 – Apparently Secure; S5 – Secure; S#S# – Range between two ranks, used to indicate the range of uncertainty in the species conservation status; SNR – conservation status not yet assessed; B - Breeding population; N – Non-breeding population. [b] The species is not listed under British Columbia’s *Wildlife Act* (R.S.B.C. 1996, c. 488) but does figure under section 11(1) of the *BC Government Actions Regulation* (BC Reg 17/04) of the *BC Forest Planning and Practices Act* as an *Identified Wildlife* species in the *Identified Wildlife Management Strategy*. Therefore, the province can designate *wildlife habitat areas* (5 -10 ha) on communal roosting sites or on breeding or wintering sites, to protect the species on provincial Crown lands. Blue list: Species and ecological communities are assigned to the red or blue list on the basis of the provincial conservation status rank (SRANK) assigned by the Conservation Data Centre. These lists may be used to designate an official status for a species under the *Wildlife Act*; [c] Established by Alberta's Endangered Species Conservation Committee and protected by the *Wildlife Act*; [d] Manitoba’s *Endangered Species and Ecosystems Act* (C.C.S.M. c. E111); [e] Ontario’s *Endangered Species Act* (S.O. 2007, c. 6); [f] Quebec’s *Act respecting threatened or vulnerable species* (C.Q.L.R., c. E-12.01) ; [g] New Brunswick’s *Species at Risk Act* (S.N.B. 2012, c. 6) ; [h] Nova Scotia's *Endangered Species Act* (S.N.S. 1998, ch. 11); [i] Newfoundland and Labrador’s *Endangered Species Act* (S.N.L. 2001, c. E-10.1) ; [j] *Species at Risk (NWT) Act* (S.N.W.T. 2009, c.16).

The Short-eared Owl is also found in Appendix II of the *Convention on International Trade in Endangered Species of Wild Fauna and Flora* (CITES) and in Schedule 1 of the *Wild Animal and Plant Trade Regulations* pursuant to section 21 of the *Wild Animal and Plant Protection and Regulation of International and Interprovincial Trade Act* (S.C. 1992, c. 52*),* which regulate trade in the species.

3. Species Information

3.1. Species Description

Wiggins et al. (2006) describe the Short-eared Owl as a medium-sized owl approximately 34 to 42 cm in length. Individuals have a large, round head, with small tufts of feathers that look like ears, although these are rarely seen. The eyes of the adults are yellow and framed by black feathers on a pale facial disk. Wings are fairly long and the tail is short. Adults have a brown back and creamy-buff chest with brown streaks that provide camouflage. Sexes are similar in appearance but females are on average slightly larger (378 g vs. 315 g) and tend to be darker ventrally and dorsally (Wiggins et al., 2006). Juveniles are similar to adults, but the upperparts and the head are more dusky and they lack the facial pattern of adults (Wiggins et al., 2006). The Short-eared Owl is conspicuous only when it flies, often at dawn and dusk. It can easily be identified by its irregular wingbeats, which resemble those of a butterfly, as well as by black patches near the ‘wrist’ on the underside of each wing.

3.2. Population and Distribution

The Short-eared Owl has a global distribution, occurring on all continents except Australia and Antarctica (Holt et al., 1999; Wiggins, 2004). In the northern hemisphere, the species has one of the largest ranges among owls, breeding in open habitats across the North Temperate Zone and on a large number of oceanic islands, including the Greater Antilles and Hawaii (Wiggins et al., 2006). Although the distribution in North America is broad (Figure 1), the species occurs irregularly within it (COSEWIC, 2008). The only subspecies occurring in North America is *A. f. flammeus.*

Partners In Flight estimates the Short-eared Owl global population at 3,000,000, the North American population at 600,000 and the Canadian breeding population at about 300,000 individuals (Partners in Flight Science Committee, 2013). In Canada, the species occurs in all provinces and territories, but is most common in the Prairie provinces (Alberta, Saskatchewan and Manitoba) and along the Arctic coast (Nunavut, Northwest Territories and Yukon). Recent observations north of the known breeding range in the Northwest Territories and Nunavut may be the result of increased survey efforts or a possible range expansion (Therrien, 2010; Reid et al., 2011, Smith et al., 2013).

During winter, the species is a regular resident in open habitats along the southern coast of British Columbia and in southern Ontario, and an occasional resident in coastal areas of Atlantic Canada (Figure 1; Schmelzer, 2005). It also occurs sporadically in the Prairie provinces and Quebec, where the number of wintering individuals fluctuates substantially from year to year (COSEWIC, 2008; National Audubon Society, 2014). Owls nesting in the Prairie Provinces move southward after breeding, wintering primarily in the United States Great Plains (Clark, 1975). During winter, individuals congregate

(usually fewer than 10) and roost in areas with high food availability (Cadman and Page, 1994).

The migratory paths and stopover sites along the way, especially for populations migrating from the Arctic coast, are largely unknown (one individual migrated from Alaska to Mexico and one from extreme northern Quebec to New York City; see results and references in Keyes, 2011).

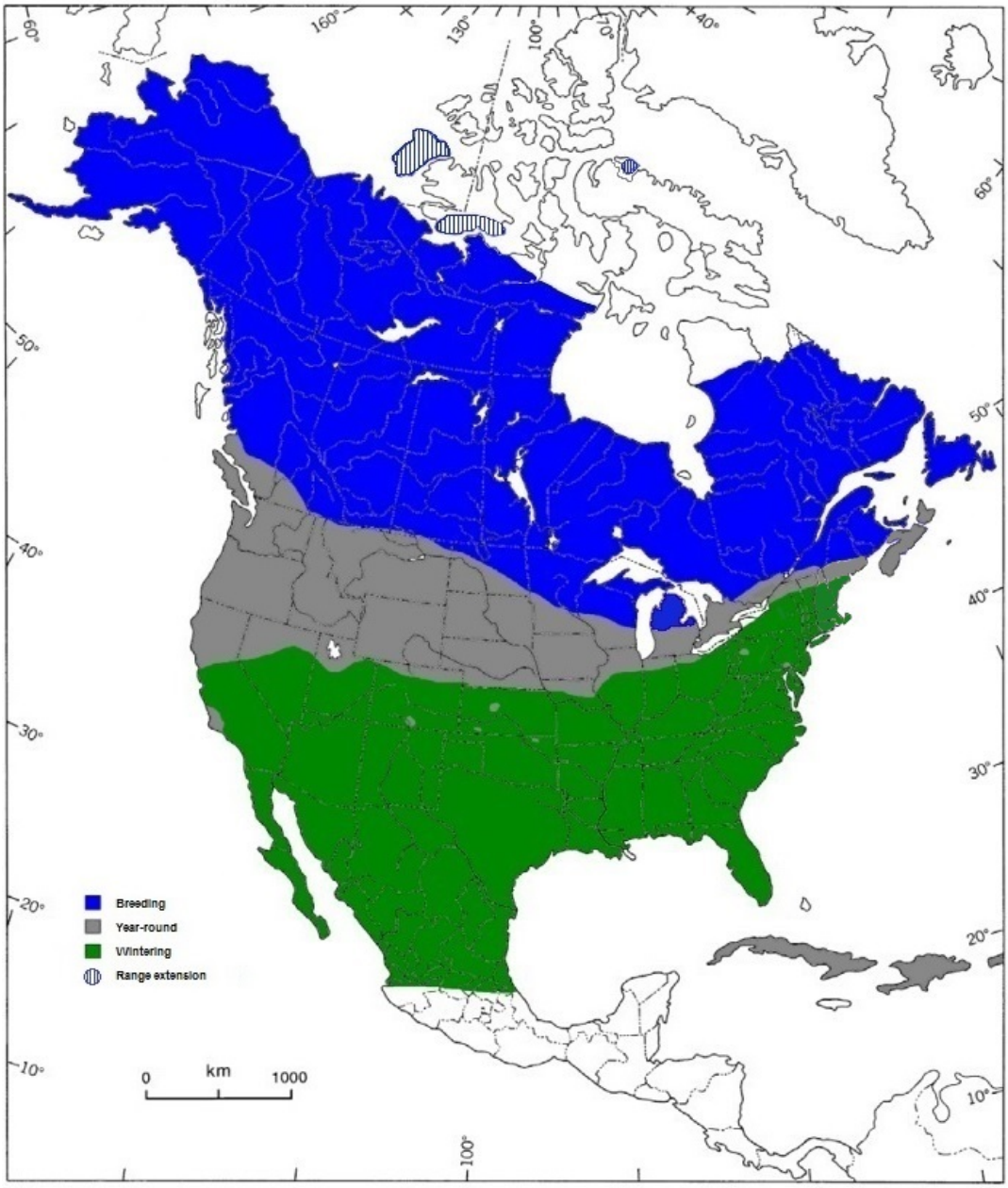

Figure 1. Distribution of the Short-eared Owl in North America
(modified from Wiggins et al., 2006, on the basis of observations from Therrien, 2010, and Smith et al., 2013).

The species' nomadic behaviour[4] and tendency toward irruptions,[5] the gaps in knowledge regarding the breeding population in remote areas and the lack of consistent standardized census results complicate population trends analysis (Cadman and Page, 1994; Clayton, 2000; Booms et al., 2014). However, data from the Christmas Bird Count (CBC) for the United States suggest that the abundance of Short-eared Owls declined by a mean of about 2.3% per year between 1960 and 2012, with a stabilization between 2002 and 2012 (National Audubon Society, 2014). Since a high proportion of these birds are likely from the Canadian breeding population, this figure is considered a reasonable estimate of the Canadian population trend (COSEWIC, 2008). The Canadian Breeding Bird Survey (BBS), a program that monitors breeding birds mostly across southern Canada, also shows a steep mean decline of 5.17% per year between 1970 and 2012 (95% C.I.= -1.05% to -9.24%) and a stabilization between 2002 and 2012 (+0.40% per year; 95% C.I.= -14.9% to +22.7%) (Environment Canada, 2014). The data for Alberta (-4.54% and +0.40%) and Saskatchewan (-5.4% and +0.68%) follow the same patterns. The number of routes where Short-eared Owl were detected was insufficient to calculate a trend in other provinces and territories.

Data from the various breeding bird atlas projects across Canada show contrasting trends (Table 2). Some show sharp declines in the number of occupied atlas squares (e.g. in Quebec), while others show stable occupancy (e.g. in the Maritimes) or even substantial increases (e.g. in Ontario). The time periods considered vary among the regions, and survey efforts and coverage often differed between first and second atlas projects within a region, making comparison difficult. For example, M.A. Grabauer (in Cadman et al., 2007) suggests that the increase in the number of occupied atlas squares in the second atlas project could be the result of extensive low-level aerial surveys in the Hudson Bay lowlands, while targeted searches to locate the species in southern Ontario by the Migration Research Foundation (2004) showed that agricultural areas away from large watercourses have been abandoned. Furthermore, the irruptive nature of the species complicates the interpretation of atlas data, especially since the data are available over a maximum of two periods of 5 or 6 years, separated by 15 to 20 years.

Data for the Yukon, the Northwest Territories, Nunavut, and Newfoundland and Labrador are scant and were gathered through smaller-scale, ad hoc surveys (see section 6.2).

[4] Nomadism: tendency of adults as well as juveniles to move widely in search of food, and to settle and breed where it is locally abundant (Andersson, 1980).
[5] Irruption: Tendency of a species to migrate to places where it is not normally present.

Table 2. Breeding Bird Atlas Data for the Short-eared Owl in Canada.

Provinces	Atlas Periods	Number of Occupied Atlas Squares	References
British Columbia	2008-2012	50	Davidson et al. (2014)
Alberta	1985-1990	NA	Semenchuk (1992)
	2000-2005	NA	Federation of Alberta Naturalists (2007)
Saskatchewan	1966-2014[a]	192	Smith (1996); *Saskatchewan Breeding Bird Atlas*[b]
Manitoba	2010-2014[a]	82	*Manitoba Breeding Bird Atlas* (2014)
Ontario	1981-1985	63	Cadman et al. (1987)
	2001-2005	158	Cadman et al. (2007)
Quebec	1984-1989	120	Gauthier and Aubry (1995)
	2010-2014[a]	67	*Québec Breeding Bird Atlas* (2014)
Maritimes	1986-1990	29	Erskine (1992)
	2006-2010	32	*Maritime Breeding Bird Atlas* (2013)

[a] Ongoing projects.
[b] The *Saskatchewan Bird Atlas* is not based on a standardized survey methodology. Data are reported continually in a web-based application (gisweb1.serm.gov.sk.ca/imf/imf.jsp?site=birds). Atlas squares correspond to the National Topographic System 1: 250 000 grids (nrcan.gc.ca/earth-sciences/geography/topographic-information/maps/9765) rather than the standard 10 x 10 km UTM grids.

3.3. Needs of the Short-eared Owl

Short-eared Owls occur in a variety of open native habitats, including grasslands, Arctic tundra, taiga, bogs, marshes, coastal wetlands, coastal barrens, estuaries and grasslands dominated by sand-sage (*Artemisia filifolia*). They are also found in many types of man-made agricultural habitats (e.g. managed grasslands) (Erskine, 1992; Sinclair et al., 2003; Wiggins et al., 2006). There is little specific information regarding habitat preferences at the landscape scale, but a mosaic of grasslands and wetlands provides optimal breeding and foraging habitats (Wiggins, 2004). At a more detailed scale, studies indicate that medium-to-tall grasses (higher than 30 cm, see Clayton, 2000; Wiggins, 2004), some dry upland for nesting (Clark, 1975; Tate, 1992) and hunting perches (e.g. scattered trees; Wiebe, 1987; Keyes, 2011) are characteristics of a number of occupied sites, although these specific features may not be required (Dechant et al., 2001). For wintering sites, thatch density and height resembling that of old fields or native habitats appears to be an important habitat characteristic (Huang et al., 2010). Ultimately, however, the density of prey populations seems to be a better indicator of habitat occupancy (e.g. Poulin et al., 2001), and several studies show that the Meadow Vole (*Microtus pennyslvanicus*), one of the predominant prey items,[6] prefers natural prairie or meadows with greater amounts of vegetative cover and typically avoids cultivated fields and annual cropland (Marinelli and Neal, 1995; Peles and Barrett, 1996; Lin and Batzli, 2001).

In suitable breeding habitats, pairs defend territories of 20 ha to more than 100 ha, although nests from multiple pairs may be clustered in habitats where food resources are abundant (semi-colonial breeder; Pitelka et al., 1955; Clark, 1975; Tate, 1992; Holt and Leasure, 1993; Wiggins, 2004). Herkert et al. (1999) suggest that the total amount of habitat within the landscape is more important than the size of individual patches; small patches which can be used if they are located near large habitat patches. Breeding may begin in late March in areas that are used year-round and may extend to late August (Dechant et al., 2001). Eggs are laid on flattened vegetation or in a scrape made on the ground and lined with grasses (Ehrlich et al., 1988). Flightless owlets leave the nest at 14 to 17 days and generally remain within 200 metres of the nest for the first few weeks (Holt and Leasure, 1993). A pair can renest if the first attempt fails (Dechant et al., 2001). Birds are capable of breeding within their second year, and wild individuals have been known to reach 12 years of age (Cramp, 1985).

Owing to fluctuating food resources, the Short-eared Owl generally exhibits low site fidelity (Anderson, 1980; Booms et al., 2014), and distances of over 1000 km between consecutive sites used in breeding seasons have been reported (Clark, 1975). Nomadism may also be more pronounced in northern populations than in southern ones, while southern populations may stay in the same area year-round (Wiggins et al., 2006). Migration and wintering sites appear to be more stable.

[6] The diet is composed largely of voles but can be complemented with other small mammals and birds (see a list of prey species in Holt, 1993, and Wiggins, 2004).

Limiting factors

Limiting factors influence a species' survival and reproduction, and play a major role in the ability to reach certain population levels or to recover following a decline. For the Short-eared Owl, the availability of food resources is a limiting factor. The Meadow Vole, one of its main prey species, has cyclic population fluctuations about every 2 to 5 years (Reich, 1981). These fluctuations affect the breeding success of the Short-eared Owl whose clutches vary between 1 and 11 eggs, with a mean of 5.6; Murray, 1976). However, the Short-eared Owl can breed earlier and increase its clutch size in times of prey abundance (Clark, 1975; Holt and Leasure, 1993; Cadman and Page, 1994).

The impact of this limiting factor is likely greater in more disturbed landscapes.

4. Threats

4.1. Threat Assessment

There are various direct and indirect threats to the Short-eared Owl and its habitats. In this management plan, threats were assessed using the International Union for the Conservation of Nature (IUCN) Threats Calculator (Salafsky et al., 2008), which considers only the direct, not the indirect, effects on population numbers. Consequently, with regard to threats leading to habitat modification, such as industrial activities, only direct threats such as loss of food resources leading to a decrease in the survival rate or shifts to suboptimal habitats are taken into consideration. Indirect threats related to habitat alteration which can lead to altered predatory/prey dynamics and to higher rates of predation on Short-eared Owls are considered only in the "Problematic Native Species" category. Also, the threats calculator takes into account only current threats within the Short-eared Owl range and threats projected to occur in the next 10 years (or 3 generations for the Short-eared Owl). Historical threats are presented in section 4.2 Description of Threats.

In Table 3, assessments are provided for northern populations (breeding and migrating) and southern populations (wintering and resident) because the impacts differ. The IUCN Threats Calculator assesses direct threats only, but the sections of the management plan following the table incorporate the indirect threats to provide a more complete understanding of the effects of each type of threat on the Short-eared Owl.

Table 3. Threats Assessed for the Short-eared Owl Using the IUCN Threats Calculator.

Threats	Threat Description	Impact[a]		Scope[b] (3 generations)		Severity[c] (3 generations)		Immediacy[d]	
		South	North	South	North	South	North	South	North
1	Residential & commercial development	Low	Negligible	Small	Negligible	Slight	Negligible	High	High
1.1	Housing & urban areas	Low	Negligible	Small	Negligible	Slight	Negligible	High	High
1.2	Commercial & industrial areas	Low	Negligible	Small	Negligible	Slight	Negligible	High	High
1.3	Tourism & recreation areas	Low	Negligible	Small	Negligible	Slight	Negligible	High	High
2	Agriculture & aquaculture	Low	Negligible	Restricted	Negligible	Slight	Negligible	High	Negligible
2.1	Annual & perennial non-timber crops	Low	Negligible	Restricted	Negligible	Slight	Negligible	High	Negligible
2.3	Livestock farming & ranching	Low	Negligible	Restricted	Negligible	Slight	Negligible	High	Negligible
3	Energy production & mining	Low	Low	Restricted	Restricted	Slight	Slight	High	High
3.1	Oil & gas drilling	Low	Low	Restricted	Restricted	Slight	Slight	High	High
3.2	Mining & quarrying	Low	Low	Restricted	Restricted	Slight	Slight	High	High
3.3	Renewable energy	Low	Low	Small	Small	Slight	Slight	High	High
4	Transportation & service corridors	Low	Low	Small	Small	Slight	Slight	High	High
4.1	Roads & railroads	Low	Low	Small	Small	Slight	Slight	High	High
4.2	Utility & service lines	Low	Low	Small	Small	Slight	Slight	High	High
5	Biological resource use	Unknown	Unknown	Unknown	Unknown	Unknown	Unknown	Low	Low
5.1	Hunting & collecting terrestrial animals	Unknown	Unknown	Unknown	Unknown	Unknown	Unknown	Low	Low
6	Human intrusions & disturbance	Negligible	Negligible	Negligible	Negligible	Negligible	Negligible	High	High
6.1	Recreational activities	Negligible	Negligible	Negligible	Negligible	Negligible	Negligible	High	High
7	Natural system modifications	Negligible	Negligible	Negligible	Small	Slight	Negligible	High	High
7.1	Fire & fire suppression	Negligible	Negligible	Negligible	Negligible	Slight	Negligible	High	High
7.2	Dams & water management/use	Negligible	Negligible	Negligible	Small	Negligible	Negligible	High	High
7.3	Other ecosystem modifications	Negligible	Low	Negligible	Small	Slight	Slight	High	High
8	Invasive & other problematic species & genes	Negligible	Negligible	Restricted	Negligible	Negligible	Negligible	High	Low
8.1	Invasive alien (non-native) species	Negligible	Negligible	Restricted	Negligible	Negligible	Negligible	High	Low
8.2	Problematic native species	Negligible	Negligible	Restricted	Negligible	Negligible	Negligible	High	Low
11	Climate change & severe weather	Negligible	Negligible	Restricted	Small	Negligible	Negligible	High	High
11.1	Habitat shifting & alteration	Negligible	Negligible	Restricted	Small	Negligible	Negligible	High	High
11.4	Storms & flooding	Negligible	Negligible	Small	Negligible	Negligible	Negligible	High	Moderate

[a] Impact is calculated based on scope and severity. Categories include: very high, high, medium, low, unknown and negligible
[b] Scope is the proportion of the population that can reasonably be expected to be affected by the threat within the next 10 years. Categories include: pervasive (71-100%), large (31-70%), restricted (11-30%), small (1-10%), negligible (<1%) and unknown. Categories can also be combined (e.g. large to restricted = 11-70%).
[c] Severity is, within the scope, the level of damage to the species (assessed as the % decline expected over the next three generations due to threats that will occur in the next 10 years. Categories include: extreme (71-100%), serious (31-70%), moderate (11-30%), slight (1-10%), negligible (<1%) and unknown. Categories can also be combined (e.g. moderate to slight = 1-30%).
[d] Immediacy describes how immediate the threat is. Categories include: high (continuing), moderate (possibly short-term [<10 years or three generations]), low (possibly long-term [>10 years or three generations]), negligible (past or no direct effect) and unknown.

4.2. Description of Threats

Threats to the Short-eared Owl can affect habitat through loss or degradation but can also affect individuals, nests and eggs. Human activities that remove or fragment large expanses of habitat required during the various life cycle stages are considered the primary factor driving declines in Short-eared Owl populations (Dechant et al., 2001; Wiggins, 2004; Wiggins et al., 2006). The direct effects of habitat loss and degradation no doubt explain part of the decline, but species experts believe that the key factors are probably linked to the indirect effects leading to reduced reproductive success due to lower (or unpredictable) prey availability and increased predation (Wiggins, 2004; Booms et al., 2014). Aside from the direct threats to Short-eared Owl habitat, there are a number of threats that affect individuals, nests or eggs.

Residential and commercial development

Habitat loss due to urban expansion, recreational activities and resort development constitute a major localized threat, particularly in productive habitats occupied year-round, such as coastal marshes and adjacent grasslands (Wiggins, 2004; Wiggins et al., 2006). This threat affects the species in some areas where it is found in high densities (e.g. the Fraser River delta of British Columbia; Campbell et al., 1990). Despite this, high densities of breeding and overwintering Short-eared Owls in urbanized areas have been reported (e.g. at Sea Island near the Vancouver airport; Butler and Campbell, 1987).

Agriculture and aquaculture

The conversion of native habitats (e.g. grassland, wetland) to agriculture, particularly for intensive agriculture, is a widespread threat throughout southern Canada. Samson and Knopf (1994) reported dramatic losses of native grasslands in Alberta (61% of mixed grass prairie), Saskatchewan (81% of mixed grass prairie and 86% of shortgrass prairie), and Manitoba (99% of tallgrass prairie and more than 75% of mixed grass prairie), as well as further south (USA) along the western and central Great Plains. This threat is ongoing in most areas of the species' range (i.e. breeding, wintering and year-round areas; Gauthier et al., 2003; Canadian Prairie Partners in Flight, 2004; Samson et al., 2004; Watmough and Schmoll, 2007; Pool et al., 2014). However, the conversion of native grasslands to more intensive crops seems to have slowed in the Prairie provinces (Statistics Canada, 2011). This may be because less of the remaining native habitats are on soils that are suitable for crop production. If this is the case, conversion rates could accelerate if alternative crops (e.g. biofuel crops) that grow well on marginal lands are developed (Liu et al., 2011). As for wetlands, the rate of loss along the St. Lawrence River has also slowed in recent years (Ducks Unlimited Canada, 2010) after decades of intensive draining (e.g. 80% of wetlands have been lost since European settlement; James, 1999; Painchaud and Villeneuve, 2003). In the Canadian Prairies, the rate of wetland loss has been slower but continuous since the early 1900s (see references in Canadian Partners in Flight, 2004).

Livestock farming and ranching is very common over much of the Canadian Prairies and the United States Great Plains (Samson and Knopf, 1994). Grazing can affect the structure of Short-eared Owl habitat by reducing grass height and density. Although habitats consisting of short or sparse grasses can be used effectively for foraging (Vukovich and Ritchison, 2008), it has been shown that overgrazing by domestic ungulates may limit the densities of herbivorous small mammals, such as voles, that constitute important prey species in grassland ecosystems, and may thus have an impact on predators at higher trophic levels (Villar et al., 2014).

Although Short-eared Owls nest on agricultural land, their breeding success in such habitats is lower than in native habitats (Campbell et al., 1990; Cadman and Page, 1994; Herkert et al., 1999; Keyes, 2011). In these areas, there can be significant egg and nestling mortality (because of trampling by livestock, mechanical trauma and so on; Arroyo and Bretagnolle, 1999), since many fields are grazed, mowed or harvested before the young leave the nest. Fondell and Ball (2004) found that reproductive success was significantly lower on grazed grasslands than on ungrazed grasslands (10% vs. 60%), in large part because of greater predation on eggs and nestlings. Mowing and harvesting can also lead to an increase in the likelihood of nest depredation, owing to reduced concealment from predators (Keyes, 2011). However, Dechant et al. (2001) suggest an occasional mowing or burning (e.g. every 2-8 years), outside of the breeding period, may be needed in some areas to maintain habitats, for instance, to prevent shrubs from invading tallgrass prairies.

The pesticides used to control pest species (e.g. pigeons, European Starlings and rodents) may pose a threat to the Short-eared Owl. First and foremost, pesticides used to control crop pests may indirectly affect the survival of individuals and reproductive success by decreasing prey populations. The ingestion of prey contaminated with pesticides (e.g. 4-amino-pyridine (Avitrol®), strychnine and fenthion) has also been shown to cause traumatic shock and death in raptors (including Short-eared Owls) Mineau et al.,1999; Campbell, 2006). Mass mortality events for raptors (including five Short-eared Owls) have been linked to the application of an insecticide used to control rodent infestations in Israel (Mendelssohn and Paz, 1977). However, concentrations of contaminants reported for Short-eared Owls (Peakall and Kemp, 1980; Henny et al., 1984) generally do not have a significant effect on eggshell thickness, tissue damage or embryo mortality (Cadman and Page, 1994; Wiggins et al., 2006). This is probably because the species' diet consists primarily of herbivorous species, making it less prone to bioaccumulation[7] of pesticides than species feeding on carnivorous prey.

New chemical compounds and substances have been developed and used across the range of the Short-eared Owl, and it is possible that individuals may be affected by bioaccumulation or biomagnification of other contaminants. There are concerns about, among other things, neonicotinoids,[8] neurotoxic insecticides known to have the potential

[7] Bioaccumulation means the capacity of a living organism to gradually absorb and concentrate a contaminant or toxic substance that is present in the environment.

[8] A group of insecticides with a chemical formula similar to that of nicotine that kill insects by their action on the central nervous system.

to cause behavioural effects in insectivorous birds (Hallmann et al., 2014). Although the Short-eared Owl is not insectivorous, some of its prey species are, and this could impact the species' populations.

Energy production and mining

Exploration to find new energy sources (e.g. oil, gas, coal and hydroelectricity) and minerals (including aggregates), exploitation of these sources (resulting in mine residues, flooding of areas to create reservoirs, and so on) and their transportation (necessitating pipelines, transmission lines, roads and so on) have generated habitat loss, degradation and fragmentation in many areas of the Short-eared Owl's range (Masek et al., 2011). However, the direct impacts of these threats on the Short-eared Owl populations have not yet been demonstrated.

Transportation and service corridors (collisions)

Mortality of Short-eared Owls has occurred as a result of collisions with aircraft, automobiles, antennas, windows, power lines, barbed-wire fences and wind turbines (Cadman and Page, 1994; Fajardo et al., 1994; Bevanger and Overskaug, 1998; Kingsley and Whittam, 2005; Preston and Powers, 2006; Jiménez-Uzcategui and Betancourt, 2008, Longcore et al., 2013). However, whether this is a significant factor in the population decline is unknown (COSEWIC, 2008).

Climate change

The potential effects of climate change on the Short-eared Owl are difficult to predict because the various species respond differently to spatial and temporal variations in their environment (Taper et al, 1995). One of the main effects could be through the availability of prey species. Indeed, climate change scenarios predict a reduction in snow cover in the Canadian Prairies (Sauchyn and Kulshreshtha, 2008), and such a reduction would negatively impact Meadow Vole populations (Heisler et al., 2014). Prey could, however, be more easily accessed in such conditions. Another effect, the increased occurrence of severe weather events (cold snaps, hurricanes, wind storms; Huber and Gulledge, 2011), could have impacts throughout the species' range.

Northern regions are likely to sustain the most significant impacts associated with climate change (Screen and Simmonds, 2010). Potential changes to the Arctic tundra through increased shrub cover (Myers-Smith et al., 2011; Miller and Smith, 2012; Zhang et al., 2013) would reduce the area of suitable habitat for the Short-eared Owl in that ecosystem. However, the warming observed in the Arctic could allow for further expansion elsewhere in northern Canada (Therrien, 2010; Smith et al., 2013).

Other threats

Hunting (in the northern part of the range) and recreational activities (e.g. use of all-terrain vehicles in coastal habitats) are likely negligible or minor threats to the

Short-eared Owl. Fire suppression (resulting in succession toward shrub cover too thick for the species), the creation of dams (flooding of large areas), invasive alien species (particularly Buckthorn (*Rhamnus cathartica*)), and some native species (e.g. nest predators such as skunks and raccoons) could be threats, although their impact is presumably more limited than that of the other threats described in this section.

5. Management Objective

The management objectives for the Short-eared Owl in Canada are:

- In the short term: Stabilize or increase the population trend over the 2015-2025 period and maintain the area of occupancy[9] at 1,500,000 km^2; and
- In the long term: Ensure a positive 10-year population trend starting in 2025, while promoting an increase in the area of occupancy, including the gradual recolonization of areas in the southern portion of the Canadian range.

These objectives address the species' long-term decline, which was the reason for its designation as Special Concern (COSEWIC 2008). The 10-year time frame for the short-term objectives is considered reasonable, given the challenge of stabilizing or increasing the population trend of such a widespread species. The area of occupancy provided corresponds to the COSEWIC (2008) estimate and maintaining it should focus on the conservation of native habitats as well as beneficial management practices in habitats altered or modified by human activities to ensure they are suitable for the Short-eared Owl, i.e. capable of sustaining prey populations and ensuring the complete life cycle, particularly the breeding part of the cycle. As for the long-term objectives, promoting an increase in the area of occupancy will necessitate additional efforts, including targeted habitat restoration in human-occupied landscapes (used year-round by the species and therefore of high conservation concern). Appendix A presents a preliminary list of areas of conservation interest for the Short-eared Owl in Canada based on recurrent observations over the past decades.

These objectives may be reviewed during the development of the report required five years after the management plan is posted to assess the implementation of the management plan and the progress towards meeting its objectives (s. 72, SARA).

6. Broad Strategies and Conservation Measures

6.1. Actions Already Completed or Currently Underway

Conservation and Management

- Regional status reports and management plans have been produced or recovery teams have been created in a number of provinces:

[9] The area of occupancy is defined as the area, within the range of the species, which is occupied (COSEWIC, 2009).

- Alberta (status report: Clayton, 2000);
- British Columbia (guidelines for raptor conservation: BC Ministry of Environment, 2013);
- Quebec (recovery team: Équipe de rétablissement des oiseaux de proie; recovery plan in preparation);
- Newfoundland and Labrador (management plan: Schmelzer, 2005).

- Stewardship and habitat conservation programs (not specific to the Short-eared Owl, but could benefit the species):
  - Alberta's Operation Grassland Community (since 1989) and the Prairie Conservation Action Plan work with landowners and ranchers to conserve prairie habitat and wildlife;
  - The Action Plan for Multi-Species at Risk in Southwestern Saskatchewan: South of the Divide is aimed at the protection and recovery of species at risk (ongoing - could be beneficial to Short-eared Owl habitat) (Environment Canada, 2015);
  - South Coast Conservation Program in British Columbia www.sccp.ca/;
  - Alberta's Multiple Species at Risk: *At Home on the Range: Living with Alberta's Prairie Species at Risk* www.multisar.ca/;
  - Under the Permanent Cover Program in the Prairies and in British Columbia (in the early 1990s; McMaster and Davis, 2001) and the Ontario Permanent Cover Program, farmers could receive funds for keeping environmentally sensitive land out of production;
  - The Conservation Cover Incentive Program for the Upper Assiniboine River Basin in Saskatchewan and Manitoba, the Grand River Watershed in Ontario and the Mill River Watershed in Prince Edward island is aimed at providing incentives for landowners to protect or restore ecosystems;
  - Manitoba's pilot municipal property tax credit program promotes the creation or maintenance of conservation cover;
  - The Alternate Land Use Services program (ALUS) provides incentives for landowners to set aside marginal agricultural land (Manitoba since 2006; Ontario since 2007; Prince Edward Island since 2008; Alberta since 2010; and Saskatchewan since 2011);
  - The Delta Farmland and Wildlife Trust Grassland Set-aside Stewardship Program encourages farmers of the lower Fraser River delta to restore the soil, promote the establishment of small mammal populations as prey for raptors, and provide foraging, roosting and breeding habitat for wildlife;
  - Environment Canada's National Conservation Plan[10] should lead to the protection and restoration of grassland bird habitats;
  - Ongoing programs to help breeding and migratory populations of waterfowl (e.g. Ducks Unlimited, Prairie Habitat Joint Venture, Eastern Habitat Joint Venture and Nature Conservancy Canada).

[10] www.canada.ca/en/services/environment/ncp/index.html

- Development of guidelines for various industries:
  - Standardized guidelines for petroleum industry activities (Scobie and Faminow, 2000; Environment Canada, 2009);
  - In British Columbia, the Identified Wildlife Management Strategy species account (www.env.gov.bc.ca/wld/frpa/iwms/documents/Birds/b_shortearedowl.pdf) and General Wildlife Measures propose practices that may be beneficial to the species;
  - The Ontario Ministry of Natural Resources and Forestry provides direction to protect occupied Short-eared Owl nests within a forestry context. The *Forest Management Guide for Conserving Biodiversity at the Stand and Site Scales* (OMNR, 2010) provides standards and guidelines for occupied nests.

- Policy development regarding:
  - Wetlands (e.g. Federal Policy on Wetland Conservation);
  - Zoning;
  - Pesticide use.

Surveys, Monitoring and Research

- In Newfoundland and Labrador, a program of surveys on large tracts of open areas or at sites where owls had previously been documented during the breeding season was initiated in 2003 and 2004 (Schmelzer, 2005);
- In southern Ontario, the Migration Research Foundation (2004) initiated monitoring of the Short-eared Owl (2003, 2006-2007) to document the breeding and wintering populations in the region. In addition, Bird Studies Canada began documenting the wintering Short-eared Owl population in southern Ontario in 2003. In 2010-2011, the program officials initiated Short-eared Owl data reporting from across Canada to identify breeding and wintering locations;
- In Quebec, since 2012,the Zoo sauvage de Saint-Félicien and Quebec's Ministère des Forêts, de la Faune et des Parcs have been implementing an inventory protocol and documenting spatial habitat use in the Saguenay – Lac-Saint-Jean region;
- Survey protocols specific to the Short-eared Owl were developed for Manitoba (Manitoba's Nocturnal Owl Survey), Newfoundland and Labrador (Schmelzer, 2005), Saskatchewan (Saskatchewan Ministry of Environment, 2014) and Alberta (Government of Alberta, 2013);
- Studies on the Short-eared Owls were carried out (Keyes, 2011) to look at the species' breeding-ground origins in North America in the context of nomadic, migratory and/or philopatric movements, to develop a practical visual survey protocol aimed at improving monitoring efforts and facilitating assessments of across-season landscape-level habitat use, and to describe nest site characteristics, nest success and causes of nest failure;
- Migratory movements were followed using leg banding, radio-telemetry, stable isotope analysis and satellite transmitters at various locations in North America (Bird Studies Canada, U.S. Fish & Wildlife Service, Wildlife Diversity Program, Alaska Department of Fish and Game, New York State Department of

Environmental Conservation, Canadian Wildlife Service, Raptor Research Foundation; Migration Research Foundation, etc.);
- Bird Studies Canada has established a volunteer-based nocturnal owl monitoring survey in the Atlantic region, Alberta, British Columbia, Manitoba, Ontario, Quebec, Saskatchewan and the Northwest Territories. Guidelines for nocturnal owl monitoring in North America were published by the Beaverhill Bird Observatory and Bird Studies Canada (Takats et al., 2001).

Awareness and Partnerships

- Scientific workshops have been held to identify Short-eared Owl conservation needs, at the inaugural meeting of the Canadian Short-eared Owl Working Group in Winnipeg in November 2006, at the annual meeting of the Raptor Research Foundation in Pennsylvania in September 2007, at the World Owl Conference in the Netherlands in November 2007 and at the annual meeting of the Raptor Research Foundation in Missoula in 2008. Also, a symposium entitled “Short-eared Owls: The Need for a Conservation Plan” was held at the 2011 Raptor Research Foundation Annual Meeting in Duluth;
- Many organizations are working on raising awareness about the species within the general public and among landowners and encouraging people to report their sightings of Short-eared Owls (e.g. Bird Studies Canada, the Zoo sauvage de Saint-Félicien, the Government of the Northwest Territories; and the British Columbia Grassland Conservation Council www.bcgrasslands.org/index.php/what-we-do).

6.2. Broad Strategies

The broad strategies to achieve the Short-eared Owl management objectives are as follows:

1. Conservation and management of the species and its suitable habitats across the breeding, migrating and wintering ranges;
2. Conducting surveys, monitoring and research on the species, its habitats and threats across the breeding, migrating and wintering ranges; and
3. Promoting awareness and partnerships with regard to conservation priorities.

6.3. Conservation Measures

Table 4. Conservation Measures and Implementation Schedule.

Conservation Measures	Priority[a]	Threats or Concerns Addressed	Timeline
Broad Strategy: Conservation and management of the species and its suitable habitats across the breeding, migrating and wintering ranges			
Identify and implement national and regional conservation priorities using multi-species or ecosystem approaches to the conservation and management (including restoration where needed) of large tracts of grasslands, wetlands and other open habitats: • Prioritize the conservation of native habitat at high risk of being lost or degraded owing to changes in land use (particularly when the land is used year-round) • Use or draw on existing habitat management and conservation programs in Canada (see section 6.1) and the United States (e.g. the Conservation Reserve Program and the Wetlands Reserve Program) • Promote beneficial management practices (e.g. Rangeland Conservation Service Ltd., 2004; Haddow et al., 2013) to eliminate, reduce or mitigate threats: - Consider excluding any activities within a 200-m radius of all occupied nests - Promote reduced-till farming practices and delayed harvests to limit the presence of machinery in occupied habitats during the breeding season - Promote re-vegetation of stream banks (to provide nesting cover and cover for prey populations, for example) - Develop and promote integrated pest management to minimize impacts on prey species, while providing low-cost management of agricultural pests; - Regularly evaluate the effectiveness of beneficial management practices, and adapt them if necessary • Evaluate the effectiveness of habitat restoration methods	High	All threats	2015-2025

Conservation Measures	Priority[a]	Threats or Concerns Addressed	Timeline
Promote compliance with: • environmental laws and regulations that prevent disturbance to adults, nests and eggs for all types of activities and land tenures using an approach similar to the one developed by Environment Canada to prevent the incidental take of migratory birds[11] • policies: - Wetland management - Site reclamation using local native vegetation, when available • land use tools: - zoning (e.g. to prevent the loss of natural habitats)	High	All threats	2015-2025
Encourage the implementation of existing reduction policies and programs for pesticides, greenhouse gases and other pollutants, and fill the gaps related to other threats (if applicable).	Medium	2. Aquaculture & agriculture (2.1 Annual & perennial non-timber crops); 11. Climate change &severe weather (11.1 Habitat shifting & alteration; 11.4 Storms & flooding)	2015-2025
Reassess the NatureServe ranks to obtain a better correspondence between national and subnational scores.	Medium/Low	Conservation priority for species	2016
Broad Strategy: Conducting surveys, monitoring and research on the species, its habitats and threats across the breeding, migrating and wintering ranges			

[11] Environment Canada's website on the incidental take of migratory birds: www.ec.gc.ca/paom-itmb/default.asp?lang=En&n=C51C415F-1

Conservation Measures	Priority[a]	Threats or Concerns Addressed	Timeline
Update the protocols developed in the provinces and territories on the basis of recent recommendations (e.g. Calladine et al., 2008, 2010; Keyes, 2011) in order to develop and implement a standardized national monitoring protocol to clarify: • abundance and population trends • annual and seasonal movements • population dynamics and demographic data, including: - how the species reacts to different management regimes and fluctuations in the populations of key prey ▪ consider including prey population surveys (e.g. small mammals and hare surveys in the Northwest Territories[12]) - links between the Canadian populations (e.g. stable isotopes, radio-telemetry, satellite telemetry, geolocators)	High	Knowledge gaps	2015-2025
Conduct research and gather Aboriginal ecological data on: • breeding, foraging, migrating, and wintering habitat requirements at multiple spatio-temporal scales • the availability and distribution of suitable habitat at multiple spatio-temporal scales • the impacts of predators in the various habitat types used by the species • the interactive effects of ecosystem changes (e.g. climate change) on grassland birds and their habitats • the impacts of certain presumed secondary threats (e.g. windfarms)	High	Knowledge gaps	2015-2025
Establish a geospatial database on land use (habitats and threats) and do regular monitoring for the adaptation of conservation priorities.	Medium	All threats; Knowledge gaps	2015-2025
Develop habitat suitability models for the Short-eared Owl or for multiple species (e.g. grassland birds) incorporating: • updated data from existing monitoring programs and databases (e.g. the nocturnal owl surveys managed by Bird Studies Canada; eBird) • vegetation cover • prey populations	Medium	Knowledge gaps	2015-2025
Broad Strategy: Promoting awareness and partnerships relative to conservation priorities			

[12] www.nwtwildlife.com/

Conservation Measures	Priority[a]	Threats or Concerns Addressed	Timeline
Establish conservation priorities for the Short-eared Owl and its habitats by continuing or forming partnerships with: • the United States and Mexico through initiatives such as Partners in Flight • the provincial and territorial authorities; • Aboriginal peoples (including wildlife management boards); • other landowners and land-use planners (e.g. industries, farmers and associations such as the Canadian Cattlemen's Association and the Union des producteurs agricoles) • the research community (e.g. the Canadian Short-eared Owl Working Group) and the managers of volunteer programs (in Europe and Russia, for example)	High	All threats	2015-2025
Determine effective methods to promote conservation measures to land managers, Aboriginal peoples and other stakeholders in an effort to increase their engagement: • participation at key stakeholder meetings (e.g. meetings of farmer associations • targeted newsletter for landowners in areas where the species is recurrent	Medium	All threats	2015-2025

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

7. Measuring Progress

The performance indicators presented below provide a way to define and measure progress toward achieving the management objectives. Success in the implementation of this management plan will be measured every five years using the following indicators:

- In the short term: the population trend over the 2015-2025 period is stabilized or increased and the area of occupancy is maintained at 1,500,000 km^2.
- In the long term: a positive 10-year population trend is reached starting in 2025 and the area of occupancy is increased, including in the southern portion of the Canadian range.

Given the current gaps in the monitoring of population trends and the general nature of the estimation of the area of occupancy, these indicators will be clarified on the basis of the protocols developed as part of the framework of conservation measures defined in section 6.2.

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Appendix A: Areas of Interest for the Conservation of the Short-eared Owl in Canada

In British Columbia, the areas of interest include:

1. Fraser River delta
2. Grasslands and wetlands along the Peace River (near the Alberta border)

In the Prairie provinces (Alberta, Saskatchewan and Manitoba), the areas of interest include:

1. The southern portion, mainly the grassland and residual pasture habitats in Bird Conservation Region 11 – Prairie Potholes

In Alberta, the areas of interest include:

1. Agricultural areas, marshes and grasslands east of Lesser Slave Lake, along the Peace River (Grande Prairie, Fairview)
2. Agricultural areas, marshes and grasslands of the Beaverhill Lake area

In Saskatchewan, the areas of interest include:

1. Agricultural areas, marshes and grasslands along the North Saskatchewan River (North Battleford)
2. Agricultural areas, marshes and grasslands along the shores of Last Mountain Lake
3. Agricultural areas, marshes and grasslands along the shores of Quill Lake

In Manitoba, the areas where the species is recurrent are:

1. Marshes and grasslands north of Lake Winnipegosis and near Clearwater Lake
2. Agricultural areas, marshes and grasslands south of Lake Manitoba

In Ontario, the areas of interest include:

1. Marshes and grasslands in the Hudson and James Bay lowlands
2. Agricultural areas, marshes and grasslands along the shores of the Great Lakes
3. Agricultural areas, marshes and grasslands near Lake St. Clair
4. Agricultural areas in the Niagara peninsula (e.g. Haldimand and Hamilton)
5. Insular agricultural areas near Kingston (e.g. Amherst Island and Wolfe Island; Weir, 2008; Keyes, 2011)

A number of agricultural areas farther from the major rivers and formerly occupied by the species seem to have been abandoned (Migration Research Foundation, 2004)

In Quebec, the areas of interest include:

1. Agricultural areas, marshes and grasslands along the St. Lawrence River, particularly on the south shore (e.g. Rimouski), but also where there are some concentrations on the north shore (e.g. Havre Saint-Pierre, Blanc Sablon and Baie Comeau)

2. Agricultural areas, marshes and grasslands of the Saguenay – Lac-Saint-Jean lowlands
3. Agricultural areas in the Abitibi region
4. Marshes and grasslands of the Magdalen Islands (records date from the late 80s/ early 90s)
5. Marshes and grasslands of Chaleur Bay
6. Marshes and grasslands of the James Bay lowlands (e.g. Boatswain Bay and Cabbage Bay)
7. Open habitats along the La Grande River (e.g. Radisson)
8. Open habitats along the Koksoak River

In the Atlantic provinces, the areas of interest include:

1. Marshes and grasslands along the coast of New Brunswick
2. Marshes and grasslands along the coast of Nova Scotia
3. Marshes and grasslands of Prince Edward Island
4. Marshes and grasslands along the coast of Newfoundland and Labrador

Appendix B: Effects on the Environment and Other Species

A strategic environmental assessment (SEA) is conducted on all SARA recovery planning documents, in accordance with the *Cabinet Directive on the Environmental Assessment of Policy, Plan and Program Proposals*[13]. 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 and to evaluate whether the outcomes of a recovery planning document could affect any component of the environment or any of the Federal Sustainable Development Strategy's [14] (FSDS) goals and targets.

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

Overall, this management plan should have a positive effect on other species living in the same type of habitats as the Short-eared Owl, because it should reduce threats through the implementation of beneficial management practices. A number of sensitive bird species may benefit from the measures set forth in the management plan, including the Burrowing Owl (*Athene cunicularia;* SARA Endangered), Henslow's Sparrow (*Ammodramus henslowii*; SARA Endangered), Ferruginous Hawk (*Buteo regalis*; SARA Threatened), Sprague's Pipit (*Anthus spragueii*; SARA Threatened); Bobolink (*Dolichonyx oryzivorus* COSEWIC Threatened), Eastern Meadowlark (*Sturnella magna;* COSEWIC Threatened), Long-billed Curlew (*Numenius americanus*; SARA Special Concern), Chestnut-collared Longspur (*Calcarius ornatus*; SARA Special Concern), Baird's Sparrow (*Ammodramus bairdii*; SARA Special Concern), and Yellow Rail (*Coturnicops noveboracensis*; SARA Special Concern).

The possibility that this management plan will inadvertently generate negative effects on the environment and on other species has been considered. The majority of recommended actions are non-intrusive in nature, including surveys and awareness raising. We conclude that the present management plan is unlikely to produce significant negative effects.

[13] http://www.ceaa.gc.ca/default.asp?lang=En&n=B3186435-1
[14] www.ec.gc.ca/dd-sd/default.asp?lang=En&n=F93CD795-1