PROPOSED

Species at Risk Act
Recovery Strategy Series

Recovery Strategy for the Eastern Whip-poor-will (*Antrostomus vociferus*) in Canada

Eastern Whip-poor-will

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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 recovery strategies for listed Extirpated, Endangered, and Threatened species and are required to report on progress 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 Eastern Whip-poor-will and has prepared this strategy, as per section 37 of SARA. To the extent possible, it has been prepared in cooperation with the provinces of Saskatchewan, Manitoba, Ontario (Ministry of Natural Resources), Quebec (Ministère des Forêts, de la Faune et des Parcs), New Brunswick and Nova Scotia as per section 39(1) of SARA.

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 and the Parks Canada Agency, or any other jurisdiction alone. All Canadians are invited to join in supporting and implementing this strategy for the benefit of the Eastern Whip-poor-will and the 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, the Parks Canada Agency, 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.

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

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Executive Summary

The Eastern Whip-poor-will (*Antrostomus vociferous*) is a nocturnal insectivorous bird that breeds in sparse forests or at the edge of forests adjacent to open habitats required for foraging. The species was designated as Threatened by the Committee for the Status of Endangered Wildlife in Canada (COSEWIC) in 2009 and has been listed under the same status in Schedule 1 of the *Species at Risk Act* (SARA) since 2011.

An estimated 120 000 Eastern Whip-poor-will individuals (6% of the global population) are found in Canada, where they breed in southern Saskatchewan, Manitoba, Ontario, Quebec, New Brunswick, Nova Scotia and Prince Edward Island. National and provincial population trends indicate a decline between 2.77% and 5.53% per year over the 2002-2012 period.

Although our understanding of the causes of the decline of the Eastern Whip-poor-will may be limited, the main threats include reduced availability of insect prey, agricultural expansion and intensification (wintering and breeding grounds), urban expansion, as well as energy development and mineral extraction. Other threats that contribute to a lesser extent are also presented.

There are unknowns regarding the feasibility of recovery of the Eastern Whip-poor-will. Nevertheless, in keeping with the precautionary principle, a recovery strategy has been prepared as per section 41(1) of SARA as would be done when recovery is determined to be feasible.

The population and distribution objectives for the Eastern Whip-poor-will in Canada are:

- In the short term: Slow the decline such that the population does not decrease by more than 10% (i.e. 12 000 individuals) over the 2015-2025 period, and maintain the area of occupancy at 3,000 km^2 or above;
- In the long term: Ensure a positive 10-year population trend starting in 2025, while favouring an increase in the area of occupancy, including the gradual recolonization of areas in the southern portion of the breeding distribution.

Broad strategies and approaches to achieve these objectives are presented in the Strategic Direction for Recovery section.

Critical habitat for the Eastern Whip-poor-will is partially identified in this recovery strategy. It corresponds to the areas of suitable nesting and/or foraging habitats within all 10 x 10 km standardized UTM squares with confirmed breeding or multiple occupancy since 2001. Overall, 212 critical habitat units are identified for the Eastern Whip-poor-will, including 32 in Manitoba, 110 in Ontario, 65 in Quebec, and five in the Maritimes (all in New Brunswick). A schedule of studies outlines the activities required to complete the identification of critical habitat.

One or more action plans will be posted on the Species at Risk Public Registry before the end of 2020.

Recovery Feasibility Summary

Based on the following four criteria that Environment Canada uses to establish recovery feasibility, there are unknowns regarding the feasibility of recovery of the Eastern Whip-poor-will. Therefore, in keeping with the precautionary principle, this recovery strategy has been prepared as per section 41(1) of SARA as would be done when recovery is determined to be feasible. This recovery strategy addresses the unknowns surrounding the feasibility of recovery.

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

   Yes. Breeding individuals are currently distributed in multiple areas of the Canadian breeding distribution as well as in the United States.

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

   Unknown. Sufficient suitable breeding habitat is available to support the species at its current level. Unoccupied and apparently suitable habitat appears to be available and additional habitats could become suitable after restoration efforts or through natural processes (e.g., succession, fires) or human activities (e.g., forest harvesting). The availability of sufficient amounts of migrating and wintering habitats is unknown.

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

   Unknown. Clarifying the impacts of some of the threats, namely the existence of possible thresholds in habitat loss as well as in the availability of insect prey populations would help establish more precise beneficial management practices. It is unknown whether threats such as reduced insect prey populations and threats to the wintering areas can be mitigated.

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

   Unknown. Habitat conservation and stewardship, along with habitat management techniques, could be effective for this species although specific management practices need to be developed and implemented. Mitigating threats, such as reduced insect prey populations and habitat availability on the wintering areas represent considerable challenges.

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1. COSEWIC* Species Assessment Information

Date of Assessment: April 2009

Common Name: Eastern Whip-poor-will

Scientific Name: *Antrostomus vociferus*

COSEWIC Status: Threatened

Reason for Designation: In Canada, this well-known, nocturnal bird has experienced both long-term and short-term population declines. Indices of abundance indicate that populations have been reduced by more than 30% over the last 10 years (i.e. 3 generations). Like other aerial foraging insectivores, habitat loss and degradation as well as changes to the insect prey base may have affected Canadian populations.

Canadian Occurrence: Saskatchewan, Manitoba, Ontario, Quebec, New Brunswick, Nova Scotia

COSEWIC Status History: Designated Threatened in April 2009.

* Committee on the Status of Endangered Wildlife in Canada. The information presented in this box, including the species' scientific name, reflects the state of knowledge at the time the species was evaluated.

2. Species Status Information

Approximately 6% of the global population and 20% of the breeding distribution of the Eastern Whip-poor-will (*Antrostomus vociferous*) is found in Canada (COSEWIC 2009; Partners in Flight Science Committee 2013). The species was listed as Threatened on Schedule 1 of the *Species at Risk Act* (SARA; S.C. 2002, c. 29) in April 2011. It is listed as Threatened under three provincial *Endangered Species Acts*: Ontario (S.O. 2007, c. 6), Nova Scotia (S.N.S. 1998, ch. 11), and Manitoba (C.C.C.S.M. c. E111, 1990), as well as under New Brunswick's *Species at Risk Act* (SNB 2012, c. 6). In Quebec, the species is listed as Likely to be designated as Threatened or vulnerable on the *List of Wildlife Species Likely to be Designated Threatened or Vulnerable*[4] produced according to the *Act Respecting Threatened or Vulnerable Species* (CQLR, c. E-12.01). As of November 2014, the species was not listed in Saskatchewan nor Prince Edward Island.

NatureServe (2014) considers the global populations of the Eastern Whip-poor-will to be Secure (G5). The species' breeding populations are Apparently Secure (N4B) in

[4] With respect to the acquisition of knowledge, special attention is given to species on the *List of species likely to be designated threatened or vulnerable*.

Canada and Secure (N5B) in the United States. Table 1 provides further details on other conservation ranks in Canada.

Table 1. Conservation Status Ranks for the Breeding Populations of the Eastern Whip-poor-will in Canada (NatureServe 2014).

Region	Nature Serve [a]
Saskatchewan	Vulnerable (S3B)
Manitoba	Vulnerable (S3B)
Ontario	Apparently Secure (S4B)
Quebec	Vulnerable (S3)
New Brunswick	Imperiled (S2B)
Prince Edward Island	Non-breeder (SNA)
Nova Scotia	Critically Imperiled (S1?B)

[a] Conservation status ranks: NA: Not Applicable; ?: Inexact numerical rank; B: Breeding. For subnational ranks (by state) in the United States, refer to NatureServe's website http://explorer.natureserve.org/. Note that some of these ranks have not been reviewed recently.

3. Species Information

The scientific name of the Eastern Whip-poor-will has been modified twice following the publication of the COSEWIC status report (2009). Initially, the Eastern Whip-poor-will (*Caprimulgus vociferus vociferus*) was considered a subspecies of the Whip-poor-will and encompased all the eastern populations of the species' breeding distribution. In 2010, it was separated from its close relative, the Mexican Whip-poor-will (*Caprimulgus arizonea*), to form a new species by itself, the Eastern Whip-poor-will (*Caprimulgus vociferus*) (Chesser et al. 2010). In 2012, the *Antrostomus* genus name, that was used for this species until 1931, was restored for the Eastern Whip-poor-will (refer to Chesser et al. 2012 for further details).

3.1 Species Description

Cink (2002) describes the Eastern Whip-poor-will as a nocturnal aerial insectivorous bird of the *Caprimulgidae* family (typical nightjars). It measures around 24 cm long and weighs 50 to 55 g. Its plumage is grey and brown, which serves to blend individuals with elements of the forest ground where they nest. Individuals have rounded wings and tail feathers and a large and flattened head with a small bill and big gape, bordered by long sensory bristles. Males differ from females in that they have a white collar and two big white patches on their outer tail feathers (smaller and buff-colored in females). Eastern Whip-poor-wills bear a striking resemblance to Common Nighthawks but lack the white patches on the wings and vocalizations are very distinct. As nocturnal birds, individuals are more often heard than seen and their distinct three-noted song "WHIP-poor-WEEL" is at the origin of the species' name.

3.2 Population and Distribution

The global breeding distribution of the Eastern Whip-poor-will is approximately 2 772 000 km^2 (COSEWIC 2009). It extends from Saskatchewan to the Maritimes and south in the United States, west to east from Oklahoma to Georgia (Cink 2002; Figure 1). The Eastern Whip-poor-will breeds locally throughout its range and no northward range expansion has been noted (Cink 2002). The global population is estimated at 2 million individuals (Partners in Flight Science Committee 2013). The Eastern Whip-poor-will's overwintering range stretches from coastal South Carolina through Florida and along the Gulf Coast of the United States into Mexico and Central America as far south as Honduras and Panama (Cink 2002; Figure 1).

The Canadian breeding distribution occupies around 535 000 km^2 (20% of the global breeding distribution) (COSEWIC 2009) from east-central Saskatchewan, southern Manitoba, southern Ontario, southern Quebec, and sparse locations in New Brunswick, Nova Scotia and Prince Edward Island (Godfrey 1986; Cink 2002; Maritimes Breeding Bird Atlas 2013). The Canadian population is estimated at 120 000 individuals, with the highest concentrations found in eastern Ontario (Partners in Flight Science Committee 2013). Although this estimate incorporates atlas data, it is mainly based on data from the North American Breeding Bird Survey (BBS), and is considered to have relatively low accuracy for the Eastern Whip-poor-will as this survey program is not designed to detect nocturnal birds (Partners in Flight Science Committee 2013). Also, the Breeding Bird Survey data does not sample the species' entire range at random, having lower coverage in more remote areas.

Figure 1: Global range of the Eastern Whip-poor-will, which includes the breeding, overwintering and migration distributions (Cornell Lab of Ornithology, 2007)

The Eastern Whip-poor-will's range within Canada has been retracting since the mid-1960s, most notably at its southern limit (Smith 1996; COSEWIC 2009). A comparison of the data from the first and second breeding bird atlases in Ontario and the Maritimes show a similar trend (Table 2). Although the atlas records have yet to be compiled for the last survey year of the second breeding bird atlas in Quebec, results indicate a slight increase in occupancy (Table 2). Differences in atlas square occupancy between successive atlases should be considered with caution as they can be the result of different levels of effort to detect the species.

Using BBS data, a Canada-wide population decline of 3.19% per year has been noted over the 1970-2012 period, or an approximate loss of 75% of the population (Environment Canada 2014a). Over the 2002-2012 period, this national trend has slightly slowed to a decline of 2.77% per year. Regional BBS trends for Ontario and Quebec, the core of the species' distribution in Canada, are consistent with the national trend (Table 2). Data from the Quebec check-list program (Étude des populations d'oiseaux du Quebec - EPOQ) also corroborate these trends with a 2002-2011 population estimated to be about half that observed in the 1970's (Larivée 2013). It should be noted that declines are observed not only at the species level but also among the guild of aerial insectivores and long-distance migrants to which the Eastern Whip-poor-will belongs (Blancher et al. 2009).

Table 2. Breeding Bird Atlases Data and Regional Breeding Bird Survey Trends.

Provinces	Atlas Periods	Number of Occupied Atlas Squares (trend 1st vs 2nd atlas)	BBS Annual Trends (1970-2012 / 2002-2012)	Atlas References
Saskatchewan	1966-2014[b,c]	~36	Not available	Smith 1996; SBA
Manitoba	2010-2013[c]	190	Not available	www.birdatlas.mb.ca
Ontario	1981-1985	885	-3.45% / -3.36%	Cadman et al. 1987
	2001-2005	554 (-37%)		Cadman et al. 2007
Quebec	1984-1989	168	-5.26% / -5.53%	Gauthier and Aubry 1996
	2010-2013[c]	179 (+7%)		Atlas des oiseaux nicheurs du Québec 2014
Maritimes	1986-1990	62 (49 NB, 12 NS, 1 PE)	+0.53% / -0.09% (NB)[d]	Erskine 1992
	2006-2010	38 (-39%) (29 NB, 8 NS, 1 PE)		Maritimes Breeding Bird Atlas 2013

[b] The Saskatchewan Bird Atlas (SBA) 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 used in atlases.
[c] Ongoing projects.
[d] Trends are not available for the other provinces in the Maritimes due to the limited number of routes on which the species was detected.

3.3 Needs of the Eastern Whip-poor-will

Eastern Whip-poor-wills, like most forest birds, appear to rely on multi-scale considerations for habitat selection. Knowledge of the species' requirements at the landscape scale as well as during migrations and on the wintering grounds are currently limited.

Regional Context

The amount of forest cover, by providing more areas suitable for breeding, as well as the spatial configuration of forest habitats next to more open habitats are often reported as central to the species' presence (Roy and Bombardier 1996; Palmer-Ball 1996; Cink 2002, Wilson 2003; Garlapow 2007). Distance to larger forest tracts may also be important (Cink 2002), namely in more agricultural settings where the amount of nesting habitat is more limited.

Nesting and Foraging Habitats

The nesting and foraging habitats of the Eastern Whip-poor-will are usually defined by structural rather that compositional characteristics (Robbins 1994; Wilson and Watts

2008). Although the species is not considered particularly territorial, territory size ranges from 3 to 30 ha (Wilson 2003; Garlapow 2007; Hunt 2010) with a maximum value of 132.4 ha observed in central Ontario (mean 31 ha; Rand 2014). Home range size, the area within which birds are expected to be found most of the time as they conduct breeding activities, forage and move between these zones, can vary from 20 to 500 ha (mean 136 ha; Rand 2014). This is in line with Sandilands' (2010) estimation that 500 to 1000 ha may be necessary to support "more than a few pairs".

Nesting habitats

Nesting habitats include most types of forest at early stages of succession (or edges of forests with a dense tree cover but showing a similar structure at the ground level), rock or sand barrens with scattered trees, savannahs, old burns, as well as sparse conifer plantations (Wilson 1985; Bushman and Therres 1988; Cink, 2002; Mills 2007; Wilson and Watts 2008; Tozer et al. 2014). All these habitats exhibit characteristics such as well-drained soils, moderate tree cover (Godfrey 1986; Roy and Bombardier 1996; 26 to 83 % in Garlapow 2007) and moderate to sparse shrub and herbaceous cover (Eastman 1991; Garlapow 2007).

When woodlots are used for nesting (e.g., in agricultural landscapes), smaller isolated woodlots are not occupied by the species (Reese 1996), suggesting that there may be a threshold in forest patch size. However, Turpak et al. (2009) state that no threshold for size has been identified for the moment. Elevation also seems to play a role with the species usually being found at altitudes lower than 350 to 430 m (Cooper 1981; Robbins 1994; Roy and Bombardier 1996).

Although nests and eggs are very well camouflaged and rarely found, eggs are known to be layed directly on a thick bed of dead leaves (or bare ground), shaded by a short herbaceous plant, shrub or sapling (Roy and Bombardier 1996; Cink 2002), often near fallen tree limbs or rocks which can be used as perches to roost during the day (Cink 2002). Individuals appear to show a high degree of fidelity to nest sites (Cink 2002).

Foraging habitats

Foraging habitats include prairies, wetlands with shrubs, regenerating clearcuts as well as agricultural fields and other habitats with low tree cover and availability of foraging perches as these conditions favor the localisation of prey (lunar light) as well as foraging efficiency (Mills 1986; Garlapow 2007).

Foraging activities usually take place within 500 m of the nest, often near forest edges (Cink 2002; Garlapow 2007). However, at the northern edge of the species' distribution, Rand (2014) showed significantly greater foraging distances that may result from reduced habitat quality and reduced flying insect abundance in regions where low temperatures hinder foraging activities.

Prey items consist mainly of large moths, scarab beetles and other nocturnal flying insects captured by sallying short distances from perches or picked directly on the ground (Tyler 1940; Cink 2002; Garlapow 2007).

Limiting Factors

Limiting factors influence a species' survival and reproduction, and play a major role in the capacity to attain certain population levels (recover following a decline). For the Eastern Whip-poor-will, these include:

- Low annual productivity: although the species may double-brood in some areas in southern Canada, it generally has a single small clutch consisting of two eggs (Peck and James 1983; Sandilands 2010).
- High predation: as a ground nester, the species may be particularly vulnerable to nest predation (Cink 2002).

4. Threats

4.1 Threat Assessment

Table 3. Threat assessment for the Eastern Whip-poor-will.

Threat	Level of Concern[e]	Extent	Occurrence	Frequency	Severity[f]	Causal Certainty[g]
Habitat Loss or Degradation						
Agricultural expansion and Intensification – wintering grounds	High	Widespread	Current	Continuous	Moderate	High
Agricultural expansion and intensification – breeding grounds	Medium	Localized	Current	Continuous	Moderate	High
Urban expansion	Medium	Localized	Current	Continuous	Moderate	Medium
Energy development and mineral extraction	Medium	Localized	Current	Continuous	Moderate	Medium
Overgrazing of forest understory	Low	Localized	Current	Continuous	Moderate	Medium
Forest management	Low	Widespread	Current	Continuous	Low	Low
Changes in Ecological Dynamics or Natural Processes						
Reduced availability of insect prey	High	Widespread	Current	Continuous	Unknown	Medium
Fire suppression	Low	Localized	Current	Recurrent	Low	Low
Natural Processes or Activities						
Habitat succession	Medium	Localized	Current	Continuous	Moderate	Medium
Climate and Natural Disasters						
Climate change	Medium	Widespread	Current	Continuous	Unknown	Medium

[e] *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.*
[f] *Severity: reflects the population-level effect (high: very large population-level effect, moderate, low, unknown).*
[g] *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

Threats are listed in decreasing order of level of concern. It should be noted that there are knowledge gaps relating to the quantitative impacts of some of the threats, particularly during migrations and on the wintering grounds. Secondary threats are not discussed in the present recovery strategy, namely collisions (e.g., with vehicles along roads), predation, interspecific competition (Chuck-will's willow [*Antrostomus carolinensis*]) and invasive species (exotic earthworms).

4.2.1. Reduced Availability of Insect Prey

The decline of aerial insectivores has been more obvious since the 1980s (Goldstein et al. 1999; Boettner et al. 2000; Wickramasinghe et al. 2004; Sauer et al. 1996; Blancher et al. 2007) and strongly suggests a cause related to changes in aerial insect populations on the breeding grounds, migration routes or wintering grounds (Nebel et al. 2010; Paquette et al. 2014). Indeed, insect populations are exhibiting significant declines worldwide, including in the United States (Laughlin and Kibbe 1985; Peterson and Meservey 2003). A recent review of global faunal population trends, noted that 33% of all insects with available IUCN-documented population trends were declining and many also exhibited range retractions (Dirzo et al. 2014). Declines are more severe in heavily disturbed regions, such as the tropics (Dirzo et al. 2014). In the northeastern United States, Wagner (2012) noted declines for many nocturnal moths, the preferred prey items for Eastern Whip-poor-will (Cink 2002).

The main possible causes for reduced availability of insect prey are identified and described below. Additional causes include changes in the predator communities, light proliferation, and acid precipitation (Graveland 1998; Benton et al. 2002; Wagner 2012; Goulson 2013). However, a direct causal effect between aerial insectivore abundance and insect populations has yet to be established, partly because long-term monitoring data on avian diets are limited (Nocera et al. 2012).

4.2.1.1. Loss of insect producing habitats

Many insects are limited to specific habitats for all or part of their life cycle and any activities that affect these habitats through habitat loss or intensification of uses (e.g., monocultures, pesticide and fertilizer-dependent crops; traditional versus conservation tillage; removal of hedgerows, wetland drainage, peat extraction, urban and coastal development; resource extraction; herbicides to control vegetation in utility rights-of-ways) would have impacts on their populations (U.S. Bureau of Land Management 1978, Foster 1991; Benton et al. 2002, Cunningham et al. 2004; Price et al. 2011, Brooks et al. 2012; Chiron et al. 2014).

Loss of insect producing habitats would affect Eastern Whip-poor-wills on the breeding grounds, along migration routes and on their wintering grounds.

4.2.1.2. Pesticides and other toxins

The use of pesticide in agriculture, forestry, and for mosquito control programs in urban areas has undoubtedly been a factor in the reduction of the abundance of flying insects throughout the Eastern Whip-poor-will's distribution.

Although most organochlorine pesticides (chemicals in the same family as dichlorodiphenyltricholoroethane – DDT) have been banned in North America for decades, there is indication that Neotropical migrant insectivores are still being exposed to their effects elsewhere in the Americas (Sager 1997, Klemens et al. 2000). These chemicals can have long-lasting effects on insect communities and thus the birds that rely on them. Dietary records of Chimney Swifts (*Chaetura pelagica*), an aerial insectivore, confirm a marked decrease in beetles (Coleoptera) and an increase in true bugs (Hemiptera) that was temporally correlated with a steep rise in DDT and its metabolites. Nocera et al. (2012) argued that DDT caused declines in Coleoptera and dramatic (possibly permanent) shifts in the insect communities, resulting in a nutrient-poor diet and ultimately a declining Chimney Swift population.

Non-selective pesticides, such as the widely used neonicotinoids, have also been shown to affect aerial insectivores by reducing their prey populations and impairing reproduction (Colburn et al. 1993, Wickramasinghe et al. 2004; Mineau and Palmer 2013; Hallmann et al. 2014). Neonicotinoids are generally used in agricultural habitats, but have been detected in wetlands (Main et al. 2014) and waterways in Canada (Environment Canada 2011a, Xing et al. 2013). In 2013, the European Food Safety Authority declared that they posed an 'unacceptable" risk to insects (Goulson 2014). Mineau and Palmer (2013) suggested that the effects of neonicotinoids on birds may not be limited to the farm scale, but likely expand to the watershed or regional scale.

Although not necessarily related to a decline in flying insect populations, the consumption of mercury-contaminated insects has been shown to decrease reproductive success, alter immune responsiveness, and cause behavioural and physiological effects in many insectivorous bird species (Scheuhammer et al. 2007, Hawley et al. 2009). Increased mercury levels may result from multiple causes (e.g., acid depositions, creation of reservoirs) and many terrestrial songbirds of northeastern North America that eat invertebrates have been found to biomagnify the substance to level that may be of conservation concern (Osborne et al. 2011; Keller et al. (2014). Although the Eastern Whip-poor-will was not part of these studies, the conclusions likely apply to the species.

4.2.1.3. Insect/breeding temporal mismatch

Birds often exhibit a strong synchronization between their reproductive timing (i.e. hatching) and peak food abundance, but climate change has caused the timing of peaks in some insects to occur sooner in the season (Both et al. 2009). Because warming may be less severe on the Eastern Whip-poor-will's wintering grounds than on their breeding

grounds, they may experience migration cues at dates that are too late for them to arrive at breeding grounds at the optimal time (Jones and Cresswell 2010). As a result, climate change is creating a temporal mismatch between reproduction and maximal prey abundance (i.e. insects) for species that are not adapting to the changing climate at the same rate as their prey (Strode 2003; Both et al. 2006; Gornish and Tylianakis, 2013). This has been shown to affect the weight of Great Tit (*Parus major*) chicks and the number of chicks that fledge (Visser et al. 2006). An insect/breeding temporal mismatch has also been linked to the population declines of migrant birds across Europe (Møller et al. 2008, Saino et al. 2011).

Long-distance migratory birds that breed in habitats where the peaks of food abundance are shorter (such as forests) are more vulnerable to climate change because the temporal mismatch is more likely and more severe (Both et al. 2006, Both et al. 2009). Although no species-specific data are currently available, the Eastern Whip-poor-will is a long-distance migratory aerial insectivore that breeds / forages in habitats where peaks of food abundance are shorter (usally late Spring/early Summer), so a climate-induced mismatch between breeding and prey availability is probable.

4.2.2. Agricultural Expansion and Intensification – wintering grounds

On the wintering grounds in Mexico and Central America, since the early 1900s, forest conversion into pastures for cattle ranching through slash-and-burn agriculture has driven the majority of deforestation (Leonard 1987; Masek et al. 2011; Aide et al. 2013). In that region, the countries that experienced the most forest area loss between 2001 and 2010 are Guatemala and Nicaragua, representing 3 019 km^2 and 7 961 km^2 respectively (Aide et al. 2013) but most countries exhibit substantial declines in forest cover (Hansen et al. 2013). Although Eastern Whip-poor-wills may benefit from habitat created by some types of conversion for cattle pastures, intensive conversion that eliminates corridors and leaves little to no forested habitat adjacent to open habitats used for foraging decreases habitat suitability.

The impact of this threat on the decline of the Eastern Whip-poor-will has not been quantified, but it is viewed as a concern because of the species' concentration in a limited amount of winter habitat.

4.2.3. Agricultural Expansion and Intensification – breeding grounds

In Canada, the increased demand for agricultural land was responsible for approximately 43% of the deforestation in 2010 (~20 000 ha), mainly in Alberta, Saskatchewan, and Manitoba where the boreal forest borders the prairies[5]. In the eastern United States, rates of conversion of forest to agricultural land have slowed considerably in recent years (Ramankutty et al. 2010; Masek et al. 2011) and many areas are returning to a forested state.

[5] http://www.nrcan.gc.ca/forests/inventory/13419

Efforts to increase the productivity of agricultural lands have led to the loss of large natural habitats, loss of habitat diversity in agricultural landscapes (e.g. conversion to row crops, elimination of hedges and other natural features), and an increase in pollution from nutrients and pesticides used on crops, all of which affect biodiversity (Robinson and Sutherland 2002). Insectivorous bird abundance and richness are higher in agricultural landscapes that provide a heterogenous array of habitats (Parish et al. 1995; Jones et al. 2005), which are also home to more insect prey (Lewis and Stephenson 1966; Lewis and Dibley 1970; Verboom and Spoelstra 1999). Furthermore, landscapes that are highly simplified (e.g., dominated by hard edges between intensive crops and adjacent forests) may not provide enough suitable habitat for the Eastern Whip-poor-will. In Quebec, it has been noticed that the species avoids large areas of intensive agriculture (Cyr and Larivée 1995; Bélanger et al. 1999). In southern Ontario, the conversion of open grasslands and thickets to intensive agriculture has also been identifed as a threat to the species (Ontario Ministry of Natural Resources 2009).

4.2.4. Urban Expansion

Urban development is an increasing threat that leads to permanent habitat losses both in suburban and rural areas. It is considered the leading cause of deforestation in the United States, as well as a major contributing factor in Canada (17%)(Robinson et al. 2005; Radeloff et al. 2005; Sun et al. 2007; Masek et al. 2011; Jobin et al. 2014). In Pennsylvania (USA), urbanization, through the increase of predation and the decrease in availability of nesting and foraging habitat, is presumed responsible for the decline of the Eastern Whip-poor-will (Santner 1992).

Habitat loss and fragmentation by urbanization may also increase water, air, noise and light pollution. Ecological light pollution has been proven to disrupt predator-prey dynamics, competition dynamics, nest site choice, orientation and communication for a variety of animals (Longcore and Rich 2004). It could also have positive components (e.g., better foraging efficiency).

4.2.5. Energy Development and Mineral Extraction

Exploration to find new energy sources (e.g., oil, gas, coal and hydroelectricity) and minerals (including aggregates), exploitation of these sources (e.g., mine residues, flooding of areas to create reservoirs) and their transportation (e.g., pipelines, transmission lines, roads) have generated habitat loss, degradation and fragmentation in some areas of the Eastern Whip-poor-will's distribution (Masek et al. 2011). Activities associated with these industries can also lead to the unintentional destruction of nest, eggs, nestling, and/or adults (Van Wilgenburg et al. 2013).

Rand (2014) found that Eastern Whip-poor-wills did not show elevated stress levels (measured by corticosterone) from exposure to mining exploration activities. Otherwise, quantitative effects of the more active exploitation phase of mining on Eastern Whip-poor-will populations have not been measured, but are presumed to be important given that habitat alterations by these activities are often permanent.

The maintenance of some infrastructures used to transport energy can generate habitat that will eventually be suitable for foraging.

4.2.6. Overgrazing of forest understory

Forests overgrazed by cattle are usually avoided for nesting purposes by the Eastern Whip-poor-will (Tyler 1940; Godfrey 1986), although they may be used for foraging if suitable nesting habitat is nearby (Cink 2002). Deer grazing can also be problematic in some areas as their populations have been increasing for decades (Russell et al. 2001). In Canada, cattle overgrazing has been identified as a factor contributing to the disappearance of the species, particularly in south-eastern Saskatchewan's aspen forests (Smith 1996; Jorgenson and Foster 2007).

Whatever the source, overgrazing of forest understory decreases vegetation cover and modifies plant community composition and dynamics (Patric and Helvey 1986; Côté et al. 2004; Rooney 2009; Goetsch et al. 2011), which in turn negatively affects wildlife by altering nest cover and food sources (Gallizioli 1979; DeGraaf et al. 1991; Pollard and Cooke 1994; Gill 2000; Allombert et al. 2005). At present, it is unknown how this threat is affecting the Eastern Whip-poor-will's population, but it would be prominent in northeastern United States and south-eastern Canada where White-tailed Deer (*Odocoileus virginianus*) are particularly abundant (Russell et al. 2001).

4.2.7. Habitat Succession

In forested landscapes, the Eastern Whip-poor-will often takes advantage of the open areas created by low-intensity agriculture or forest management for foraging, while relying on adjacent forests for nesting (COSEWIC 2009). Agricultural land abandonment creates early- and mid-successional forests that can, at first, provide suitable habitat for the species, but succession eventually leads to older forest stages, which are not preferred habitats (Bushman and Therres 1988).

Although cropland areas have increased over the past 50 years in most of the Eastern Whip-poor-will's range in southern Canada, succession of abandoned farmland has been the trend in marginal areas (Cadman et al. 2007; Latendresse et al. 2008), such as eastern Ontario (Ontario Ministry of Natural Resources 2009) and the eastern United States where this succession has been implicated in the Eastern Whip-poor-wills' decline (Medler 2008). In those areas, forest succession may have caused some degree of nesting/foraging habitat loss for the Eastern Whip-poor-will (Mills 2007; Smith 1996).

4.2.8. Climate Change

The potential effects of climate change on the Eastern Whip-poor-will can be difficult to predict because different bird species respond differently to spatial and temporal variations in their environment (Taper et al. 1995). One effect, the increase in the

number of severe weather events (cold snaps, hurricanes, wind storms), can have an impacts on the breeding grounds, along the migration routes and on the wintering grounds. Cold, wet weather during the breeding season is well known for affecting aerial insectivores (e.g., Brown and Brown 2000). Such fluctuations and weather extremes are expected to occur more frequently due to climate change (Huber and Gulledge 2011).

Fire activity is also strongly influenced by weather (Flannigan et al. 2009) and the extent, intensity, and frequency of forest fires are projected to increase due to warmer springs and summers and decreases in water availability in some areas (Flannigan et al. 2009, North American Bird Conservation Initiative US Committee 2010, de Groot et al. 2013, Girardin et al. 2013). This would have a positive effect on Eastern Whip-poor-will habitat availability.

During the Fall migration, tropical storms and hurricanes can kill individuals in large numbers; a single hurricane (Hurricane Wilma in 2005) led to a decline of 50% in the population of the Chimney Swift in Québec (Dionne et al. 2008). On the tropical and subtropical wintering areas, Anodon et al. (2014) suggest that climate change will result in the expansion of savannahs at the expense of forests, which could eventually affect Eastern Whip-poor-wills.

4.2.9. Fire Suppression

The Eastern Whip-poor-will may be associated with habitat created by fires (Cink 2002). Fire in a natural system may provide a shifting mosaic of nesting and foraging habitat. Modern fire suppression may keep forest stands into a more mature stage, less suitable for the species. Fire suppression has been identified as one of the causes of the bird's decline in Ontario (Mills 2007; Tozer et al. 2014). The extent of this threat is not quantified for Eastern Whip-poor-will populations but would mostly affect the northern (non-agricultural) portion of the range.

4.2.10. Forest Management

Between 2000 and 2012, approximately 11 million ha of forest were harvested throughout Canada (NFD 2014). Forest harvesting rates in most of Canada have been relatively stable throughout the past 20 years but are expected to decline in the coming years (Masek et al. 2011).

Forest harvesting can have short term negative effects on nesting birds by disrupting breeding activities (Hobson et al. 2013). The nests and/or eggs can be inadvertently harmed or disturbed as a result of clearing trees and other vegetation (e.g. pre-commercial thinning) (Environment Canada 2014b). Nesting failure could also result from disruptive activities experienced by a nesting bird (Environment Canada 2014b). Hobson et al. (2013) estimated that between 616,000 and 2.09 million nests (of many species) are lost annually as a result of industrial forest harvesting.

However, forest management can also improve habitat through practices such as clearcut interspersion with mature forests (Wilson and Watts 2008, Tozer et al. 2014), variable density thinning, early thinning and other aspects of partial cutting (Bushman and Therres 1988).

Much of the northern distribution of the Eastern Whip-poor-will in Canada is under forest management. Forest harvesting is also a prevalent activity along the migratory routes and on the wintering grounds.

5. Population and Distribution Objectives

The population and distribution objectives for the Eastern Whip-poor-will in Canada are:

- In the short term: Slow the decline such that the population does not decrease by more than 10% (i.e. 12 000 individuals) over the 2015-2025 period, and maintain the area of occupancy at 3,000 km^2 or above.
- In the long term: Ensure a positive 10-year population trend starting in 2025, while favouring an increase in the area of occupancy, including the gradual recolonization of areas in the southern portion of the breeding range.

These objectives address the species' long-term decline, which was the reason for its designation as Threatened (COSEWIC 2009). The 10-year time frame for the short term objectives corresponds to the period between successive COSEWIC assessments of a species status and is considered reasonable given the challenge halting the Eastern Whip-poor-will's decline represents. The area of occupancy provided corresponds to the COSEWIC (2009) estimate (33 000 Eastern Whip-poor-will pairs occupying 1,650 km^2) but with the updated Canadian population (120 000 individuals or 60 000 pairs) provided by the Partners in Flight Science Committee (2013), for a total of 3,000 km^2. As for the long term objectives, due to the substantial loss of suitable habitat in the southern portion of the species' range (agricultural and urban landscapes), it may be unrealistic to bring Eastern Whip-poor-will populations back to their historical levels. Nevertheless, ensuring that suitable habitat is available throughout the species' range in Canada, including through restoration of habitats in highly transformed landscapes, is necessary for the management and recovery of the Eastern Whip-poor-will.

These objectives may be reviewed during the development of the report required five years after this strategy is posted to assess the implementation of the strategy and the progress towards meeting its objectives (s. 46 SARA).

6. Broad Strategies and General Approaches to Meet Objectives

6.1 Actions Already Completed or Currently Underway

Numerous activities have been initiated since the latest COSEWIC assessment (2009). The following list is not exhaustive, but is meant to illustrate the main areas where work is already underway, to give context to the broad strategies outlined in section 6.2.

- Multiple projects targeting the Eastern Whip-poor-will on federal, provincial and private lands with funding from the Habitat Stewardship Program, the Interdepartmental Recovery Fund and the Aboriginal Fund for Species at Risk.

Manitoba

- Surveys on Department of National Defence establishments.

Saskatchewan

- Research underway on the broad-scale predictors of aerial insectivorous bird declines across North America (Dr. Christy Morrissey's Ecotoxicology Lab at the University of Saskatchewan http://homepage.usask.ca/~cam202/page11.html).

Ontario

- General Habitat Description completed under the Endangered Species Act, 2007 *http://www.ontario.ca/environment-and-energy/eastern-whip-poor-will*
- Roadside surveys conducted by Bird Studies Canada (2010-ongoing) and provincial partners such as Ministry of Natural Resources and Forestry in many districts and Ontario Parks (e.g., Algonquin Park).
- Study on habitat use, types of forest management and landscape characteristics is underway (Philina English – Simon Fraser University; John Vandenbroeck - OMNRF Fort Frances District; English and Conboy 2013).
- Surveys on Department of National Defence establishments.

Quebec

- Roadside surveys coordinated by Regroupement QuebecOiseaux on 25 permanent BBS-style routes in agricultural landscapes (2012-ongoing).
- Surveys along potential routes in the Outaouais region by Dendroica Environnement et Faune (2013 – ongoing).
- Project funded by the Interdepartmental Recovery Fund and the Department of National Defence to conduct surveys of the populations, describe the location of suitable habitat and propose potential mitigation measures for military activities at five Department of National Defence establishments (2012-ongoing).

Maritimes

- Habitat Stewardship Program projects on forest birds at risk to assist in the development of Maritimes-specific beneficial management practices conducted by Bird Studies Canada (ongoing)

6.2 Strategic Direction for Recovery

Table 4. Recovery Planning for the Eastern Whip-poor-will.

Threat or Limitation	Broad Strategy for Recovery	Priority[h]	General Description of Research and Management Approaches
All threats	Stewardship and management of the species and its suitable habitat	High	– Support habitat conservation using legal measures (where applicable), stewardship agreements and other regulatory tools on the breeding grounds, along migration routes and on the wintering grounds – Support Beneficial Management Practices (BMP) development and implementation at the local and landscape levels to increase population size as well as the areas of occupied habitat – BMPs should prioritize the importance of maintaining/creating insect producing habitats – Integrate BMPs for Eastern Whip-poor-will with BMPs for other wildlife within an heterogeneous and dynamic mosaic – Use management techniques over large land units and/or within an ecosystem approach – Restore habitats in some highly modified landscapes to promote the recolonisation of portions of the global distribution range

Threat or Limitation	Broad Strategy for Recovery	Priority[h]	General Description of Research and Management Approaches
Knowledge gaps	Monitoring and Research	High	– Develop and implement standardized research and monitoring protocols to gather information on the species' ecology, populations and trends, habitat characteristics and insect prey populations, including: – Determine habitat attributes (e.g., amount, spatial scale, composition and configuration), insect prey densities/composition and other variables that influence the selection and quality of nesting and foraging habitat – Links between insect prey populations (including trends), bird diets in habitats of various qualities and reasons for decline – Links between insect populations and migration phenology, especially in the context of climate change – Electronic acoustic monitoring in less accessible parts of the range (e.g., southern portion of the Canadian Shield) – Dispersal distances and migratory paths – Determine if important migratory stopover sites exist for this species and proceed with their description (see Mehlman et al. 2005) – Clarify impacts of threats on the wintering areas and along migratory routes – Develop, validate or improve habitat models (e.g., Boreal Avian Modelling Initiative; Broeckaert 2012; Broeckaert and Bédard 2012)
		Low	– Survey historical occurrences at regular intervals (e.g., 10 years)
All threats	Education and Partnerships	Medium	– Promote national and international cooperation and coordination of local and landscape-level planning (e.g. Bird Conservation Regions and Conservation Strategies[i]) to mitigate threats on the breeding, migrating and overwintering ranges – Examine the necessity for a working group for the species or for nocturnal aerial insectivores – Establish partnerships with governmental departments and agencies, groups interested in the species, private owners and the general public for a local/regional/territorial implementation of the recovery strategy
All threats	Law and Policy	High	– Promote the compliance with existing environmental laws, regulations and policies, namely the *Migratory Birds Convention Act, 1994* and associated regulations to prevent disturbance to adults, nests and eggs for all types of activities and land tenure[j]

Threat or Limitation	Broad Strategy for Recovery	Priority[h]	General Description of Research and Management Approaches
		Medium	– Encourage the implementation of existing policies and reduction programs for pesticides, light pollution, greenhouse gasses, and other pollutants and develop new policies and programs where gaps exist

[h] *"Priority" reflects the degree to which the approach contributes directly to the recovery of the species or is an essential precursor to an approach that contributes to the recovery of the species.*
[i] *Environment Canada's website on Bird Conservation Regions and Conservation Strategies https://www.ec.gc.ca/mbc-com/default.asp?lang=En&n=1D15657A-1*
[j] *Environment Canada's website on the incidental take of migratory birds : http://www.ec.gc.ca/paom-itmb/default.asp?lang=En&n=C51C415F-1*

6.3 Narrative to Support the Recovery Planning Table

Stewardship and Management of the Species and its Suitable Habitat

Preserving and enhancing Eastern Whip-poor-will nesting and foraging habitats will require promotion of approaches on a broad scale. These habitats must be managed and protected to ensure species survival, particularly in areas where large portions of habitat have been lost or degraded or are facing increased development pressures.

The key actions that can be promoted include beneficial management practices in forest management and agricultural activities as well as habitat restoration to increase habitat supply, where needed. Beneficial management practices for the Eastern Whip-poor-will must be integrated with those for other bird species to maintain heterogeneous landscapes that are a dynamic mosaic of habitat conditions which will benefit several species. Whenever possible, a multi-species or ecosystem approach to recovery should be considered. Beneficial management practices for governments, industry, and even individuals can play an important role for the ongoing efforts to promote recovery of the Eastern Whip-poor-will. However, it must be kept in mind that such approches will fail to recover the species unless migration and wintering habitats are also maintained and threats are addressed.

Monitoring and Research

A comprehensive approach to research and monitoring (that includes all stages of the annual life cycle and the entire range of occupancy) will be required to more completely understand the status of the species, as well as its threats and limiting factors on the breeding, migration and wintering grounds. Currently, adequate monitoring of the species is limited and concentrated close to urban centres. Targeted research and monitoring efforts are required throughout the Eastern Whip-poor-will's range in order to determine key demographic parameters (e.g., survival, dispersal, reproductive success in different habitat types) and identify migratory routes, stopover sites, and migratory connectivity that provide insight into the species needs at multiple scales. Trends in habitats and prey populations must be better understood (and monitored) to know whether maintaining, enhancing, and/or restoring insect producing habitats would significantly benefit Eastern Whip-poor-will populations.

Because the broad-scale monitoring of the Eastern Whip-poor-will is complicated by the large range of the species and its nocturnal habits, using alternative survey approaches (e.g., electronic acoustic monitoring) should be explored and citizen-based databases such as eBird should be considered. There are fewer monitoring programs established on the wintering grounds, but these are essential. They need to be developed and implemented to provide better information on habitat use, local habitat and population trends. Associated with these efforts, there is a need to build and validate corresponding habitat models at national and regional scales to better understand where on the landscape the species would be expected to breed, and assist with efforts to protect important and critical habitat.

Education and Partnerships

Collaboration with national and international jurisdictions (all levels of government), aboriginal peoples, industries, non-governmental organizations and landowners to preserve, restore, and enhance breeding, migration and wintering habitats is an important component of this recovery strategy. This could take the form of a working group such as those that have been put together for the Golden-winged Warbler (*Vermivora chrysoptera*) and the Canada Warbler (*Wilsonia canadensis*) or could target a larger group of species such as nocturnal aerial insectivores. Indeed, to be effective, research, conservation, and stewardship approaches must be applied throughout the species' range.

Promoting volunteer participation and collaborations in monitoring programs will also be a key element. Volunteers whose efforts should be promoted include local bird clubs who have knowledge of areas with high breeding densities and citizen scientists participating in bird atlases, breeding bird survey programs and citizen-based data collection (e.g., eBird).

Law and Policy

Throughout the species range, promoting the compliance with existing regulations and policies should be a priority. Currently, there are multiple legal means available to protect Eastern Whip-poor-wills and their habitats in Canada (e.g., Endangered Species Acts). It is important that these tools are fully realized and utilized for the protection of the species.

General prohibitions under the *Migratory Birds Convention Act, 1994* and its regulations also protect Eastern Whip-poor-will adults, young, nests and eggs anywhere they are found in Canada, regardless of land ownership. During the breeding period, potential destructive or disruptive activities should be avoided at locations where the species is likely to be encountered (Environment Canada 2014a).

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…". Section 41(1)(c) of SARA requires that recovery strategies include an identification of the species' critical habitat, to the extent possible, as well as examples of activities that are likely to result in its destruction. This recovery strategy partially identifies critical habitat, based on the best available information for the Eastern Whip-poor-will as of September 2014. The Schedule of Studies (section 7.2) outlines the activities required for completing the identification of the critical habitat necessary to meet the population and distribution objectives. As additional information becomes available, more precise boundaries may be mapped and further critical habitat may be identified.

The identification of critical habitat for the Eastern Whip-poor-will is based on two criteria: habitat occupancy and habitat suitability.

7.1.1 Habitat Occupancy

This criterion is intended to identify, with a reasonable degree of certainty, the areas of nesting and foraging habitats used by the species. In an analysis of a large number of studies of North American and European birds, Bock and Jones (2004) found that habitat occupancy was frequently an appropriate indicator of habitat suitability.

Habitat occupancy is based on documented nest locations, standardized survey data, as well as incidental observations. Confirmed breeding records[6,7] constitute the highest indication of habitat occupancy. However, as the Eastern Whip-poor-will is a nocturnal species, breeding confirmation is rare. Accordingly, a more precautionary approach to establishing occupancy is warranted and considers combinations of records with lower nesting probabilities (probable or possible breeding birds).

Because Breeding Bird Atlases are the main sources of Eastern Whip-poor-will data across Canada, the earliest fieldwork year among the second editions of atlas projects (2001 in Ontario) was determined as the starting year to establish occupancy using all available data sources (species-specific surveys, BBS, Conservation Data Centres and check-lists such as eBird that compile records that do not originate from standardized programs). All confirmed breeding records were selected. For other types of records, a multiple occupancy criterion, useful to increase confidence that individuals use the habitats in which they were detected, was established at a scale relevant to Eastern Whip-poor-will populations. This was determined to be the 10 x 10 km atlas square because this is consistent with available data (e.g., breeding bird atlas projects, land cover datasets and standardized national grid systems) but also because it is a representative scale to capture the species' needs. It is at this scale that disturbance regimes (both natural and anthropogenic) operate to provide the supply of nesting and foraging habitats necessary to support self-sustaining populations. Consequently, the habitat occupancy criteria for the Eastern Whip-poor-will are met within an atlas square when records from the 2001 breeding season (21st May - 15th August) or thereafter consist of at least :

- One record of confirmed breeding;
  OR
- Two records during a single year or from distinct years, where at minimum one record consists of probable breeding;
  OR
- Two possible breeding records during a single year in combination with at least one possible breeding record from any other year;
  OR
- Five possible breeding records during a single year or from different years.

[6] Standard breeding evidence definitions used in Canadian breeding bird atlases can be found at www.bsc-eoc.org/norac/atlascodes.htm

[7] Searching for confirmed breeding activity by this species would not be advisable as it would likely result in inadvertent destruction or disturbance of the nest and eggs.

The data used to identify the critical habitat in the present recovery strategy are from 2001 to 2014, inclusively depending on the data available within each region. Since many habitat types occupied by the Eastern Whip-poor-will are dynamic (e.g., a clear cut forest can become too dense for nesting or foraging within 10-15 years under optimal conditions), records older than 2001 will need to be validated to determine if suitable nesting and foraging habitats are still available and if the species still occupies the area.

7.1.2 Habitat Suitability

This criterion refers to the biophysical attributes of habitats in which individuals may carry out breeding (e.g., courtship, territory defense, nesting) and foraging activities in Canada (Table 5). Breeding and foraging habitats form a mosaic. Depending on the habitat attributes available locally, nesting and foraging habitats overlap to various degrees (e.g., individuals forage in wetlands with sufficient perches but do not nest in them, whereas individuals may nest and forage in young regenerating forests). The criteria to determine the extent of suitable habitat vary accordingly. The United States Fish and Wildlife Service (2002) developed a habitat model for the Eastern Whip-poor-will in the northeastern United States. It suggests that when forests with a dense tree cover are used for nesting purposes, only the first 30 m from the edge needs to be included as the species is not associated to the forest interior. On the other side of the spectrum, when habitats can only be used for foraging purposes because the vegetation structure or other characteristics (e.g., drainage) are unsuitable for nesting, data from Rand's (2014) study suggest that it is sufficient to incorporate the habitat up to 1,250 m of the edge with nesting habitats, i.e. the maximum movement observed.

Table 5. Description of the Biophysical Attributes of Suitable Habitats for the Eastern Whip-poor-will.

Components of habitat suitability	Biophysical Attributes
Regional context	Forests (e.g., deciduous, mixedwood, coniferous, treed wetlands) and open habitats (e.g., shrublands, fallow fields, regeneration following fires or clear-cuts, rock and sand outcrops; shrubby wetlands) form a mosaic
Habitats suitable for both nesting and foraging	– Forests with sparse to moderate [k] tree cover or open habitats **AND** – Sparse to moderate shrub and herbaceous cover **AND** – Well-drained soils (e.g., sand, sandy-loam) ➢ *Within an atlas square, includes all corresponding areas of 3 ha [l] or more*
Habitats suitable for nesting only [*must be adjacent to foraging habitats*]	– Forests with a dense tree cover **AND** – Sparse to moderate shrub and herbaceous cover **AND** – Well-drained soils (e.g., sand, sandy-loam) ➢ *Within an atlas square, includes all corresponding areas up to 30 m on the interior side of the forest edge*
Habitats suitable for foraging only [must be *adjacent to nesting habitats*]	– Forests with sparse tree cover or open habitats **AND** – Dense shrub cover **AND** – Soil drainage is deficient ➢ *Within an atlas square, includes all corresponding areas up to 1,250 m from the edge with suitable nesting habitat* **OR** – Agricultural land with scattered shrubs or trees (e.g., hedgerows) that can be used as perches ➢ *Within an atlas square, includes all corresponding areas up to 1,250 m from the edge with suitable nesting habitat*

[k] Sparse : <25% ; Moderate : 25-75% ; Dense : > 75%
[l] Minimum territory size for the Eastern Whip-poor-will (Cink 2002).

7.1.3 Application of the Critical Habitat Criteria

Critical habitat for the Eastern Whip-poor-will is partially identified in this recovery strategy. It corresponds to the areas of suitable nesting and/or foraging habitats within all 10 x 10 km atlas squares meeting the occupancy criteria. Each of these 10 x 10 km

atlas squares is a critical habitat unit. Due to the dynamic nature of some of the habitat components required by the species, no detailed critical habitat mapping is provided. It is also unknown, at this time, to what degree the objective of maintaining the area of occupancy above 3000 km^2 is met. The identification of critical habitat is considered partial due to limited survey data availability in certain areas of the Eastern Whip-poor-will's distribution and knowledge gaps related to the importance of landscape-level habitat attributes.

Appendix A (Tables A-1 to A-4 and Figures A-1 to A-4) presents the units within which critical habitat is found for the Eastern Whip-poor-will in Canada. Because they both originate from breeding bird atlas squares, critical habitat units for this species are the same as the 10 x 10 km standardized UTM squares used by Environment Canada to indicate the general geographic location of critical habitat (red hatched outlines in figures in Appendix A). Overall, 212 critical habitat units are identified for the Eastern Whip-poor-will, including 32 in Manitoba, 110 in Ontario, 65 in Quebec, and five in the Maritimes (all in New Brunswick). More detailed information on the location of critical habitat to support protection of the species and its habitat may be requested, on a need-to-know basis, by contacting Environment Canada's Recovery Planning section at : RecoveryPlanning_Pl@ec.gc.ca.

Any anthropogenic structure (e.g., houses, paved surfaces) and any other areas that do not have the biophysical attributes of suitable habitat are not identified as critical habitat.

7.2 Schedule of Studies to Identify Critical Habitat

Table 6. Schedule of Studies to Identify Critical Habitat

Description of Activity	Rationale	Timeline
Determine habitat characteristics (e.g., spatial scale, configuration) that influence the selection and quality of nesting and foraging habitat for the Eastern Whip-poor-will in Canada	Clarify critical habitat identification criteria and add a landscape component if needed	2015-2020
Conduct standardized nocturnal breeding surveys where: - Records since 2001 partially meet the occupancy criteria; - Records date before 2001 and continued occupancy needs to be verified - Insufficient or no surveys have been conducted (e.g., less accessible areas)	Additional critical habitat identified to meet the short term population and distribution objectives	2015-2025
Identify areas in the southern portion of the breeding distribution in Canada where the species could recolonize habitats following their restoration or management	Additional critical habitat identified to meet the long term population and distribution objectives	2015-2035

7.3 Activities Likely to Result in the Destruction of Critical Habitat

Understanding what constitutes destruction of critical habitat is necessary for the protection and management of critical habitat. Destruction is determined on a case by case basis. Destruction would result if part of the critical habitat were degraded, either permanently or temporarily, such that it would not serve its function when needed by the species. Destruction may result from a single or multiple activities at one point in time or from the cumulative effects of one or more activities over time (Government of Canada 2009). Activities described in Table 7 are examples of those likely to cause destruction of critical habitat for the species; however, destructive activities are not necessarily limited to those listed. It should be noted that some activities that would result in the destruction of critical habitat if conducted during the breeding season could also generate the open habitats necessary for foraging as well as nesting habitats in the following years (dynamic habitat mosaic).

Table 7. Examples of Activities Likely to Destroy Critical Habitat for the Eastern Whip-poor-will.

<table>
<tr><th>Description of Activity</th><th>Description of Effect</th><th>Details of Effect</th></tr>
<tr><td>Intensification of agricultural practices (e.g., conversion of extensive cultures to more intensive crops)</td><td>Loss or degradation of suitable foraging habitats; Removal of conditions that allow for sufficient prey populations; Fragmentation of habitat; Reduced insect prey populations through the use of pesticides or herbicides on the crops and adjacent habitats</td><td rowspan="5">Applicable at all times in critical habitat units (10 x 10 km squares) where the forest cover is already low (e.g., <25%) and if the effect is permanent;

Applicable at all times in critical habitat units if activity would result in forest cover falling below 25% and if the effect is permanent;

Applicable at all times if biophysical attributes would become unavailable or available in insufficient amounts at the time they are needed by the species.</td></tr>
<tr><td>Conversion of forests to agricultural lands</td><td rowspan="3">Loss or degradation of suitable habitats for nesting and/or foraging; Removal of conditions that allow for sufficient prey populations; Fragmentation of habitat</td></tr>
<tr><td>Energy development and mineral extraction (e.g., pipelines, energy corridors, resource extraction, dams)</td></tr>
<tr><td>Construction of housing units and other urban infrastructures (e.g., commercial and industrial buildings, playgrounds, roads)</td></tr>
<tr><td>Forest management (e.g., clearing of shrubs to install tubes in a sugarbush; maintenance in plantations)</td><td>Degradation of suitable nesting habitats in dense forests through impacts on the shrub and herbaceous layers required for the nest site and for roosting</td></tr>
<tr><td>Maintenance of linear infrastructures (e.g., utility rights-of-way, energy corridors) or other types of non-linear infrastructures (e.g., military ranges and fields used for military training)</td><td>Degradation of suitable nesting habitats through the reduction/elimination of the shrub and herbaceous layers required for nest site placement and loss of perches needed for roosting and foraging; Reduced insect prey populations through the use of herbicides (less insect producing habitats)</td><td>These activities, if conducted outside of the breeding season[m], may not be considered as habitat destruction. When possible, these activities could be conducted in successive steps to maintain partial shrub cover.</td></tr>
</table>

[m] Eastern Whip-poor-will general nesting period in Canada extends from mid-May to mid-August (Rousseu and Drolet, unpublished data).

The 25% forest cover (i.e. 2,500 ha) figure within each 10 x 10 km atlas square within which Eastern Whip-poor-will records occur was selected as a value under which activities, if they were to occur, are more likely to result in the abandonment of the remaining suitable habitats. The following considerations were taken into account :

- The Eastern Whip-poor-will is generally considered a bird of forested landscapes;
- Each individual may require nesting and foraging resources within home ranges as large as 500 ha (Rand 2014). Many of the atlas squares meeting the occupancy criteria had 3 or more individuals;
- Individuals often occupy transitional habitats (e.g., a partial cut forest can become too dense for nesting or foraging within 10-15 years under optimal conditions) making it necessary to maintain alternate nesting and foraging sites over areas larger than those occupied in any given year. This consideration is particularly important in atlas squares where forest cover is already under 25% and alternate breeding habitats may no longer be available ;
- Regions with higher forest cover are more likely to sustain Eastern Whip-poor-will populations over the long term (more suitable habitats, reduced impact of some threats);
- An analysis shows that 10 x 10 km atlas squares meeting the occupancy criteria described in section 7.1.1 have a mean forest cover of 56% in Ontario (range = 41-98%); 42% in Quebec (range = 8-78%) and 74% in the Maritimes (range = 62-91%). This implies that there is a lot of flexibility to maintain habitat supply above 25% within most 10 x 10 km squares within which critical habitat is found.

The 25% forest cover figure should be viewed as a general indication of the level of additional activities that could take place within each 10 x 10 km square rather than a true threshold. Other considerations, including the configuration of remaining forest habitats and the level of fragmentation are also key elements. Some site-level biophysical attributes (e.g., well-drained soils such as sand deposits) may also be available in limited amounts.

8. Measuring Progress

The performance indicators presented below provide a way to define and measure progress toward achieving the population and distribution objectives.

- In the short term (2015-2025), declining population trends have been halted or reversed to a point where the Canadian population of the Eastern Whip-poor-will have declined no more than 10% and the areas of occupied habitats are maintained at 3000 km^2 or more.
- In the long term (after 2025), a positive 10-year trend, measured by BBS and other available data (e.g., targeted surveys), is achieved (i.e., the population is increasing) and the species has started gradually recolonizing former areas in the southern portion of the Canadian range.

9. Statement on Action Plans

One or more action plans for the Eastern Whip-poor-will will be posted on the Species at risk public registry before the end of 2020.

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Appendix A: Critical Habitat for the Eastern Whip-poor-will in Canada

Table A-1. Critical habitat units (10 x 10 km standardized UTM squares) within which critical habitat for the Eastern Whip-poor-will is found in Manitoba. Critical habitat occurs where the criteria described in Section 7.1 are met.

10 x 10 km standardized Grid Square ID [n]	UTM Grid Square Coordinates [o]		Land tenure [p]
	Easting	Northing	
14LE48	340000	5980000	Non-federal Land
14MC93	490000	5730000	Non-federal Land
14MD66	460000	5860000	Non-federal Land
14MD76	470000	5860000	Non-federal Land
14MD87	480000	5870000	Non-federal Land
14MD95	490000	5850000	Non-federal Land
14MF80	480000	6000000	Non-federal Land
14NB56	550000	5660000	Non-federal Land
14NB87	580000	5670000	Other federal Land/ Non-federal Land
14NB96	590000	5660000	Non-federal Land
14NC23	520000	5730000	Non-federal Land
14NC53	550000	5730000	Non-federal Land
14ND16	510000	5860000	Non-federal Land
14PA66	660000	5560000	Non-federal Land
14PA76	670000	5560000	Non-federal Land
14PA85	680000	5550000	Non-federal Land
14PB70	670000	5600000	Non-federal Land
14PB79	670000	5690000	Non-federal Land
14PB97	690000	5670000	Other federal Land/ Non-federal Land

10 x 10 km standardized Grid Square ID [n]	UTM Grid Square Coordinates [o]		Land tenure [p]
	Easting	Northing	
14PV64	660000	5440000	Non-federal Land
14PV89	680000	5490000	Non-federal Land
14QA11	710000	5510000	Non-federal Land
15TQ94	290000	5440000	Non-federal Land
15TS96	289996	5660000	Non-federal Land
15UR08	300000	5580000	Non-federal Land
15UR18	310000	5580000	Non-federal Land
15UR29	320000	5590000	Non-federal Land
15US05	300000	5650000	Non-federal Land
15US06	300000	5660000	Non-federal Land
15US21	320000	5610000	Non-federal Land
15US35	330000	5650000	Non-federal Land
15UT37	330000	5770000	Non-federal Land
Total: 32 critical habitat units			

[n]Based on the standard UTM Military Grid Reference System (see http://www.nrcan.gc.ca/earth-sciences/geography-boundary/mapping/topographic-mapping/10098), where the first 2 digits represent the UTM Zone, the following 2 letters indicate the 100 km x 100 km Standardized UTM grid, followed by 2 digits to represent the 10 x 10 km Standardized UTM grid containing all or a portion of the critical habitat unit. This unique alphanumeric code is based on the methodology produced from the Breeding Bird Atlases of Canada (See http://www.bsc-eoc.org/ for more information on breeding bird atlases).

[o]The listed coordinates are a cartographic representation of where critical habitat can be found, presented as the southwest corner of the 10 x 10 km Standardized UTM grid squares containing all or a portion of the critical habitat unit. The coordinates may not fall within critical habitat and are provided as a general location only.

[p]Land tenure is provided as an approximation of the types of land ownership that exist at the critical habitat units and should be used for guidance purposes only. Accurate land tenure will require cross referencing critical habitat boundaries with surveyed land parcel information.

Table A-2. Critical habitat units (10 x 10 km standardized UTM squares) within which critical habitat for the Eastern Whip-poor-will is found in Ontario. Critical habitat occurs where the criteria described in Section 7.1 are met.

10 x 10 km standardized Grid Square ID [q]	UTM Grid Square Coordinates [r]		Land tenure [s]
	Easting	Northing	
15VQ11	410000	5410000	Non-federal Land
15VQ21	420000	5410000	Non-federal Land
15VQ31	430000	5410000	Non-federal Land
16CV80	380000	5400000	Other Federal Land / Non-federal Land
16GS25	720000	5150000	Other Federal Land / Non-federal Land
17LM66	360000	5160000	Non-federal Land
17MG28	420000	4680000	Non-federal Land
17MG38	430000	4680000	Non-federal Land
17MH28	420000	4780000	Other Federal Land / Non-federal Land
17MH38	430000	4780000	Non-federal Land
17MK61	460000	4910000	Non-federal Land
17MK69	460000	4990000	Federal Protected Area / Non-federal Land
17MK78	470000	4980000	Non-federal Land
17MK79	470000	4990000	Non-federal Land
17ML40	440000	5000000	Other Federal Land / Non-federal Land
17ML50	450000	5000000	Federal Protected Area / Non-federal Land
17ML60	460000	5000000	Federal Protected Area / Non-federal Land
17ML69	460000	5090000	Other Federal Land / Non-federal Land
17ML70	470000	5000000	Federal Protected Area / Non-federal Land
17ML71	470000	5010000	Federal Protected Area / Non-federal Land
17MM04	400000	5140000	Non-federal Land

10 x 10 km standardized Grid Square ID [q]	UTM Grid Square Coordinates [r]		Land tenure [s]
	Easting	Northing	
17NH32	530000	4720000	Non-federal Land
17NH41	540000	4710000	Federal Protected Area (Big Creek National Wildlife Area) / Non-federal Land
17NH42	540000	4720000	Non-federal Land
17NH52	550000	4720000	Non-federal Land
17NH61	560000	4710000	Federal Protected Area (Long Point National Wildlife Area) / Non-federal Land
17NH69	560000	4790000	Non-federal Land
17NH71	570000	4710000	Federal Protected Area (Long Point National Wildlife Area) / Non-federal Land
17NH79	570000	4790000	Non-federal Land
17NK88	580000	4980000	Non-federal Land
17NK96	590000	4960000	Federal Protected Area / Non-federal Land
17NL37	530000	5070000	Other Federal Land / Non-federal Land
17NL43	540000	5030000	Non-federal Land
17NL62	560000	5020000	Non-federal Land
17NL70	570000	5000000	Non-federal Land
17NL87	580000	5070000	Non-federal Land
17NL88	580000	5080000	Non-federal Land
17NN86	580000	5260000	Non-federal Land
17PH35	630000	4750000	Non-federal Land
17PJ77	670000	4870000	Non-federal Land
17PJ87	680000	4870000	Non-federal Land
17PJ98	690000	4880000	Non-federal Land

10 x 10 km standardized Grid Square ID [q]	UTM Grid Square Coordinates [r]		Land tenure [s]
	Easting	Northing	
17PK17	610000	4970000	Non-federal Land
17PK25	620000	4950000	Other Federal Land / Non-federal Land
17PK46	640000	4960000	Non-federal Land
17PK53	650000	4930000	Federal Protected Area / Non-federal Land
17PK54	650000	4940000	Other Federal Land / Non-federal Land
17PK55	650000	4950000	Non-federal Land
17PK56	650000	4960000	Non-federal Land
17PK57	650000	4970000	Non-federal Land
17PK64	660000	4940000	Non-federal Land
17QJ38	730000	4880000	Non-federal Land
17QK03	700000	4930000	Other Federal Land / Non-federal Land
17QK14	710000	4940000	Other Federal Land / Non-federal Land
17QK23	720000	4930000	Other Federal Land / Non-federal Land
17QK24	720000	4940000	Other Federal Land / Non-federal Land
17QK26	720000	4960000	Non-federal Land
17QK32	730000	4920000	Other Federal Land / Non-federal Land
17QK34	730000	4940000	Other Federal Land / Non-federal Land
17QL07	700000	5070000	Non-federal Land
18TP77	270000	4780000	Non-federal Land
18TQ63	261440	4930000	Non-federal Land
18TQ64	261808	4940000	Other Federal Land / Non-federal Land
18TQ74	270000	4940000	Other Federal Land / Non-federal Land
18TQ75	270000	4950000	Other Federal Land / Non-federal Land

10 x 10 km standardized Grid Square ID [q]	UTM Grid Square Coordinates [r]		Land tenure [s]
	Easting	Northing	
18TQ93	290000	4930000	Non-federal Land
18TR74	270000	5040000	Non-federal Land
18TR88	280000	5080000	Non-federal Land
18TR96	290000	5060000	Other Federal Land / Non-federal Land
18TR98	290000	5080000	Other Federal Land / Non-federal Land
18UP25	320000	485000	Other Federal Land / Non-federal Land
18UP46	340000	486000	Federal Protected Area (Prince Edward Point National Wildlife Area) / Non-federal Land
18UP88	380000	488000	Non-federal Land
18UQ03	300000	4930000	Non-federal Land
18UQ28	320000	4980000	Non-federal Land
18UQ43	340000	4930000	Non-federal Land
18UQ54	350000	4940000	Non-federal Land
18UQ63	360000	4930000	Non-federal Land
18UQ67	360000	4970000	Non-federal Land
18UQ72	370000	4920000	Other Federal Land / Non-federal Land
18UQ73	370000	4930000	Non-federal Land
18UQ74	370000	4940000	Other Federal Land / Non-federal Land
18UQ75	370000	4950000	Non-federal Land
18UQ80	380000	4900000	Federal Protected Area / Non-federal Land
18UQ82	380000	4920000	Other Federal Land / Non-federal Land
18UQ83	380000	4930000	Other Federal Land / Non-federal Land
18UQ92	390000	4920000	Other Federal Land / Non-federal Land

10 x 10 km standardized Grid Square ID [q]	UTM Grid Square Coordinates [r]		Land tenure [s]
	Easting	Northing	
18UQ93	390000	4930000	Other Federal Land / Non-federal Land
18UQ95	390000	4950000	Other Federal Land / Non-federal Land
18UR04	300000	5040000	Non-federal Land
18UR06	300000	5060000	Non-federal Land
18UR16	310000	5060000	Non-federal Land
18UR17	310000	5070000	Non-federal Land
18UR18	310000	5080000	Other Federal Land / Non-federal Land
18UR25	320000	5050000	Non-federal Land
18UR28	320000	5080000	Other Federal Land / Non-federal Land
18US00	300000	5100000	Other Federal Land / Non-federal Land
18VQ01	400000	4910000	Non-federal Land
18VQ03	400000	4930000	Federal Protected Area / Non-federal Land
18VQ04	400000	4940000	Other Federal Land / Non-federal Land
18VQ05	400000	4950000	Other Federal Land / Non-federal Land
18VQ12	410000	4920000	Non-federal Land
18VQ22	420000	4920000	Federal Protected Area / Non-federal Land
18VQ27	420000	4970000	Federal Protected Area (Rideau Migratory Bird Sanctuary) / Non-federal Land
18VQ37	430000	4970000	Federal Protected Area (Rideau Migratory Bird Sanctuary) / Non-federal Land
18VQ38	430000	4980000	Other Federal Land / Non-federal Land
18VR10	410000	5000000	Non-federal Land
18VR12	410000	5020000	Non-federal Land
18VR22	420000	5020000	Other Federal Land / Non-federal Land

10 x 10 km standardized Grid Square ID [q]	UTM Grid Square Coordinates [r]		Land tenure [s]
	Easting	Northing	
18VR82	480000	5020000	Non-federal Land
Total: 110 critical habitat units			

[q]Based on the standard UTM Military Grid Reference System (see http://www.nrcan.gc.ca/earth-sciences/geography-boundary/mapping/topographic-mapping/10098), where the first 2 digits represent the UTM Zone, the following 2 letters indicate the 100 km x 100 km Standardized UTM grid, followed by 2 digits to represent the 10 x 10 km Standardized UTM grid containing all or a portion of the critical habitat unit. This unique alphanumeric code is based on the methodology produced from the Breeding Bird Atlases of Canada (See http://www.bsc-eoc.org/ for more information on breeding bird atlases).

[r]The listed coordinates are a cartographic representation of where critical habitat can be found, presented as the southwest corner of the 10 x 10 km Standardized UTM grid squares containing all or a portion of the critical habitat unit. The coordinates may not fall within critical habitat and are provided as a general location only.

[s]Land tenure is provided as an approximation of the types of land ownership that exist at the critical habitat units and should be used for guidance purposes only. Accurate land tenure will require cross referencing critical habitat boundaries with surveyed land parcel information.

Table A-3. Critical habitat units (10 x 10 km standardized UTM squares) within which critical habitat for the Eastern Whip-poor-will is found in Quebec. Critical habitat occurs where the criteria described in Section 7.1 are met.

10 x 10 km standardized Grid Square ID [t]	UTM Grid Square Coordinates [u]		Land tenure [v]
	Easting	Northing	
17PN26	620000	5260000	Non-federal Land
17PP45	640000	5350000	Non-federal Land
17PP55	650000	5350000	Non-federal Land
18UR38	330000	5070000	Other Federal Land / Non-federal Land
18UR47	340000	5070000	Other Federal Land / Non-federal Land
18UR48	340000	5080000	Other Federal Land / Non-federal Land
18UR85	380000	5050000	Non-federal Land
18UR93	390000	5030000	Other Federal Land / Non-federal Land
18UR95	390000	5050000	Other Federal Land / Non-federal Land
18US33	330000	5130000	Other Federal Land
18VR19	410000	5040000	Other Federal Land / Non-federal Land
18VR14	410000	5090000	Other Federal Land / Non-federal Land
18VR24	420000	5040000	Other Federal Land / Non-federal Land
18VR26	420000	5060000	Non-federal Land
18VR28	420000	5080000	Non-federal Land
18VR35	430000	5050000	Non-federal Land
18VR47	440000	5070000	Non-federal Land
18VR54	450000	5040000	Non-federal Land
18VR55	450000	5050000	Non-federal Land
18VT10	410000	5200000	Non-federal Land
18WQ59	550000	4990000	Non-federal Land

10 x 10 km standardized Grid Square ID [t]	UTM Grid Square Coordinates [u]		Land tenure [v]
	Easting	Northing	
18WQ69	560000	4990000	Non-federal Land
18WQ88	580000	4980000	Other Federal Land / Non-federal Land
18WQ89	580000	4990000	Non-federal Land
18WQ98	590000	4980000	Other Federal Land / Non-federal Land
18WQ99	590000	4990000	Non-federal Land
18WR56	550000	5060000	Non-federal Land
18WR66	560000	5060000	Non-federal Land
18WR90	590000	5000000	Non-federal Land
18WR98	590000	5080000	Non-federal Land
18WR99	590000	5090000	Other Federal Land / Non-federal Land
18XQ09	600000	4990000	Non-federal Land
18XR00	600000	5000000	Other Federal Land / Non-federal Land
18XR10	610000	5000000	Non-federal Land
18XR29	620000	5090000	Other Federal Land / Non-federal Land
18XR46	640000	5060000	Non-federal Land
18XR50	650000	5000000	Non-federal Land
18XR51	650000	5010000	Other Federal Land / Non-federal Land
18XR52	650000	5020000	Other Federal Land / Non-federal Land
18XR60	660000	5000000	Non-federal Land
18XR61	660000	5010000	Non-federal Land
18XR62	660000	5020000	Non-federal Land
18XR73	670000	5030000	Non-federal Land
18XR78	670000	5080000	Non-federal Land

10 x 10 km standardized Grid Square ID [t]	UTM Grid Square Coordinates [u]		Land tenure [v]
	Easting	Northing	
18XR89	680000	5090000	Non-federal Land
18XR96	690000	5060000	Non-federal Land
18XS74	670000	5140000	Other Federal Land / Non-federal Land
18XV60	660000	5400000	Other Federal Land / Non-federal Land
18YR08	700000	5080000	Non-federal Land
18YR18	710000	5080000	Non-federal Land
18YR19	710000	5090000	Non-federal Land
18YR28	720000	5080000	Non-federal Land
18YS00	700000	5100000	Non-federal Land
18YS10	710000	5100000	Other Federal Land / Non-federal Land
18YS20	720000	5100000	Other Federal Land / Non-federal Land
18YS21	720000	5110000	Non-federal Land
18YS30	730000	5100000	Non-federal Land
18YS31	730000	5110000	Non-federal Land
19BM71	270000	5110000	Non-federal Land
19BM72	270000	5120000	Non-federal Land
19BM82	280000	5120000	Non-federal Land
19CM06	300000	5160000	Non-federal Land
19CM16	310000	5160000	Non-federal Land
19CM26	320000	5160000	Non-federal Land
19DP43	440000	5330000	Other Federal Land / Non-federal Land
Total: 65 critical habitat units			

[at]Based on the standard UTM Military Grid Reference System (see http://www.nrcan.gc.ca/earth-sciences/geography-boundary/mapping/topographic-mapping/10098), where the first 2 digits represent the UTM Zone, the following 2 letters indicate the 100 km x 100 km Standardized UTM grid, followed by 2 digits to represent the 10 x 10 km Standardized UTM grid containing all or a portion of the critical habitat unit. This unique alphanumeric code is based on the methodology produced from the Breeding Bird Atlases of Canada (See http://www.bsc-eoc.org/ for more information on breeding bird atlases).

[u]The listed coordinates are a cartographic representation of where critical habitat can be found, presented as the southwest corner of the 10 x 10 km Standardized UTM grid squares containing all or a portion of the critical habitat unit. The coordinates may not fall within critical habitat and are provided as a general location only.

[v]Land tenure is provided as an approximation of the types of land ownership that exist at the critical habitat units and should be used for guidance purposes only. Accurate land tenure will require cross referencing critical habitat boundaries with surveyed land parcel information.

Table A-4. Critical habitat units (10 x 10 km standardized UTM squares) within which critical habitat for the Eastern Whip-poor-will is found in New Brunswick. Critical habitat occurs where the criteria described in Section 7.1 are met.

10 x 10 km standardized Grid Square ID [w]	UTM Grid Square Coordinates [x]		Land tenure [y]
	Easting	Northing	
19FL96	690000	5060000	Other Federal Land / Non-federal Land
19GL17	710000	5070000	Other Federal Land / Non-federal Land
19GL19	710000	5090000	Other Federal Land / Non-federal Land
19FN24	620000	5240000	Non-federal Land
20LT01	300000	5210000	Other Federal Land / Non-federal Land

[w]Based on the standard UTM Military Grid Reference System (see http://www.nrcan.gc.ca/earth-sciences/geography-boundary/mapping/topographic-mapping/10098), where the first 2 digits represent the UTM Zone, the following 2 letters indicate the 100 km x 100 km Standardized UTM grid, followed by 2 digits to represent the 10 x 10 km Standardized UTM grid containing all or a portion of the critical habitat unit. This unique alphanumeric code is based on the methodology produced from the Breeding Bird Atlases of Canada (See http://www.bsc-eoc.org/ for more information on breeding bird atlases).

[x]The listed coordinates are a cartographic representation of where critical habitat can be found, presented as the southwest corner of the 10 x 10 km Standardized UTM grid squares containing all or a portion of the critical habitat unit. The coordinates may not fall within critical habitat and are provided as a general location only.

[y]Land tenure is provided as an approximation of the types of land ownership that exist at the critical habitat units and should be used for guidance purposes only. Accurate land tenure will require cross referencing critical habitat boundaries with surveyed land parcel information.

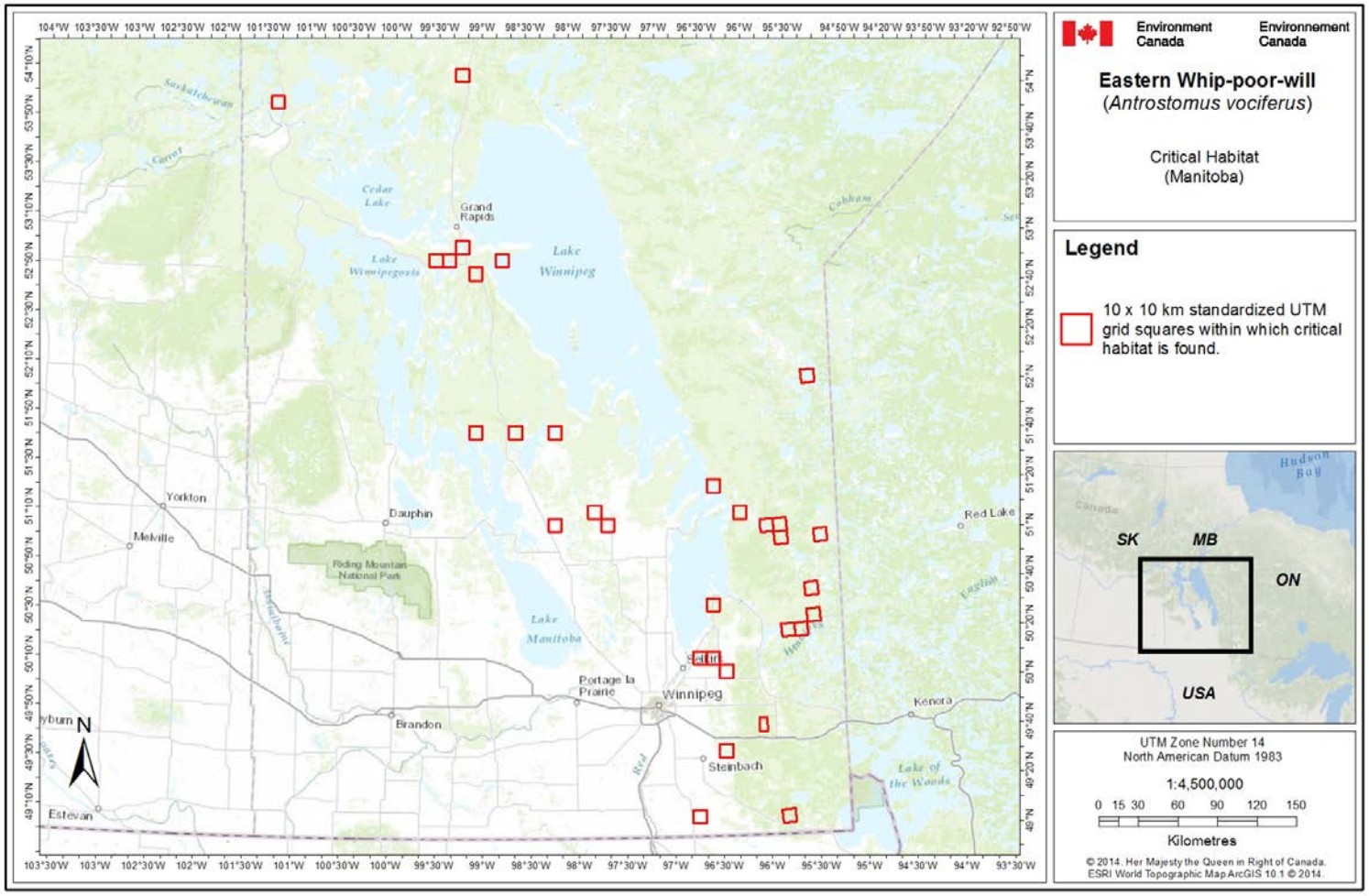

Figure A-1. Critical habitat for the Eastern Whip-poor-will in Manitoba occurs within the 10 x 10 km Standardized UTM grid squares indicated (red outline), where the criteria and methodology set out in Section 7.1 are met. This Standardized national grid system indicates the general geographic area within which critical habitat is found; detailed critical habitat mapping is not shown.

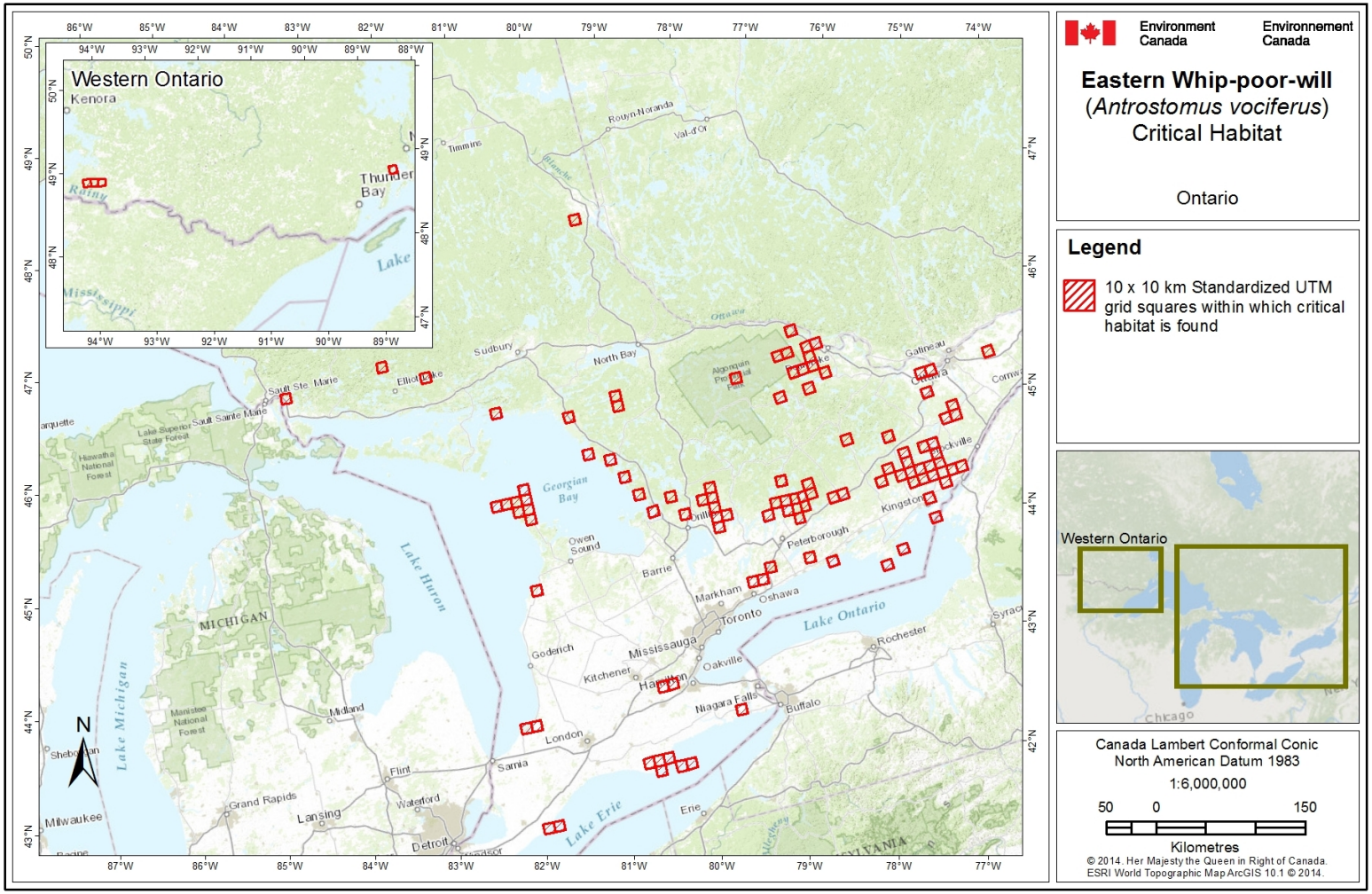

Figure A-2. Critical habitat for the Eastern Whip-poor-will in Ontario occurs within the 10 x 10 km Standardized UTM grid squares indicated (red hatched outline), where the criteria and methodology set out in Section 7.1 are met. This Standardized national grid system indicates the general geographic area within which critical habitat is found; detailed critical habitat mapping is not shown.

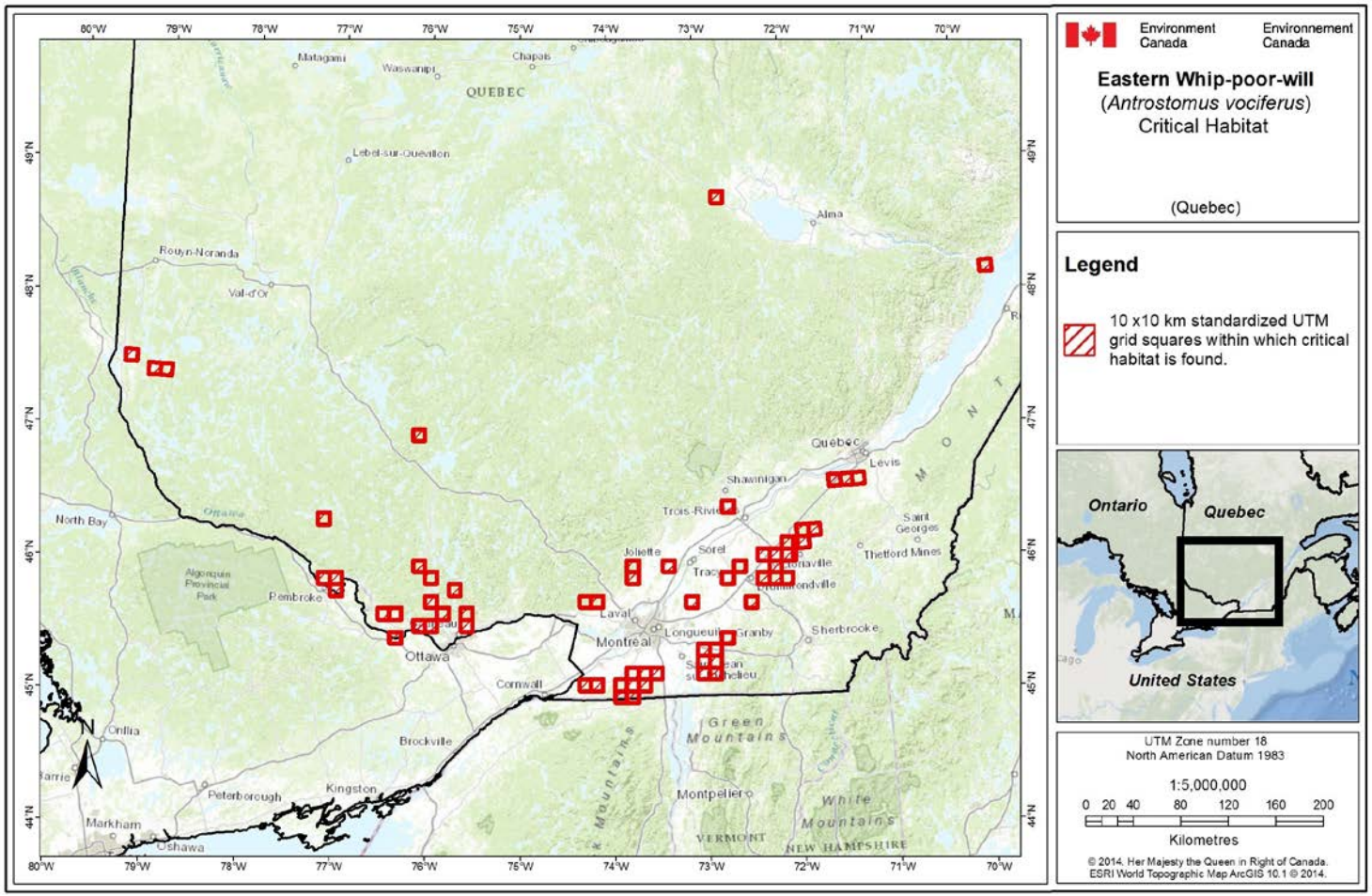

Figure A-3. Critical habitat for the Eastern Whip-poor-will in Quebec occurs within the 10 x 10 km Standardized UTM grid squares indicated (red hatched outline), where the criteria and methodology set out in Section 7.1 are met. This Standardized national grid system indicates the general geographic area within which critical habitat is found; detailed critical habitat mapping is not shown.

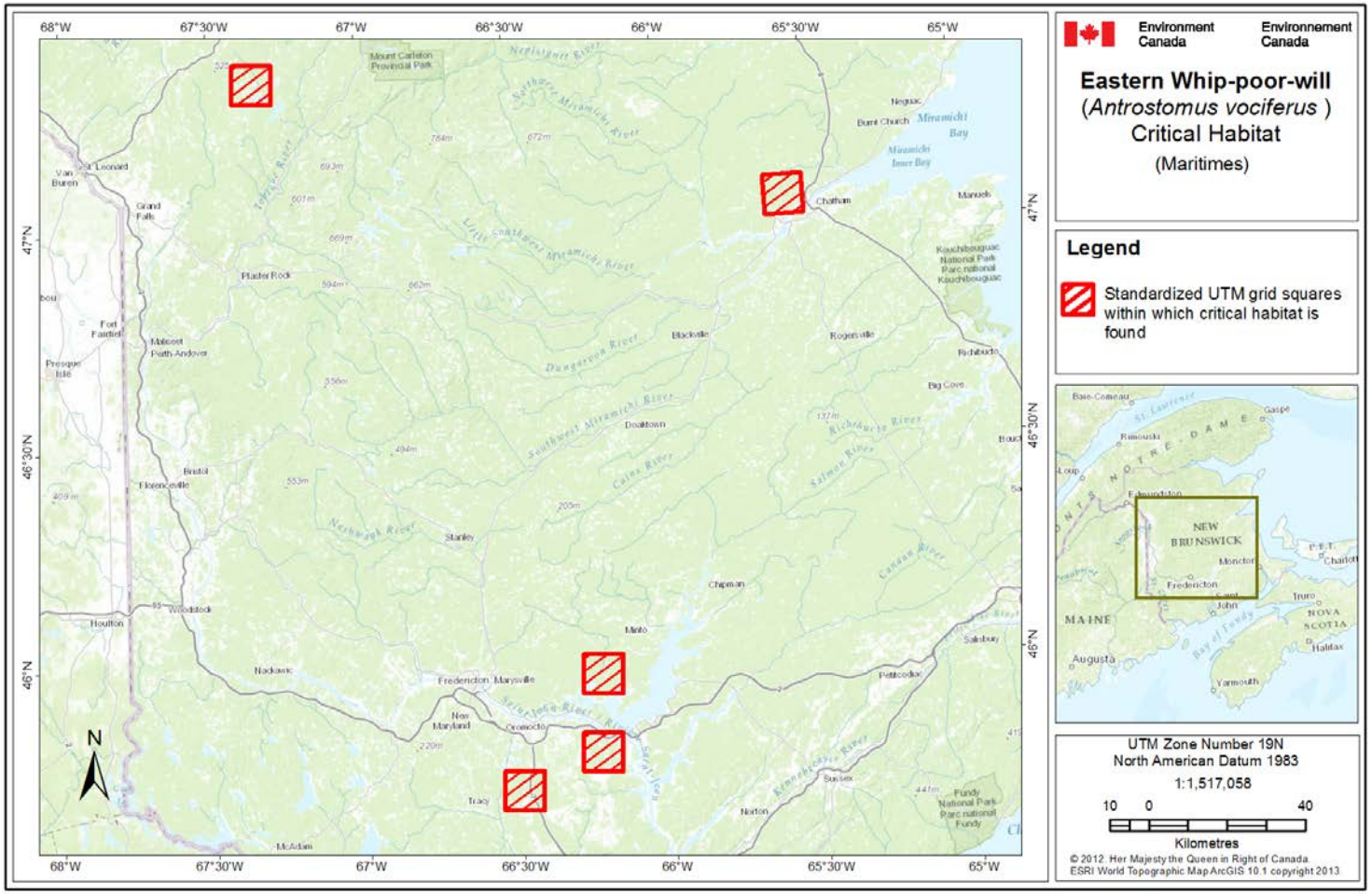

Figure A-4. Critical habitat for the Eastern Whip-poor-will in New Brunswick occurs within the 10 x 10 km Standardized UTM grid squares indicated (red hatched outline), where the criteria and methodology set out in Section 7.1 are met. This Standardized national grid system indicates the general geographic area within which critical habitat is found; detailed critical habitat mapping is not shown.

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*[8]. 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[9] (FSDS) goals and targets.

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 in this statement.

All species that depend on aerial insects for prey such as bats, swallows, and specifically, bird species at risk including: the Chimney Swift (*Chaetura pelagica*), the Common Nighthawk (*Cordeiles minor*), the Olive-sided Flycatcher (*Contopus cooperi*), the Acadian Flycatcher (*Empidonax virescens*) may benefit from the recommended approaches for Eastern Whip-poor-will, namely by increasing the availability of insect producing habitats. These species are also important for integrated pest management.

Nonetheless, some species, including other species at risk, may prefer different forest conditions than the Eastern Whip-poor-will, which needs open areas for nesting. Recovery actions for the species must be integrated with best practices for other songbird species, especially where the best practices may conflict.

The possibility that the present recovery strategy inadvertently generates negative effects on the environment and on other species was considered. The majority of recommended actions are non-intrusive in nature, including surveys and outreach. We conclude that the present recovery strategy is unlikely to produce significant negative effects.

[8] http://www.ceaa.gc.ca/default.asp?lang=En&n=B3186435-1
[9] http://www.ec.gc.ca/dd-sd/default.asp?lang=En&n=CD30F295-1