

**COSEWIC**  
**Assessment and Status Report**

on the

**Whip-poor-will**  
*Caprimulgus vociferus*

in Canada



**THREATENED**  
**2009**

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



**COSEPAC**  
Comité sur la situation  
des espèces en péril  
au Canada

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## COSEWIC Assessment Summary

### Assessment Summary – April 2009

**Common name**

Whip-poor-will

**Scientific name**

*Caprimulgus vociferus*

**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.

**Occurrence**

Saskatchewan, Manitoba, Ontario, Quebec, New Brunswick, Nova Scotia

**Status history**

Designated Threatened in April 2009. Assessment based on a new status report.



**COSEWIC**  
**Executive Summary**

**Whip-poor-will**  
*Caprimulgus vociferus*

**Species information**

The Whip-poor-will is a 50-55 g crepuscular-nocturnal, insectivorous bird with cryptic plumage. Whip-poor-wills have a large gape ringed with sensory bristles for capturing flying insects. All Canadian populations belong to the one eastern North America subspecies (*C. v. vociferus*).

**Distribution**

The breeding range of *C. v. vociferus* extends from east-central Saskatchewan to Nova Scotia, southward into the USA from Oklahoma to South Carolina. This breeding range is approximately 2,772,000 km<sup>2</sup>, of which approximately 535,000 km<sup>2</sup> occurs in Canada. During the winter, this subspecies ranges from coastal South Carolina (rarely) through Florida and along the Gulf Coast of the USA into Mexico and northern Central America.

**Habitat**

Whip-poor-will breeding habitat is dependent upon forest structure rather than composition, although common tree associations in both summer and winter are pine (*Pinus*) and oak (*Quercus*). The species avoids both wide-open spaces and closed-canopy forests. Semi-open forests or patchy forests with clearings, such as barrens or forests that are regenerating following major disturbances, are preferred as nesting habitat. Areas with little ground cover are also preferred. In winter, Whip-poor-wills occupy primarily mixed woods, commonly in broadleaf evergreen forests near open areas.

**Biology**

Whip-poor-wills lay two eggs and both parents contribute to raising the young. Pairs can raise one or two broods per year. Breeding can occur in the first year following hatching, the longevity record is 15 years, and the survival rate for adults might be as high as 77%. These figures suggest that the average age of breeding adults in the population is four years.

## **Population sizes and trends**

Breeding Bird Survey (BBS) data from the 1990s have generated an estimated population size of 66,000 adult Whip-poor-wills in Canada. Long-term BBS data show a decline of 3.5%/yr between 1968 and 2007, which amounts to a population loss of 75% over this period. Based on this rate of decline, the population of Whip-poor-wills in Canada would have been reduced by 35% over the last three generations.

## **Limiting factors and threats**

The factors implicated in the Whip-poor-will decline are speculative. Possible causes of decline include habitat loss and degradation, automobile collisions and changes in food supply related to pesticides and climate change.

## **Special significance of the species**

The Whip-poor-will is commonly evoked as a symbol of rural life. It has attained significant status in popular culture, being mentioned in countless songs, poems, books, and movies.

## **Existing protection or other status designations**

In Canada, the Whip-poor-will is protected under the *Migratory Birds Convention Act*, 1994. The species is not considered threatened or endangered globally, and is rated as “least concern” by the IUCN because of its relatively large range and population size.



### COSEWIC HISTORY

The Committee on the Status of Endangered Wildlife in Canada (COSEWIC) was created in 1977 as a result of a recommendation at the Federal-Provincial Wildlife Conference held in 1976. It arose from the need for a single, official, scientifically sound, national listing of wildlife species at risk. In 1978, COSEWIC designated its first species and produced its first list of Canadian species at risk. Species designated at meetings of the full committee are added to the list. On June 5, 2003, the *Species at Risk Act* (SARA) was proclaimed. SARA establishes COSEWIC as an advisory body ensuring that species will continue to be assessed under a rigorous and independent scientific process.

### COSEWIC MANDATE

The Committee on the Status of Endangered Wildlife in Canada (COSEWIC) assesses the national status of wild species, subspecies, varieties, or other designatable units that are considered to be at risk in Canada. Designations are made on native species for the following taxonomic groups: mammals, birds, reptiles, amphibians, fishes, arthropods, molluscs, vascular plants, mosses, and lichens.

### COSEWIC MEMBERSHIP

COSEWIC comprises members from each provincial and territorial government wildlife agency, four federal entities (Canadian Wildlife Service, Parks Canada Agency, Department of Fisheries and Oceans, and the Federal Biodiversity Information Partnership, chaired by the Canadian Museum of Nature), three non-government science members and the co-chairs of the species specialist subcommittees and the Aboriginal Traditional Knowledge subcommittee. The Committee meets to consider status reports on candidate species.

### DEFINITIONS (2009)

Wildlife Species	A species, subspecies, variety, or geographically or genetically distinct population of animal, plant or other organism, other than a bacterium or virus, that is wild by nature and is either native to Canada or has extended its range into Canada without human intervention and has been present in Canada for at least 50 years.
Extinct (X)	A wildlife species that no longer exists.
Extirpated (XT)	A wildlife species no longer existing in the wild in Canada, but occurring elsewhere.
Endangered (E)	A wildlife species facing imminent extirpation or extinction.
Threatened (T)	A wildlife species likely to become endangered if limiting factors are not reversed.
Special Concern (SC)*	A wildlife species that may become a threatened or an endangered species because of a combination of biological characteristics and identified threats.
Not at Risk (NAR)**	A wildlife species that has been evaluated and found to be not at risk of extinction given the current circumstances.
Data Deficient (DD)***	A category that applies when the available information is insufficient (a) to resolve a species' eligibility for assessment or (b) to permit an assessment of the species' risk of extinction.

\* Formerly described as "Vulnerable" from 1990 to 1999, or "Rare" prior to 1990.

\*\* Formerly described as "Not In Any Category", or "No Designation Required."

\*\*\* Formerly described as "Indeterminate" from 1994 to 1999 or "ISIBD" (insufficient scientific information on which to base a designation) prior to 1994. Definition of the (DD) category revised in 2006.



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The Canadian Wildlife Service, Environment Canada, provides full administrative and financial support to the COSEWIC Secretariat.

# **COSEWIC Status Report**

on the

## **Whip-poor-will** *Caprimulgus vociferus*

**in Canada**

2009

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## SPECIES INFORMATION

### Name and classification

Scientific name:	<i>Caprimulgus vociferus</i> Wilson, 1812
Subfamily, Family and Order:	Caprimulginae, Caprimulgidae, Caprimulgiformes
English name:	Whip-poor-will
French name:	Engoulevent bois-pourri
Spanish name:	Tapacaminos cuerporruin

The *Caprimulgus* genus comprises about 60 nocturnal or crepuscular insectivorous species found on all continents except Antarctica. The Whip-poor-will has a disjunct range of eastern (one subspecies) and western parts (five subspecies), each described as a group. All Canadian populations are placed in the eastern Whip-poor-will group (*vociferus*) of one subspecies, *C. v. vociferus* (Cink 2002). The western Whip-poor-will group (*arizonae*) comprises five subspecies. Some authors (Howell and Webb 1995) consider the two groups to be separate species based on voice and morphology, but genetic analysis of the genus has not clarified subspecific status within this species (Barrowclough *et al.* 2006).

### Description

The plumage of both sexes is cryptic, mostly grey and brown. This confers effective camouflage while they roost during the day, mostly on ground leaf litter. Males have a white collar on the upper breast and have substantial white corners on outer tail feathers; in females, these are buff, and the tail patches are reduced. Whip-poor-wills appear to have a small beak, but their gape is large and is ringed with long, sensory rictal bristles. Males weigh 55 g and females 50 g, and the species averages 24 cm in length (Cink 2002).

### Designatable units

There is one subspecies of Whip-poor-will in Canada and no known distinctions between populations within that subspecies that would warrant consideration of designatable units beyond this level. This report is based on a single designatable unit, *C. v. vociferus*.

## DISTRIBUTION

### Global range

The breeding range of the Whip-poor-will (Figure 1) is in two disjunct parts. The eastern part (*vociferus* group) extends from east-central Saskatchewan to Nova Scotia, southward into the USA extending, west to east, from Minnesota and South Dakota to Maine, southward to Oklahoma, northern Georgia, and South Carolina. This breeding range is approximately 2,772,000 km<sup>2</sup>. During the winter, this population ranges from coastal south Carolina (rarely) through Florida and along the Gulf Coast of the USA into Mexico and Honduras, perhaps to Nicaragua (Cink 2002).

The western subspecies (*arizonae* group) breeds from extreme southern California (locally) to southwestern New Mexico (and western Texas very locally), south in the Mexican highlands to southwestern Honduras (Cink 2002). This breeding range is approximately 733,000 km<sup>2</sup>.

### Canadian range

In Canada, the Whip-poor-will breeds from east-central Saskatchewan (sparsely) eastward through southern Manitoba, southern and south central Ontario, southern Quebec, New Brunswick, and locally in central Nova Scotia (Godfrey 1986). Canadian populations are contiguous, although the state of Maine, as well as Lake Superior tend to separate the Canadian populations into three parts.

The Atlas of Saskatchewan Birds (Smith 1996) indicates that the Whip-poor-will is now limited to the east-central part of Saskatchewan extending from southern Prince Albert National Park eastward to the Manitoba border from about Cumberland House to Endeavour. The species' range has contracted in the province; before the mid-1960s, the species occurred further south in eastern Saskatchewan, including Good Spirit and Crescent Lakes in the Yorkton district (Smith 1996). It has, however, recently been heard at Good Spirit Lake (Brigham, pers. comm. 2008).

In Manitoba, the species' range is usually considered to be a swath about 200 km wide beginning at the Saskatchewan border in the vicinity of Lake Winnipegosis and oriented from the northwest to southeast, meeting the Minnesota and Ontario borders south and east of Winnipeg (Cink 2002). However, the range is somewhat more extensive than that, being found as far north as the Bird River area in the east and The Pas, Grand Rapids, and Minago River further west (Taylor and Holland 2003). It has been fairly common in the Dauphin area (Walley, pers. comm. 2008). It is absent as a breeder from the southwest, although a nest was found at Carberry in 1883 (Taylor and Holland 2003). There is an extralimital record from Churchill on 9 June 1989 (Taylor and Holland 2003).

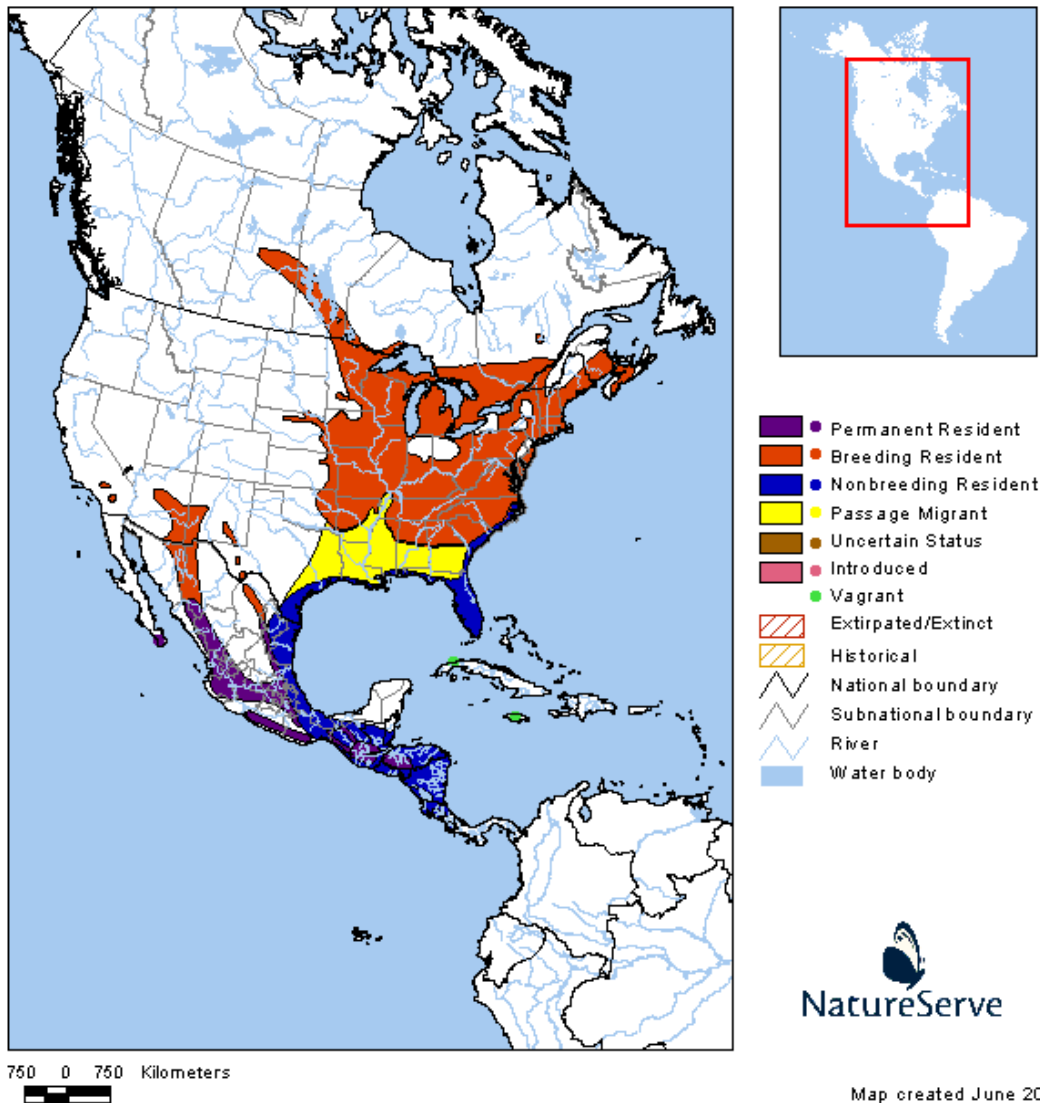


Figure 1. Global distribution of the Whip-poor-will (*Caprimulgus vociferus*). Data provided by NatureServe in collaboration with Robert Ridgely, James Zook, The Nature Conservancy–Migratory Bird Program, Conservation International–Center for Applied Biodiversity Science, World Wildlife Fund–US, and Environment Canada–Wildspace.

In Ontario, the historical range for the Whip-poor-will is one that crosses the province eastward from the Lake of the Woods region in the west, with a northern limit roughly following the north shore of Lake Superior, south to the American border and the lower Great Lakes (Mills 1987) (Figure 2). During the second Ontario breeding bird atlas project (2001-2005), however, the species was found very sparingly in several isolated locations north of that latitude, including the vicinities of Red Lake and Lake Nipigon (Mills 2007).

In Quebec, the main part of the range is the Eastern Townships, the Central St. Lawrence Lowland (to Quebec City at least), and the southern Laurentians (north to the Baskatong Reservoir); north of the 47<sup>th</sup> parallel, the distribution is patchy (Roy and Bombardier 1996). During the Quebec atlas period (1984-1989), isolated records were found as far north as Rouyn-Noranda, Lac St-Jean and Tadoussac (Roy and Bombardier 1996).

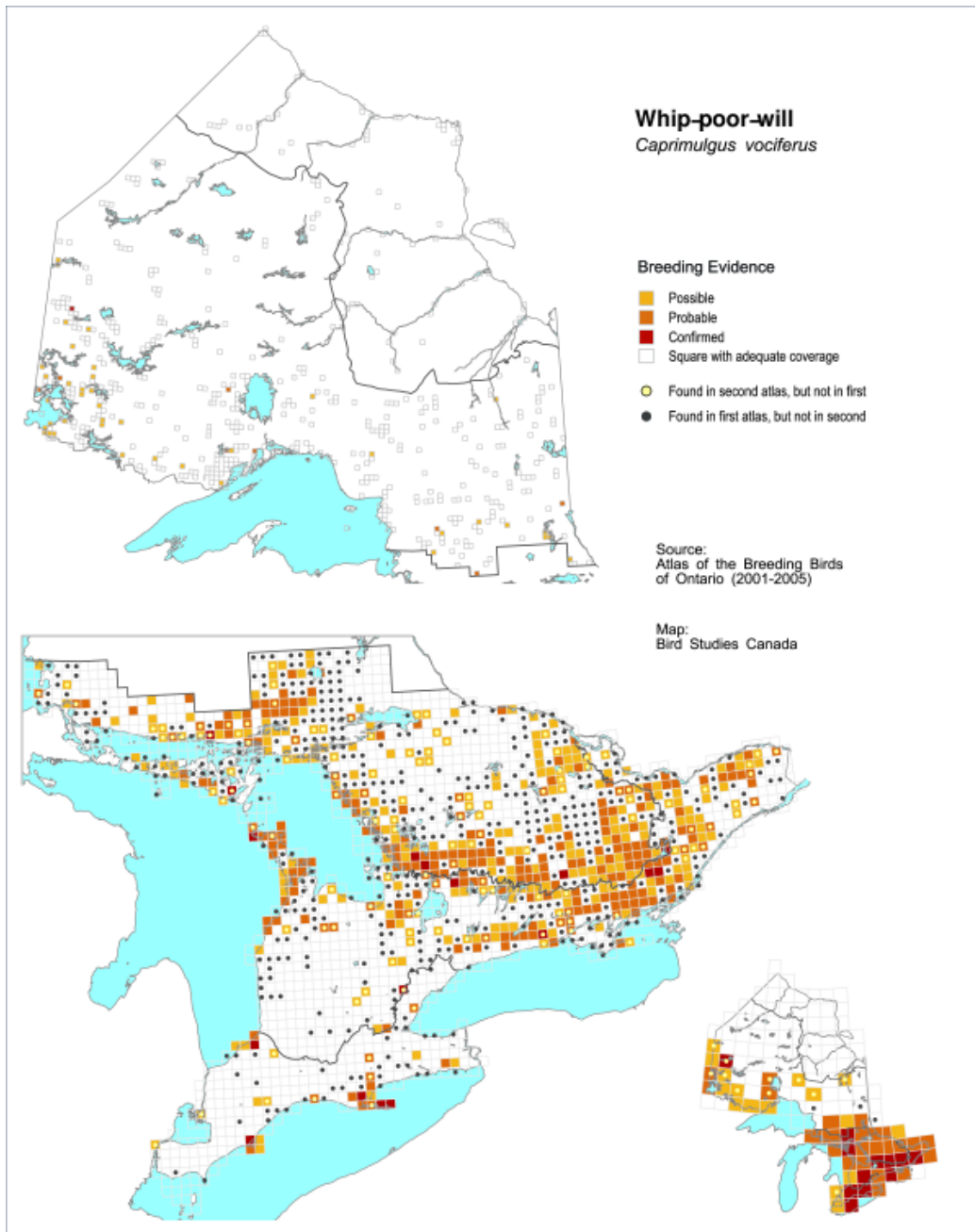


Figure 2. Ontario distribution of the Whip-poor-will during the period 2001-2005 (reproduced with permission).

The species is sparsely and irregularly distributed in Atlantic Canada (Figure 3). The main part of the range is in New Brunswick, primarily in two locations, the southwest, defined by the St. John River valley, and the lower Miramichi River watershed (Godfrey 1986, Erskine 1992). The species was a confirmed breeder in both locations during the first atlas period (1986-1990) (Erskine 1992).

In Prince Edward Island, the Natural History Society of Prince Edward Island (incorporated 1991, website [www.isn.net/~nhspei/](http://www.isn.net/~nhspei/), accessed April 2008) reports that the Whip-poor-will is found, on average, one to nine times per decade in each of spring and summer. During the first Maritimes breeding bird atlas project, the species was found in one square only, without breeding evidence (Erskine 1992).

In Nova Scotia, the species has never been common (Tufts 1986), and breeding birds never seem to establish long-lasting populations (Elderkin, pers. comm. 2008). During the first Maritimes breeding bird atlas project, the species was found in only a dozen, scattered 10 km x 10 km squares, including several near Halifax (Erskine 1992). Cape Breton Island has never, evidently, formed part of the species' range (Tufts 1986).

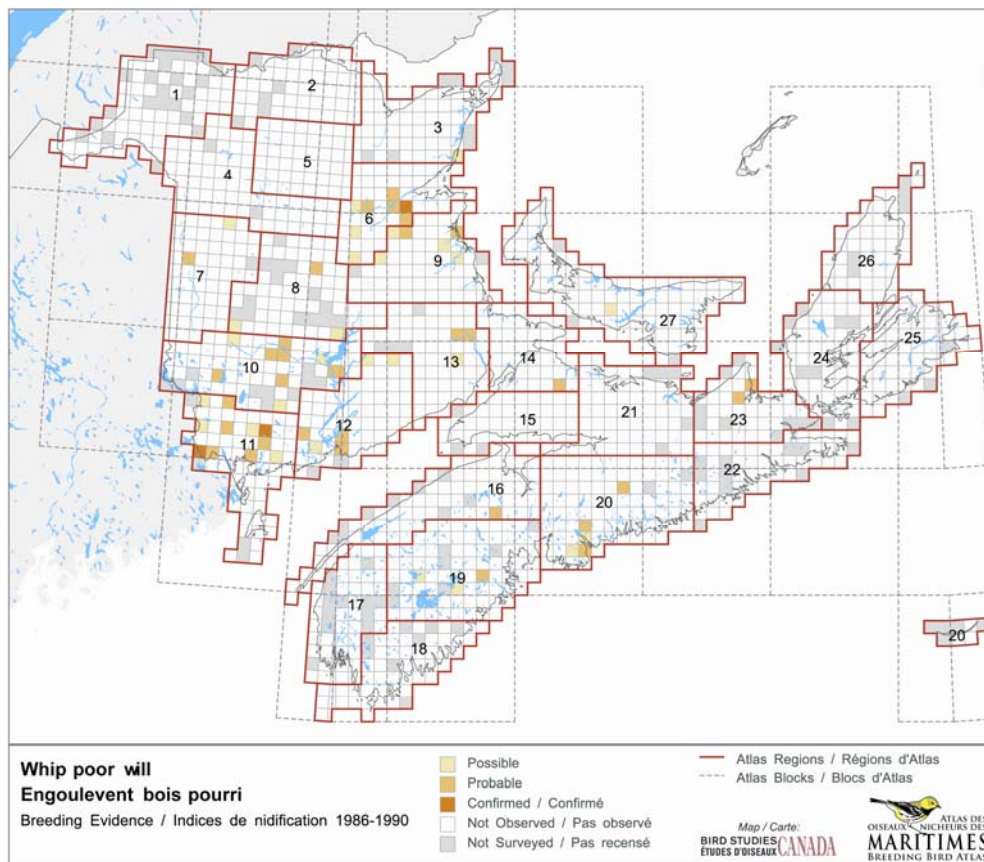


Figure 3. Whip-poor-will distribution in the three Maritime provinces during the period 1986-1990, as determined by the breeding bird atlas project (Erskine 1992). Reproduced with permission. Many of the records shown were found through species-specific inventory efforts (Elderkin, pers. comm. 2008).

The Canadian breeding range for the Whip-poor-will is about 535,000 km<sup>2</sup>, amounting to about 15% of the total breeding range of the species or 20% of the *vociferus* breeding range. The Extent of Occurrence (EO) for the species in Canada is estimated at 1,845,000 km<sup>2</sup> measured as a minimum convex polygon based on the NatureServe range map (Filion, pers. comm. 2008). The Area of Occupancy (AO) is approximately 1,650 km<sup>2</sup>, assuming a population estimate of 33,000 pairs (see below), and based on an average territory area of 5 ha (Fitch 1958, Cink 2002). The Index of Area of Occupancy is greater than 2,000 km<sup>2</sup> (Filion, pers. comm. 2008).

## HABITAT

### Breeding

Whip-poor-will breeding habitat is not dependent upon species composition, but rather on forest structure (Wilson 1985). The species shuns both wide-open spaces and dense forest (Bushman and Therres 1988). Wilson (2003) found that in the American southeast, roughly 50% of home ranges consisted of open habitats, used primarily for foraging. Wilson and Watts (2008) also reported that regenerating forest edges hosted higher densities of foraging birds. Common habitat choices include rock or sand barrens with scattered trees, savannahs, old burns or other disturbed sites in a state of early to mid-forest succession, or open conifer plantations (Mills 1987, Cink 2002). Accordingly, pine (barrens and plantations), oak (barrens and savannahs), and aspen and birch (early to mid-succession) are common tree species associations. Individuals will often feed in nearby shrubby pastures (Roy and Bombardier 1996) or wetlands with perches, and power-line and roadway corridors are also occupied (Palmer-Ball 1996), presumably for feeding. Areas with decreased light levels where forest canopies are closed are generally not occupied (James and Neal 1986), perhaps because of reduced foraging success for this visual insectivore (P. Cavanaugh, pers. comm. in Cink 2002).

Other necessary habitat elements are thought to involve ground-level vegetation and woodland size. Areas with little ground cover are preferred (Eastman 1991). Although there are no data indicating minimum woodland size, small isolated woodlands are avoided, at least in Maryland (Reese 1996). Accordingly, distance from nearby tracts of woodland may also be important (Cink 2002).

### Migration

There is little information on habitat during migration. Whip-poor-wills have been observed in suburban areas with large trees (A. Mills, pers. obs.), forests similar to where they are found during breeding and coastal scrub (Cink 2002).

## **Winter**

In the southeast USA, Whip-poor-wills primarily occupy mixed woods during winter, commonly in broadleaf evergreen forests near open areas (Hamel 1992). Common tree associations in Florida are pine and oak (Cink 2002).

## **Habitat trends**

In the early days of European expansion and settlement, the Whip-poor-will probably took advantage of newly opened habitat created by partial deforestation and fires in the eastern United States and Canada (Cink 2002). Since then, forest fire suppression and the conversion of early and mid-successional forests to mature forests have likely reduced Whip-poor-will habitat in eastern North America, although this has not been quantified.

## **Breeding habitat protection/ownership**

The quantity of Whip-poor-will habitat available on public lands and the degree of protection of that habitat is undetermined. Significant amounts of habitat exist on Crown land, and the species is found in numerous national parks (P. Nantel, pers. comm. 2008). Although Crown land is vulnerable to disturbance and is subject to logging in particular, it tends to remain nominally protected from permanent conversion. While logging disturbance can have immediate negative effects on nesting birds, such disturbance could ultimately favour Whip-poor-wills through the generation of early and mid-successional woodlands. Controlled burning programs in specific national parks could increase the species' habitat. In managed forests, there are no specific programs for Whip-poor-will habitat protection or enhancement.

Data are lacking on the level of habitat protection for this species in private areas (i.e. recreational and rural lands). In rural southwestern Ontario, where most land is privately owned, the few significant remnant pockets of breeding Whip-poor-wills include publicly owned forest lands—Pinery Provincial Park, Rondeau Provincial Park, the St. Williams Conservation Reserve in the Norfolk Sand Plain (Mills 2007), and Long Point CWS lands.

Because it is not known where Canadian Whip-poor-wills specifically over-winter, it is not possible to assess the degree of habitat protection during that season.

## **BIOLOGY**

The most complete source of information on the biology of this species is the Birds of North America account (Cink 2002).



## Life cycle and reproduction

Studies from Kansas (long-term; Cink 2002) and Ontario (two-year; Mills 1986) provide most life history details. There are no such studies from elsewhere in Canada.

The sex ratio appears to be 1:1 based on a Florida winter study (Fisk 1979), and banding data from Long Point Bird Observatory (LPBO). Of 103 Whip-poor-wills banded and sexed at LPBO between 1960 and 2007 inclusive, 56 (54%) were male and 47 (46%) were female (Bird Studies Canada database).

Males establish territories at the beginning of the nesting season, generally ranging from 3 to 11 ha and averaging about 5 ha (Cink 2002). There is no evidence for non-monogamous breeding or of exchange of mates during a summer (Mills 1987, Cink 2002). There is some evidence for site fidelity. In Kansas, eight of 14 pairs re-established pair bonds on the same territory in more than one year, and five of 10 females re-nested within 5 m of their former nest site (Cink 2002). The North American Bird Banding Office has 13 banding recoveries where the banding date and recovery date span at least one winter. Most (10) are of recoveries at the same location in a subsequent year (Ontario, Massachusetts, Maryland, New York, Wisconsin).

Eggs are laid directly on leaf litter. The clutch size is invariably two eggs (31 of 32 Ontario clutches) and clutches are laid between late May and early July in Ontario (Peck and James 1983). The incubation period is 19 to 21 days (Cink 2002). In eastern Ontario, first flights were noted in the third week following hatching, the first feeding sally was at 18-19 days, and young accepted food from parents as late as 30 days following hatching (Mills 1986). One of three pairs in that eastern Ontario study was double-brooded (Mills 1986). In Kansas, double-brooding is not uncommon (about 60% of 20 pairs) with a 32-day average interval between clutches (Cink 2002). The male takes responsibility for the first nest once incubation on the second nest begins (Mills 1986, Cink 2002).

In an eastern Ontario study, three nests of four females all fledged young (Mills 1986) and in Kansas, of 20 pairs (100 nesting attempts), at least 140 young (70%) fledged successfully (Cink 2002). According to DeGraaf and Rudis (1987), the Whip-poor-will first breeds at the age of one year.

There are few longevity records (Cink 2002): a female of unknown age was banded in Kansas and was recaptured at the same place 13 years later and a banded male was recaptured after 15 years. These longevity records are similar to other members of the genus (Staav and Fransson 2006, Klimkiewicz 2008). Twenty of 26 Whip-poor-wills (77%) banded as adults returned to a Kansas breeding site the following year (Cink 2002).

Assuming (a) individuals breed in their first year, (b) an equal sex ratio, (c) an annual survivorship rate of 77%, and (d) a terminal age of 15 years, the average age of breeding adults in the population is four years. This figure is conservative for two reasons. The annual survivorship rate may exceed 77%, as the Kansas study it is based on could not ascertain that the birds that didn't return to the study site were in fact dead. Also, the maximum age is likely to exceed the known record of 15 years.

### **Migration and dispersal**

There is no information on dispersal from the natal site, although there appears to be fidelity exhibited by adults to nesting sites (Cink 2002). The Bird Banding Office has 13 banding recoveries where the banding date and recovery date span at least one winter. Three recoveries are from locations different from the banding site; (a) a bird banded in Michigan in May 1985 was recovered in nearby Ontario in May 1986, (b) a female banded in Maryland in September 1964 was recovered in North Carolina in April of the following year, and (c) a male banded in Michigan in September 1962 was recovered further north in Michigan in May 1965.

### **Diet and feeding habits**

The Whip-poor-will is insectivorous, eating a variety of species from multiple insect orders (Cink 2002). It feeds primarily by sallying from perches like Tyrant Flycatchers, rather than hawking like Common Nighthawks (*Chordeiles minor*) and swallows (Mills 1986). It has occasionally been noted feeding from the ground or other substrates (Cink 2002).

## **POPULATION SIZES AND TRENDS**

### **Search effort and basis for determining trends**

#### Breeding bird survey

The North American Breeding Bird Survey (BBS) began in 1966 with a prescribed survey protocol: during one morning in the breeding season (generally June), the observer tallies all individuals of all species noted during 50, three-minute stops separated by 0.8 km along a 39.2 km randomly generated route. The protocol requires sampling to begin one half hour before sunrise. This allows Whip-poor-wills to be tallied only during the first few of the stops, thus reducing the effective sample size to less than 10% of that for daytime-active species. Trends can, therefore, be imprecise with low counts and small samples (Dunn 2002, Sauer *et al.* 2007), and variance among years can be substantial. Nonetheless, over many BBS routes, trend results have been calculated for this species. Although BBS routes are biased toward roadsides, this is unlikely to have any influence on trend data in Whip-poor-wills, as they commonly visit edges of the little-used roads preferred to run the surveys, and it is the among-year differences that are of interest. In Canada, BBS coverage in the north is limited. This

does not, however, affect Whip-poor-will trends because the coverage approximates the northern limit of the Whip-poor-will range. Fewer routes are run in the prairies than in more heavily populated Canada, which increases the imprecision of this survey for assessing Whip-poor-will trends at the western edge of the range in Canada.

### Breeding bird atlas

Most states and provinces have embarked on breeding bird atlas projects, whereby over a period of years (usually at least five), observers spend a prescribed minimum amount of time (e.g. 20 hours) in a particular census area (10 km x 10 km squares in the Maritimes, Quebec, and Ontario, for instance) during the bird breeding season. Observers note species present, and record evidence of breeding. These projects have been helpful in ascertaining both the extent of occurrence and within that, the area of occupancy of many species. Some jurisdictions have just completed the second generation of those projects (e.g. Ontario, Vermont, New York), allowing comparison approximately 20 years later. For Whip-poor-wills, this is a relatively rich source of information.

The limitation of this method is that nocturnal birds, like the Whip-poor-will, are under-sampled compared to daytime-active birds. If, however, the same effort has been made in searching for Whip-poor-wills during the second atlas compared to the first atlas, then declines can be meaningful.

The only Canadian jurisdiction with two completed projects that allow for comparisons is Ontario, with surveys between 1981-1985 (Cadman *et al.* 1987) and 2001-2005 (Cadman *et al.* 2007). Greater than 99% of the 1890, 10 km x 10 km squares in southern Ontario were visited, and in 89% of those squares at least 20 hours of fieldwork was conducted. The amount of crepuscular or nocturnal fieldwork was not tracked, however. The method selected for considering change during the two decade period was the “probability of observation”, a measure of the likelihood that a species would be found in a survey square after 20 hours of effort. These measures were effort-adjusted because the effort in the second atlas was about 25% higher than in the first.

### Étude des populations d’oiseaux du Québec (ÉPOQ)

In Quebec, the Étude des Populations d’Oiseaux du Québec (ÉPOQ), which uses birders’ checklists, was begun in 1950 for analyzing trends (Cyr and Larivée 1993). It currently computerizes thousands of checklists annually. Despite a lack of specific protocols, trends evident in the checklist data tend to match Breeding Bird Survey trends (Dunn *et al.* 1996).

## Anecdotal evidence

Anecdotal evidence does not control for confounding factors and it does not reliably quantify patterns in space and time. If, however, there are many instances of similar but independent opinions about trends, especially if they accord with more sophisticated analyses, anecdotal evidence can be given some weight.

## **Abundance**

Partners in Flight (PIF) has a landbird population estimates database for North America ([http://www.rmbo.org/pif\\_db/laped/default.aspx](http://www.rmbo.org/pif_db/laped/default.aspx)) that includes figures for the Whip-poor-will. Population estimates for Canada suggest approximately 66,000 individuals or 3.3% of the global estimate of 2.1 million (Rich *et al.* 2004). Estimates are assigned to the provinces as follows: Ontario 30,000, Quebec 20,000, Manitoba 8,000, Saskatchewan 6,000, New Brunswick 2,000. There are no estimates for Nova Scotia. According to these estimates, even though Canada comprises about 15% of the Whip-poor-will global range, it is home to only about 3.3% of the global population.

## **Fluctuations and trends**

### Breeding bird survey

In Canada, long-term BBS data show a decline of 3.5%/yr (61 routes;  $0.05 < P < 0.1$ ; Figure 4) between 1968 and 2007. This amounts to a loss of 75% of the population over this period. In the most recent 10-year period (1997-2007), BBS data show a decline of 0.4%/year (25 routes;  $P > 0.1$ ). The latter trend information is, however, unreliable because of the combination of low sample size (25 routes) and poor detectability (0.01 birds/route). Given the unreliability of the short-term trend information, the decline for this species over three generations (i.e. 12 years) is based on the long-term rates of decline between 1968 and 2007. Based on a decline of 3.5%/year over the last 12 years, the population of Whip-poor-wills in Canada would have been reduced by 35%.

In Ontario, the only jurisdiction with sufficient data to generate a trend, long-term BBS data between 1968 and 2007 show a decline of 3.2%/year (33 routes;  $P > 0.1$ ).

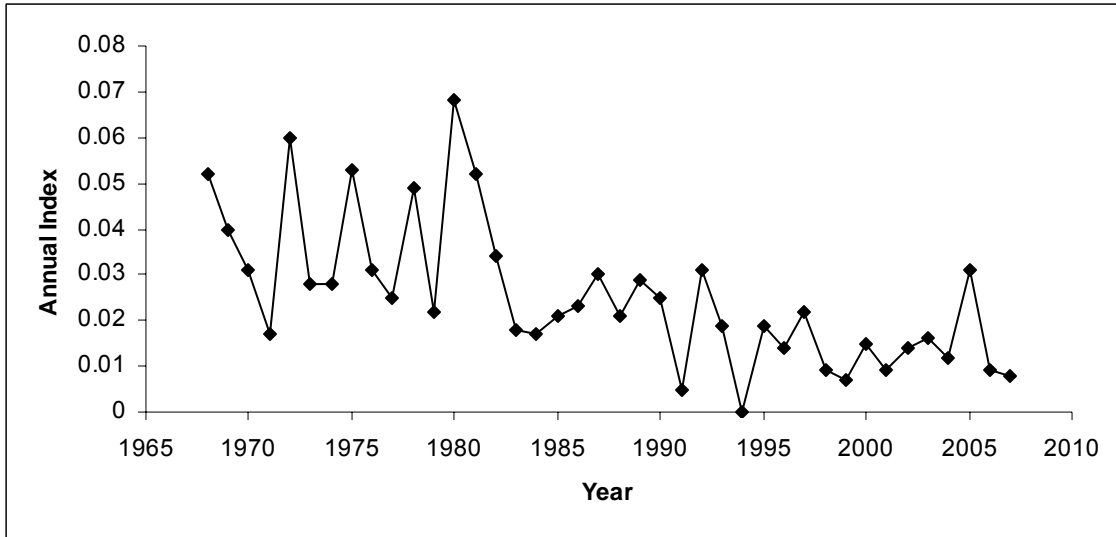


Figure 4 Whip-poor-will trend data plotted for the period 1968-2007, based on Breeding Bird Survey results from Canadian routes (n = 61 routes; 0.05<P<0.1; Downes and Collins 2007).

### Breeding bird atlas

In Ontario, based on the “probability of observation” measure, adjusted for the increased effort in the second project, the Whip-poor-will declined by 51% between atlases. This decline was evenly represented throughout the species’ geographic range in the province. For the southern shield, the Lake Simcoe-Rideau belt south of the shield, and the Carolinian zone respectively, the statistically significant declines in the probability of observation were 57%, 57%, and 54% (Mills, in Cadman *et al.* 2007). These figures suggest an approximate 30% decline in the past 12 years.

The southern Ontario map generated by atlas fieldwork (Figure 5) demonstrates that a feature of the Ontario decline in Whip-poor-wills includes a range contraction. Were it not for persistent populations near Pinery Provincial Park, Rondeau Provincial Park, and Long Point, the species is all but gone from Carolinian Canada and much of the rest of southwestern Ontario. Further north and east, other significantly sized parts of the province appear to have had Whip-poor-wills during the first atlas, but not the second, such as areas around Sudbury.

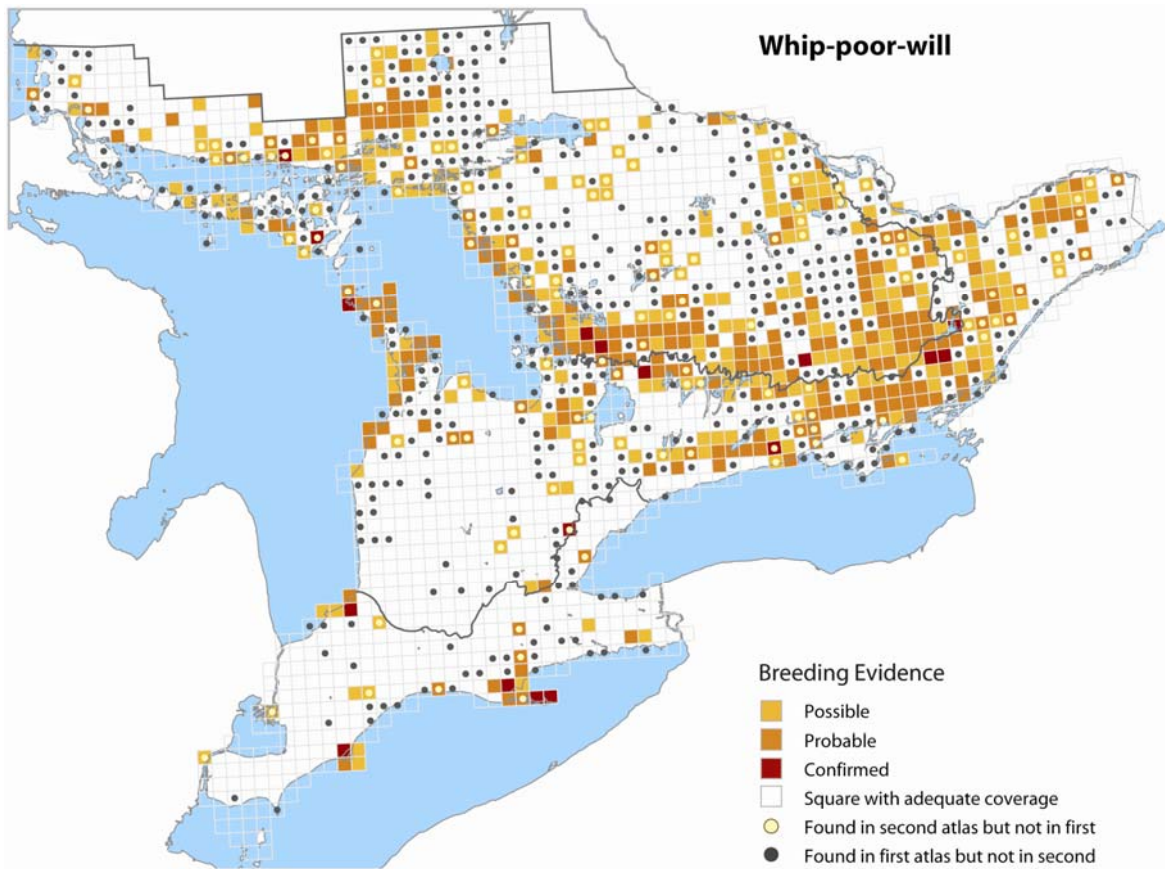


Figure 5. Whip-poor-will distribution and change in status in southern Ontario, taken with permission from Cadman *et al.* (2007). Note the much wider distribution during the first atlas project (1981-1985) than the second (2001-2005), as evidenced by the dark circles.

The Maritimes atlas has completed three of five field seasons (2006-08). During the first atlas, Whip-poor-wills were recorded in 49 squares in nine regions in New Brunswick, 12 squares in five regions in Nova Scotia, and one square in Prince Edward Island, totaling 62 squares in 15 regions (Erskine 1992). During the first three seasons of the second atlas, Whip-poor-wills have been recorded in only 10 squares in six regions in New Brunswick and in one square in Nova Scotia, totalling 11 squares in seven regions ([www.mba-aom.ca](http://www.mba-aom.ca), accessed October 2008).

#### Quebec check-list program (ÉPOQ)

Using the 37-year period, 1970-2006, for the seasonal period 15 May to 30 June (the greatest period of vocalization) for latitudes south of 47°N and west of 71°W (the main Quebec range), there has been a long-term decline in Quebec over this period, indicating a current population about half that of the 1970 value ( $r^2 = 0.25$ ,  $F = 11.5$ ,  $P = 0.002$ ) (Gilles Falardeau and François Shaffer, CWS Biologists, Quebec) (Figure 6).

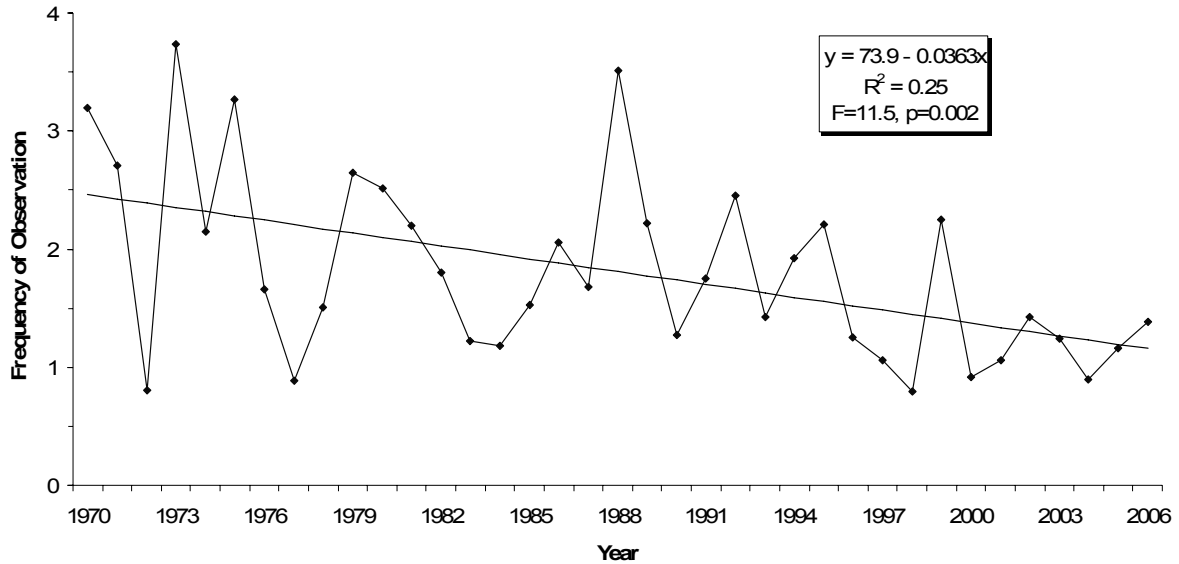


Figure 6. Annual variation in the frequency of observation of Whip-poor-wills in Quebec (1970-2006) based on a linear regression analysis of check-list data in the ÉPOQ database.

### Anecdotal evidence

Macoun and Macoun (1909) presented the then current knowledge of the distribution and status of Canadian birds, although field coverage was far from uniform. In it, there are several accounts that attest to the abundance of Whip-poor-wills in Manitoba and Ontario more than 100 years ago. Historically, densities in Quebec and the Maritime provinces appear to have been less, except perhaps locally (Macoun and Macoun 1909, Tufts 1986, Erskine 1992, Gauthier and Aubry 1996).

Until recently, most indications of changes in status, changes in range, and trends in population for Whip-poor-wills have been anecdotal. Yet collectively, those anecdotes suggest that widespread declines, and perhaps some range retraction as well, have been underway for many decades. Populations in the Maritimes appear to be too sparse to generate any consensus about historical population trends (Erskine 1992). Similarly, for most of the twentieth century, no substantial status change occurred in Quebec (Ouellet 1974, Gauthier and Aubry 1996). In Ontario, however, there is a substantial collection of regional works that have reported long-term declines and local disappearances. As early as the 1940s, local disappearances were noted: Snyder (1941), writing of Prince Edward County, commented that it was a “vanishing species...twenty-five years ago the species was observed more regularly than it is today.” Writing in the latter part of the twentieth century, numerous authors of regional works reported declines from former levels of abundance and distribution, including, for example, Simcoe County (Devitt 1967: “Formerly common throughout the county...”), Oshawa-Lake Scugog (Tozer and Richards 1974: “The bird was apparently more common here in the past”), Wellington County (Brewer 1977), and Muskoka and

Parry Sound (Mills 1981). In the heavily visited west side of Ontario's Algonquin Provincial Park, a noticeable Whip-poor-will decline began in about the 1960s, so that by the 1990s, the species had almost completely disappeared there (Rutter 1963, Tozer in prep.). In Manitoba, there was little evidence of decline during the bulk of the twentieth century (Manitoba Avian Research Committee 2003), although long-time naturalists in the area now report that in southeast Manitoba "they take a bit more effort to find than they used to" (Taylor, pers. comm. 2008). In Saskatchewan, there appears to have been an early range retraction; it was the opinion of Smith (1996) that historical data indicate that the species formerly had a wider breeding distribution in that province, extending further south.

### Summary of trends

Several lines of evidence suggest a long-term, broad-scale decline for Whip-poor-wills in Canada. Long-term BBS trends suggest a loss of 75% of the Canadian population since 1968 and short-term trends over the last three generations suggest a loss of 35% of the population. Similarly, the Ontario Breeding Bird Atlas suggests a loss of 30% of the population in the last three generations and a contraction of the range in Ontario. Long-term declines have also been recorded in Quebec and anecdotal evidence, mostly from Ontario, suggests a long-term decline that may have begun more than 50 years ago.

### **Rescue effect**

In theory, immigration of individuals from the USA is possible. Immigration is, however, likely to be limited because the species is also showing significant declines across its American range (BBS: 1966–2007:  $-2.2\%/year$ ,  $P=0.00$ ,  $n=476$  routes; Sauer *et al.* 2007) and for the eight states primarily associated with the western Great Lakes (Fish and Wildlife Service Region 3, from Ohio to Missouri to Minnesota;  $-2.10\%/year$ ,  $P=0.038$ ,  $n=143$  routes) and for 13 northeastern states (Fish and Wildlife Service Region 5, from Virginia to Pennsylvania to Maine;  $-2.94\%/year$ ,  $P=0.00$ ,  $n=148$  routes).

## **LIMITING FACTORS AND THREATS**

The causes of declines in Whip-poor-will numbers are unknown. Below, several hypothesized threats to the Whip-poor-will are discussed.

### **Habitat loss/degradation**

Habitat loss is thought to be a factor in declines of nightjars, including Whip-poor-wills (Cink 2002), although there has been no demonstration of a direct link between Whip-poor-will population decline and reductions in suitable habitat. Early to mid-successional forests, barrens and savannahs with scattered trees, aspen parkland, and open conifer plantations are likely the most important habitats for this species in Canada (Erskine 1992, Cink 2002, Mills 2007). It is difficult to quantify changes in the extent of



these habitats, however, partly because different processes can work in opposite directions, such as direct losses to urbanization and cropland countering regeneration of low quality agricultural lands (Young *et al.* 2006). Although cropland has increased in southern Canada in most of the Whip-poor-will range over the past 50 years (Statistics Canada; [www.statcan.ca/start.html](http://www.statcan.ca/start.html), accessed October 2008), there has also been a succession of abandoned farmland in more marginal areas (Cadman *et al.* 2007), following which there has been a succession of forest types, some of which have been suitable for Whip-poor-wills. Consequently, Canadian Whip-poor-will populations may be losing suitable habitat to both forest maturation and agricultural intensification (Mills 1987, Smith 1996), while gaining habitat from selective logging, through the generation of early and mid-successional woodlands.

Threats that have been shown to negatively impact European Nightjars (*Caprimulgus europaeus*) include land development near breeding sites, suggesting that the effect of urban development is more than just direct habitat loss (Liley and Clarke 2003). The experience in Great Britain with the European Nightjar suggests that habitat management can increase breeding numbers. Nightjar numbers have approximately doubled since a national survey was conducted in 1981, a trend that has been closely associated with their colonization of clear-cut areas in planted forests (Langston *et al.* 2007).

Invasive earthworms are producing dramatic changes to North American forests, including reductions in herbaceous ground cover (Hale *et al.* 2006) as well as leaf litter (Suarez *et al.* 2006). It is unknown, however, if such effects have impacted Whip-poor-wills.

### **Changes in food supply**

Another factor speculated to be involved in the decline of Whip-poor-wills is a decrease in insect availability due to pesticides (Eastman 1991), climate change and changes in water or air quality (Cadman *et al.* 2007).

### **Collisions with vehicles**

Like most nightjars, Whip-poor-wills commonly sit on gravel roads or road shoulders at night (Cink 2002), making them particularly vulnerable to automobile collisions (Jackson 2003). The relationship between the species' decline and this source of mortality has not, however, been quantified.

### **Predation**

To the list of factors implicated in Whip-poor-will declines, Hunt (2006) adds nest disturbance due to human-generated increases in populations of cats, raccoons, and other potential predators, consistent with literature that shows that declining species tend to be raccoon-vulnerable (Schmidt 2003).

## **Possible demographic changes in competitor populations**

In Maryland, atlas results suggest that Chuck-will's-widows (*Caprimulgus carolinensis*) are replacing Whip-poor-wills on the lower eastern shore ([www.mdbirds.org/birds/mdbirds](http://www.mdbirds.org/birds/mdbirds), accessed April 2008). This may be either a cause, or a response, to Whip-poor-will declines there, but Chuck-will's-widows are rare in Canada and could not be a factor here.

## **Life history effects**

Life history values for Whip-poor-wills are largely unknown, but it is clear the species at least exhibits relatively low fecundity. Low fecundity reduces the ability of a species to respond to factors that reduce populations.

## **SPECIAL SIGNIFICANCE OF THE SPECIES**

Most people's experience with this species, if any, is through its haunting song. This species has achieved a special significance for rural peoples, as well as others such as campers and cottagers. It is commonly evoked as a symbol of rural life. Accordingly, it has attained significant status in popular culture, being mentioned in countless songs, poems, books, and movies.

## **EXISTING PROTECTION OR OTHER STATUS DESIGNATIONS**

In Canada, the Whip-poor-will is protected under the *Migratory Birds Convention Act*, 1994. The species is not considered threatened or endangered globally, and is rated as "least concern" by the IUCN because of its relatively large range and population size (based on Rich *et al.* 2004).

The current sub-national rankings for Canadian jurisdictions are S3 in Saskatchewan, New Brunswick and Nova Scotia and S4 in Manitoba, Ontario, and Quebec (Canadian Endangered Species Conservation Council). In Saskatchewan, the species has been ranked S3 on the basis of its small population and restricted distribution, but with little perceived threat (C. Sutherland, pers. comm. 2008). In Manitoba, based on the impressions of long-time naturalists, the conservation status rank for the species in the Manitoba Conservation Database was upgraded from an S5 to an S4S5 in the 2004 review (K. De Smet, pers. comm. 2008).

## TECHNICAL SUMMARY

### ***Caprimulgus vociferus***

Whip-poor-will

Engoulevent bois-pourri

Range of Occurrence in Canada: Saskatchewan, Manitoba, Ontario, Quebec, New Brunswick, Nova Scotia

#### **Demographic Information**

Generation time (average age of parents in the population)	4 yrs
Estimated percent reduction total number of mature individuals over the last 3 generations. Based on long-term rate of decline from BBS surveys	35%
[Projected or suspected] percent [reduction or increase] in total number of mature individuals over the next [10 or 5 years, or 3 or 2 generations].	Unknown
[Observed, estimated, inferred, or suspected] percent [reduction or increase] in total number of mature individuals over any [10 or 5 years, or 3 or 2 generations] period, over a time period including both the past and the future.	Unknown
Are the causes of the decline clearly reversible?	No
Are the causes of the decline understood?	Not fully
Have the causes of the decline ceased?	No
[Observed, inferred, or projected] trend in number of populations	N/A
Are there extreme fluctuations in number of mature individuals?	No
Are there extreme fluctuations in number of populations?	N/A

#### **Extent and Area Information**

Estimated extent of occurrence Measured as a minimum convex polygon based on the NatureServe range map	1,845,000 km <sup>2</sup>
Observed trend in extent of occurrence	Stable
Are there extreme fluctuations in extent of occurrence?	No
Index of area of occupancy Area of occupancy based on number of breeding pairs (33,000) with an average territory size of 5 ha	> 2,000 km <sup>2</sup>  1,650 km <sup>2</sup>
Observed trend in area of occupancy Based on Ontario Breeding Bird Atlas	Decline
Are there extreme fluctuations in area of occupancy?	No
Is the total population severely fragmented?	No
Number of current locations	N/A
Trend in number of locations	N/A
Are there extreme fluctuations in number of locations?	N/A
Trend in area and/or quality of habitat	No clear trend

#### **Number of mature individuals in each population**

<b>Population</b>	<b>N Mature Individuals</b>
Total	66,000
Number of populations (locations)	N/A

#### **Quantitative Analysis**

	Ex.: % chance of extinction in 50 years
--	---

**Threats (actual or imminent, to populations or habitats)**

Hypothesized threats include:

Habitat loss/degradation because of fire suppression and forest succession

Reduced insect abundance because of pesticides

Collisions with vehicles

**Rescue Effect (immigration from an outside source)**

Status of outside population(s)?

USA: Declining

Is immigration known?

Unknown

Would immigrants be adapted to survive in Canada?

Yes

Is there sufficient habitat for immigrants in Canada?

Yes

Is rescue from outside populations likely?

No

**Current Status**

COSEWIC: Threatened (2009)

**Status and Reasons for Designation**

**Status:**

Threatened

**Alpha-numeric code:**

A2bc

**Reasons 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.

**Applicability of Criteria**

**Criterion A** (Decline in Total Number of Mature Individuals): Meets Threatened A2bc, with a reduction in population size of > 30% in the last three generations, based on an appropriate index of abundance (b) and a decline in the area of occupancy in Ontario (c).

**Criterion B** (Small Distribution Range and Decline or Fluctuation): Not applicable - Extent of Occurrence > 20,000 km<sup>2</sup> and Area of Occupancy > 2,000 km<sup>2</sup>.

**Criterion C** (Small and Declining Number of Mature Individuals): Not applicable - total population size > than 10,000.

**Criterion D** (Very Small Population or Restricted Distribution): Not applicable - population size > than 1,000 and Area of Occupancy > than 20 km<sup>2</sup>.

**Criterion E** (Quantitative Analysis): None

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## INFORMATION SOURCES

- Barrowclough, G.F., J.G. Groth, and L.A. Mertz. 2006. The RAG-1 exon in the avian order Caprimulgiformes: Phylogeny, heterozygosity, and base composition. *Molecular Phylogenetics and Evolution* 41: 238-248.
- Blancher, P.J., K.V. Rosenberg, A.O. Panjabi, B. Altman, J. Bart, C.J. Beardmore, G.S. Butcher, D. Demarest, R. Dettmers, E.H. Dunn, W. Easton, W.C. Hunter, E.E. Iñigo-Elias, D.N. Pashley, C.J. Ralph, T.D. Rich, C.M. Rustay, J.M. Ruth, and T.C. Will. 2007. Guide to the Partners in Flight Population Estimates Database. Version: North American Landbird Conservation Plan 2004. Partners in Flight Technical Series No 5. <http://www.partnersinflight.org/>
- Brewer, A.D. 1977. The birds of Wellington County. Guelph Field Naturalists' Club Special Publication, Guelph.
- Brigham, R.M.B., pers. comm. 2008. Email correspondence to Alex Mills. February 2008. Biology Professor, University of Regina. Specialist, Ecological Integrity Branch, Parks Canada.
- Bushman, E.S. and G.D. Therres. 1988. Habitat management guidelines for forest interior breeding birds of coastal Maryland. Maryland Dept. of Natural Resources, Wildlife Tech. Publ. 88-1. 50 pp.

- Butcher, G.S. and D.K. Niven. 2007. Combining data from the Christmas Bird Count and the Breeding Bird Survey to determine the continental status and trends of North American birds. Technical Report of the National Audubon Society (<http://stateofthebirds.audubon.org/cbid/content/Report.pdf>)
- Cadman, M.D., P.F.J. Eagles, and F.M. Helleiner, eds. 1987. Atlas of the Breeding Birds of Ontario. University of Waterloo Press, Waterloo, Ontario. 617 pp.
- Cadman, M.D., D.A. Sutherland, G.G. Beck, D. LePage, and A.R. Couturier, eds. 2007. Atlas of the Breeding Birds of Ontario, 2001-2005. Bird Studies Canada, Environment Canada, Ontario Field Ornithologists, Ontario Ministry of Natural Resources, and Ontario Nature, Toronto, xxii + 706 pp.
- Cink, C.L. 2002. Whip-poor-will (*Caprimulgus vociferus*). In The Birds of North America, No. 620 (A. Poole and F. Gill, eds.). The Birds of North American, Inc., Philadelphia, PA.
- Cyr, A. and J. Larivée. 1993. A checklist approach for monitoring Neotropical migrant birds: Twenty-year trends in birds of Quebec using ÉPOQ, pp. 229-237 in Finch, D.M. and P.W. Stangel, eds. Status and management of Neotropical migratory birds. Gen. Tech. Rep. RM-229. Fort Collins, CO: U. S. Department of Agriculture, Forest Service, Rocky Mountain Forest and Range Experiment Station, 422 pp.
- DeGraaf, R. M. and D. D. Rudis. 1987. New England wildlife: habitat, natural history, and distribution. United States Department of Agriculture, Forest Service, Northeastern Forest Experiment Station, Broomall, Pennsylvania. General Technical Report NE-108, 491 pp.
- De Smet, K., pers. comm. 2008. Email correspondence to Alex Mills. March 2008. Species at Risk Specialist, Manitoba Conservation.
- Devitt, O.E. 1967. Birds of Simcoe County. Brereton Field Naturalists' Club, Barrie.
- Downes, C.M. and B.T. Collins. 2007. Canadian Bird Trends Web site Version 2.2. Canadian Wildlife Service, Environment Canada, Gatineau, Quebec
- Dunn, E., J. Larivee, and A. Cyr. 1996. Can checklist programs be used to monitor populations of birds recorded during the migration season? Wilson Bulletin 108:540-549.
- Dunn, E.H. 2002. Using decline in bird populations to identify needs for conservation action. Conservation Biology 16:1632-1637.
- Eastman, J. 1991. Whip-poor-will, pp. 252-253 in Brewer, R., G.A. McPeck, and R.J. Adams Jr., eds. The Atlas of Breeding Birds of Michigan. East Lansing, MI: Michigan State University Press, East Lansing, Michigan. 594pp.
- Elderkin, M., pers. comm. 2008. Email correspondence to, and telephone conversation with, Alex Mills. March 2008. Species at Risk Biologist, Nova Scotia Department of Natural Resources.
- Erskine, A.J. 1992. Atlas of Breeding Birds of the Maritime Provinces. Nimbus Publishing Ltd., The Nova Scotia Museum, 270 pp.

- Filion, A., pers. comm. 2008. Email correspondence to Alex Mills. October 2008. Scientific and Geomatics Project Officer, CWS.
- Fisk, E.J. 1979. Fall and winter birds near Homestead, Florida. *Bird-banding* 50:224-243.
- Fitch, H.S. 1958. Home ranges, territories, and seasonal movements of vertebrates of the Natural History Reservation. *Univ. of Kansas Publ. Mus. Nt. Hist.* 11: 63-326.
- Gauthier, J. and Y. Aubry, eds. 1996. *The Breeding Birds of Quebec: Atlas of the Breeding Birds of Southern Quebec*. Province of Quebec Society for the Protection of Birds and Canadian Wildlife Service, Montreal. xviii + 1,302 pp.
- Geissler, P.H. and J.R. Sauer. 1990. Topics in route-regression analysis, pp. 54-57 in J.R. Sauer and S. Droege, eds. *Survey Designs and Statistical Methods for the estimation of Avian Population Trends*. U. S. Fish and Wildlife Service, Biological Report 90(1).
- Godfrey, W.E. 1986. *Birds of Canada*. National Museum of Natural Sciences, Ottawa, 595 pp.
- Hale, C.M., L.E. Frelich, and P.B. Reich. 2006. Changes in hardwood forest understory plant communities in response to European earthworm invasions. *Ecology* 87: 1637-1649.
- Hamel, P.B. 1992. *Land manager's guide to the birds of the South*. U.S. For. Serv. General Tech. Rep. SE-22.
- Howell, S.N.G. and S. Webb. 1995. *A guide to the birds of Mexico and northern Central America*. Oxford Univ. Press, New York.
- Hunt, P.D. 2006. *Northeast Partners in Flight Nightjar Monitoring Summary*. Audubon Society of New Hampshire, Concord.
- Jackson, H.D. 2003. A field survey to investigate why nightjars frequent roads at night. *Ostrich* 74: 97-101
- James, D.A. and J.C. Neal. 1986. *Arkansas birds: their distribution and abundance*. Univ. of Arkansas Press, Fayetteville.
- Klimkiewicz, M. K. 2008. *Longevity Records of North American Birds*. Version 2008.1. Patuxent Wildlife Research Center. Bird Banding Laboratory. Laurel MD.
- Langston, R.H.W., S.R. Wotton, G.J. Conway, L.J. Wright, J.W. Mallord, F.A. Currie, A.L. Drewitt, P.V. Grice, D.G. Hoccom, and N. Symes. 2007. Nightjar *Caprimulgus europaeus* and Woodlark *Lullula arborea*: recovering species in Britain? *Ibis* 149:250-260.
- Liley, D. and R.T. Clarke. 2003. The impact of urban development and human disturbance on the numbers of nightjar *Caprimulgus europaeus* on heathlands in Dorset, England. *Biological Conservation* 114:219-230.
- Macoun, J. and J.M. Macoun. 1909. *Catalogue of Canadian Birds*. Geol. Surv. Canada, Dept. Mines.

- Manitoba Avian Research Committee. 2003. The Birds of Manitoba. Manitoba Naturalists Society, Winnipeg, MB. viii + 504 pp.
- Medler, M.D. In press. Whip-poor-will, *Caprimulgus vociferus*, in K.J. McGowan and K. Corwin, eds. The Second Atlas of Breeding Birds in New York State. Cornell University Press, Ithaca, NY.
- Mills, A.M. 1981. A cottager's guide to the birds of Muskoka and Parry Sound. Ampersand Press, Guelph. xxiv + 209 pp.
- Mills, A.M. 1986. The influence of moonlight on the behavior of goatsuckers (*Caprimulgidae*). *Auk* 103:370-378.
- Mills, A.M. 1987. Whip-poor-will, pp. 224-225 in Cadman, M.D., P.F.J. Eagles, and F.M. Helleiner, eds. Atlas of the Breeding Birds of Ontario. University of Waterloo Press, Waterloo, Ontario. 617 pp.
- Mills, A.M. 2007. Whip-poor-will, pp. 312-313 in Cadman, M.D., D.A. Sutherland, G.G. Beck, D. LePage, and A.R. Couturier, eds. Atlas of the Breeding Birds of Ontario, 2001-2005. Bird Studies Canada, Environment Canada, Ontario Field Ornithologists, Ontario Ministry of Natural Resources, and Ontario Nature, Toronto, xxii + 706 pp.
- Nantel, P., pers. comm. 2008. Email correspondence to M. Leonard. August 2008. Species Assessment Specialist, Ecological Integrity Branch, Parks Canada.
- Ouellet, H. 1974. Les oiseaux des collines montérégiennes et de la région de la Montreal, Quebec, Canada. Musées nationaux de Canada. Musée national des sciences naturelles, Ottawa. Publication de zoologie no. 5, xi + 167 pp.
- Palmer-Ball, B.L. Jr. 1996. The Kentucky Breeding Bird Atlas. Univ. Press of Kentucky, Lexington.
- Peck, G.K. and R.D. James. 1983. Breeding birds of Ontario, nidiology and distribution, Vol. 1: nonpasserines. Royal Ontario Museum, Toronto, 321 pp.
- Reese, J.G. 1996. Whip-poor-will, pp. 194-195 in C.S. Robbins, ed. Atlas of the Breeding Birds of Maryland and the District of Columbia. Univ. of Pittsburgh Press, Pittsburgh, PA.
- Rich, T. D., C. J. Beardmore, H. Berlanga, P. J. Blancher, M. S. W. Bradstreet, G. S. Butcher, D. W. Demarest, E. H. Dunn, W. C. Hunter, E. E. Iñigo-Elias, J. A. Kennedy, A. M. Martell, A. O. Panjabi, D. N. Pashley, K. V. Rosenberg, C. M. Rustay, J. S. Wendt, T. C. Will. 2004. Partners in Flight North American Landbird Conservation Plan. Cornell Lab of Ornithology. Ithaca, NY. Partners in Flight website. [http://www.partnersinflight.org/cont\\_plan/](http://www.partnersinflight.org/cont_plan/) (VERSION: March 2005).
- Roy, L. and M. Bombardier. 1996. Whip-poor-will, pp. 626-629 in Gauthier, J. and Y. Aubry, eds. The Breeding Birds of Quebec: Atlas of the Breeding Birds of Southern Quebec. Province of Quebec Society for the Protection of Birds and Canadian Wildlife Service, Montreal. xviii + 1,302 pp.
- Rutter, R.J. 1963. Bird records summary cards. Algonquin Park Museum files.



- Sauer, J. R., J. E. Hines, and J. Fallon. 2007. The North American Breeding Bird Survey, Results and Analysis 1966 - 2006. Version 10.13.2007. USGS Patuxent Wildlife Research Center, Laurel, MD.
- Schmidt, K.A. 2003. Nest predation and population declines in Illinois songbirds: a case for mesopredator effects. *Conservation Biology* 17:1141-1150.
- Shaffer, F., pers. comm. 2008. Email correspondence to Alex Mills. March 2008. Species at Risk Biologist, CWS.
- Smith, A.R. 1996. Atlas of Saskatchewan birds. Canadian Wildlife Service, Natural History Society, Regina, 456 pp.
- Snyder, L.L. 1941. A faunal investigation of Prince Edward County (The Birds of Prince Edward County). University of Toronto Studies, Biol. Ser. 48. pp 25-92.
- Staav, R. and T. Fransson. 2006. EURING list of longevity records for European birds ([http://www.euring.org/data\\_and\\_codes/longevity.htm](http://www.euring.org/data_and_codes/longevity.htm)).
- Suarez, E.R., T.J. Fahey, J.B. Yavitt, P.M. Groffman, and P.J. Bohlen. 2006. Patterns of litter disappearance in a northern hardwood forest invaded by exotic earthworms. *Ecological Applications* 16: 154-165.
- Sutherland, C., pers. comm. 2008. Email correspondence to Alex Mills. April 2008. Endangered Species Data Technician, Saskatchewan Conservation Data Centre.
- Taylor, P. and G.E. Holland. 2003. Whip-poor-will, p. 239 in Manitoba Avian Research Committee. The Birds of Manitoba. Manitoba Naturalists Society, Winnipeg, MB. viii + 504 pp.
- Taylor, P., pers. comm. 2008. Email correspondence to Alex Mills. April 2008. Manitoba naturalist.
- Toner, M., pers. comm. 2008. Email correspondence to Alex Mills. April 2008. New Brunswick Department of Natural Resources.
- Tozer, R.G. and J.M. Richards. 1974. Birds of the Oshawa-Lake Scugog region, Ontario. R.G. Tozer & J.M. Richards, Oshawa.
- Tozer, R.G. In prep. The Birds of Algonquin Park.
- Tufts, R.W. 1986. Birds of Nova Scotia. Third Edition. Nimbus Publ. and the Nova Scotia Museum. Halifax, NS. 478 pp.
- Walley, B., pers. comm. 2008. Telephone conversation with Alex Mills, March 2008. Manitoba naturalist.
- Wilson, M.D. 2003. Distribution, abundance, and home range of the Whip-poor-will (*Caprimulgus vociferus*) in a managed forest landscape. MS. Thesis. College of William and Mary, Williamsburg, VA.
- Wilson, M.D. and B.D. Watts. 2008. Landscape configuration effects on distribution and abundance of Whip-poor-wills. WJO in press.
- Wilson, S.G. 1985. Summer distribution of Whip-poor-wills in Minnesota. *Loon* 57:6-8.

Young, J.E., G.A. Sanchez-Azofeifa, S.J. Hannon, and R. Chapman. 2006. Trends in land cover change and isolation of protected areas at the interface of the southern boreal mixedwood and aspen parkland in Alberta, Canada. *Forest Ecology and Management* 230: 151-161.

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Alexander Mills completed an M.Sc. at Carleton University in 1985 based on field research analyzing the influence of moonlight on the behaviour of breeding Whip-poor-wills. He completed a Ph.D. at the University of Toronto in 2006 based on field research considering seasonal changes on the structure of bird communities. He has worked as an interpretive naturalist at Algonquin Provincial Park in Ontario and Jasper National Park in Alberta. He was a Regional Coordinator for the first Ontario breeding bird atlas project, and was a field surveyor for the first Alberta atlas and the second Ontario one. He has been an Assistant Professor teaching undergraduate biology at Cape Breton University and the University of Windsor. He is currently doing post-doctoral research at Acadia University and Bird Studies Canada.