

COSEWIC
Assessment and Status Report

on the

Henslow's Sparrow
Ammodramus henslowii

in Canada



ENDANGERED
2011

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 – May 2011

Common name

Henslow's Sparrow

Scientific name

Ammodramus henslowii

Status

Endangered

Reason for designation

In Canada, this species occurs sporadically in Ontario and Quebec. Its Canadian population is extremely small, ranging from 0 to 25 individuals depending on the year. Populations in adjacent parts of the U.S., which are a likely source of birds for Canada, are declining. Habitat loss is ongoing for this species.

Occurrence

Ontario, Quebec

Status history

Designated Threatened in April 1984. Status re-examined and designated Endangered in April 1993. Status re-examined and confirmed in November 2000 and May 2011.



COSEWIC Executive Summary

Henslow's Sparrow *Ammodramus henslowii*

Wildlife species description and significance

The Henslow's Sparrow is a small short-tailed sparrow (13 cm, 10-15 g) distinguished by its relatively large, flat-topped head with olive-green colouring, chestnut-coloured wings and back, and lightly streaked pale breast. The Henslow's Sparrow is considered an indicator species for the state of grassland habitats, including native prairies and surrogate agricultural grasslands in southern Ontario and in the eastern and central United States.

Distribution

In Canada, the Henslow's Sparrow historically bred locally in the Mixedwoods Plain ecozone in southern Ontario and extreme southwestern Quebec. It now occurs sporadically at scattered locations within this breeding range. The global breeding range extends from Minnesota east to New York, southwest to Oklahoma, and southeast to Tennessee. This short-distance migrant winters in the southeastern United States.

Habitat

The Henslow's Sparrow is an area-sensitive grassland obligate; it requires grassland habitat and occurs more frequently and at higher densities in large patches of suitable habitat. Before European settlement, the Henslow's Sparrow in North America presumably nested in tallgrass prairie, wet meadow, and marsh habitats. Following settlement, this species adapted to breeding in surrogate grassland habitats including agricultural grasslands and grasslands on reclaimed surface mines. In Ontario, Henslow's Sparrow colonies have been located in abandoned fields, lightly grazed pasture, and wet meadows.

Wintering Henslow's Sparrows are mostly associated with Longleaf Pine savannas, a fire-dependent habitat. This species has also been observed in winter in other habitats such as grassy swales, marsh borders, utility line rights-of-way, roadsides, unmowed fields, and saline prairie.

Biology

The Henslow's Sparrow forages on the ground, feeding on insects and seeds. Territorial males sing frequently throughout their lengthy breeding season, from early May through August. The distinctive song is described as a simple, quiet *tse-zlik*. Breeding territories are small and often clustered in loose colonies. Nests are built on the ground at the base of thick grass clumps and females typically lay 4 eggs. Pairs may raise two or more broods per year.

Although this small songbird can live for at least 6 years, the average age of breeding adults is likely about 2 to 3 years. It shows low site fidelity and rarely returns to the same breeding or wintering location, making it hard to monitor.

Population sizes and trends

The Henslow's Sparrow population in Canada is small and birds are sighted only sporadically during the breeding season. Over the past 10 years there have been a total of 19 reports of this species in the breeding season in Ontario and Quebec. The number of birds currently breeding or attempting to breed in Canada in a given year likely ranges from 0 to 25 individuals.

Immigration from the United States is considered essential to maintaining or recovering the Canadian population. Although the Henslow's Sparrow population in the United States has rebounded from an estimated 80,000 birds in the 1990s, to approximately 400,000 birds in recent years, populations in the northern states adjacent to the Canadian range are continuing to decline. Thus, rescue from the United States is likely to be limited.

Threats and limiting factors

Habitat loss on the breeding grounds is the primary threat to the Henslow's Sparrow in Canada and the United States. The decline of the Henslow's Sparrow in Canada appears to track the loss of infrequently disturbed agricultural grasslands and old-field habitats. Recent population increases in some parts of the United States are attributed to the creation of suitable breeding habitat through farmland retirement under the Conservation Reserve Program.

Protection, status, and ranks

The Henslow's Sparrow is protected under the *Migratory Birds Convention Act* in Canada and the United States. It is listed as Endangered under the *Species at Risk Act* in Canada and the *Endangered Species Act* in Ontario. In the United States, this species is on the national list of Birds of Conservation Concern and is listed as Endangered or Threatened in 13 states, including the four states abutting the Canadian range. Globally, this species is classified as Near Threatened and ranked as apparently secure (G4). It is identified as a priority species of conservation concern in many bird and wildlife conservation plans.

TECHNICAL SUMMARY

Ammodramus henslowii

Henslow's Sparrow

Bruant de Henslow

Range of occurrence in Canada: Ontario, Quebec

Demographic Information

Generation time (average age of parents in the population)	2-3 yrs
Is there an [observed, inferred, or projected] continuing decline in number of mature individuals? <i>Ontario Breeding Bird Atlas results indicate an 80% decline in distribution between 1981-85 and 2001-05.</i>	Likely
Estimated percent of continuing decline in total number of mature individuals within [5 years or 2 generations]	Unknown
[Observed, estimated, inferred, or suspected] percent reduction in total number of mature individuals over the last [10 years or 3 generations].	Unknown
[Projected or suspected] percent [reduction or increase] in total number of mature individuals over the next [10 years or 3 generations].	Unknown
[Observed, estimated, inferred or suspected] percent [reduction or increase] in total number of mature individuals over any [10 years or 3 generations] period, over a time period including both the past and the future.	Unknown
Are the causes of the decline clearly reversible and understood and ceased? <i>Understood but continued habitat loss and degradation.</i>	No
Are there extreme fluctuations in number of mature individuals?	No

Extent and Occupancy Information

Estimated extent of occurrence	110,300 km ²
Index of area of occupancy (IAO) <i>0-2 known sites/year, <25 sites over 10-year period</i>	<100 km ²
Is the total population severely fragmented?	No
Number of "locations"	Unknown
Is there an [observed, inferred, or projected] continuing decline in extent of occurrence?	No
Is there an [observed, inferred, or projected] continuing decline in index of area of occupancy? <i>Ontario Breeding Bird Atlas results indicate a decline</i>	Yes
Is there an [observed, inferred, or projected] continuing decline in number of populations? <i>Likely a single population</i>	N/A
Is there an [observed, inferred, or projected] continuing decline in number of locations?	Unknown
Is there an [observed, inferred, or projected] continuing decline in [area, extent and/or quality] of habitat? <i>Yes, ongoing decline in extent of agricultural grasslands, loss and degradation of habitat at historic sites, no specific habitat restoration efforts</i>	Yes
Are there extreme fluctuations in number of populations? <i>Likely a single population</i>	N/A
Are there extreme fluctuations in number of locations?	Unlikely
Are there extreme fluctuations in extent of occurrence?	No
Are there extreme fluctuations in index of area of occupancy?	No

Number of Mature Individuals (in each population)

Population	N Mature Individuals
Total	0-25 individuals

Quantitative Analysis

Probability of extinction in the wild. <i>Not available.</i>	None available
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Threats (actual or imminent, to populations or habitats)

Habitat loss due to ongoing decline in amount of infrequently disturbed agricultural grasslands (lightly grazed pasture and summer fallow).

Rescue Effect (immigration from outside Canada)

Status of outside population(s)? <i>Increasing in core range in north-central United States but decreasing in areas adjacent to Canadian range.</i>	
Is immigration known or possible?	Yes
Would immigrants be adapted to survive in Canada?	Yes
Is there sufficient habitat for immigrants in Canada? <i>Some areas of suitable habitat identified in 2007-08 surveys, but limited availability.</i>	Yes, but declining
Is rescue from outside populations likely?	Yes, but limited because in adjacent states birds are declining

Current Status

COSEWIC: Endangered (May 2011)

Status and Reasons for Designation

Status: Endangered	Alpha-numeric code: C2a(i,ii); D1
Reasons for designation: In Canada, this species occurs sporadically in Ontario and Quebec. Its Canadian population is extremely small, ranging from 0 to 25 individuals depending on the year. Populations in adjacent parts of the U.S., which are a likely source of birds for Canada, are declining. Habitat loss is ongoing for this species.	

Applicability of Criteria

Criterion A (Decline in Total Number of Mature Individuals): Does not meet criterion. No information on declines in population abundance.
Criterion B (Small Distribution Range and Decline or Fluctuation): Does not meet criterion. EO is > than thresholds. IAO is < 500 km ² , but number of locations is unknown, and there is no evidence for severe fragmentation or extreme fluctuations in EO, IAO, populations or number of mature individuals.
Criterion C (Small and Declining Number of Mature Individuals): Meets Endangered C2a(i,ii) because the total number of mature individuals is < 2500 and a decline is inferred from continuing declines in habitat quality; and no population is estimated to contain > 250 individuals and one population has ≥ 95% of all mature individuals.
Criterion D (Very Small or Restricted Total Population): Meets Endangered D1 because the population is estimated to have < 250 mature individuals.
Criterion E (Quantitative Analysis): None conducted

PREFACE

The status of the Henslow's Sparrow in Canada has not improved since the 2000 assessment. New information is available from the Ontario Breeding Bird Atlas (2001-05), habitat assessments at historic occurrences in 2002 and 2007-08, and ongoing casual observations. There have been no confirmed breeding records in Canada for more than 20 years. This migratory species does, however, continue to occur sporadically in areas of suitable habitat within its historic breeding range in Canada.



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 (2011)

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.

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Henslow's Sparrow *Ammodramus henslowii*

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2011

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WILDLIFE SPECIES DESCRIPTION AND SIGNIFICANCE

Name and classification

Scientific Name: *Ammodramus henslowi* (Audubon 1829)

English Name: Henslow's Sparrow

French Name: Bruant de Henslow

Class: Aves

Order: Passeriformes

Family: Emberizidae

Genus: *Ammodramus*

Species: *Ammodramus henslowii*

Classification follows the American Ornithologist Union (AOU 1998, 2009). Of the two generally recognized subspecies, only the nominate *A. h. henslowii* occurs in Canada (Knapton 1984a; James 1991). Recognition of intraspecific taxa in the Henslow's Sparrow remains disputed, and the taxonomic validity and continued existence of an Atlantic slope race (ssp. *susurrans*) remains undetermined (Herkert *et al.* 2002).

This species is currently classified as one of nine species in the New World genus *Ammodramus*. This genus may not be monophyletic (Zink and Avise 1990; AOU 1998; NatureServe 2009). This species was formerly placed in the genus *Passerherbulus* (AOU 1998).

Morphological description

The Henslow's Sparrow is a small short-tailed sparrow (13 cm, 10-15 g) distinguished by its relatively large, flat-topped head with olive-green colouring on the top, sides and nape and two dark stripes on either side of a pale median stripe. The feathers on the wings, back, and tail are chestnut with black centres, contrasting with the lightly streaked, pale buffy breast and plain whitish underparts. The tail feathers are narrow and pointed. Males and females look similar. Young birds lack the streaking on the breast.

Population spatial structure and variability

There is no evidence of spatial structuring within the Canadian population, which belongs to the primarily Midwestern, nominate subspecies *A. h. henslowii*, whose range extends east into West Virginia (Knapton 1984a; Rising 1996; Pyle 1997). The breeding range of the eastern race, *A. h. susurrans*, is limited to Atlantic coastal states, possibly extending as far west as central New York (Pyle 1997; Herkert *et al.* 2002).

The small Canadian population is contiguous with larger populations of *A. h. henslowii* in the northern United States including Michigan, Ohio, Pennsylvania, and New York. The lower Great Lakes do not pose a significant geographic barrier to this migratory species.

Overall geographic variation in morphology in this species is considered moderate, but obscured by individual variation (Pyle 1997; Herkert *et al.* 2002). Measures of intra-specific genetic variation within this species and genus are relatively low (Zink and Avise 1990).

Biochemical and genetic evidence suggests that Henslow's and Baird's (*A. bairdii*) sparrows are a relatively old sister-species pair (Zink and Avise 1990). Skeletal analysis supported this relationship (Webster and Webster 1999). A multi-character phylogenetic analysis suggested that Henslow's and LeConte's (*A. lecontei*) sparrows might be closely related but further work is needed to establish intrageneric relationships (Patten and Fugate 1998).

Designatable units

Only one subspecies is found in Canada and it is restricted to one ecozone and there are no other distinctions that would warrant consideration of designatable units below the species level. The report is, therefore, based on a single designatable unit.

Special significance

The Henslow's Sparrow is considered an indicator species for the state of grassland habitats, including native prairies and surrogate agricultural grasslands in southern Ontario and in the eastern and central United States. Population declines and range contraction in this habitat specialist were noted in eastern North America by the 1960s, preceding the general decline in North American grassland birds by at least a decade. Due to long-term declines and range-wide habitat threats, the Henslow's Sparrow has been identified as a species of high conservation concern at all scales, from global to local (see **Protection, Status and Ranks** section of this report for details). It has been identified as a "focal species for conservation action" and a "Bird of Management Concern" by the U.S. Fish and Wildlife Service (United States Fish and Wildlife Service (USFWS) 2005, 2008; Cooper 2009).

DISTRIBUTION

Global range

The current breeding range of the Henslow's Sparrow is centred in the north-central United States and extends from Minnesota east to New York, southwest to Oklahoma, and southeast to Tennessee (Figure 1). There is also an isolated breeding population in North Carolina (not shown in Figure 1; Pruitt 1996; Cooper 2009). The total global breeding range is approximately 1,100,000 km² (derived from Ridgeley *et al.* 2007).

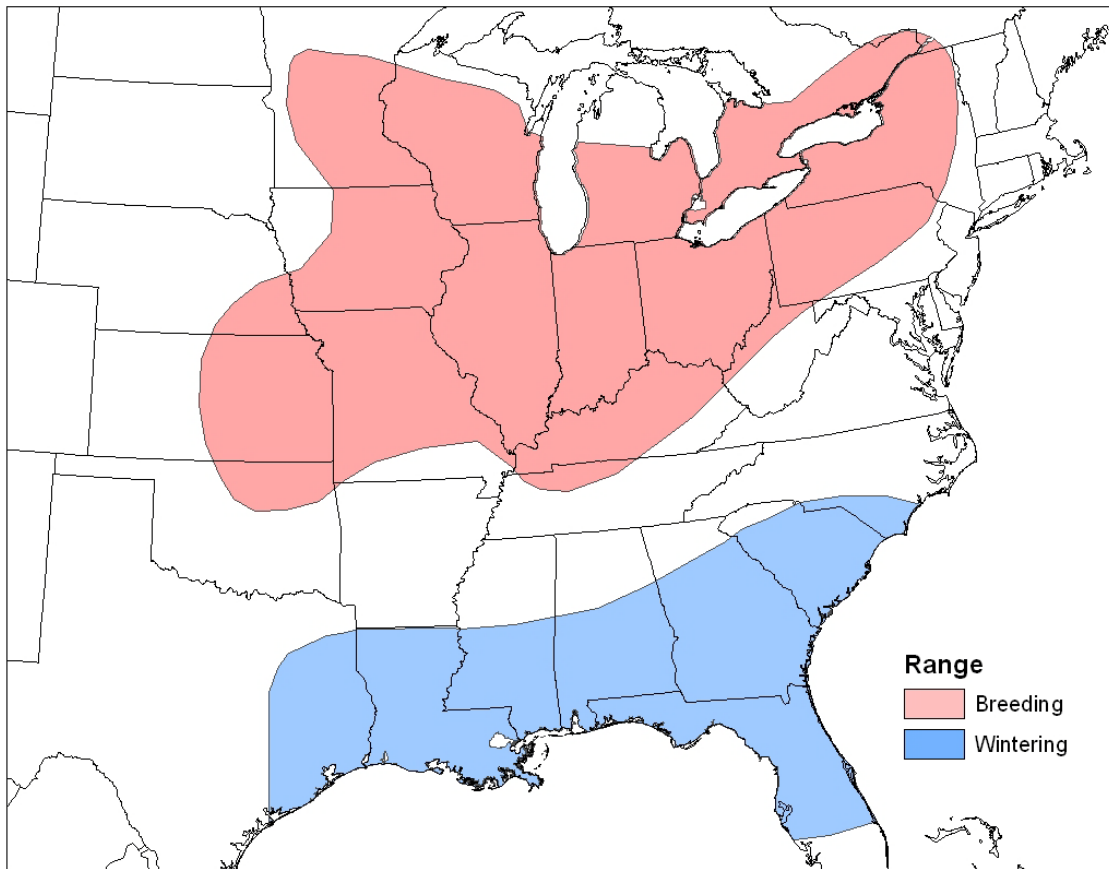


Figure 1. General breeding and wintering distribution of the Henslow's Sparrow. Populations are local and variable in many regions and some small disjunct occurrences are not shown (e.g., North Carolina breeding population). Map based on Herkert *et al.* (2002) and recent analysis of breeding and wintering records from multiple sources. [Reproduced with permission from Cooper 2009.]

The breeding range of the Henslow's Sparrow is difficult to delineate precisely because it is a relatively inconspicuous and uncommon species and occurs only locally and sporadically within its range. Moreover, the breeding distribution of this species has expanded and contracted over the past century or more in response to ongoing changes in habitat availability (Herkert *et al.* 2002). Consequently, there are marked differences in the range maps shown in various publications (e.g., Knapton 1984a, Austen and Cadman 1993; Pruitt 1996; Rising 1996; Herkert *et al.* 2002; Ridgeley *et al.* 2007; Cooper 2009).

Historically, this species is presumed to have had two centres of distribution: one in the tallgrass prairies of the Midwestern United States and the other in the coastal marshes of the eastern United States (Herkert *et al.* 2002). Following European settlement, the two breeding populations merged as the species expanded into newly cleared agricultural grasslands. In most areas of eastern North America, the maximum breeding extent occurred during the 1950s or 1960s, after which the species experienced a widespread range contraction (Pruitt 1996; Herkert *et al.* 2002). The Henslow's Sparrow is now considered rare or extirpated in much of the north-eastern portion of its former breeding range, including the New England states and coastal populations in the mid-Atlantic states (Pruitt 1996; Cooper 2009). An isolated breeding population in Texas is now considered extirpated (Cooper 2009). In 1983 a new breeding population was discovered in disturbed habitats in the Coastal Plain of North Carolina (Lynch and LeGrand 1985; Pruitt 1996; Cooper 2009). Local range expansions were reported in the western and southern part of the breeding range starting in the late 1980s (Pruitt 1996; Cooper 2009).

The wintering range is restricted to the southeastern United States including coastal states from North Carolina south to peninsular Florida and west to southeastern Texas, and north at least to southern Arkansas (Herkert *et al.* 2002). The extent of the wintering range of this secretive species is not precisely known but is approximately 660,000 km² (Figure 1, derived from Ridgeley *et al.* 2007).

Canadian range

The Canadian breeding distribution is restricted to the Mixedwood Plain ecozone in southern Ontario and southwestern Quebec. During the past decade (2000-09), there have been a total of 19 breeding season records from scattered locations across the historic breeding range (Table 1, Figure 2). The map does not include an extra-limital record of a singing Henslow's Sparrow observed at Paskwachi Point, Ontario in the James Bay lowland in July 2009. The total area of the Canadian range is about 80,000 km², or 8% of the global range (calculation based on Ridgeley *et al.* 2007).

Table 1. Henslow's Sparrow breeding season records in Canada, 2000-2009.

County/Regional Municipality	Locality	Year	Breeding Evidence	Source
Halton	Milton, ON	2000	S	OBRC
Halton	Bronte Creek PP, ON	2000	T	OBRC
Halton	Acton, ON	2001	T ¹	OBBA2
Bruce	Bruce Peninsula, ON	2002	S	OBBA2
Grey	Badjeros, ON	2002	T	OBBA2
Niagara	Port Colborne, ON	2002	S	OBBA2
Lambton	Walpole, ON	2003	H	OBBA2
Grey	Meaford, ON	2004	S	OBBA2
Chatham-Kent	Dealtown, ON	2005	P	OBBA2, NHIC
Norfolk	Walsingham, ON	2005	S	OBBA2
Simcoe	Cannington, ON	2005	S	OBBA2
Bruce	North Bruce, ON	2006	T	OBRC
Kawartha Lakes (Victoria)	Carden/Kirkfield, ON	2006	S	OBRC
Montréal	Huntingdon, QC	2006	T	OdQ
Montréal	Powerscourt, Elgin, Montée Jamieson	2006	<u>BP</u>	<u>ÉPOQ</u>
Montréal	<u>Bromont</u>	<u>2006</u>		<u>ÉPOQ</u>
Kawartha Lakes (Victoria)	Carden/Kirkfield, ON	2007	S	OBRC
Bruce	Neyaashiinigmiing (Cape Croker) I.R., ON	2009	S	NHIC
Kawartha Lakes (Victoria)	Carden Alvar PP, ON	2009	T ²	Other

¹ Up to 4 birds. ² Two birds present for several weeks, appeared to be a nesting pair (no nest search conducted).

Breeding Evidence codes: S – singing male; T – territorial behavior; P – pair, BP – Breeding probable.

Sources: OBRC – Ontario Birds Reporting Committee, OBBA2 – Ontario Breeding Bird Atlas, 2001-05,

OdQ – Oiseaux du Québec 2009, NHIC – Natural Heritage Information Centre 2009, ÉPOQ – Étude des Populations des Oiseaux du Québec, Other – B. Wilson pers. comm. 2010; K. Tuininga pers. comm. 2010.

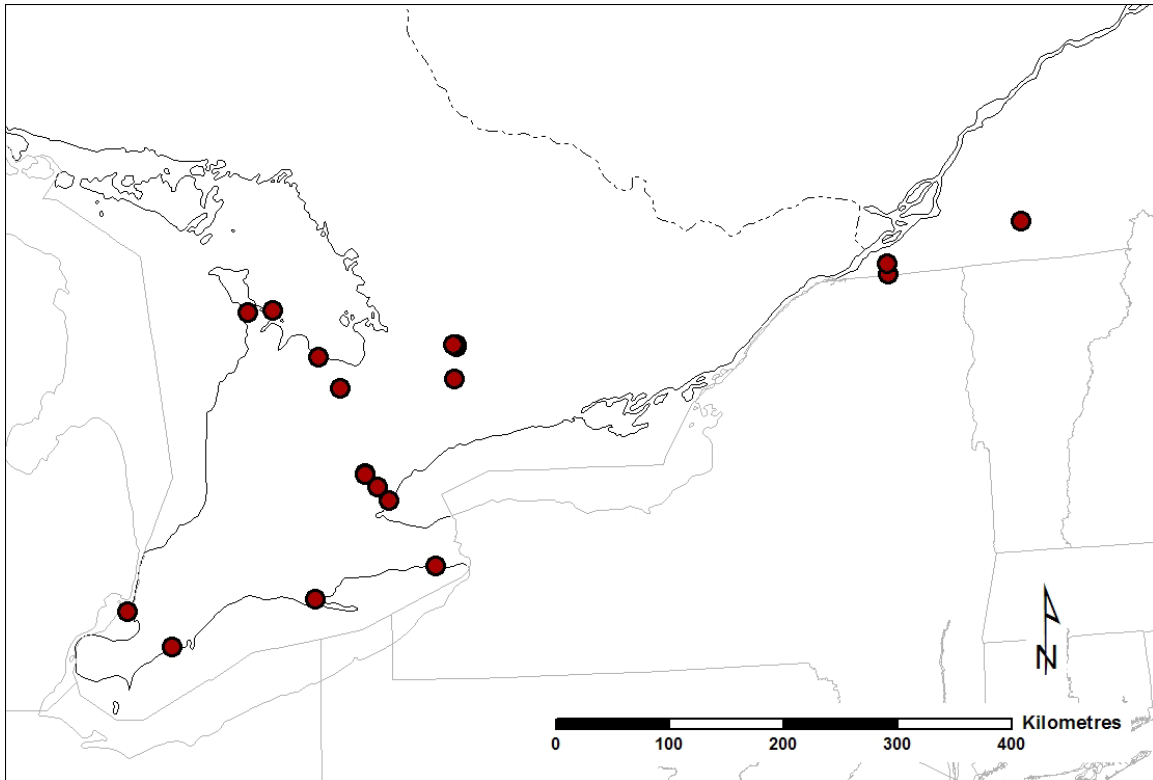


Figure 2. Locations of recent breeding season records, 2000-09, for Henslow's Sparrow in Canada.

There have been marked temporal changes in the distribution of the Henslow's Sparrow in Canada, as described in previous status reports and species accounts (Knapton 1984a,b, 1987; Austen and Cadman 1993; Austen 1994; Austen *et al.* 1994; Bannon 1996; James 2000; Tuininga 2007).

This inconspicuous sparrow was first reported in Canada in 1898, when it was found at two sites in extreme southwestern Ontario and at one site in eastern Ontario (Macoun and Macoun 1909). There is uncertainty as to the historic distribution of this species in Canada but it is possible that the Henslow's Sparrow was breeding unnoticed in native tallgrass prairie habitats in extreme southwestern Ontario before these early reports (Knapton 1984b, 1987; James 2000). By the early 1900s it was breeding regularly in Essex and Lambton Counties. During the first half of the 20th century its range gradually expanded northward and eastward across southern Ontario and into southern Quebec.

The earliest record from Quebec was in 1943 and there is one nest record from 1947 (David 1996). The Henslow's Sparrow was not considered a regular breeder in Quebec.

The historic status of this species in adjacent jurisdictions in the United States is also enigmatic. In Michigan, Henslow's Sparrow was first reported by the early 1900s, but was considered uncommon (Currier 2001). In Ohio, it was first reported in 1872 but was not observed regularly until 1920 (Peterjohn and Rice 1991). In New York, this species was first reported in 1844 on Long Island and was considered "undoubtedly uncommon prior to European settlement, although it may well have nested in the native coastal grasslands on Long Island" (McGowan 2008).

At its maximum extent in Canada during the 1950s and 1960s, this species only occurred very locally and it never occupied all parts of its range simultaneously (Knapton 1984b). By the 1970s, it had largely disappeared from Quebec and it was absent from much of its former range in Ontario.

The extent of the current breeding range is difficult to define as there have been no regularly occupied sites or core breeding areas for Henslow's Sparrow in Canada for about 20 years (Knapton 1987; Bannon 1996; James 2000; Environment Canada 2010). Nonetheless, the species continues to be reported sporadically within its former Canadian range (Tuininga 2007; Crins 2007; Richards 2008; K. Tuininga pers. comm. 2010; B. Wilson pers. comm. 2010). The extent of occurrence (EO) using a minimum convex polygon is estimated to be 110,300 km²

The area of occupancy is estimated by extrapolating from the small number of sites reported over the past 10 years. Based on the 19 known breeding season records (no confirmed breeding records), it seems likely that fewer than 25 sites have been occupied in at least one year over the past 10 years. Therefore, the index of area of occupancy is inferred to be less than 100 km². Given an average territory size of about 1 ha, the biological area of occupancy over the past decade is less than 1 km².

Search effort

Information on the historic and current breeding distribution of the Henslow's Sparrow in Canada has been gathered through the efforts of volunteer and professional field biologists participating in breeding bird atlases, conducting targeted searches of known locations and suitable habitat, and documenting observations of rare birds (see **Sampling effort and methods** section for details).

HABITAT

Habitat requirements

The Henslow's Sparrow is a grassland-obligate bird that exhibits high habitat specificity on the breeding and wintering grounds. It is also considered an area-sensitive species, occurring more frequently and at higher densities in larger habitat patches (Ribic *et al.* 2009).

Breeding habitat

Before European settlement, the Henslow's Sparrow in North America presumably nested in tallgrass prairie, wet meadow, and coastal marsh habitats. As prairies and forests in eastern North America were converted to agriculture in the 19th century, this species adapted to nesting in agricultural grasslands. During the 20th century, Henslow's Sparrows colonized other newly created surrogate grassland habitats including grasslands on reclaimed surface mines, grassland cover on retired agricultural lands, and forb-grassland in regenerating clearcuts in North Carolina.

In Ontario, Henslow's Sparrow colonies have been located in abandoned fields, ungrazed and lightly grazed pasture, fallow hayfields with high clover and alfalfa content, grassy swales in open farmland, wet meadows, and infrequently mowed fields (Cuddy 1984). Some of the more recent reports from southwestern Ontario have been in native tallgrass prairie remnants or restorations (Tuininga 2007).

Key elements of the breeding habitat, as identified in studies from the United States and Ontario and summarized in the National Recovery Strategy are described below (Environment Canada 2010). These habitat elements may be particularly important at low population densities (Cooper 2009).

Large areas of grassland

Large tracts of grassland, in excess of 30 ha and preferably greater than 100 ha, may be required for birds to establish and maintain active colonies when regional population densities are low.

Tall dense grass cover

The vegetation at breeding sites is typically over 30 cm tall, has a high percentage of ground cover, and a high to moderate density of grasses and sedges.

Thick thatch layer

The ground layer generally has a thick mat of dead plant material from previous years' vegetation.

Lack of emergent woody vegetation

The Henslow's Sparrow appears to avoid sites with emergent shrubs, trees, or fence lines, and to prefer open sites.

Low-lying wet areas

Areas of standing water or low-lying areas that are wet in the spring appear to be an important habitat factor in Ontario and other parts of the breeding range.

Periodic disturbance is necessary to maintain suitable habitat for this species (Herkert 2003). Research in the US portion of the species' breeding range found that Henslow's Sparrows generally avoid areas that have been recently disturbed by burning, mowing, or grazing and that occupancy increases 1 to 3 years following disturbance once the required habitat structure has recovered (Herkert 2003). Habitat management activities should be implemented on a rotational schedule to maintain sufficient areas of suitable habitat.

Migration habitat

This species is difficult to detect during migration (especially in the fall), but it has been observed in a variety of grassland habitats, and also in shrubby areas and hedgerows adjacent to open areas (Herkert *et al.* 2002). Information on migration habitat requirements and trends is not available.

Wintering habitat

The largest wintering Henslow's Sparrow populations occur in coastal Longleaf Pine (*Pinus palustris*) savannas that have a dense graminoid ground cover, and in associated Pitcher Plant (*Sarracenia sp.*) bogs (Herkert *et al.* 2002; Cooper 2009). Fire is critical to creating suitable wintering habitat conditions (vegetation structure and seed availability), with bird abundance peaking in the winter following burning and then rapidly declining in subsequent winters (Cooper 2007; 2009; Johnson *et al.* 2009). This species has also been observed in winter in other habitats such as grassy swales, marsh borders, managed utility line corridors, roadsides, and unmowed fields but the viability of birds in these other habitats has not been studied (Pruitt 1996; Cooper 2007, 2009). Recently, the Henslow's Sparrow has been found wintering in saline prairie (salt barrens) in southern Arkansas at densities similar to those found in Longleaf Pine savannas (Cooper 2009).

Habitat trends

Trends in breeding habitat in Canada

Regardless of whether this species was breeding in natural prairie habitats in southwestern Ontario before the 20th century, it was the availability of agricultural grassland habitats that enabled Henslow's Sparrow to spread across southern Ontario and into southwestern Quebec during the first half of the 20th century. Similarly, the decline in the amount of suitable agricultural grassland habitat has been widely identified as the most probable cause of the decline of this species in Canada and the United States in the latter half of the 20th century (Knapton 1984a; Pruitt 1996; Austen *et al.* 1997; Cooper 2009; Environment Canada 2010).

Information from the Census of Agriculture shows that the extent of agricultural grassland in Ontario and Quebec has been declining for more than 50 years (Statistics Canada 2009). The most important agricultural land categories with regards to potential Henslow's Sparrow breeding habitat are summerfallow (land that is not cropped for at least one year), natural pasture, and improved pasture (seeded and tame pasture). In 2006, a total of 315,000 ha in Ontario was included in these three categories, and has shown a decline of 14% since 1996 and 61% since 1976. Comparable data from Quebec show steeper short- and long-term declines of 26% and 69%, respectively, with only 152,000 ha of pasture and summerfallow land reported in 2006. Analyses of satellite data from the Mixedwoods Plains ecozone in Quebec also show a decrease in agricultural grassland land cover, primarily due to a shift from perennial to annual crops (Jobin *et al.* 2010).

Territorial Henslow's Sparrows have also been found in hay and fodder croplands in Ontario and Quebec, although hayfields are not generally considered suitable breeding habitat as they are cut too frequently and lack the required vegetation structure. The total acreage of hay and fodder crops in these provinces is relatively extensive (more than 1,000,000 ha in Ontario and 850,000 ha in Quebec as of the 2006 Census of Agriculture) and has been fairly stable for several decades (Statistics Canada 2009).

Due to this species' very specific habitat requirements (see **Breeding habitat** description above), especially the requirement for habitat patches in excess of 30 ha, only a very small proportion of agricultural grassland habitat is potentially suitable for the Henslow's Sparrow. Existing native prairie remnants or restorations in southern Ontario are generally too small and isolated to support a persistent breeding population.

Habitat assessments of known breeding and sighting locations (since 1980) conducted in 2002 and 2007-08 found that much of this former habitat now appears unsuitable for the Henslow's Sparrow because of development, conversion to shrubland, or changes to agricultural land use practices (Wiercinski 2002; Environment Canada 2010; K. Tuininga pers. comm. 2010). No areas of critical habitat (suitable habitat with birds present) are known, although further surveys are ongoing (Environment Canada 2010).

There is no evidence of the Henslow's Sparrow using grasslands planted on reclaimed surface mines or retired landfill in Canada, although these sites provide important breeding habitat in parts the United States range (see below). There is considerable interest in the use of agrobiomass as a fuel at coal-burning electricity plants in Ontario. New bioenergy crops could provide suitable habitat for the Henslow's Sparrow, particularly if they involve perennial grasslands planted with a mix of prairie grasses and forbs. This would, however, only benefit the species if the grasslands were left unharvested for a year or two after mowing, which seems unlikely (Allen Woodliffe pers. comm. 2010).

Trends in breeding habitat in the United States

Because immigration from the United States is necessary to recover and maintain this species in Canada (see **Rescue effect** section), habitat trends in the United States have a direct effect on the status of the Henslow's Sparrow in Canada. Trends in breeding habitat availability in the United States show more temporal and geographic variability than the simple pattern of expansion and contraction in the availability of agricultural grasslands seen in Canada (Pruitt 1996; Burhans 2002; Cooper 2007, 2009). Comprehensive data on habitat availability have not been compiled but trends for the various types of grasslands used by the species in the US (native grasslands, grasslands on public lands, agricultural grasslands, mine grasslands) are summarized below.

The historic native habitats of this species, specifically tallgrass prairies in the US Midwest and coastal grasslands in the northeast US, were largely converted for other land uses by the early 20th century (Burhans 2002). Many native prairie remnants in the US Midwest and elsewhere are now protected and being actively managed. Thus, the availability of native grassland habitat suitable for this species is likely at least stable, albeit very limited in total extent. In addition, some extensive native and anthropogenic grasslands on public lands in the eastern US, including military installations and national forests are being actively managed to conserve grassland birds (Burhans 2002; Cooper 2007).

The extent and condition of the agricultural grasslands, which have supported the majority of breeding Henslow's Sparrow for more than a century, have been in general decline since at least the 1960s (Pruitt 1996). However, US federal programs that provide financial incentives to farmers to convert cropland to permanent or long-term vegetative cover have directly affected the availability of suitable grassland habitat in

the US breeding range. Henslow's Sparrow habitat and population size declined rapidly after the end of the first such incentive program, known as the Soil Bank program, which ran from 1956 and 1965 (Cooper 2007). Since 1985 when the current Conservation Reserve Program (CRP) was initiated, millions of hectares of cropland have been converted to grasslands that support the Henslow's Sparrow and other grassland birds (Burhans 2002). Research has shown that local Henslow's Sparrow population trends are positively correlated with CRP enrolment in Illinois and across the US breeding range (Herkert 2007a,b). This research indicates that the CRP may be responsible for the recent reversal of population declines in parts of the US range (see **Rescue effect** section).

The US Farm Act (the "Farm Bill") that enables the CRP was reauthorized in 2008 but total enrolment in the CRP has dropped since 2007, due at least in part to recent high commodity prices (Cooper 2007; United States Department of Agriculture (USDA) 2010). As in Canada, agricultural grassland habitat outside the CRP continues to decline due to various factors including development, conversion to cropland, fragmentation, natural succession, reforestation, early mowing, and more intensive grazing (Burhans 2002; Cooper 2007, 2009).

Grasslands planted on reclaimed surface mines since the late 1940s constitute another important breeding habitat for this species in parts of its US range including Pennsylvania (Brothers 1990; Burhans 2002; Cooper 2007, 2009). While these anthropogenic "mine grasslands" appear relatively stable, most are not being actively managed and are slowly being invaded by woody vegetation, and some are being converted to other uses (Burhans 2002; Cooper 2007, 2009).

There were distinct regional differences in habitat trends for this species during the latter half of the 20th century. The habitat increases associated with CRP enrolment, mine reclamation, and prairie restoration were concentrated in the western and southern portion of the breeding range (Cooper 2007, 2009). The various factors that led to these habitat increases have since stabilized or reversed. Consequently, Henslow's Sparrow habitat availability in the core of its US range has likely peaked. In the northeast US, the Henslow's Sparrow is found primarily on agricultural grassland. As in eastern Canada, there has been a long-term and ongoing decline in the availability of suitable agricultural grasslands in the northeastern US due to conversion to shrubland, development, and agricultural intensification (Cooper 2007, 2009). Throughout the US breeding range, a high proportion of Henslow's Sparrow breeding habitat is considered vulnerable to conversion to other land uses, as determined by economic and policy factors, or to invasion by woody species in the absence of active management (Cooper 2007, 2009).

Wintering habitat in the United States

Longleaf Pine savannas once covered about 30,000,000 ha in the southeast United States but only approximately 1,200,000 ha of mostly second-growth forest remains (Van Lear *et al.* 2005). Less than half of the remaining Longleaf Pine habitat patches are on public lands, primarily in the coastal plains of the Carolinas, Georgia, Florida, Alabama, Louisiana, and Texas (USFWS 2009).

Public land owners are now using frequent prescribed burns to manage Longleaf Pine forests and restore ecosystem function and preserve biodiversity (Van Lear *et al.* 2005). These management practices favour wintering Henslow's Sparrow. Habitat restoration efforts on public lands could at best double the amount of available Longleaf Pine habitat within the next few decades (Van Lear *et al.* 2005). In the absence of fire, habitat quality in most privately owned Longleaf Pine forest is continuing to deteriorate (USFWS 2009).

The extent and trends for other potentially important wintering habitats (e.g., saline prairie) are not known.

BIOLOGY

Information on the biology of the Henslow's Sparrow presented in this section is based on the Birds of North America species account prepared by Herkert *et al.* (2002), supplemented as indicated with available information on the Canadian population and recent studies on US populations.

Life cycle and reproduction

The Henslow's Sparrow is an omnivore, feeding on insects and seeds. Insects, particularly grasshoppers (Orthoptera) and beetles (Coleoptera), are the predominant food source during the breeding season. This sparrow forages on or near the ground.

Territorial males sing frequently throughout their lengthy breeding season, from when they arrive on their territory (early May in Ontario) until they begin their post-breeding moult (August in Ontario). The song is described as a simple *tse-zlik*, given frequently throughout the day. The song is distinctive but quiet and can be masked by other species during the dawn chorus. Henslow's Sparrow surveys are often conducted at dusk rather than at dawn as this increases detection rates (Cuddy 1984; Knapton 1984a).

Breeding territories are small, with reported average territory sizes ranging 0.2 to 0.7 ha. Territories are often clustered in loose colonies, with multiple birds in close proximity rather than randomly distributed across available habitat (Herkert *et al.* 2002). Nests are generally difficult to find, being built at or near the base of thick grass clumps, 0 to 50 cm above ground level (Peck and James 1987; Herkert *et al.* 2002; NatureServe 2009).

Both sexes are presumed to breed at one year of age and are generally monogamous. Clutch size is typically 4 eggs (range 2 to 5). The incubation period is 10-12 days; incubation and brooding is by the female only. Nestlings are fed by both adults and leave the nest at 9-10 days.

In the US, this species is frequently double-brooded and occasionally has three broods. Egg dates for Ontario nests (N=12) range from 2 June through 14 August, suggesting this species may also be double-brooded in Canada (Peck and James 1987). The later egg dates could also represent birds that have been displaced from drought-stricken parts of their range, as this species is known to shift locations within a season (Herkert *et al.* 2002).

Nest productivity is difficult to assess because of the difficulty in finding nests. Only 13 nests have ever been found in Canada, all in southern Ontario (Peck and James 1987; Peck and Peck 2008). In US studies, Mayfield nest success rates range from 6 to 40%, and the number of young fledged per successful nest ranged from 3.3 to 3.7 (Herkert *et al.* 2002). Nest success rates in grasslands on reclaimed surface coal mines and non-mined grassland habitat in the US were comparable and relatively high, suggesting that this species is doing reasonably well where it is still nesting (Galligan *et al.* 2006). No estimates of annual or lifetime reproductive success are available.

As with other small passerines, the expected life span is short, and the generation time (average age of breeding adults) is likely about 2-3 years. The longevity record for this species (based on banding records) is a female that was at least 6.5 years old when last captured (Lutmerding and Love 2009).

Migrating and wintering birds are usually found singly or in small groups. Wintering birds feed mostly on seeds of graminoid and forb species. Wintering birds are non-territorial and exhibit site fidelity within a winter season but don't often return to the same area in subsequent years (Johnson *et al.* 2009).

Physiology and adaptability

No information is available on nutrition, energetics, metabolism, or temperature regulation. The Canadian population is at the northern limit of the species' breeding range but it is not known whether this range edge is limited by climatic tolerances or habitat availability. Climate is an important predictor of regional abundance in the core US range (Thogmartin *et al.* 2006).

This species exhibits some adaptations to the natural variability and uncertainty in its breeding and wintering habitat supply including: an aptitude for finding and colonizing new sites (as demonstrated by intermittent site occupancy and supported by low breeding and winter site fidelity), higher breeding densities in years with increased moisture availability, a long breeding season, and a tendency to shift sites within a breeding season (Herkert *et al.* 2002).

The Henslow's Sparrow is considered a habitat specialist as it has specific habitat patch size and vegetation structure requirements, irrespective of species composition. It exhibits habitat flexibility in that it adapted to nesting in agricultural grasslands during the 19th century (in conjunction with loss of native prairie and coastal marsh habitats) and colonized grassland habitats created on reclaimed surface mines during the mid-20th century.

Dispersal and migration

Site fidelity and dispersal

There is no information on site fidelity for Canada, but Henslow's Sparrows in the US generally exhibit relatively low breeding and wintering site fidelity (Herkert *et al.* 2002; Cooper 2009; Johnson *et al.* 2009). Regularly occupied sites in the core range are generally larger habitat patches or large habitat patch mosaics (Herkert *et al.* 2002; Cooper 2009). Even when population levels in Canada were more robust, breeding locations in Ontario typically showed a pattern of intermittent or sporadic use with high site turnover (Knapp 1984a).

Dispersal patterns have not been documented but both adults and young are presumed to disperse to new sites to breed (dispersal distance unknown). There is some evidence that adults may shift territories between nesting attempts within a breeding season (Herkert *et al.* 2002).

None of 25 Henslow's Sparrows banded in Canada from 1955 to 2008 were encountered elsewhere, and no foreign banded birds were recovered in Canada during that period (Brewer *et al.* 2000; Canadian Bird Banding Office unpub. data 2009).

Migration

The Henslow's Sparrow is a short-distance, temperate-wintering migrant. Spring migrants appear at migration stopover locations in southwestern Ontario from mid-April to mid-May (Huebert and Wormington 2008; Long Point Bird Observatory unpublished data). Birds arrive on the breeding grounds in Ontario in late April and early May and can remain through until September or early October (Environment Canada 2010). This species is rarely observed during fall migration but available data indicate that Ontario birds likely begin their fall migration anytime from late July to late October (Speirs 1985; Huebert and Wormington 2008).

The only Canadian location where this species is observed regularly during spring migration is at Point Pelee National Park, Ontario, where a total of 28 birds were recorded over the past decade (2000-09) with one to eight birds reported in eight of the past 10 years (Huebert and Wormington 2008; A. Wormington pers. comm. 2009). The majority of these birds are assumed to be overshoots from Ohio or other population strongholds in the northern US (Knapton 1984a; Huebert and Wormington 2008). Given the difficulty detecting this species (see **Sampling effort**), there could be more individuals breeding than are observed (Allen Woodliffe pers. comm. 2010).

Little is known about the migratory behaviour of this species. No important migration concentration areas for this species are known in Canada or elsewhere.

Interspecific interactions

Henslow's Sparrow nests are occasionally parasitized by the Brown-headed Cowbird (*Molothrus ater*) (Herkert *et al.* 2002). Parasitized nests have smaller clutches, fewer fledglings, and higher nest-predation rates than unparasitized nests. Cowbird eggs were found in one of 12 nests in Ontario (Peck and James 1987).

Breeding territories can overlap with those of other grassland birds including the closely related Grasshopper Sparrow (*A. savannarum*) (Herkert *et al.* 2002).

POPULATION SIZES AND TRENDS

Sampling effort and methods

The biology of the Henslow's Sparrow makes it a difficult species to monitor compared to most other small songbirds. During the breeding season territorial males sing persistently, but their quiet song can be drowned out by the louder songs of other grassland birds and by other background noises. Population trends are difficult to detect at all scales because breeding sites are highly localized and clustered, the number of birds at occupied sites can undergo marked year-to-year fluctuations, and sites are often occupied intermittently (Knapton 1984a; Pruitt 1996; Burhans 2002; Cooper 2009). Outside the breeding season, this species is cryptic and occurs at low densities, making it very difficult to detect (Pruitt 1996; Burhans 2002; Cooper 2009). In addition, since the *Trespass to Property Act* came into force in Ontario in the 1990s, access to considerable areas of grassland has declined, reducing survey effort (Allen Woodliffe pers. comm. 2010).

Breeding Bird Survey (BBS)

The BBS is a volunteer-based program designed to monitor population trends for North American breeding bird populations (Sauer *et al.* 2008). BBS routes consist of 50 roadside points along randomly selected stratified routes throughout North America. Each point is surveyed once (3-minute point count) by an experienced birder during the breeding season. The BBS has been run annually in the US and Canada since 1966. Not all routes have been surveyed continuously for the entire period.

The BBS covers the entire breeding range of the Henslow's Sparrow but the species occurs at low relative abundance and, therefore, is rarely detected on BBS routes in Canada (Sauer *et al.* 2008).

Breeding bird atlases

The Ontario and southern Quebec Breeding Bird Atlas projects provide snapshots of the Canadian breeding distribution of the Henslow's Sparrow. Fieldwork for the first and second Ontario BBAs was carried out between 1981-85 (OBBA1) and 2001-05 (OBBA2), respectively (Cadman *et al.* 1987, 2007). Fieldwork for the Atlas of the Breeding Birds of Southern Quebec (BBASQ) was carried out in 1984-1989 (Gauthier and Aubry 1996). Most atlas squares (10 km x 10 km) received a minimum of 20-hours coverage by atlasers, a level of effort considered adequate to detect the majority of species occurring in a square. Point counts were used to collect abundance data during the second Ontario BBA. For rare species such as the Henslow's Sparrow, atlasers were asked to collect detailed abundance and distribution information. No additional documentation was provided for many of the Henslow's Sparrow records included in the first Ontario atlas. The atlases incorporated the results of directed searches for the Henslow's Sparrow that occurred during the relevant time period.

Special surveys

Since the early 1980s there has been a series of targeted surveys of known and potential Henslow's Sparrow breeding locations in Ontario using a combination of experienced professional and volunteer field staff. These surveys generally followed a similar protocol, listening for singing males during evening surveys at roadside stops or along walking transects through potential habitat using conspecific call broadcast surveys to stimulate singing. Additional follow-up visits were made at occupied sites.

Several special Henslow's Sparrow surveys were conducted in southern Ontario during the 1980s and early 1990s (see details in Austen and Cadman 1993; Austen 1994; Austen *et al.* 1994, 1997). Since 1995, there have been some local searches focused on specific areas by various individuals and organizations. Environment Canada organized more extensive surveys in 2002, 2007 and 2008 to assess habitat suitability at more than 50 sites, including most of the previously known locations for the Henslow's Sparrow across southern Ontario (Wiercinski 2002; Environment Canada 2010; K. Tuininga pers. comm. 2010). Similar targeted surveys have not been done in Quebec, as it is not considered a regular breeding species in that jurisdiction.

Rare bird reporting

Many reports of this rare species are the result of casual observations by birdwatchers. Breeding records of the Henslow's Sparrow in Canada have been compiled since concerns about declines were first raised during the 1970s (Knapton 1984a,b). In Ontario, breeding occurrences are tracked by the provincial Natural Heritage Information Centre (NHIC) species element database, and the Ontario Bird Records Committee (OBRC), which requests documentation for all observations of this rare species. Records accepted by the OBRC are published annually in the Ontario Field Ornithologists' publication Ontario Birds. In Quebec, birders are asked to submit breeding season observations of the Henslow's Sparrow and other birds at risk to the "Suivi de l'Occupation des Stations des nidification des Populations d'Oiseaux en Peril" (SOS-POP) database coordinated by the Regroupement QuébecOiseaux (RQO). Henslow's Sparrow records are also compiled in the Oiseaux du Québec rare bird database and through Étude des Populations des Oiseaux du Québec (ÉPOQ), which manages the bird checklists produced by thousands of volunteers since 1969.

Christmas Bird Count (CBC)

The CBC provides information on the distribution and abundance of wintering bird populations in North America. The CBC involves thousands of volunteers and is carried out annually over a three-week period between 14 December and 5 January. Each count occurs on a single day in a fixed 24-km diameter circle. The number of individuals of each species observed is reported, along with effort data including the number of observers, number of party hours, and weather conditions. The CBC was initiated in 1900 and the number of counts and number of observers has increased over time to more than 2100 count circles and almost 60,000 observers in 2008-09 (LeBaron 2009). To correct for variations in effort, CBC data are generally reported as individuals per party-hour.

Between 1965 and 2005, the Henslow's Sparrow was reported from 147 CBC count circles, distributed across most of the wintering range (Butcher and Niven 2007). CBC data for the Henslow's Sparrow are affected by inherent weaknesses in the survey methodology (Burhans 2002; Dunn *et al.* 2005). Connectivity between wintering and breeding distributions has not been determined and CBC trend information cannot be directly linked to regional breeding populations.

Abundance

Across its range the Henslow's Sparrow occurs at low abundance levels and the total global population is relatively small. Based on BBS point count data from the 1990-99 period, the global population was estimated to be about 80,000 birds, of which less than 1% (ca. 300 birds) occurred in Canada (Rich *et al.* 2004; Partners in Flight (PIF) 2007). The overall population estimate is considered to have fair accuracy but low precision whereas the estimate for Canada is based on just a few detections and is rated as "very poor" (Rich *et al.* 2004; Blancher *et al.* 2007). Global population estimates based on more recent BBS data are substantially higher: ~191,000 pairs (127,000–328,000 95% C.I.), in 2006 (W. Thogmartin, USGS in Cooper 2009) or ~400,000 birds for 1998-2007 (P. Blancher, Environment Canada, unpublished data 2008).

The Henslow's Sparrow has been reported only 13 times on BBS routes in Ontario, with no detections since 2002 (BBS database, USGS 2010). Other survey methods provide a better estimate of the actual abundance of this rare species in Canada.

Low numbers of singing males were detected during the special Henslow's Sparrow surveys conducted in Ontario during the 1980s and early 1990s (Austen 1994). The highest reported one-year count during this period was of 25 to 29 individuals at 13 sites in 1983 (including atlas records). Extensive surveys in 1992-93 of known sites and suitable habitat across southern Ontario found only one occupied site, with one singing male present in each year (Austen *et al.* 1997).

The number of Henslow's Sparrow reported during the second Ontario BBA was also extremely low (Tuininga 2007). The Henslow's Sparrow was reported from a total of nine squares over the five-year atlas period, 2001-05. Seven of these records were of a single bird. This rare species was not detected during any point counts during the second atlas. Included in the atlas records is the single bird found during a Henslow's Sparrow habitat assessment survey conducted at several sites in 2002 (Wiercinski 2002). No Henslow's Sparrow were reported during the habitat assessments carried out in 2007 and 2008 (Environment Canada 2010).

For the 10-year period 2000-09, the Henslow's Sparrow was reported from a total of 16 sites in Ontario (including atlas records) and three sites in Quebec (Table 1). Most records are of a singing male in suitable habitat on one day in a single year. Three reports involve multiple birds (up to 4 birds). Four reports involve territorial birds present for at least a week. The Henslow's Sparrow has been reported in more than one year from only one area, the Carden Alvar area northeast of Lake Simcoe, where a territorial pair was present at one site in 2009 and singing males were reported from other nearby sites in 2006 and 2007.

The breeding status of the Henslow's Sparrow in Canada is uncertain as there are no recent confirmed breeding records and no regularly occupied sites. This inconspicuous species continues to be observed in suitable habitat at scattered locations within its historic Canadian range almost annually (Table 1). The presence of territorial individuals and pairs suggests that nesting may be occurring in some years.

Based on the available data and search effort, the number of breeding pairs in Canada in any given year is inferred to be in the range of 0 to 10 pairs, or 0 to 25 mature individuals. Numbers are likely near the lower end of this estimate in most years. The population estimate is consistent with other recent estimates of the Ontario population (Table 2). The territorial male observed in Quebec in 2006, along with several other sightings (Table 2), suggests that a few birds may still occasionally breed within the species' historic range in southwestern Quebec.

Table 2. Breeding population estimates for Henslow's Sparrow in Ontario

Source	Primary data set	Population estimate
Knapton 1987	1981-85 Ontario BBA	unlikely that the total provincial population exceeds 50 pairs
Austen <i>et al.</i> 1994	Ontario Rare Breeding Bird Program, 1988-92	far fewer than 50 pairs
Austen 1994	1992-93 surveys	far fewer than 50 pairs (probably less than 10 pairs)
James 2000	COSEWIC Update Report	still likely to be a few nesting somewhere in Ontario
Tuininga 2007	2001-05 Ontario BBA	detected in one or two sites per year in Ontario
Environment Canada 2010	Recovery Strategy (based on data from 2001-05 Ontario BBA)	at least one breeding territory may exist in Ontario each year.

Fluctuations and trends

The abundance and breeding distribution of the Henslow's Sparrow in Canada and North America have undergone marked fluctuations at various geographic and time scales in response to changes in habitat availability. In Canada and the northeastern US, this species underwent a long cycle of expansion and contraction during the 20th century. Even at its peak in the mid-20th century, the Canadian population exhibited year-to-year fluctuations in the number of birds present at those sites occupied in

consecutive years, as well as high turnover in occupied sites (Knapton 1984a). Patterns in the US are more complex but also show regional long-term changes and local year-to-year fluctuations in abundance (Herkert *et al.* 2002; Cooper 2009). Local population fluctuations in the US have been linked to spring precipitation levels (higher densities in wet years) as well as to changes in land use and habitat availability (Herkert *et al.* 2002).

During the 2001-05 Ontario Breeding Bird Atlas, the Henslow's Sparrow was reported from 9 squares, down 80% ($p < 0.10$) from the 38 squares during the 1981-85 atlas (Cadman *et al.* 1987, 2007; Tuininga 2007). This is equivalent to a 55% decline in distribution over 10 years. Only two squares recorded more than one individual during the second atlas, compared to 19 squares with multiple birds in the first atlas.

Observations since 1985 are too few to determine recent trends. There are certainly no indications of any increase in the number of Henslow's Sparrow in Canada since the 2000 status assessment, which stated "there is still likely to be a few nesting somewhere in Ontario" (James 2000).

Rescue effect

Immigration of individuals from the United States is considered essential to maintaining or recovering the Canadian population (Knapton 1984a; Austen *et al.* 1997; James 2000; Environment Canada 2010). Dispersal of individuals from the United States has not been documented but the persistence of the Canadian population at extremely low levels supports this assumption, as do the regular observations of spring migrants at Point Pelee, which are thought to be overshoots from the U.S. population (Huebert and Wormington 2008, but see above).

The Canadian range is contiguous with breeding populations in adjacent states including Michigan, Ohio, Pennsylvania, and New York. The probability of rescue of this species in Canada is dependent on population trends and recovery activities in these states, which are influenced by population trends for the overall US population (Environment Canada 2010).

Population trends in states adjacent to the Canadian range show strong long-term declines with no apparent reversal in recent years (Table 3). Second round BBAs in New York, Ohio, Pennsylvania and Michigan also indicate general state-wide population declines across these border states, except in southeastern Ohio and western Pennsylvania where the species continues to breed regularly in grasslands created on reclaimed coal mines (Cooper 2009). The species continues to occur regularly in parts of southeastern Michigan (Michigan Natural Features Inventory (MNFI) 2007). Of particular concern to the status of the Canadian population are recent declines in the numbers of Henslow's Sparrows breeding at traditional sites in northern and western New York, within 100 km of the Canadian border (Brinkley and Baicich 2004; McGowan 2008).

Table 3. Annual indices of population change for Henslow's Sparrow in adjacent states by state/province and survey-wide from route-regression analysis of BBS data (Sauer *et al.* 2008).

Region	Long-term Trend, 1966-2007			Short-term Trend, 1998-2007		
	Annual Indices	P	N	Annual Indices	P	N
Michigan	-12.08	<0.01	20	-		
New York	-13.88	0.01	28	-		
Ohio	-5.11	0.03	22	1.42	0.62	6
Pennsylvania	-3.85	0.65	18	-		
Wisconsin	-9.02	0.02	5	-		
Survey-wide	-8.25	<0.01	184	2.49	0.37	61

Survey-wide BBS data show that the Henslow's Sparrow population has declined by 8.1% annually between 1966 and 2007 ($p < 0.01$, $N = 187$) (Sauer *et al.* 2008). This is equivalent to a 98% decline over the past 47 years. For the most recent 10-year period 1998-2007, there was no detectable change ($-0.63\%/y$, $p = 0.80$, $N = 64$) in the survey-wide population. BBS trend results for this species should be viewed with caution, however, due to the low number of routes involved (187 of more than 3500 BBS routes in North America) and the low relative abundance of 0.14 birds per route (Sauer *et al.* 2008).

Results from the CBC survey suggest an increasing short-term trend (Cooper 2007, 2009). However, increased interest in this extremely localized, cryptic species has likely resulted in a significant positive bias to CBC results (Butcher and Niven 2007; Cooper 2007).

THREATS AND LIMITING FACTORS

Habitat loss on the breeding grounds is the primary threat to Henslow's Sparrow populations in Canada and the United States and is also the most important limiting factor (Cooper 2009; Environment Canada 2010). The decline in Henslow's Sparrows in Canada appears to track the loss of infrequently disturbed agricultural grasslands and old-field habitats (Environment Canada 2010). The tall-grass prairie habitat that was the historic natural habitat for the Henslow's Sparrow in the US Midwest, and presumably in Canada, was largely converted to agriculture more than a century ago. Although conversion of native prairie is still occurring in parts of the United States, it is not a significant factor in the Canadian range of this species.

The Henslow's Sparrow requires large areas of grassland habitat that are generally undisturbed but periodically subject to fire, grazing, and/or mowing to limit the growth of woody species. Activities that result in the destruction of this habitat include natural succession to shrubland or forest in the absence of disturbance, afforestation, drainage or infilling of low-lying areas, residential development, and urbanization. Conversion to cropland also results in habitat loss, but this loss is reversible.

Breeding habitat degradation can result from regular mowing, heavy grazing, or frequent fire as these disturbances prevent the formation of the specific habitat structure required by this species.

Primary threats to the Henslow's Sparrow wintering habitat include altered fire regimes, residential and industrial development, incompatible forestry practices, invasive species, and land conversion to agriculture (Cooper 2009).

The importance of breeding habitat as a population limiting factor is demonstrated by recent population increases in the core range in the United States that correlate with increased breeding habitat availability as a result of the Conservation Reserve Program (Cooper 2009).

The effects of climate change on the Henslow's Sparrow have not been modelled but range and abundance declines are forecast for several grassland sparrow species in the United States, including the closely related Grasshopper Sparrow (Matthews *et al.* 2004). Drought sensitivity during summer months is the climatic factor driving the forecast declines in Grasshopper Sparrow (Matthews *et al.* 2004). The Henslow's Sparrow could be similarly affected by climatic factors. A recent assessment of the vulnerability of US bird species to climate change ranked the Henslow's Sparrow at medium vulnerability (North American Bird Conservation Initiative (NABCI) 2010).

PROTECTION, STATUS, AND RANKS

Legal protection and status

The Henslow's Sparrow is protected in Canada under the *Migratory Birds Convention Act, 1994*. This legislation prohibits the possession or sale of migratory birds and their nests, and activities that are harmful to migratory birds, their eggs, or their nests, except as permitted under the *Migratory Bird Regulations*. This species also received legal protection in the United States and Mexico under similar legislation.

The Henslow's Sparrow is listed as Endangered under Canada's *Species at Risk Act, 2002 c.29*, Schedule 1. SARA prohibits harming or possessing a listed species, or damaging its residence or critical habitat. The residence of this species has been identified as the nest, which is protected against disturbance during the breeding season (late April until end of August) under SARA and the MBCA 1994 (Government of Canada 2006).

The recently completed Recovery Strategy sets population and distribution objectives for the Henslow's Sparrow in Canada over the next five years (Environment Canada 2010). These objectives are to establish and secure at least one large patch (greater than 50 ha) of suitable grassland habitat and achieve at least one stable breeding population of 5-10 pairs. The Recovery Strategy does not identify critical habitat as there are no known locations where regular sightings of this species occur.

The Henslow's Sparrow is also listed as Endangered under Ontario's *Endangered Species Act, 2007*, which protects species that are at risk and their habitats (ESA 2007; OMNR 2009). In addition, areas in Ontario on which Henslow's Sparrow depend directly or indirectly to carry on its life processes are protected under the general habitat protection provision of the ESA 2007, as a species-specific habitat regulation has not yet been developed for this species (OMNR 2008). This species was first recognized as Threatened in Ontario in 1986, and formally listed as Endangered in 1994.

This species has no special legal status in other provinces. It has never been listed under Quebec's species at risk legislation, *Loi sur les espèces menacées ou vulnérables* (LEMV 1989).

The Henslow's Sparrow was considered as a candidate for listing as a Threatened species in the United States but review of available data by the USFWS ascertained that listing was not warranted (Pruitt 1996; USFWS 1998). It is listed as Endangered or Threatened in 13 US states, including several border states: Wisconsin (Threatened), Minnesota (Endangered), Michigan (Endangered, legally protected) and New York (Threatened) (MNFI 2007; Cooper 2009). Due to recent population increases, the Henslow's Sparrow has been de-listed in some states (e.g. Pennsylvania) and is under consideration for down-listing or de-listing in others (Pruitt 1996; Burhans 2002; Cooper 2009).

Non-legal status and ranks

The Henslow's Sparrow was first designated as Threatened in Canada by COSEWIC in 1984 (Knapton 1984a), and reassessed as Endangered in 1993 (Austen and Cadman 1993). This status was re-examined and confirmed as Endangered in 2000 (James 2000). The General Status ranks of this species are At Risk (1) in Canada and Ontario, and Accidental (8) in Quebec and Nova Scotia (CESCC 2006).

This species is currently classified as Near Threatened on the IUCN Red List due to suspected moderately rapid population declines over the last three decades (BirdLife International 2008).

NatureServe (2009) ranks this species as apparently secure globally (G4), apparently secure during the non-breeding season in the United States (N4N), vulnerable as a breeding species in the United States (N3B), and critically imperiled as a breeding species in Canada (N1B). NatureServe status definitions and province- and state-level rankings are provided in Table 4.

Table 4. Legal status and NatureServe ranks assigned to Henslow's Sparrow in North America jurisdictions (Cooper 2009, NatureServe 2009).

Region	NatureServe Rank Breeding ¹	NatureServe Rank Non-Breeding ¹	Provincial/State Status ²
Global	G4	G4	
Canada	N1B	-	
United States	N3B	N4N	
Ontario	SHB		Endangered
Quebec	S1B		
Alabama		S2N	Highest Concern
Arkansas	S1B	S2N	Inventory Element
Connecticut	SHB	SHN	Extinct
Delaware	SHB	S1N	Endangered
District of Columbia		S2S3N	
Florida		SNRN	
Georgia		S2	Rare
Illinois	S2		Endangered
Indiana	S3B		Threatened
Iowa	S3B	S2N	Endangered
Kansas	S3B		Conservation Concern
Kentucky	S3B		Special Concern
Louisiana		S3N	
Maryland	S1S2B		Threatened
Massachusetts	S1B		Endangered
Michigan	S2S3		Endangered
Minnesota	S1B		Endangered
Mississippi		S3N	
Missouri	S3		
Nebraska	S2		
New Hampshire	SHB		Endangered
New Jersey	S1B		Endangered
New York	S3B		Threatened
North Carolina	S2B	S1N	
Ohio	S4		
Oklahoma	S2		
Pennsylvania	S4B		(Special Concern)
Rhode Island	SX		
South Carolina		SNA	

Region	NatureServe Rank Breeding ¹	NatureServe Rank Non-Breeding ¹	Provincial/State Status ²
South Dakota	S1B		
Tennessee	S1B		
Texas	SXB	S2S3N	
Vermont	S1B		Endangered
Virginia	S1B		Threatened
West Virginia	S3B		
Wisconsin	S3B		Threatened

¹ Source: NatureServe 2009. SX – Presumed extirpated because not located despite intensive searches of historical sites and other appropriate habitat, and virtually no likelihood it will be rediscovered; SH – Possibly extirpated (historical) because it has not been verified in the past 20-40 years despite extensive searches but there is some possibility that it may be rediscovered; S1 - Critically imperilled because of extreme rarity (often 5 or fewer occurrences) or because of some factor(s) such as very steep declines, making it especially vulnerable to extirpation; S2 - Imperilled because of rarity due to very restricted range, very few populations (often 20 or fewer), steep declines, or other factors making it very vulnerable to extirpation; S3 - Vulnerable due to restricted range, relatively few populations (often 80 or fewer), recent and widespread declines, or other factors making it vulnerable to extirpation; S4 – Apparently secure as the species is uncommon but not rare and there is some cause for long-term concern due to population declines or other factors; S5 – Secure because it is common, widespread, and abundant in the nation or state/province. B indicates breeding population. N indicates non-breeding population; SNR – status not yet assessed; SNA – Not applicable because the species is not a suitable target for conservation activities.

² Source: Cooper 2009 (current as of 2007).

In the 2004 North American Landbird Conservation Plan, the Henslow's Sparrow is identified as a Watch List species in need of immediate conservation action due to multiple causes of concern across its entire range (Rich *et al.* 2004). It is included on the national list of Birds of Conservation Concern in the United States (USFWS 2008). It is identified as a priority species of conservation concern in the landbird conservation plans covering southern Ontario (OPIF 2008). Its status as a landbird of High Conservation Concern in North America has recently been confirmed by the Partners in Flight Science Committee (Berlanga *et al.* 2010).

Habitat protection and ownership

Most Henslow's Sparrow breeding occurrences in Ontario have been on private agricultural lands but some breeding colonies have been in protected areas including Presqu'île Provincial Park, Tiny Marsh Provincial Wildlife Management Area, Luther Marsh Wildlife Management Area, and Point Pelee National Park (NHIC 2009). Of the 19 recent breeding season records, two were on protected public lands (Carden Alvar Provincial Park in 2009 and at Bronte Creek Provincial Park in 2000), and one was on an Indian Reservation (Neyaashiinigmiing I.R. 27 in 2009). There are also pre-2000 records from the Walpole Island First Nation (Walpole Island I.R. 46).

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COLLECTIONS EXAMINED

No collections were examined.