PROPOSED

Species at Risk Act
Recovery Strategy Series

Recovery Strategy for the Henslow's Sparrow (*Ammodramus henslowii*) in Canada

Henslow's Sparrow

July 2006

Environment Canada Environnement Canada

Canada

About the *Species at Risk Act* Recovery Strategy Series

What is the *Species at Risk Act* (SARA)?

SARA is the Act developed by the federal government as a key contribution to the common national effort to protect and conserve species at risk in Canada. SARA came into force in 2003, and one of its purposes is *"to provide for the recovery of wildlife species that are extirpated, endangered or threatened as a result of human activity."*

What is recovery?

In the context of species at risk conservation, **recovery** is the process by which the decline of an endangered, threatened, or extirpated species is arrested or reversed and threats are removed or reduced to improve the likelihood of the species' persistence in the wild. A species will be considered **recovered** when its long-term persistence in the wild has been secured.

What is a recovery strategy?

A recovery strategy is a planning document that identifies what needs to be done to arrest or reverse the decline of a species. It sets goals and objectives and identifies the main areas of activities to be undertaken. Detailed planning is done at the action plan stage.

Recovery strategy development is a commitment of all provinces and territories and of three federal agencies — Environment Canada, Parks Canada Agency, and Fisheries and Oceans Canada — under the Accord for the Protection of Species at Risk. Sections 37–46 of SARA (http://www.sararegistry.gc.ca/the_act/default_e.cfm) outline both the required content and the process for developing recovery strategies published in this series.

Depending on the status of the species and when it was assessed, a recovery strategy has to be developed within one to two years after the species is added to the List of Wildlife Species at Risk. Three to four years is allowed for those species that were automatically listed when SARA came into force.

What's next?

In most cases, one or more action plans will be developed to define and guide implementation of the recovery strategy. Nevertheless, directions set in the recovery strategy are sufficient to begin involving communities, land users, and conservationists in recovery implementation. Cost-effective measures to prevent the reduction or loss of the species should not be postponed for lack of full scientific certainty.

The series

This series presents the recovery strategies prepared or adopted by the federal government under SARA. New documents will be added regularly as species get listed and as strategies are updated.

To learn more

To learn more about the *Species at Risk Act* and recovery initiatives, please consult the SARA Public Registry (http://www.sararegistry.gc.ca/) and the Web site of the Recovery Secretariat (http://www.speciesatrisk.gc.ca/recovery/default_e.cfm).

Recovery Strategy for the Henslow's Sparrow (*Ammodramus henslowii*) in Canada [Proposed]

July 2006

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Additional copies:

Additional copies can be downloaded from the SARA Public Registry (http://www.sararegistry.gc.ca/).

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ISBN *To come*
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DECLARATION

Environment Canada has developed its recovery strategy for the Henslow's Sparrow as required by the *Species at Risk Act*. This proposed recovery strategy has been prepared in cooperation with jurisdictions responsible for the species, as described in the Preface.

Success in the recovery of this species depends on the commitment and cooperation of many different constituencies that will be involved in implementing the directions set out in this strategy and will not be achieved by Environment Canada or any other jurisdiction alone. In the spirit of the Accord for the Protection of Species at Risk, the Minister of the Environment invites all Canadians to join Environment Canada in supporting and implementing this strategy for the benefit of Henslow's Sparrow and Canadian society as a whole. Environment Canada will endeavour to support implementation of this strategy, given available resources and varying species at risk conservation priorities. The Minister will report on progress within five years.

This strategy will be complemented by one or more action plans that will provide details on specific recovery measures to be taken to support conservation of the species. The Minister will take steps to ensure that, to the extent possible, Canadians directly affected by these measures will be consulted.

RESPONSIBLE JURISDICTIONS

Environment Canada – Ontario Region
Parks Canada Agency
Government of Ontario

AUTHORS

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STRATEGIC ENVIRONMENTAL ASSESSMENT

A strategic environmental assessment (SEA) is conducted on all SARA recovery planning documents, in accordance with the *Cabinet Directive on the Environmental Assessment of Policy, Plan and Program Proposals*. The purpose of a SEA is to incorporate environmental considerations into the development of public policies, plans, and program proposals to support environmentally-sound decision making.

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

This recovery strategy will clearly benefit the environment by promoting the recovery of the Henslow's Sparrow. The potential for the strategy to inadvertently lead to adverse effects on other species was considered. The SEA concluded that this strategy will clearly benefit the environment and will not entail any significant adverse effects. Refer to the following sections of the document in particular: 1.3 Needs of Henslow's Sparrow; 2.4 Approaches Recommended to Meet Recovery Objectives; and 2.7 Effects on Other Species.

RESIDENCE

SARA defines residence as: *a dwelling-place, such as a den, nest or other similar area or place, that is occupied or habitually occupied by one or more individuals during all or part of their life cycles, including breeding, rearing, staging, wintering, feeding or hibernating* **[Subsection 2(1)]**.

Residence descriptions, or the rationale for why the residence concept does not apply to a given species, are posted on the SARA public registry: http://www.sararegistry.gc.ca/plans/residence_e.cfm.

PREFACE

Henslow's Sparrow was officially assessed as endangered in April 1993, and its status was confirmed in November 2000. It is also a migratory bird protected under the *Migratory Birds Convention Act, 1994* and is under the management jurisdiction of the federal government. The *Species at Risk Act* (SARA, Section 37) requires the competent minister to prepare recovery strategies for listed extirpated, endangered, or threatened species. The Canadian Wildlife Service – Ontario Region, Environment Canada, led the development of this recovery strategy, which is an update of the National Recovery Plan for Henslow's Sparrow (Austen *et al*. 1997), in cooperation with the Province of Ontario and the Parks Canada Agency. All responsible jurisdictions reviewed and approved the strategy. This proposed strategy meets SARA requirements in terms of content and process (Sections 39–41).

EXECUTIVE SUMMARY

Henslow's Sparrow is a small grassland sparrow that is restricted to southern Ontario in Canada and is listed by the Committee on the Status of Endangered Wildlife in Canada (COSEWIC) as an endangered species. In Canada, its population was an estimated 50 breeding pairs in the early 1980s, but in the 2001-2005 Ontario Breeding Bird Atlas breeding evidence was documented at only nine locations. This species also has a scattered and localized distribution in the northeastern United States, where its population has also been declining in many states. Henslow's Sparrow has undergone a continental-scale average annual decline of 8.7% since 1966.

The loss and degradation of both breeding and wintering habitat have been identified as key threats and limiting factors for this species throughout its range. Its decline appears to closely track the loss of grassland and old-field habitats on the breeding grounds due to industrial and residential development and changes to agricultural practices. Changes to fire management of pine savanna on the wintering grounds have also resulted in loss and degradation of habitat.

Henslow's Sparrow requires large areas of grassland habitat for breeding, rearing, and feeding. Breeding habitat is characterized by tall, dense grassland with a high percentage cover of grass and with a thick thatch layer and deep litter layer. Sites with trees and shrubs (or posts, fencelines, and wires) that emerge above the grass layer are avoided. Grassland habitats in wet, low-lying areas may provide more stable habitat. Henslow's Sparrows appear to be an area-sensitive species, particularly when populations are at low densities; large grassland areas greater than 50 ha in size may be required for their recovery.

The recovery goal for Henslow's Sparrow is to achieve at least 50 breeding pairs spread over three geographically distinct grassland patches within the next 20 years. The recovery goal will be achieved primarily through habitat rehabilitation and management, in conjunction with recovery efforts for other grassland, prairie, and wetland species. Grassland patches greater than 50 ha in size are recommended. Little research is available on this species in Canada; consequently, much of the information presented is based on U.S. research. Grassland management methods used in the United States provide a model for Canada, and recovery of the Canadian population should be undertaken in close collaboration with managers in the United States. The recovery goal will recover the Canadian population to a level that is stable with immigration from the United States.

The 2001–2005 Ontario Breeding Bird Atlas documented breeding evidence at only nine locations. Critical habitat will be identified in an action plan for the species, since there is not enough information currently available to identify it in this recovery strategy. The recovery strategy also summarizes available information on successful recovery efforts for Henslow's Sparrow in the United States. The recovery strategy provides direction for the next five years.

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SPECIES ASSESSMENT INFORMATION FROM COSEWIC

Date of Assessment: November 2000

Common Name: Henslow's Sparrow

Scientific Name: *Ammodramus henslowii*

COSEWIC Status: Endangered

Reason for designation: This species has disappeared from most of its former limited range in Canada. There are now fewer than 10 pairs remaining in the country. Habitat loss and degradation have largely induced the population decline.

Canadian Occurrence: ON

COSEWIC Status History: Designated Threatened in April 1984. Status re-examined and designated Endangered in April 1993. Status re-examined and confirmed in November 2000. Last assessment based on an update status report.

1. BACKGROUND

1.1 Description

Henslow's Sparrow is a small (13 cm, 10–15 g) grassland sparrow. The head is pale olive-green and has two black stripes on the top, separated by a pale median stripe. The feathers on the back are black edged with white, creating a scaled appearance. The rump, wings, and tail are chestnut coloured, with black in the middle of the feathers, and the breast, sides, and flank are buff with black streaks. Adult males and females look alike, but young Henslow's Sparrows can be distinguished from adults by the lack of streaking on the buff underparts. This is a very secretive species; it is rarely seen and difficult to flush. It is most easily detected when males sing during the breeding season. The song is an insect-like "*tsi-lick*."

1.2 Populations and Distribution

1.2.1 Global Breeding Distribution

Henslow's Sparrow breeds in the northeastern United States, from eastern South Dakota, Minnesota, New York, and central New England south to Kansas, Missouri, Kentucky, North Carolina, and eastern Texas. In Canada, it has been known to breed in southern Ontario and southwestern Québec (Figure 1). Throughout this range, it has a very scattered and localized distribution. Less than 9% of the global range occurs in Canada (NatureServe 2006).

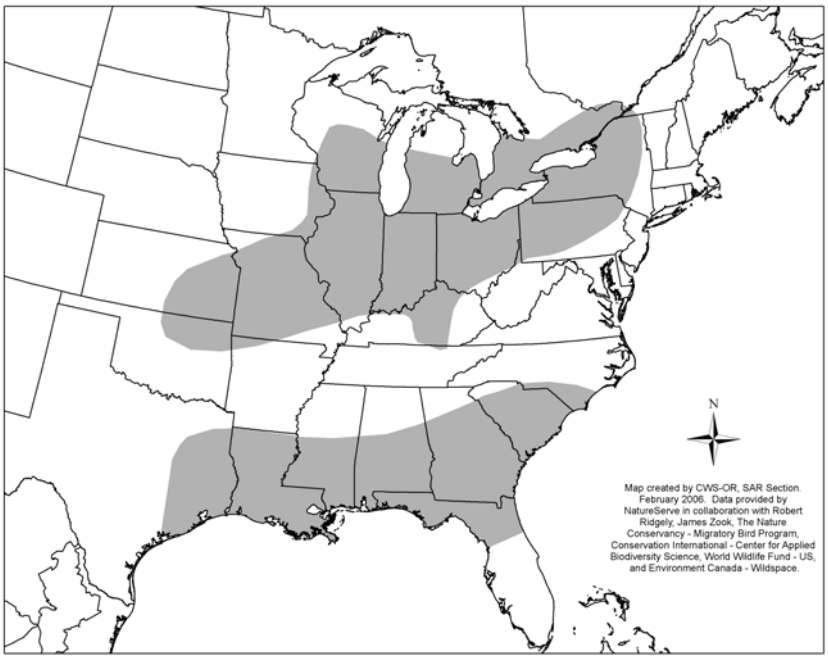

Figure 1. North American distribution of Henslow's Sparrow.

1.2.2 Canadian Breeding Distribution

Henslow's Sparrow was recorded during the breeding season in southwestern Québec (e.g., Hull, Eccles-Hill, Montreal) between 1943–1950 and 1965–1968 , but it has not been recorded breeding there since 1968 (Godfrey 1972; Knapton 1982). It is now considered only a vagrant there (Gauthier and Aubry 1996). For this reason, Henslow's Sparrow is not listed as a species at risk in Québec.

In Ontario, the historical range of Henslow's Sparrow is considered to be southern Ontario, north to Barrie and Ottawa and east to at least Morrisburg. However, the breeding range has contracted substantially since the 1950s. In the early 1980s, Knapton (1982, 1986) found the main concentration of breeding pairs to be in the southern part of Hastings, Lennox-Addington, Frontenac, and Prince Edward counties. In the early 1990s, a thorough search for the birds revealed only a single singing male (Austen 1994). Recent surveys in eastern Ontario have yielded similar results. At least seven singing males were heard on occasion in the Regional Municipality of Halton in 2000 (M. Austen pers. comm.). Breeding evidence was documented in a total of nine locations in Ontario during the 2001–2005 Ontario Breeding Bird Atlas surveys. (Figure 2).

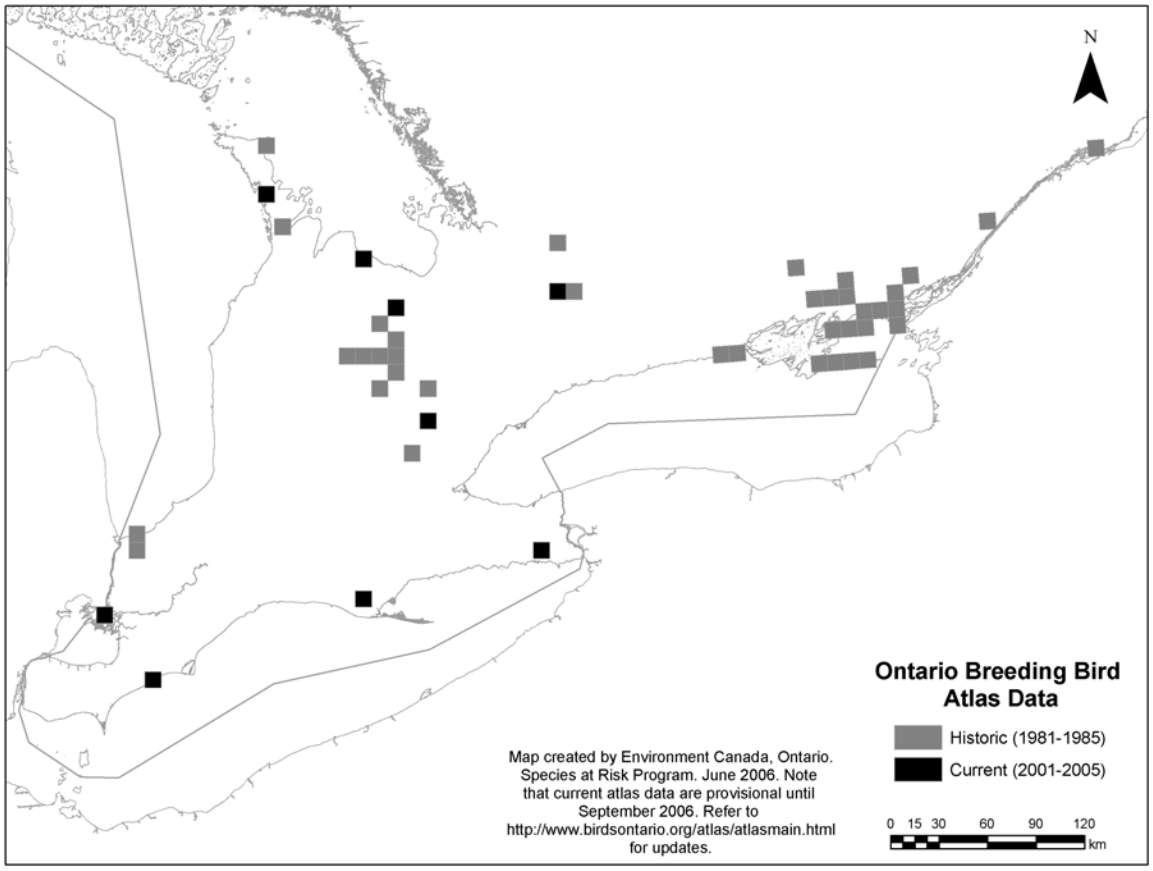

Figure 2. Breeding distribution of Henslow's Sparrow in Canada from 1981 to 1985 and from 2001 to 2005. [Reproduced with permission from Ontario Breeding Bird Atlas.]

1.2.3 Winter Distribution

Henslow's Sparrow is a short-distance migrant, wintering primarily in the southeastern United States. The winter range is not well known, but is believed to include eastern Texas, southern Louisiana, southern Mississippi, southern Alabama, Florida, southern Georgia, eastern South Carolina, and southeastern North Carolina.

The species is difficult to detect during migration, and so migration patterns, pathways, and behaviour are poorly understood.

1.2.4 Population Size and Trends

The continental population of Henslow's Sparrow has experienced a significant decline during the period 1966–2004, averaging an 8.7% annual decline. Breeding Bird Survey data suggest that Henslow's Sparrow populations have declined in Michigan, Ohio, and Wisconsin. Data from other states in the north-central United States are insufficient to allow meaningful trends to be

calculated, although Breeding Bird Atlas data suggest that population trends in these states are variable. For example, in Illinois, the establishment of large areas of grassland through the Conservation Reserve Program has resulted in a 10-fold increase in Henslow's Sparrow numbers in recent years (Herkert 2005). In western Pennsylvania, reclaimed surface mines have created an estimated core area of 35 373 ha of grassland habitat where at least 4884 Henslow's Sparrows were present in 2001 (Mattice *et al*. 2005). Despite this increase in suitable habitat, Henslow's Sparrow range in Pennsylvania appears to have remained relatively stable between 1984 and 2004 (Pennsylvania Breeding Bird Atlas 2006).

The State of New York noted a significant decline in Henslow's Sparrow throughout its range in surveys conducted between 1980–1985 and 2000–2004 (New York State Department of Environment and Conservation 2005). Currently, the largest area of suitable habitat appears to be concentrated in Jefferson County, in the vicinity of Fort Drum Military Reserve, where the population has also been declining (C. Norment pers. comm.). In this county, 151 fields were surveyed for Henslow's Sparrow in 1997, and 18 (12%) were occupied by a total of 47 male birds; by 2005, only four male Henslow's Sparrows were recorded at a total of 3 of 156 fields (2%) (C. Norment, pers. comm.).

In Michigan in 2005, 20 singing males were recorded in the southern part of the Lower Peninsula, and one singing male was recorded in the northern part of the Lower Peninsula; no singing males were recorded in the Upper Peninsula of Michigan (J. Gibson pers. comm.). The decline of Henslow's Sparrow in Michigan since the 1970s may correspond with the more intensive use of grasslands occurring there in the mid-1970s (R. Adams pers. comm.).

The first Ontario Breeding Bird Atlas (1981–1985) reported Henslow's Sparrow in only 38 squares, and confirmed breeding was reported in only three of these (Cadman *et al*. 1987). In the early 1980s in Ontario, it was estimated that there were fewer than 50 pairs remaining in the southern part of Hastings, Lennox-Addington, Frontenac, and Prince Edward counties (Knapton 1987). In the early 1990s, a thorough search for the birds in these areas revealed only a single singing male. The results of surveys in 1992 and 1993 suggested that there were probably fewer than 10 pairs nesting in Ontario at that time (Austen 1994). Breeding evidence was documented in nine locations in the 2001–2005 Ontario Breeding Bird Atlas and suggests that at least one breeding territory may exist in Ontario each year. The conservation status for Henslow's Sparrow across its range is outlined in Table 1.

Table 1. Conservation Status

Status	Jurisdiction
N1 (critically imperilled nationally)	Canada (N1B)
N3 (vulnerable to extirpation nationally or extinction)	United States (N3B N4N)
S1 (critically imperilled in the province/state)	Ontario (S1B), Arkansas (S1B, S2N), Maryland (S1S2B), Minnesota (S1B), Massachusetts, Nebraska, New Jersey (S1B), Tennessee (S1B), Vermont (S1B), Virginia (S1B), West Virginia (S1B)
S2 (imperilled in the province/state)	Alabama (S2N), District of Columbia (S2S3N), Illinois, Michigan (S2S3), North Carolina (S2B, S1N) , Oklahoma, Texas (S2S3N, SXB), Wisconsin (S2S3B)
S3 (vulnerable to extirpation in the province/state)	Georgia, Indiana (S3B), Iowa (S3B), Kansas (S3B), Kentucky (S3B), Louisiana (S3N), Missouri, New York (S3B)
S4 (apparently secure)	Ohio, Pennsylvania (S4B)
SNA (conservation rank not applicable)	Mississippi, South Carolina
SUB (unrankable due to lack of information or conflicting information)	South Dakota
SNR (not yet assessed)	Quebec, Florida (SNRN)
SX (presumed extirpated)	Rhode Island
SHB (historical breeding)	Connecticut (SHB, SHN), Delaware (SHB, S1N), New Hampshire

Source: NatureServe (2006)

1.3 Needs of Henslow's Sparrow

1.3.1 Habitat and Biological Needs

Biological Needs

Birds arrive on the breeding grounds in Ontario in late April and early May. Males begin singing as soon as they arrive on the breeding grounds, with the frequency and vigour of this song increasing until mid-May (Herkert *et al.* 2002). Singing begins approximately one half hour before sunrise and stops approximately one half hour after sunset, with singing intensity greatest at dawn and dusk.

Males defend their territory; territories may be clustered to form a loose colony (Wiens 1969; Cully and Michaels 2000). In Michigan, the average territory size was 0.3 ha (Robins 1971); in Wisconsin, the average territory size is larger (0.7 ha ± 0.26 SD, n = 4; Wiens 1969); and in Pennsylvania, the territories on reclaimed surface mines are often smaller (0.18 ha ± 0.05 SD, n = 22; Piehler 1987). Henlow's Sparrows are generally monogamous. Females build the nest in about 5–6 days (Hyde 1939). The cup-shaped nest is constructed of dead vegetation (typically grass) and placed at the base of grass clumps, resting on litter usually 2.5 cm to several centimetres above the ground (Robins 1967 1971). The nest is generally not fastened to the

standing vegetation. A new nest is constructed for each nesting attempt (Robins 1971). Typically, 4–5 eggs (range 2–5 eggs) are laid, one per day. Incubation over a 10- to 12-day period is performed by the female, as is brooding. Young are tended by both parents and fledge at 9–10 days. In Michigan, two clutches may be raised in a single year; it is not known whether Henslow's Sparrows are double-brooded in Ontario. Birds leave the breeding grounds in Ontario during September or early October. Very low numbers of banded birds are recaptured in successive years at active colonies (Herkert *et al*. 2002), suggesting either low site fidelity by individual sparrows or high mortality. However, colonies will remain active year after year if suitable habitat is available.

Breeding Habitat

Henslow's Sparrows occupy open fields. They are believed to have originally been adapted to the tallgrass prairie community (Knapton 1982), wet fields, and marshes. Many of these grassland and prairie habitats in both the United States and Canada have been converted to agricultural lands, developed, or degraded through intense grazing pressure (Smith 1992); others have grown in with woody species in the absence of fire. Less than 1% of Canada's tallgrass prairie remains; tallgrass prairie remnants are in southern Manitoba and Ontario (Morgan *et al*. 1995). Today, Henslow's Sparrows in Ontario inhabit mainly pastureland and uncut and abandoned hayfields.

The key elements of the breeding habitat, based upon studies from the United States and Ontario, are summarized below. Henslow's Sparrow has highly specific habitat requirements on the breeding (and wintering) grounds. However, as population density in an area increases, a wider range of habitat elements may be selected, and the importance of the following features may decline (J.R. Herkert pers. comm.).

Tall, dense grass cover – In Ontario, colonies have been located in abandoned fields, ungrazed or lightly grazed pasture, fallow hayfields with high clover and alfalfa content, grassy swales in open rolling farmland, wet meadows, or, infrequently, mowed fields (Cuddy 1984). The key feature of these habitats has been a high percentage of cover and a moderate to high density of grasses and sedges. The dense vegetation is typically over 30 cm tall. Herkert (1998) reviewed the habitat associations of Henslow's Sparrow and found that their abundance was positively related to maximum herbaceous vegetation height and maximum vegetation density and negatively correlated with the amount of bare ground.

Thick thatch layer – A thick mat of dead plant material from previous years' vegetation is generally found in the ground layer. In Kansas (Zimmerman 1988), Wisconsin (Wiens 1969), and Illinois (Herkert 1994a), occupied areas had a higher density of standing dead vegetation than unoccupied areas. Areas with high litter depth readings (Wiens 1969; Winter 1999) and greater litter coverage (Wiens 1969; Kahl *et al*. 1985) appear to be favoured and may be associated with greater nest success (Winter 1999). However, Henslow's Sparrows were negatively correlated with this feature in Missouri (Skinner *et al*. 1984).

Lack of emergent vegetation – Henslow's Sparrows appear to avoid sites with hills or treelines nearby and sites with posts, fence lines, wires, or trees (Wiens 1969). They will also avoid grassland with emergent shrubs or trees. Long, unbroken views to the horizon may be essential

(Peterson 1983). In New York, Henslow's Sparrow territories had fewer than 10 woody stems (average height 0.5 m) per 250 m^2 and shrub cover <1% (Krebs 2002). In Kansas, Henslow's Sparrow habitat had significantly lower tree (>4 m tall) densities (mean 0.54 trees/ha) than random sites (6.67 trees/ha; Cully and Michaels 2000).

Large areas of grassland habitat – Henslow's Sparrow was described as an area-sensitive species in Illinois; grassland size had a significant positive influence on the probability of occurrence for Henslow's Sparrow, and a grassland fragment of 55 ha was required for the probability of occurrence to equal 50% of its maximum value (Herkert 1994b). The average size of an occupied grassland patch was 421 ha (Herkert 1994a). J.R. Herkert (pers. comm.) suggests that as population density increases and birds become more common, breeding birds are increasingly found in smaller fields; large tracts of grassland may be required for birds to establish and maintain active colonies when densities are low.

Restored grasslands should be greater than 50 ha in size, preferably greater than 100 ha. Contiguous grassland greater than 30 ha should be provided. Smaller grasslands are generally dominated by generalist species and less likely to support viable populations of area-sensitive species such as Henslow's Sparrow (Herkert 1998). However, small fragments surrounded by other grassland habitat and near large grassy areas may also provide suitable habitat, but support lower densities (Winter and Faaborg 1999). A rotational system of management, where management (e.g., mowing, burning, grazing) is applied to small sections of the grassland on a regular rotating schedule, may be most appropriate and would best be facilitated in large grasslands. Management units should be approximately 30 ha in size (Herkert 1998).

Low-lying wet areas – In Ontario, a number of historical locations contained, or were adjacent to, low-lying areas that were seasonally flooded during the spring. Canada blue-joint (*Calamagrostis canadensis*) or reed canary grass (*Phalaris arundinacea*) were common in these habitats (Cuddy 1984). In Michigan, Henslow's Sparrow occupied habitat with an intermediate moisture range; very wet or very dry areas were avoided (Robins 1971). J.R. Herkert (pers. comm.) states that of 11 grassland fields studied for 11 years in Illinois, the field containing the most stable population between years was also the wettest; he speculates that this native prairie field contained habitat with the most stable vegetation structure from year to year (even after fire) and that this stability was attributable to the wetness of the location. At Fort Drum Military Reserve in New York, Henslow's Sparrow breeding pairs appeared to select microhabitats with standing water (C. Norment pers. comm.).

Migration Habitat

Because Henslow's Sparrows are believed to migrate singly or in small groups at night over a short period (1–2 weeks), migrating individuals are rarely observed. They have been found in grassland habitats, adjacent to grassland habitats in hedgerows, and at the edges of shrubby areas.

Winter Habitat

Little is known about habitat selection on the wintering grounds. Typical habitat appears to be open longleaf pine (*Pinus palustris*) savannas that have a dense ground cover; fire intervals are important for maintaining appropriate forest structure (Chandler and Woodrey 1995; McNair 1998; Plentovich *et al*. 1999; Fuller *et al*. 2005; Johnson *et al*. 2005; Thatcher *et al*. 2005).

1.3.2 Limiting Factors

Henslow's Sparrows require large areas of grassland for breeding, rearing, and feeding, little disturbance, and a sufficient supply of invertebrates for food. Undisturbed grassland habitat other than the necessary management through fire, grazing, or mowing is essential. The following activities can result in destruction of habitat:

- drainage or infilling of low-lying areas;
- urbanization;
- aforestation;
- cultivation without extended periods of fallow;
- regular mowing that prevents the formation of tall, dense herbaceous cover;
- heavy grazing that prevents the formation of tall, dense herbaceous cover;
- succession of grasslands to shrubland or forest; and
- fire that prevents the formation of tall, dense herbaceous cover with a dense thatch layer.

Management of grassland habitat using fire, grazing, or mowing is periodically required to ensure the long-term availability of both breeding and wintering habitat. The timing of these events appears critical. Historically, prairie grasslands were swept repeatedly by wildfire, which prevented the invasion by woody vegetation. The time taken by Henslow's Sparrow to recolonize grassland following a fire appears variable and location specific and may be related to the timing, intensity, and heterogeneity of the burn. In Kansas, Henslow's Sparrows returned in low densities to a field managed on a three-year burn rotation one year after the fire and at much higher densities after 2–3 years (Austen *et al*. 1997). In Minnesota, Henslow's Sparrow recolonized a burned field 4–5 years after a fire, around the same time that woody forbs reestablished, and were potentially eliminated when rotation periods less than four years were used (Austen *et al.* 1997).

1.4 Threats

Threats to the survival of Henslow's Sparrow are presented in order of significance.

1.4.1 Loss/Degradation of Breeding Habitat

The decline of Henslow's Sparrows in the United States and Canada appears to track the loss of grassland or old-field habitats on the breeding grounds (Knapton 1986; Hands *et al*. 1989; McPeek 1991; Peterjohn and Rice 1991; Smith 1992). Industrial and residential development and changes in agricultural practices are the key factors involved in habitat loss and decline. Changes to agricultural practices that degrade habitat include row crop production, fodder and grain production, the continual use of fields with no fallow periods, earlier and more frequent cutting

of hay crops, overgrazing, and aforestation. Natural events, such as succession of grassy fields to shrub and forest or flooding of low-lying areas, also destroy habitat. Henslow's Sparrow requires large patches of suitable habitat, and so fragmentation of habitat through changing land use practices also threatens habitat. Recent Henslow's Sparrow population increases in some areas of the United States (a 10-fold increase in Illinois) appear to be associated with the creation of undisturbed grassland habitat by the Conservation Reserve Program (Herkert 1997; Herkert *et al*. 2002), suggesting that habitat creation could reverse the negative population trend for this species over time.

1.4.2 Loss of Wintering Habitat

The typical wintering habitat, longleaf pine savannas, are threatened by many of the same processes that threaten breeding habitat. Primary threats include changes due to a decreasing frequency of fire, habitat degradation, or habitat loss through drainage, urbanization, and conversion to agriculture or pine plantations (Herkert *et al*. 2002). For example, in Mississippi, pine savannas managed on a three- to four-year fire cycle appear to provide suitable wintering habitat for Henslow's Sparrow (Chandler and Woodrey 1995); few sparrows are recorded when fire intervals are longer.

1.4.3 Catastrophic Disturbance

The small population size and clumped breeding distribution due to both the limited availability of suitable habitat and the semi-colonial breeding behaviour of Henslow's Sparrows suggest that localized catastrophic disasters such as poorly managed or uncontrolled fire, incompatible agricultural practices, and extreme weather events would pose a threat to the species.

Localized catastrophic events (e.g., intense storms and hurricanes) on the wintering grounds may also pose a threat to the species. Currently, insufficient information is known about the winter distribution of Henslow's Sparrow to enable an assessment of its vulnerability.

1.4.4 Low Adult and Juvenile Survival

Few birds banded at breeding sites have returned to those same sites the following year (Robins 1967; Hands *et al.* 1989; Skipper 1998), suggesting that adult or juvenile mortality may be high before or during migration or on the wintering grounds. However, Henslow's Sparrow may also not be faithful to individual breeding locations due to the unpredictable nature of its habitat (Hands *et al*. 1989), and so the lack of banded birds returning does not prove a high level of mortality. Increased levels of monitoring are required to confirm this.

1.4.5 Threats to Reduce Breeding Productivity

Very little information is available on either nest success rates or predation rates for Henslow's Sparrow. In Michigan, Robins (1971) found that six of 11 nests (55%) had at least one young and that all young were successfully raised in only one of those 11 nests (9.1%). From 46 eggs, 17 young were produced (37%; Robins 1971). Because nests are placed so close to the ground, mammals such as skunks, weasels, raccoons, and snakes are expected to be important nest

predators (Robins 1971; Smith 1992; Winter 1999; Winter *et al*. 2000). Predation may be higher in small grassland fragments, particularly grassland habitats close to woody cover. Predation rates on artificial ground nests in tallgrass prairie fragments were examined in Missouri. Nests close to woody vegetation (<60 m) experienced a 28.7% predation rate, compared with a 7.9% predation rate for nests farther away (Burger *et al*. 1994). For Henslow's Sparrow, nest success was lower in areas less than 50 m from a shrubby edge, presumably because of predation (Winter *et al*. 2000).

Nests in Michigan and Ontario are infrequently parasitized by Brown-headed Cowbirds (*Molothrus ater*) (Robins 1971; Peck and James 1987). In Ontario, one of 12 nests examined had been parasitized by cowbirds (Peck and James 1987), representing a parasitism rate of 8.3%. In Oklahoma and Missouri, parasitized nests that successfully fledged young fledged both Henslow's Sparrow and cowbird young (Winter 1999; Reinking *et al*. 2000).

Competition for habitat, particularly with other sparrows, may limit breeding success. Aggressive interactions between Henslow's Sparrow and Bobolinks (*Dolichonyx oryzivorus*), Savannah Sparrows (*Passerculus sandwichensis*), Grasshopper Sparrows (*Ammodramus savannarum*), and Red-winged Blackbirds (*Agelaius phoeniceus*) have been observed (Wiens 1969; Robins 1971). Savannah and Grasshopper sparrows in particular have a high degree of habitat overlap with Henslow's Sparrow (Hands *et al*. 1989; Smith 1992; Smith and Smith 1992), although Henslow's Sparrow appears to have a larger area requirement (Smith and Smith 1992) and requires taller, denser grassland habitat.

The most significant threat to breeding productivity may be habitat disturbance early in the breeding season from agricultural activities such as grazing and mowing. If these activities do not prevent territory establishment, they may delay the onset of breeding until vegetation height and density are sufficient to provide breeding habitat; as a minimum, grass tussocks are required (Winter 1999). Mowing during the breeding season will result in a high rate of nestling and fledgling mortality and is incompatible with Henslow's Sparrow persistence. However, mowing later in the summer may be acceptable. For example, in New York, hayfields that were mown in September, leaving unmown strips or unmown habitat in a checkerboard pattern, provided suitable habitat for Henslow's Sparrow the following spring (S. Lazazzero pers. comm.).

1.5 Actions Already Completed or Under Way

In 1995, a draft habitat management plan for Henslow's Sparrow was prepared (Enright 1995). This plan provides broad guidelines on habitat area size and shape, grass mixtures to plant, and prescribed burn, grazing, haying, and woody vegetation management. The management plan proposed to restore approximately 1000 ha of grassland habitat in South Cayuga, Ontario, predominantly on land owned by the Ontario Ministry of Natural Resources. The management plan was not implemented.

In 1998, an adaptive habitat management project was initiated at Ostrander Point in Prince Edward County. Approximately one third of the area identified for treatment was mowed and cleared of brush. In 1999, bird surveys were conducted to determine if the mowing and clearing of brush had had a positive impact on Henslow's Sparrow; several singing males were heard in

1999 and again in 2000, indicating that with careful habitat management, this species may again breed there (Environment Canada 2006).

While no habitat stewardship projects in Ontario have focused exclusively on Henslow's Sparrow, a few habitat securement projects were completed between 2000 and 2006, such as on Walpole Island First Nation lands, and habitat restoration projects that could benefit the species were completed in Alderville First Nation and Pelee Island, among other locations.

1.6 Knowledge Gaps

In addition to information gaps related to the identification of critical habitat, there is currently inadequate information available on:

- the size, status, and distribution of the Henslow's Sparrow population in Canada;
- productivity and factors affecting productivity;
- management techniques to maintain, create, or enhance habitat for Henslow's Sparrow in Ontario;
- sources of the birds that immigrate into Ontario from the United States;
- migration and wintering habitat needs and the location of each for the Canadian population; and
- significance of migration and wintering habitat threats to the Canadian population.

Henslow's Sparrow will respond to taped calls of conspecifics. Call playback was used for censusing Henslow's Sparrow in the early 1990s (M. Austen pers. comm) and could be used for attracting them to a new breeding site (through conspecific attraction).

2. RECOVERY

2.1 Rationale for Recovery Feasibility

Recovery of this species is considered technically and biologically feasible, if limiting factors and threats are adequately addressed (e.g., through habitat restoration).

Immigration from the United States is necessary to maintain the species in Canada. Hence, its recovery in Canada will depend on population trends and recovery activities in the relevant U.S. states. Currently, individual male Henslow's Sparrows are recorded in Ontario each year. The difficulty of detecting unpaired female Henslow's Sparrows precludes an estimate of their availability in Ontario. Source populations exist in Indiana, Illinois, New York, Ohio, Pennsylvania, and Michigan. Increasing population density in Illinois, Ohio, and Pennsylvania may allow Henslow's Sparrow to expand to adjacent states, thus supplementing populations within New York and Michigan.

Sufficient suitable habitat is unlikely to be currently available and secure in Ontario. However, the potential to rehabilitate and maintain suitable habitat is high. Henslow's Sparrow has shown the capacity to expand into new areas once suitable habitat is available. For example, populations in Pennsylvania increased in the 1980s due to the increased availability of suitable habitat on reclaimed surface mines (Reid 1992; Mattice *et al*. 2005).

Securing critical habitat areas in Ontario and utilizing appropriate management would help mitigate threats to habitat. Long-term protection and management of rehabilitated habitat might best be achieved on public land. However, collaboration with landholders to encourage compatible land management on adjacent lands would allow for a wider range of habitat values to be provided in the landscape, thereby benefiting a wider array of species. Habitat restoration techniques used in the United States provide a model for success. Establishment of at least 3–4 separate populations in Ontario would mitigate against catastrophic disturbance.

2.2 Recovery Goal

The long-term recovery goal for Henslow's Sparrow is to increase the Canadian population to a stable annual minimum population of 50 breeding pairs spread among at least three geographically distinct nesting areas over the next 20 years.

Although this population size is not expected to be self-sustaining without immigration from populations in the United States, it is expected to be achievable. In the early 1980s, the Canadian population was at this level, until key habitat became unsuitable through lack of appropriate management (R. Knapton pers. comm.).

The short-term goal over the next five years is to create large patches of suitable, secure grassland habitat at three locations in Ontario.

Establishment of at least three separate habitat locations in Ontario will maximize the probability that suitable habitat will be found by immigrating Henslow's Sparrows. Establishment of

populations at several locations will mitigate against catastrophic disturbance. Isolated habitat patches should be greater than 30 ha and ideally greater than 50–100 ha in size. Several small habitat patches (minimum 30 ha) separated by less than 2 km may together function as a single large habitat patch and will be given preference over small isolated patches during recovery.

2.3 Recovery Objectives

Over the next five years, the recovery goal will be achieved by:

1. locating and securing large habitat areas to provide suitable or potential habitat for Henslow's Sparrow;
2. creating, restoring, rehabilitating, and enhancing habitat at appropriate sites;
3. ensuring that at least three large (greater than 50 ha), geographically distinct nesting areas are available annually in order to mitigate potential catastrophic effects from disturbance;
4. conducting annual surveys at identified priority locations to determine population status and distribution;
5. establishing at least one stable breeding colony in Ontario;
6. identifying and securing critical habitat and monitoring its condition;
7. establishing a dialogue and relationship with agencies and organizations that are interested in recovery efforts in Indiana, Illinois, New York, Michigan, Pennsylvania, and Ohio;
8. establishing a dialogue and relationship with landholders that are interested in recovery efforts in Ontario; and
9. producing a detailed description of migration and wintering habitat and evaluating its protection status, in cooperation with other species management agencies.

2.4 Approaches Recommended to Meet Recovery Objectives

2.4.1 Recovery Planning

Table 2 outlines a broad strategy to address threats, with reference to the pertinent recovery objective.

Table 2. Strategies for Recovery

Priority	Objective No.	Threats addressed	Broad strategy to address threats	Recommended approaches to meet recovery objectives	Outcomes or deliverables
High	1.	Habitat loss	Habitat availability	• Develop a method to identify candidate habitat areas. • Secure candidate habitat.	• Candidate sites identified and secured.
High	1. 3.	Catastrophic disturbance	Habitat availability	• Identify and maintain geographically distinct habitat patches.	• Minimum of three geographically distinct patches identified and maintained.

Priority	Objective No.	Threats addressed	Broad strategy to address threats	Recommended approaches to meet recovery objectives	Outcomes or deliverables
High	2. 3.	Habitat loss and degradation	Habitat restoration	• Develop criteria for the prioritization of sites that would most clearly benefit from strategic restoration activities. • Develop appropriate restoration and management tools to restore breeding habitat at each site as needed. • Actively manage habitat to maintain habitat supply.	• Suitable habitat is created/restored where cost-effective and appropriate, with a priority on projects most likely to be successful. • Breeding populations established.
High	4.	N/A	Inventory and monitoring	• Develop and implement protocol to monitor habitat conditions in priority and/or occupied sites.	• Database maintained; results reported; strategies for addressing negative changes developed and implemented.
High	4.	N/A	Inventory and monitoring	• Monitor annual population trend, productivity, and survivorship in Canada in relation to habitat characteristics.	• Produce annual reports, and maintain a georeferenced database of survey results.
High	5. 6.	Habitat loss and degradation	Habitat protection	• Identify and, if appropriate, map critical habitat. • Prioritize sites that are in most urgent need of protection. • Determine ideal protection strategies for each high-priority site (tax relief, easement, covenant, acquisition, stewardship).	• Candidate sites for securement identified. • Securement strategies identified.
High	1. 3. 5. 8.	Habitat loss and degradation	Public outreach	• Identify relevant landowners and land managers for candidate habitat, and support appropriate land management.	• Appropriate management agreements obtained.

Priority	Objective No.	Threats addressed	Broad strategy to address threats	Recommended approaches to meet recovery objectives	Outcomes or deliverables
Medium	3. 5. 8.	Habitat loss and degradation	Public outreach	• Identify neighbouring landowners, land managers, and other target audiences, and support the development of appropriate outreach materials. • Provide guidance to interested neighbouring landowners on agricultural practices compatible with Henslow's Sparrow (such as later-season hay harvest).	• Additional target audiences identified. • Information materials provided to landowners and land managers.
Medium	7.	Habitat loss (United States)	Communication	• Identify potential U.S. partners/collaborators in states that likely provide source populations to Canada.	• Contacts established with U.S. partners to address conservation needs in relevant states.
Medium	9.	Loss of migration and wintering habitat	Research	• In cooperation with other researchers and agencies, quantitatively describe migration and wintering habitat and define essential habitat components; determine site fidelity; determine how much habitat remains and its protection status; determine significance of migration and wintering habitat threats to Canadian population.	• Important migration and wintering habitat elements known. • Significance of migration and wintering threats identified.

2.4.2 Narrative to Support Recovery Planning Table

Lack of suitable, secure breeding habitat is thought to be the primary reason that Henslow's Sparrow has declined in Canada. Where apparently suitable habitat is available, it is often too small to support Henslow's Sparrow or lacks important vegetation structural components. Cooperative and voluntary measures will be the primary means used to secure habitat areas. This strategy recommends that habitat creation, restoration, rehabilitation, and enhancement be implemented immediately as the primary tool by which Henslow's Sparrow will be recovered in

Ontario. The success of recovery efforts in Ontario will depend on sufficient source population being available in the United States, and the Recovery Team will need to work closely with agencies and organizations in relevant states.

The creation, restoration, rehabilitation, and enhancement of large areas (greater than 50 ha in size) of grassland habitat potentially adjacent to wetlands or existing protected areas and managed for Henslow's Sparrow would provide suitable habitat for Henslow's Sparrow, as well as a range of other at-risk grassland, wetland, and prairie species. Appropriate management of adjacent agricultural areas (such as later-season hay harvesting) would increase the size of habitat area available to Henslow's Sparrow. Other grassland species not at risk but undergoing range-wide declines, such as the Grasshopper Sparrow and Savanna Sparrow, would also benefit. Henslow's Sparrow habitat located in native grasslands will provide for native grassland communities. A multispecies approach to recovery should be considered in the action plan.

2.5 Critical Habitat

2.5.1 Identification of the Species' Critical Habitat

Identifying and protecting critical habitat and monitoring its condition are recovery priorities. However, critical habitat will not be defined until an action plan is developed. Breeding evidence was documented in only nine locations in the 2001–2005 Ontario Breeding Bird Atlas, and much of the formerly occupied habitat is now believed to be unsuitable because of development, conversion to shrubland, or earlier harvesting of hayfields. Consequently, insufficient information is currently available to permit critical habitat to be defined.

Although the literature provides information on the general type of habitat that the species uses, the extent of potential and actual habitat within Ontario is not known. Surveys in 2002 catalogued historical record locations and examined a portion of these sites for Henslow's Sparrows (Wiercinski 2002). Additional sighting locations since 2002, held by the Natural Heritage Information Centre and identified during Ontario Breeding Bird Atlas surveys, should be added to this list, searched for breeding Henslow's Sparrows, and their current status as suitable habitat described. Much of this habitat is expected to be now unsuitable for Henslow's Sparrow.

Critical habitat identification will require an assessment of habitat condition at historical breeding locations and locations at which singing males have been detected since 1980. Priority should be given to the most recent records. However, as much of this habitat is expected to be now unsuitable for Henslow's Sparrow, this activity should be undertaken concurrently with the identification of large areas of secure grassland that may be candidate areas for habitat creation, enhancement, or restoration. Preferably, these areas of potential habitat will be located on public land or in areas already identified as critical habitat for other species with similar habitat needs to ensure that a stable supply of grassland habitat is identified. These areas will also need to be located in an "open" landscape where there are relatively few forest patches or physical structures such as buildings. The South Cayuga Fields area considered by Enright (1995) should be reconsidered. Historical breeding locations and candidate habitat areas should be surveyed for

breeding Henslow's Sparrow to confirm the breeding status of this species in Ontario and to provide a baseline for subsequent population monitoring.

2.5.2 Schedule of Studies to Identify Critical Habitat

The research activities listed in Table 3 will be incorporated into the action plan for this species.

Table 3. Schedule of Studies: Recommended research activities for the identification of critical habitat for Henslow's Sparrow

Description of activity	Outcome/rationale	Completion date
1. Assess habitat condition at historical breeding locations and current sighting locations (defined as habitat occupied between 1980 and 2005). Activities include: o Inventorying known historical breeding locations. o Adopting and/or developing standard monitoring protocols. o Measuring: size of grassland patch; vegetation composition; vegetation height; presence of dense thatch; amount of bare ground; degree of woody invasion; soil moisture; potential for disturbance; and distance to the horizon, fencelines, trees, roads, and dwellings.	a. Location of all historically occupied habitat collated. b. Current area of suitable habitat at historically documented sites confirmed.	August 2008
2. Identify large patches (greater than 30 ha) of suitable or potential habitat. Activities include: o Evaluating the suitability of critical habitat areas identified for other SARA species that might also be suitable for Henslow's Sparrow. o Evaluating habitat suitability on public lands within former range. o Consulting with OMNR and other resource management agencies to identify potential habitat areas.	a. Candidate areas for habitat creation, enhancement, or restoration identified. b. Potential critical habitat identified.	August 2008
3. Confirm breeding status at locations identified in Activity 1 where suitable habitat currently exists.	Breeding status in Ontario confirmed.	August 2009

OMNR = Ontario Ministry of Natural Resources; SARA = *Species at Risk Act*

2.6 Performance Measures

The recovery strategy and action plan must follow the adaptive management approach, whereby new information feeds back into the plan on a regular basis in order to take advantage of new tools, knowledge, challenges, and opportunities. A five-year evaluation of the recovery strategy will be based upon the performance measures listed below, using 2006 as the benchmark year.

Table 4. Recovery Performance Measures

Recovery objective	Performance measure(s)	Broad approach
1. Locate and secure large areas to provide habitat	Number of habitat areas identified and secured	Habitat availability, public outreach
2. Enhance, create, and restore habitat	At least three sites of at least 50 ha each enhanced and/or restored	Habitat restoration
3. Ensure that at least three geographically distinct breeding areas are available annually	Increased number of geographically distinct breeding areas that are available	Habitat availability, habitat restoration, public outreach
4. Conduct annual population surveys	Surveys completed at each created habitat area annually; number of birds found	Inventory and monitoring
5. Establish at least one breeding colony	Increased number of breeding pairs	Habitat availability, public outreach
6. Identify critical habitat, and secure and monitor it (none currently identified)	Critical habitat identified and effectively secured and monitored	Habitat protection/stewardship, public outreach
7. Establish a dialogue and relationship with agencies and organizations that are interested in recovery efforts in relevant U.S. states	Number of new recovery projects established in the United States, and number of joint meetings/site visits that are held between U.S. and Canadian collaborators	Habitat protection
8. Establish a dialogue and relationship with landholders that are interested in recovery efforts in Ontario	Number of landholders associated with Henslow's Sparrow critical habitat using compatible land management techniques	Habitat protection/stewardship, public outreach
9. Identify migration and wintering habitat, and evaluate its protection status	Characteristics of essential habitat are defined; essential wintering areas are broadly mapped; and a threat assessment is conducted and reported on	Research

2.7 Effects on Other Species

Recovery efforts that are focused on Henslow's Sparrows — especially efforts that are designed to protect, restore, or create grassland habitats — will benefit a great variety of species. The protection, restoration, or creation of native grasslands will be particularly beneficial. Grassland habitat creation adjacent to wetlands, tallgrass prairie, or existing protected areas will be especially beneficial. Species at risk listed in Table 5 utilize grassland, prairie, or wetland habitats and would benefit from the creation of Henslow's Sparrow habitat. No species of conservation concern are expected to be detrimentally affected.

Table 5. List of species at risk that are expected to benefit from recovery activities directed at Henslow's Sparrow

Common name	Latin name	COSEWIC status
American badger	*Taxidea taxus*	Endangered
Bird's foot violet	*Viola pedata*	Endangered
Butler's garter snake	*Thamnophis butleri*	Threatened
Climbing prairie rose	*Rosa setigera*	Special concern
Dense blazing star	*Liatris spicata*	Threatened
Eastern fox snake	*Elaphe vulpina gloydi*	Threatened
Eastern prairie fringed-orchid	*Platanthera leucophaea*	Endangered
Gattinger's agalinis	*Agalinis gattingeri*	Endangered
Loggerhead Shrike	*Lanius ludovicianus migrans*	Endangered
Milk snake	*Lampropeltis triangulum*	Special concern
Monarch butterfly	*Danaus plexippus*	Special concern
Northern Bobwhite	*Colinus virginianus*	Endangered
Pink milkwort	*Polygala incarnata*	Endangered
Purple twayblade	*Liparis liliifolia*	Endangered
Riddell's goldenrod	*Solidago riddellii*	Special concern
Short-eared Owl	*Asio flammeus*	Special concern
Showy goldenrod	*Solidago speciosa var. rigidiuscula*	Endangered
Skinner's agalinis	*Agalinis skinneriana*	Endangered
Slender bush-clover	*Lespedeza virginica*	Endangered
Small white lady's-slipper	*Cypripedium candidum*	Endangered
Tuberous Indian plantain	*Arnoglossum plantagineum*	Special concern
White prairie gentian	*Gentiana alba*	Endangered
Willowleaf aster	*Symphyotrichum praealtum*	Threatened

2.8 Statement of when one or more action plans in relation to the recovery strategy will be completed

A Henslow's Sparrow action plan should be completed by August 31, 2010. To address most threats and further delineate critical habitat, a single, overarching action plan is envisaged. This action plan will take a multispecies approach and consider the creation of grassland habitat that will benefit a range of species at risk. Separate management plans should be developed for each identified grassland habitat area to be created, in consultation with other appropriate recovery teams, such as the Tallgrass Communities of Southern Ontario and Walpole Island Ecosystem recovery teams. The overarching action plan will identify the need for, and roles of, any recovery implementation groups.

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