PROPOSED

Species at Risk Act
Recovery Strategy Series

Recovery Strategy for the Sprague's Pipit (*Anthus spragueii*) in Canada

Sprague's Pipit

2008

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 (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 (www.sararegistry.gc.ca/) and the Web site of the Recovery Secretariat (www.speciesatrisk.gc.ca/recovery/).

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2008

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Additional copies:

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

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DECLARATION

This recovery strategy has been prepared in cooperation with the jurisdictions responsible for the Sprague's Pipit. Environment Canada has reviewed and accepts this document as its recovery strategy for the Sprague's Pipit, as required under the *Species at Risk Act*. This recovery strategy also constitutes advice to other jurisdictions and organizations that may be involved in recovering the species.

The goals, objectives, and recovery approaches identified in the strategy are based on the best existing knowledge and are subject to modifications resulting from new findings and revised objectives.

This recovery strategy will be the basis for one or more action plans that will provide details on specific recovery measures to be taken to support conservation and recovery of the species. The Minister of the Environment will report on progress within five years.

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 responsible jurisdictions and Canadians to join Environment Canada in supporting and implementing this strategy for the benefit of the Sprague's Pipit and Canadian society as a whole.

RESPONSIBLE JURISDICTIONS

Environment Canada
Parks Canada Agency
Government of Alberta
Government of Saskatchewan
Government of Manitoba

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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 Sprague's Pipit. 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. The reader should refer to the following sections of the document in particular: Description of the species' habitat and biological needs, ecological role, and limiting factors; effects on other species; and the recommended approaches for recovery.

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: www.sararegistry.gc.ca/plans/residence_e.cfm

PREFACE

The Sprague's Pipit (*Anthus spragueii*) was designated Threatened by the Committee on the Status of Endangered Wildlife in Canada (COSEWIC) in 2000 and was officially listed under the *Species at Risk Act* (SARA) in June 2003. SARA (Section 37) requires the competent Minister to prepare a recovery strategy for all listed extirpated, endangered, or threatened species. The Canadian Wildlife Service – Prairie and Northern Region, Environment Canada, led the development of this recovery strategy. It was developed in cooperation or consultation with the Parks Canada Agency, Department of National Defence, Agriculture and Agri-Food Canada, and the Governments of Alberta, Manitoba, and Saskatchewan. In addition, all Aboriginal groups within the range of the Sprague's Pipit in Canada were invited to comment on the strategy. All responsible jurisdictions reviewed and approved the strategy. The strategy meets SARA requirements in terms of content and process (Sections 39–41).

EXECUTIVE SUMMARY

The Sprague's Pipit is a small ground-nesting passerine endemic to the Northern Great Plains and was assessed as a threatened species in 2000 by the Committee on the Status of Endangered Wildlife in Canada (COSEWIC). According to Canadian analyses of the Breeding Bird Survey (BBS), Sprague's Pipit populations across Canada steadily declined (−3.1% per year) from 1968 to 2005; although prairie populations appear to have been relatively stable over the last 20 years, parkland populations continue to decline (−4.7% per year) over this same period. However, trend results from the Canadian Wildlife Service's Grassland Bird Monitoring Program (GBM; 1996–2004) show a decline of 10.5% annually in the prairie region compared with a 1.8% annual decline measured by the BBS in Bird Conservation Region 11 for the same period. Given that much of the Sprague's Pipit population occurs within the area monitored by the GBM (mean of 22.6 birds per route on GBM routes compared with 3.4 birds per route on BBS routes), a decline in this core area represents considerable risk for the species.

The loss and degradation of breeding habitat have been identified as key threats and limiting factors for this species throughout its range. Native prairie is critical for the survival and recovery of the Sprague's Pipit. Inappropriate grassland management regimes (including idling and overgrazing) can result in an increase in invasive species and woody vegetation and can alter the structure of vegetation so that it is no longer attractive to pipits. Management through fire, grazing, or mowing is essential for maintaining suitable habitat, with the intensity and frequency of disturbance dependent upon soil productivity and climate. Sprague's Pipits require relatively large areas (≥145 ha) of open grassland for breeding, rearing, and feeding and prefer grassland vegetation of intermediate height and density and few shrubs. Such areas tend to occur where habitats are lightly to moderately grazed or where vegetation is periodically removed by haying or burning. Sprague's Pipits will breed in non-native grassland habitats in some regions with suitable vegetation structure, but numbers are lower in non-native grasslands than in native grasslands.

The recovery goals for the Sprague's Pipit are to increase and then maintain population size and distribution at or above the 1980–1989 levels throughout the pipit's historic range in Canada and to prevent further loss and degradation of native prairie within its historic range. The recovery goal will be achieved primarily through intensive and extensive grassland conservation initiatives, such as stewardship and management agreements, conservation easements, policy reform, and tax incentives. Education and communication programs targeted at youth, land managers, and the general public are needed to increase awareness of pipits and their habitat requirements. Identification of important breeding areas and critical habitat is urgently required to effectively prioritize recovery actions, since this information is currently lacking. Research and monitoring will play important roles in the adaptive management process by ensuring that critical information gaps are filled and enabling recovery activities and goals to be evaluated.

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1. BACKGROUND

1.1 Species Assessment Information from COSEWIC

Date of Assessment: May 2000

Common Name (population): Sprague's Pipit

Scientific Name: *Anthus spragueii*

COSEWIC Status: Threatened

Reason for Designation: Although this species remains relatively common in suitable habitat, numbers have declined significantly in Canada and there is evidence of contraction of its range at the periphery. This species requires relatively large tracts of native grassland greater than 150 ha, which are increasingly rare in its breeding range.

Canadian Occurrence: Alberta, Saskatchewan, Manitoba

COSEWIC Status History: Designated Threatened in April 1999. Status re-examined and confirmed in May 2000. Last assessment based on an existing status report.

1.2 Description

The Sprague's Pipit is a small (15–17 cm, 23–25 g) ground-nesting passerine of the Northern Great Plains. It is a secretive bird that is rarely seen on the ground. Males are most often detected by their song, a series of slurred, descending notes delivered high from the ground: "zeer, zeer, zeer zeer zeer zeer" (Robbins 1998). Females are not typically seen unless flushed from a nest or if an observer is near a nest containing young (S. Davis, pers. obs.). At this point, both males and females may circle the intruder, giving their characteristic squeaky alarm call: "squeet."

The species superficially resembles a sparrow, with its brown and white streaked plumage, and has several field marks that make it readily identifiable if observed in close proximity. The head is characterized by a thin bill and relatively large brown eyes; the breast is composed of a necklace of short streaks, while the belly and flanks are unmarked. The outer white tail feathers contrast markedly with the inner brown feathers and are most noticeable when the tail is fanned during flight. Females are slightly smaller than males, but otherwise sexes are similar in appearance (Robbins and Dale 1999).

1.3 Populations and Distribution

1.3.1 Distribution

The Sprague's Pipit is endemic to North America, where it breeds from the foothills of the Rocky Mountains in southern and central Alberta to southwestern Manitoba and south to southern Montana, northern South Dakota, and northwestern Minnesota (Figure 1; Robbins and Dale 1999). A single breeding record was recorded in the Riske Creek area of south-central British Columbia in 1991 (McConnell et al. 1993). The breeding range of the Sprague's Pipit in Canada has contracted from the eastern and northern portions of its historic range in each of the three provinces (COSEWIC 2000). Overall, 60% of the continental breeding range of the Sprague's Pipit occurs in Prairie Canada (CPPF 2004). Pipits winter in the southwestern United States (primarily Texas, Louisiana, Oklahoma, New Mexico, and Arizona) and northern Mexico (Robbins and Dale 1999).

Figure 1. Distribution of the Sprague's Pipit in North America (from Robbins and Dale 1999).

1.3.2 Population trends

The following information is based on U.S. analyses of the North American Breeding Bird Survey (BBS) data (Sauer et al. 2005). Pipit populations in Canada experienced a 4.8% annual decline between 1966 and 2005. In Alberta, pipits underwent an annual decline of 5.6% over this same period. Pipits also declined in Saskatchewan and Manitoba, but estimates are more variable due to the smaller number of routes and birds, particularly in Manitoba. In the United States, pipit populations were relatively stable, whereas the North American population overall

underwent a 4.1% annual decline between 1966 and 2005. Pipit populations in all jurisdictions and physiographic strata experienced their largest declines between 1966 and 1979, but they have not stabilized and have shown continued declines since 1980.

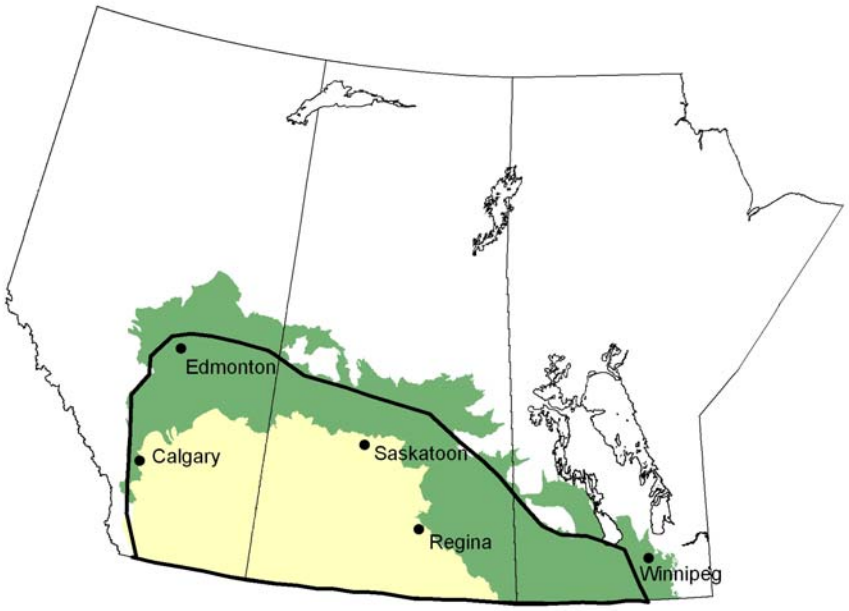

Figure 2. Current distribution of the Sprague's Pipit within the prairie (yellow) and parkland/boreal transition (green) regions of the Prairie Habitat Joint Venture.

Canadian analyses of the BBS data (CWS 2006) also show Sprague's Pipits to have declined in Canada from 1968 to 2005 (−3.1% per year), with declines evident in each of the Prairie provinces. A recent analysis (B. Collins, unpubl. data) of routes within the Prairie Habitat Joint Venture (Figure 2) indicates a 4.5% annual decline between 1970 and 2005. This appears to be driven by severe declines along the eastern and northern portions of the region (hereafter termed "parkland"): pipit populations in the prairie region underwent a 2.8% annual decline between 1970 and 2005, compared with a 6.4% decline in the parkland region (Figure 3). Furthermore, prairie populations appear to have been relatively stable over the last 20 years, whereas parkland populations continue to decline (−4.7% per year) when BBS results alone are examined. However, the BBS has sparse coverage in areas where the bulk of the remaining grassland occurs.

The Canadian Wildlife Service's Grassland Bird Monitoring Program (GBM; Dale et al. 2003) uses BBS-type methodology on supplementary routes in those areas within the Mixed-grass Prairie ecoregion where grassland is still fairly common. Trend results for the GBM (1996–2004) show a decline of 10.5% annually compared with a 1.8% annual decline measured by the BBS in all of Bird Conservation Region (BCR) 11 for the same period (B. Dale and B. Collins, unpubl. data). Given that the bulk of the Sprague's Pipit population occurs in this area (mean of 22.6 birds per route on 16 GBM routes compared with 3.4 birds per route on 70 BCR11 BBS routes), declines in this core area can have a large impact on the population. This pattern of stronger declines in areas of higher population is often observed in declining species (Rodriguez 2002).

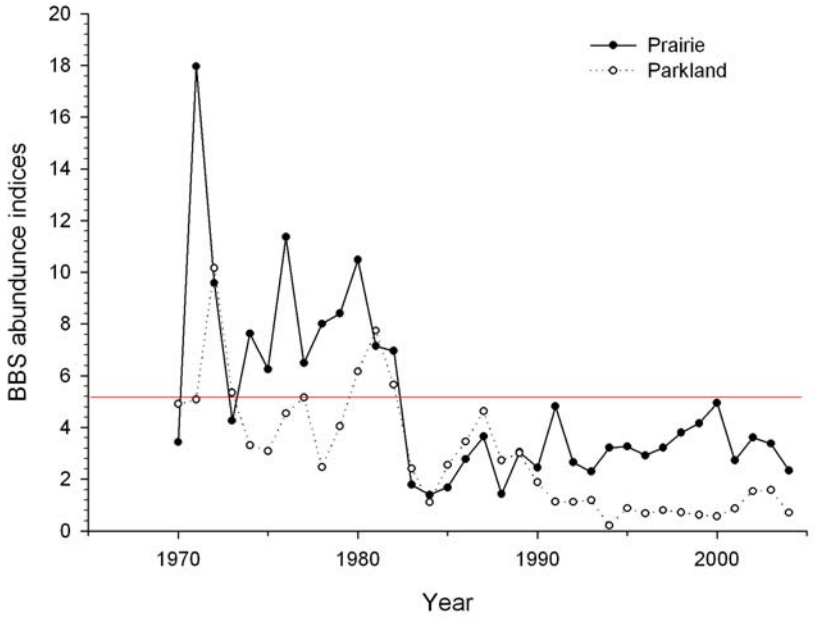

Figure 3. Population trend of Sprague's Pipits in the prairie and aspen parkland regions of Canada based on North American Breeding Bird Survey (BBS) data. The red line indicates the 1980–1989 recovery target for Canada (see section 2.3).

1.4 Needs of the Sprague's Pipit

1.4.1 Habitat and biological needs

Native prairie is critical for the survival and recovery of Sprague's Pipits. The species is rarely found in cultivated lands and is uncommon in most areas where native grasses have been replaced with introduced forage (Owens and Myres 1973; Davis et al. 1999; McMaster and Davis 2001). Territorial pipits have been recorded in some non-native grasslands where the structure of the vegetation is similar to that of native vegetation (Dale et al. 1997; Sutter and Brigham 1998; Davis and Duncan 1999). In Saskatchewan, Sprague's Pipits have been documented nesting in non-native hayfields at Last Mountain Lake National Wildlife Area (S. Davis, unpubl. data), but not in hayfields in the Missouri Coteau (D. McMaster and S. Davis, unpubl. data). In general, Sprague's Pipits prefer grassland vegetation of intermediate height (10–30 cm) and density and few shrubs (COSEWIC 2000). Such areas tend to occur where habitats are lightly to moderately grazed or where vegetation is periodically removed by haying or burning.

The amount of residual vegetation remaining from the previous year's growth is a strong predictor of Sprague's Pipit occurrence (Dale 1983; Davis and Duncan 1999) and where they locate their nests (Dieni and Jones 2003; Davis 2005). Sutter (1997) also found that pipit nests in southern Saskatchewan were located in relatively tall (27 cm), dense grasslands with low forb density and bare ground compared with random sites. In Saskatchewan, vegetation structure immediately surrounding the nest site had little influence on nest survival; however, nest survival did increase with increasing distance from shrubs (Davis 2005).

Sprague's Pipits are also influenced by the size of grassland patches and likely by the amount of grassland in the landscape (Franken et al. 2003; Davis 2004; Skinner 2004). The number of Sprague's Pipits recorded on BBS and GBM routes surrounded by more than 50% grassland was found to be 20.6 individuals per route compared with a mean of 3.2 individuals per route on routes with less than 50% grassland (B. Collins and B. Dale, unpubl. data). In southern Saskatchewan, pipits were absent on grassland patches smaller than 29 ha and had a 50% probability of occurring on patches at least 145 ha (95% confidence interval = 69–314 ha) in size; by definition, the latter patch size is considered to be their minimum size requirement (Davis 2004). Sprague's Pipit abundance was also higher on patches with a smaller edge-to-area ratio. Moreover, Davis et al. (2006) found that Sprague's Pipit density and the number of young fledged per successful nest were also positively related to grassland patch size.

1.4.2 Ecological role

Sprague's Pipits are primarily insectivorous during the breeding season, consuming a variety of arthropods, such as grasshoppers, lepidopteran larvae, and spiders. Pipits and their eggs and young are also a source of food for predators, such as the Merlin (*Falco columbarius*), Northern Harrier (*Circus cyaneus*), Black-billed Magpie (*Pica hudsonia*), American Crow (*Corvus brachyrhynchos*), American skunk (*Mephitis mephitis*), thirteen-lined ground squirrel (*Spermophilus tridecemlineatus*) and various small mammals (S. Davis, unpubl. data). Sprague's Pipits are one of the few grassland songbirds that are endemic to the mixed-grass prairies of the Northern Great Plains (Knopf 1994). The highest populations have likely always occurred on the Canadian prairies. The Sprague's Pipit is strongly associated with native grassland in good condition and is highly sensitive to anthropogenic changes in its breeding habitat. Thus, the Sprague's Pipit is a good indicator of the health of the Canadian prairies and is a suitable flagship for other rare and endangered grassland species.

1.4.3 Limiting factors

Sprague's Pipits require relatively large areas (>65 ha) of open grassland for breeding, rearing, and feeding. Management through fire, grazing, or mowing is essential for maintaining suitable habitat, with the ideal intensity and frequency of disturbance dependent upon soil productivity and climate (Robbins and Dale 1999). Breeding habitats located in more mesic regions and on productive soils are likely to require more frequent disturbance/management events than those in arid regions.

1.5 Threats

Habitat loss and degradation, nest predation and parasitism, pesticides, and climate change are threats that currently limit Sprague's Pipit populations or have great potential to limit them in the near future (Table 1).

1.5.1 Habitat loss

Recent information suggests that at least 75% of native grasslands on the Canadian prairies have been lost (Agriculture and Agri-Food Canada 2001), primarily to cultivation, succession, road

construction, gravel extraction, petroleum exploration and extraction, and settlement (i.e., urban and rural expansion). This has greatly reduced the quality and availability of suitable habitat for Sprague's Pipits. Furthermore, resource exploration and extraction are expected to continue to be threats into the future as demands for resources increase globally. In some regions, pipits are known to breed in non-native grasslands, but their occurrence and abundance are lower than those of pipits found in native grassland (Dale et al. 1997; Sutter and Brigham 1998; Davis et al. 1999).

1.5.2 Habitat degradation

Complete loss of grassland habitat invariably results in Sprague's Pipit populations disappearing from a given area. Habitat degradation (including fragmentation), on the other hand, typically reduces the population, but can lead to local extirpation if the magnitude, frequency, and duration of these threats are great enough.

Cultivation of grassland habitat in Prairie Canada has fragmented much of the remaining grassland, resulting in smaller, isolated patches of habitat (Agriculture and Agri-Food Canada 2001). Although it is difficult to separate the effects of habitat loss from those of habitat fragmentation (Fahrig 2003), recent studies suggest that the Sprague's Pipit is area-sensitive in terms of both abundance and demography (Franken et al. 2003; Skinner 2004; Davis 2004; Davis et al. 2006). In addition, Koper and Schmiegelow (2006) found Sprague's Pipit abundance to be inversely correlated with distance to cropland, and Sutter et al. (2000) found this species to be more abundant along upland trails than along roadsides. Linear development and stretches of broken land are typically associated with invasion by exotic plants such as smooth brome (*Bromus inermis*), which reduces habitat suitability for Sprague's Pipits (Robbins and Dale 1999). Thus, the increased amount of edge habitat resulting from fragmentation may be detrimental to pipits because of their association with interior habitats.

Successful management of grassland habitat often requires some form of disturbance. Idling grassland habitat will reduce its suitability for Sprague's Pipits, particularly in more mesic portions of their range (e.g., Moist Mixed Grassland and Aspen Parkland ecoregions). While grazing, haying, and prescribed burning are necessary and effective tools to maintain and enhance breeding habitat for pipits, these activities can reduce habitat suitability if the timing, frequency, intensity, or duration of disturbance is inappropriate. Inappropriate management regimes (including idling and overgrazing) can result in an increase in invasive species and woody vegetation and can alter the structure of the vegetation so that it is no longer attractive to pipits.

The response of Sprague's Pipits to grazing likely varies geographically, but the species generally avoids heavily grazed pastures (Maher 1973; Dale 1993; Prescott and Wagner 1996; Davis et al. 1999). Because livestock grazing occurs on most native grassland in Prairie Canada, Sprague's Pipit populations could be susceptible to habitat degradation if prolonged periods of high-intensity grazing occur. Not only does overgrazing by livestock negatively influence vegetation structure, but, under high stocking densities, cattle may also reduce reproductive success through disturbance of breeding birds and trampling of nests (Kie and Loft 1990; Paine et al. 1996; Driscoll 2004).

Although Sprague's Pipits are not common on planted hayfields, in areas where they do occur, haying during the nesting season may lower reproductive success through mechanical destruction of nests and adults or by reducing overhead vegetative cover and exposing nests to predators and inclement weather (Dale et al. 1997).

Sprague's Pipits have evolved with periodic fires on the prairies and may therefore be limited by the reduced fire frequencies that have accompanied human settlement. Subsequent encroachment by woody vegetation and invasive exotics and excessive accumulation of litter have degraded breeding habitat in many areas. Prescribed burning can have adverse short-term effects on Sprague's Pipit abundance and occurrence (Pylypec 1991), but this may be offset by long-term benefits through improved habitat quality. Maher (1973) recorded large increases in Sprague's Pipit populations two years after a burn in Saskatchewan. Madden (1996) found that pipits did not occur on North Dakota grasslands that had not been burned for over eight years and that breeding abundance was highest two to seven years after a fire. In more arid regions, pipits were common on native pastures that had not been burned for more than 15 years (Sutter 1996; Dale et al. 1997). Thus, the effects of burning likely vary with burning frequency, soil type, and moisture regimes (Robbins and Dale 1999).

1.5.3 Nest predation / nest parasitism

Predation is the most prominent factor reducing the reproductive success of Sprague's Pipits (Davis and Sealy 2000; Davis 2003, unpubl. data; Jones and Dieni, in press). Although it is difficult to ascertain whether current predation rates are higher than historic levels, changes in predator communities, habitat structure, and landscape composition and configuration of remaining grassland habitat have likely increased the risk of predation (Phillips et al. 2004; Horn et al. 2005). Sprague's Pipits nesting in small habitat patches near edges may suffer reduced productivity because of increased activity of nest predators and Brown-headed Cowbirds (*Molothrus ater*) (Gates and Gysel 1978; Johnson and Temple 1986, 1990). In southwestern Manitoba, 18% of pipit nests were parasitized by Brown-headed Cowbirds, with parasitism occurring only on the smallest (22 ha) site (Davis and Sealy 2000). In Manitoba and Saskatchewan, cowbirds reduced pipit clutch size and hatching success, with an overall cost of 1.3–1.6 young per parasitized nest (Davis and Sealy 2000; Davis 2003). The cost of parasitism to the Canadian pipit population overall, however, may be small, as parasitism rates have been reported to be lower elsewhere (Davis 2003, unpubl. data).

1.5.4 Pollution

Pesticides

Pesticides are used to control weeds, insects, and burrowing mammal populations on agricultural land. Although these chemicals do not target Sprague's Pipits, they may have negative consequences if ingested indirectly through prey or if the chemicals reduce food supplies at a critical period of the nesting cycle. Anecdotal observations suggest that Sprague's Pipits may occasionally forage in cropland and thus could be exposed to pesticides (Martin et al. 2005). However, the amount of time pipits could be exposed to pesticides during the breeding and non-breeding season is unknown.

Industrial noise

Industrial noise has been found to cause reduced pairing success and influence age structure of breeding birds (Habib et al. 2007). Expanding energy development in grassland regions may result in increased noise levels and subsequently interfere with male song. The effect of anthropogenic noise on Sprague's Pipit breeding success has yet to be determined.

1.5.5 Climate change

Climate change models predict more variable and severe weather events (Intergovernmental Panel on Climate Change 2001). Prolonged droughts result in reduced numbers of birds recorded on BBS routes (B. Dale, pers. comm.) and could reduce reproductive output (George et al. 1992). Similarly, prolonged periods of cool and wet weather can also reduce productivity of Sprague's Pipits. During the 2004–2006 breeding seasons at Last Mountain Lake, for example, over 90% of active nests failed during periods of cool wet weather (S. Davis, unpubl. data). Nest failure was attributed to flooding and to young dying from exposure or starvation. The impact at a population level is unknown, but prolonged inclement weather may impact local populations.

Table 1. Summary of threats to Sprague's Pipit populations on Canadian breeding grounds.

Threat category	General threat	Specific threat	Stress	Extent	Occurrence	Frequency	Causal certainty	Severity	Level of concern
Habitat loss or degradation	Crop or forage production	Conversion of native grassland to other cover	Local extinction	Widespread	Current	Ongoing	High	High	High
	Crop or forage production	Reduced vegetation growth due to conversion of Class 1–3 soils	Reduced resource availability	Widespread	Current	Ongoing	Low	Medium	Low
	- Linear development (e.g., roads, pipelines) - Resource extraction	Reduction of interior habitat, increased edge	Reduced resource availability	Widespread	Current	Ongoing	Low	Unknown	Local – high Range-wide –medium
	- Linear development (e.g., roads, pipelines) - Resource extraction	Alteration of plant community or structural diversity	Reduced population size and viability	Widespread	Current	Ongoing	Local – high Range-wide – low	Unknown	Local – high Range-wide –medium
	Invasion by woody or exotic species	Alteration of plant community or structural diversity	Reduced resource availability to local extinction	Widespread	Current	Continuous	High	Medium	High
	Inappropriate or insufficient disturbance - Grazing - Burning - Mowing	Alteration of plant community or structural diversity	Reduced resource availability to local extinction	Widespread	Current	Continuous	High	Local – high Range-wide – unknown	Local – high Range-wide –medium
	Water impoundment	Habitat conversion	Reduced resource availability	Unknown	Current	Ongoing	Low	Unknown	Low
	Urbanization	Habitat conversion	Local extinction	Localized	Current	Ongoing	Local – high Range-wide – low	Local – high Range-wide – low	Local – high Range-wide –low

Threat category	General threat	Specific threat	Stress	Extent	Occurrence	Frequency	Causal certainty	Severity	Level of concern
	Haying	Mortality of adults and young	Reduced productivity	Localized	Current	Ongoing	Medium	Low	Low
Nest predation or parasitism	Altered prey and nest parasitism dynamics	Increased predation; egg removal by cowbirds	Reduced productivity	Widespread	Widespread	Seasonal	Medium	Local – moderate Range-wide – unknown	Medium
Pollution	Exposure to pesticides and herbicides	Pesticide loading and direct exposure	Reduced fitness	Widespread	Current	Continuous	Low	Unknown	Low
	Industrial (noise, light)	Behavioural and social disruption	Reduced productivity	Localized	Current	Ongoing	Low	Unknown	Low
Climate change	Drier and warmer	Reduced primary productivity	Reduced resource availability	Widespread	Current and anticipated	Ongoing	Local – medium Range-wide – low	Unknown	Low
	Increased severe weather events	Nest failure due to inclement weather	Reduced productivity	Widespread	Current and anticipated	Ongoing	Local – medium Range-wide – low	Unknown	Low

1.6 Actions Already Completed or Under Way

Sprague's Pipit status reports for Canada (COSEWIC 2000) and Alberta (Prescott 1997) have been written, and the Sprague's Pipit Recovery Team was formed in 2004. Recovery efforts to date are primarily associated with monitoring and applied research. Although the BBS has provided long-term population trends throughout the prairie region, these trends may not be reliable in grassland-dominated landscapes where BBS coverage is inadequate. Consequently, the GBM was established in 1996 to increase survey coverage and to improve population trend estimates of grassland species in Alberta and Saskatchewan (Dale et al. 2003). Similarly, priority grassland bird surveys on federal lands (e.g., National Wildlife Areas, Prairie Farm Rehabilitation Administration pastures, Department of National Defence lands, and Grasslands National Park) in Saskatchewan and Alberta monitor local populations and refine the status, distribution, and abundance of pipits in these areas. The Manitoba Conservation Data Centre has collected and collated Sprague's Pipit occurrence data from 1987 to 2006. A federal database has been established to manage and distribute Sprague's Pipit data collected by various agencies across the prairie region in Canada and the United States.

Past research in Canada has focused primarily on distribution, habitat use, area requirements, and productivity in grasslands (Dale et al. 1997; Sutter and Brigham 1998; Davis et al. 1999, 2006; Davis and Sealy 2000; McMaster and Davis 2001; Davis 2003, 2004, 2005; McMaster et al. 2005; Koper and Schmiegelow 2006a, 2006b). Currently, researchers are investigating 1) the influence of landscape composition on Sprague's Pipit use of and productivity on native and non-native habitat in Saskatchewan and Alberta, 2) the effects of grazing on pipit abundance and nest success in Grasslands National Park, and 3) the effects of habitat edges on pipit densities in southern Alberta. In addition, researchers are examining whether other grassland bird species are possible surrogates of pipit nesting success and developing predictive models to guide management of federal lands. Research on nesting habitat requirements, diet, survival of nests, juveniles, and adults, territory size, and renesting propensity in Saskatchewan is also ongoing (S. Davis, unpubl. data). This intensive research will provide much-needed information to land managers, allowing for more informed decisions regarding future management and protection of seeded and native grasslands.

The Alberta grassland bird modelling project (Franken et al. 2003) and the draft Decision Support System for Priority Bird Species in the Prairie Habitat Joint Venture (S. Davis and B. Dale, unpubl. data) have modelled BBS and GBM Sprague's Pipit occurrence data as a function of multiple landscape features. Both models suggest that Sprague's Pipit occurrence is related to grassland area and soil types. These models can be refined to help identify critical pipit breeding habitat.

Finally, many larger prairie conservation initiatives at federal (e.g., Agricultural Policy Framework), provincial (e.g., Prairie Conservation Action Plans), and non-governmental organization levels are committed to the identification, restoration, and conservation of priority grasslands and to promoting voluntary stewardship and improving land use management. These projects will positively contribute to pipit recovery and conservation across the Canadian prairie region.

1.7 Knowledge Gaps

Several knowledge gaps exist for Sprague's Pipits in Canada. Information that is currently unknown but required to adequately address threats and recovery objectives is outlined below:

1) Oil and gas and wind energy development activities have greatly increased in southeastern Alberta and southern Saskatchewan. Many of these activities are taking place on the remaining large parcels of native grassland. However, it is unknown what direct and indirect effects these activities have on density, survival, and productivity of pipits.

2) Although pipits are most abundant on native grassland, they will breed in tame forages in some regions of Prairie Canada; however, the conditions under which this occurs are unknown. Furthermore, it is not known whether these anthropogenic habitats act as an ecological source or sink or whether management (and if so, what type of management) improves habitat suitability, reproductive success, and survival of pipits.

3) Pipits rarely use cropland as breeding habitat. However, pipits may forage in cropland and be exposed to pesticide applications during migration. The risk to pipits of pesticide exposure on breeding, migration, and wintering grounds is unknown.

4) The current status of migration and wintering habitats is unknown, along with the factors that threaten the quantity and quality of these habitats.

5) An increasing number of conservation and agricultural programs are encouraging use of native species in converting cropland to perennial cover. It is unknown whether native grassland can be created or restored such that the new habitat is attractive and productive for pipits.

6) Pipit populations are monitored by the BBS program, but no large-scale program monitors native grassland habitat. Determining the quantity and quality of grassland habitat and monitoring changes in quantity and quality over time are required to assess whether recovery efforts are successful.

7) The primary factors causing population declines in different regions of Prairie Canada (e.g., relative effects of habitat loss and degradation, pesticide exposure, predation, etc., in prairie and parkland) are currently unknown.

8) Pipits have been shown to be area-sensitive, but results are from a single study in Saskatchewan. It is unknown whether (and if so, how) density and reproductive success vary with patch size and landscape factors (e.g., amount of native and tame grassland, cropland, wetlands, and woody vegetation) in different regions and at different times.

9) The lack of population estimates limits our ability to develop habitat objectives for the Sprague's Pipit. Developing and refining the best method to derive population estimates will allow setting of meaningful habitat objectives.

2. RECOVERY

2.1 Recovery Feasibility

Recovery of this species is considered technically and biologically feasible if limiting factors and threats are adequately addressed. Although native grassland habitat may be limited in many regions, sufficient suitable grassland habitat is likely available in Canada, and the potential to rehabilitate and maintain suitable habitat is high. Furthermore, Sprague's Pipits have shown the capacity to expand into new areas once suitable habitat is available. For example, pipits will occupy non-native grassland sites that were previously cultivated if vegetation structure is appropriate (Dale et al. 1997; Sutter and Brigham 1998; Davis and Duncan 1999). However, numbers are lower in these habitats, and planted cover in most areas appears to be unsuitable (McMaster and Davis 2001). In addition, pipits have been observed occupying previously unused habitat later in the breeding season after it was grazed or hayed (Owens and Myres 1973; S. Davis, unpubl. data).

Conserving remaining contiguous grassland habitat and implementing appropriate management will help mitigate threats to habitat. Long-term protection and management of habitat might be more readily achieved on public land, but collaboration with all landholders would allow for a wider range of habitat values to be provided in the landscape, thereby benefiting a wider array of species.

2.2 Recovery Goals

1) Increase and maintain population size and distribution of the Sprague's Pipit at or above mean abundance levels experienced during the 1980–1989 time period throughout the pipit's historic range in Canada (Table 2).
2) Prevent further loss and degradation of native prairie within the historic range of the species.

Agricultural census data indicate that the cultivation rate of natural grasslands stabilized during the mid-1980s (Statistics Canada 1997). Furthermore, the 1980s were characterized by a mix of wet and dry periods. Given the affinity of the Sprague's Pipit for native grassland and population-level responses to environmental conditions, the mean abundance for 1980–1989 was considered to be a meaningful population benchmark for recovery. It is assumed that population declines after 1990 may be related to habitat degradation or other unknown factors that may be occurring on the breeding or wintering grounds. These recovery goals recognize that while we can not return to a condition prior to the intensive cultivation of the Canadian prairies, it is possible to meaningfully improve the status of the species and address ongoing declines in abundance and in the distribution of habitat. Increasing populations to 1980–1989 levels may be logistically feasible and biologically reasonable over the long term (i.e., 30 years).

2.3 Population and Distribution Objectives

Population objectives for Sprague's Pipit in Canada are given in Table 2 (see Appendix 1 for methods used to derive population objectives).

Table 2. Population objectives (mean number of birds per route) derived from Breeding Bird Survey (BBS) data for prairie and parkland regions and the Prairie provinces.[1]

Region	Current BBS index[2] (1996–2005)	Target BBS index (1980–1989)	Population increase required to meet 1980s objective
Prairie Canada	1.9	4.6	2.4×
Prairie region	3.6	4.0	1.1×
Parkland region	1.0	4.0	4.0×
Alberta	3.8	6.7	1.8×
Saskatchewan	1.3	3.8	2.9×
Manitoba[1]	0.2	4.8	24.0×

[1] Low sample sizes from Manitoba yield trend and abundance estimates that are unreliable but are presented for comparison with other provinces.

[2] BBS index = mean number of birds per route

Distribution objectives will be partly realized through accomplishment of population objectives in each jurisdiction and ecoregion. However, fully accomplishing these objectives requires that Sprague's Pipits be recorded in regions where they have occurred since the 1980s.

2.4 Recovery Objectives

Over the next five years, progress towards the recovery goals will be achieved by the following:

1) Ensure that all larger prairie conservation programs and land use planning processes integrate Sprague's Pipit recovery needs.
2) Ensure that prairie landowners and other key target audiences are aware of Sprague's Pipit ecology, habitat requirements, habitat management, and recovery strategies.
3) Ensure that recovery partners are aware of the perceptions, attitudes, and needs of landowners and managers, land users, and the general public.
4) Identify and conserve critical habitat in Prairie Canada.
5) Understand the current status of both breeding and wintering habitats.
6) Reduce conservation and land use uncertainties through robust monitoring and science programs.

2.5 Approaches Recommended to Meet Recovery Objectives

2.5.1 Recovery planning

Table 3 outlines recovery actions that are required to achieve Sprague's Pipit recovery goals and objectives.

Table 3. Activities required to mitigate threats and work towards achieving recovery objectives.

Priority	Recovery Objective No(s).	Threats addressed	Broad strategy to address threats	Recommended approaches to meet recovery objectives	Outcomes or deliverables
Urgent	4	Habitat loss/degradation	Habitat conservation	Identify and prioritize important breeding habitat areas and create a process to identify critical habitat.	Candidate sites are identified, and a process for identifying critical habitat is identified and shared with recovery partners.
Urgent	4	Habitat loss/degradation	Habitat conservation	Define and delineate critical habitat (see Table 5, schedule of studies).	Critical habitat is identified and delineated.
Necessary	2–4	Habitat loss/degradation	Habitat conservation	Identify and implement conservation strategies for sites with critical habitat (policy reform, tax relief, easements, stewardship, acquisition, etc.).	Conservation strategies are identified and implemented.
Necessary	1–4	Habitat loss/degradation	Habitat conservation	Identify land use guidelines and practices that benefit pipits, and provide input to inform and influence land use decisions and policies that affect grassland habitat.	Habitat requirements of pipits are incorporated into federal and provincial land use guidelines.
Urgent	2–4	Habitat loss/degradation	Habitat restoration and management	Identify priority areas to target restoration activities. Develop, promote, and implement appropriate restoration and management tools to improve and maintain the quality of breeding habitat.	Suitable habitat is created/restored where cost-effective and appropriate.
Necessary	2, 3	Habitat loss/degradation	Habitat restoration and management	Identify areas where haying of pipit habitat is common, and establish and implement guidelines for haying during the breeding season. Determine whether incentives are required to offset costs to producers.	Haying on Sprague's Pipit breeding sites is delayed to reduce nestling, fledgling, and adult mortality without economic hardship to producers.
Necessary	3	Habitat loss/degradation	Public outreach	Gather information regarding factors influencing management decisions by landowners/stakeholders and provide to wildlife managers.	Wildlife managers are more knowledgeable about factors influencing land use management decisions, resulting in enhanced and maintained habitat for pipits via improved relations between landowners and wildlife managers.

Priority	Recovery Objective No(s).	Threats addressed	Broad strategy to address threats	Recommended approaches to meet recovery objectives	Outcomes or deliverables
Necessary	1	Habitat loss/ degradation	Public outreach	Integrate recovery strategy with other federal and provincial species at risk recovery plans and grassland conservation initiatives.	Pipit recovery actions are integrated into landscape-level conservation initiatives.
Necessary	1–3	Habitat loss/ degradation	Public outreach	Incorporate Sprague's Pipit communication into existing prairie conservation education programs.	Schoolchildren have an increased awareness of pipits and their habitat requirements.
Necessary	2	Habitat loss/degradation	Public outreach	Educate the general public in urban centres about Sprague's Pipit and grassland habitat and their role in prairie conservation.	General public has an increased awareness of pipits and their habitat requirements.
Necessary	4, 6	Habitat loss/degradation	Research	Determine whether (and if so, how) density and reproductive success vary with patch size and landscape factors (e.g., amount of native and tame grassland, cropland, wetlands, and woody vegetation) in different regions and at different times.	Study results lead to identification of critical habitat.
Necessary	4, 6	Habitat loss/degradation	Research	Determine the direct and indirect effects of oil and gas activity and wind energy development on density, survival, and productivity of pipits.	Impact of oil and gas and wind energy development activities is determined, and appropriate guidelines are developed if necessary.
Necessary	4-6	Habitat loss/degradation	Research	Determine whether non-native grassland habitats act as ecological sources or sinks and whether management (and if so, what type of management) improves habitat suitability, reproductive success, and survival of pipits.	Importance of non-native habitats is determined, thus refining the identification of critical habitat.
Necessary	6	Habitat loss/degradation	Research	Determine whether native grassland can be created or restored such that the new habitat is attractive and productive for pipits.	Restoration techniques are developed and implemented to recover pipit populations in areas that have experienced much habitat loss.
Necessary	4, 6	Habitat loss/degradation	Research	Develop and refine the best method to derive population estimates.	Population estimates result in setting of habitat objectives and identification of how much critical habitat is required.

Priority	Recovery Objective No(s).	Threats addressed	Broad strategy to address threats	Recommended approaches to meet recovery objectives	Outcomes or deliverables
Beneficial	6	Climate change	Research	Gain an understanding of population fluctuations and demographic consequences of changing weather patterns.	Improved knowledge of annual variation in population size and resiliency of Sprague's Pipit to climate change.
Necessary	5, 6	Pollution	Research	Determine risk of exposure to pesticides on breeding, migration, and wintering habitats.	Improved understanding of whether pesticides are a potentially important threat to Sprague's Pipit.
Necessary	5, 6	Habitat loss/degradation	Research	In cooperation with other researchers and agencies, quantitatively describe migration and wintering habitats 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 the Canadian population.	Identification of important migration and wintering habitat elements and their relative significance.
Necessary	6	NA	Inventory and monitoring	Evaluate need to create new habitat monitoring programs or augment existing programs to ensure that important pipit habitat is covered.	The most cost-effective means of monitoring pipit habitat is identified and implemented.
Necessary	6	Habitat loss/degradation	Inventory and monitoring	Determine the quantity and quality of grassland habitat, and monitor changes in quantity and quality over time.	Habitat quantity and quality are monitored, thus facilitating assessment of whether or not recovery efforts are successful.
Beneficial	6	NA	Inventory and monitoring	Encourage and solicit volunteer participation in the BBS and increase the number of trained observers and routes in grassland habitat.	A greater number of routes and sites are monitored by trained surveyors within the Sprague's Pipit breeding range, resulting in improved population trend estimates.
Necessary	6	Habitat loss/degradation	Research	Establish long-term study plots to monitor demographic parameters.	Monitoring of demographic rates improves our understanding of life history and population ecology of pipits and provides insight into population trends.

2.5.2 Narrative to support recovery planning table

Conservation activities that maintain and improve the integrity of native grassland habitat are of the utmost importance in recovering pipit populations. Although 75% of the native grassland has been lost, the amount of potentially suitable habitat for Sprague's Pipits is still great. Thus, a strategic approach to conserving grassland habitat is essential. A method for identifying important breeding areas and critical habitat is required to effectively prioritize recovery actions. Conservation and restoration of native prairie may be realized through incentive programs, stewardship and management agreements, conservation easements, and land purchase. Extensive programs, such as extension, policy reform, and tax incentives, will also play a large role in conserving and maintaining good quality grassland habitat. Communication and outreach are considered a high priority because of the limited public profile and awareness of the Sprague's Pipit. Education programs targeted to youth, landowners and managers, and the general public are needed to increase awareness of pipits and their habitat requirements. Research and monitoring will play important roles in the adaptive management process by ensuring that critical information gaps are filled and enabling recovery activities and goals to be evaluated.

2.6 Performance Measures

Performance measures used to determine whether Sprague's Pipit recovery objectives (see section 2.4) are being met are shown in Table 4.

Table 4. Performance measures used to determine whether Sprague's Pipit recovery objectives are being met.

Performance measure	Objective No(s).
Satellite imagery and data from programs like the Prairie Habitat Joint Venture habitat monitoring program will be used to document trends in the amount of grassland habitat over time. Similar programs will be identified through collaboration with U S and Mexican partners to identify, assess and monitor habitat on the wintering grounds.	4–6
Communication and extension programs: uptake of management guidelines, number of schools and students reached, number and type of communication products (media ads, posters, brochures, etc.).	2, 3
Integration of recovery efforts will be considered successful if there is at least one joint recovery team/implementation group meeting/workshop with prairie species at risk specialists by 2009; integration will also be measured by the number of initiatives and groups involved in delivering conservation activities enhancing Sprague's Pipit recovery.	1
Research-related initiatives will be considered successful when at least one study has been completed that addresses each of the knowledge gaps and when results are used to guide recovery planning and implementation.	6
Canada-wide BBS trends and abundance indices will be used to evaluate whether distribution and population targets are being met; avian checklist, bird atlas, and collated sightings from bird enthusiasts will assist in refining and monitoring the extent of breeding distribution in Canada.	6

2.7 Critical Habitat

2.7.1 Identification of the species' critical habitat

Critical habitat will be identified in an Action Plan in 2011 because currently there is a lack of adequate information to determine what habitat is necessary for the survival and recovery of this species. Although Sprague's Pipits are known to occur more often and in greater densities on larger parcels of native grassland, the amount, location and fine-scale attributes of habitat required are currently unknown. It will be an arduous task to accomplish and a series of studies is required to fill important information gaps before critical habitat can be effectively delineated across the Canadian breeding range of Sprague's Pipit.

2.7.2 Schedule of studies to identify critical habitat

Table 5 outlines a number of studies that are required to identify critical habitat for Sprague's Pipits.

Table 5. Schedule of studies to identify critical habitat (see also section 1.7 on knowledge gaps).

Description of activity	Outcome/rationale	Timeline
Develop and refine predictive models of occurrence and abundance using existing data to help identify potential critical habitat areas.	Geographic information system (GIS) maps delineating regions of high probability of occurrence and abundance. Results are used to identify candidate landscapes containing critical habitat.	March 2009
Determine how response to patch size and landscape factors varies temporally and spatially.	Identify potential landscapes that would contain critical habitat across the Canadian range.	March 2011
Determine influence of woody vegetation in landscape in northern and eastern portions of range.	Identify potential critical habitat areas in the mesic portions of the Canadian range where woody vegetation encroachment is prevalent.	March 2011
Determine influence of wetlands and topography on density and reproductive success.	Determine whether or not high-density wetland landscapes are candidates for critical habitat.	March 2011
Determine influence of exotic vegetation.	Identify critical habitat.	March 2011
Identify factors influencing use and reproductive success in non-native habitats.	Identify non-native grassland habitats that could positively influence recovery.	March 2011
Refine ability to derive population estimates to allow setting of habitat objectives.	Gain a better understanding of how much critical habitat is required for recovery.	March 2009
Refine critical habitat definition, incorporating any new information as needed.	The highest quality habitat is conserved for Sprague's Pipit.	March 2009–ongoing

2.8 Existing and Recommended Approaches to Habitat Protection

Sprague's Pipit habitat may be conserved in a number of ways. Voluntary stewardship agreements have been widely used by conservation groups as a means of establishing and building relationships with producers. Landowners typically make a pledge that they will continue to conserve the native resource to the benefit of the wildlife species that depend upon it. In addition, stewards have access to extension materials and technical resource workshops and demonstration sites where they can learn from professionals and their peers. These activities are an important step towards protection of habitat. Management agreements are typically short-term formal agreements (10–15 years) that are legally binding and represent an agreement between the producer and conservation organization. Incentives are provided (e.g., watering system development, fencing materials, forage seed, etc.) to encourage landowners to alter current management regimes for species at risk and other wildlife.

Sprague's Pipit habitat may also be protected in the longer term through conservation easements (voluntary and paid) or purchase of land. Conservation easements allow landowners to maintain control of their land under certain restrictions agreed to by both the landowner and the agency offering the easement. For this reason, the agricultural community may find this form of protection more appealing than conservation agencies purchasing and controlling agricultural land. However, there may be circumstances where land acquisition is deemed to be the best option for both the producer and the conservation agency. While these approaches typically result in the protection of a relatively small proportion of available pipit habitat, the greatest potential for conserving large expanses of grassland habitat is likely via land policy initiatives that affect Crown and private land. Much of the prairie landscape is owned and managed by individual landowners and the provinces. Hence, any changes to agricultural or Crown land policies that conserve grassland habitat, in terms of quality and quantity, and allow producers to make a living have great potential to positively impact a large proportion of pipit habitat.

2.9 Effects on Other Species

Recovery efforts that are designed to conserve and restore native prairie or create grassland habitats will benefit a great variety of grassland species. Specifically, protection and proper management of native prairie will also benefit other federally listed grassland species, such as Burrowing Owl (*Athene cunicularia*), Short-eared Owl (*Asio flammeus*), Ferruginous Hawk (*Buteo regalis*), Long-billed Curlew (*Numenius americanus*), swift fox (*Vulpes velox*), and Greater Sage-Grouse (*Centrocercus urophasianus*). Few species are expected to be detrimentally affected. However, prairie conservation initiatives that control and eliminate woody vegetation may have local negative consequences for Loggerhead Shrikes (*Lanius ludovicianus*) in some areas. Furthermore, grassland species requiring tall and dense or short and sparse vegetation may be negatively affected to some degree by habitat management programs directed at pipits.

2.10 Recommended Approach for Recovery Implementation

Refer to Table 3 for a list of approaches recommended to address threats and meet recovery objectives.

2.11 Statement on Action Plans

Action plans compliant with the *Species at Risk Act* are scheduled for development by March 31, 2011, to cover jurisdictions within the range of the Sprague's Pipit in Canada. The distribution of the Sprague's Pipit overlaps with that of many other prairie species at risk. Therefore, multispecies or landscape-level action plans may help to reduce redundancy and better accommodate situations where species have competing habitat requirements.

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4. RECOVERY TEAM MEMBERS

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4. APPENDIX 1

Establishing population objectives for Sprague's Pipit.

The population objective for Sprague's Pipit was set using data from the Breeding Bird Survey (BBS), 1970 – 2005 (see section 2.2 for rationale). Survey routes located within the Canadian distribution were selected and divided into Prairie and Parkland (Table 6) because BBS trends differed substantially in the two regions. Model-based estimates of abundance (BBS annual index) were calculated for each year using the program BBSINDEX (B. Collins unpubl. data; www.cws-scf.ec.gc.ca/nwrc-cnrf/default.asp?lang=en&n=F0768C53). Annual abundance estimates were calculated for each province (Manitoba [MB], Saskatchewan [SK], and Alberta [AB]), each region (Prairie and Parkland) and for Prairie Canada using all routes in Table 6. A ten-year mean was calculated for 1996-2005 to determine the relative size of the current Canadian population. Similarly a 10-year average was calculated for the 1980's to serve as a population target ((see section 2.2 for rationale).

Table 6. Routes included in the calculation of Breeding Bird Survey annual abundance (mean number of birds per route) estimates for Sprague's Pipit population objectives.

Province	Route No.	Region	Province	Route No.	Region
AB	04010	Parkland	AB	04139	Parkland
AB	04013	Parkland	AB	04210	Parkland
AB	04015	Parkland	AB	04221	Parkland
AB	04018	Parkland	AB	04222	Parkland
AB	04020	Parkland	AB	04227	Parkland
AB	04021	Parkland	AB	04228	Parkland
AB	04022	Parkland	AB	04229	Parkland
AB	04026	Parkland	AB	04230	Parkland
AB	04027	Parkland	AB	04238	Parkland
AB	04028	Parkland	AB	04240	Parkland
AB	04029	Parkland	AB	04241	Parkland
AB	04030	Parkland	AB	04310	Parkland
AB	04031	Parkland	AB	04315	Parkland
AB	04036	Parkland	AB	04321	Parkland
AB	04037	Parkland	AB	04322	Parkland
AB	04038	Parkland	AB	04326	Parkland
AB	04039	Parkland	AB	04328	Parkland
AB	04040	Parkland	AB	04329	Parkland
AB	04110	Parkland	AB	04330	Parkland
AB	04115	Parkland	AB	04338	Parkland
AB	04119	Parkland	AB	04340	Parkland
AB	04121	Parkland	AB	04421	Parkland
AB	04122	Parkland	AB	04430	Parkland
AB	04126	Parkland	AB	04438	Parkland
AB	04127	Parkland	MB	45002	Parkland
AB	04128	Parkland	MB	45003	Parkland
AB	04129	Parkland	MB	45005	Parkland
AB	04130	Parkland	MB	45007	Parkland

AB	04136	Parkland	MB	45009	Parkland
AB	04137	Parkland	MB	45011	Parkland
MB	45014	Parkland	SK	79112	Parkland
MB	45016	Parkland	SK	79113	Parkland
MB	45018	Parkland	SK	79120	Parkland
MB	45020	Parkland	SK	79128	Parkland
MB	45021	Parkland	SK	79129	Parkland
MB	45024	Parkland	SK	79130	Parkland
MB	45042	Parkland	SK	79131	Parkland
MB	45102	Parkland	SK	79135	Parkland
MB	45103	Parkland	SK	79139	Parkland
MB	45105	Parkland	SK	79140	Parkland
MB	45107	Parkland	SK	79141	Parkland
MB	45109	Parkland	SK	79142	Parkland
MB	45111	Parkland	SK	79143	Parkland
MB	45116	Parkland	SK	79150	Parkland
MB	45118	Parkland	SK	79210	Parkland
MB	45121	Parkland	SK	79222	Parkland
MB	45203	Parkland	SK	79229	Parkland
MB	45205	Parkland	SK	79230	Parkland
MB	45207	Parkland	SK	79237	Parkland
MB	45209	Parkland	SK	79243	Parkland
MB	45214	Parkland	AB	04001	Prairie
MB	45216	Parkland	AB	04002	Prairie
MB	45218	Parkland	AB	04003	Prairie
MB	45220	Parkland	AB	04004	Prairie
MB	45320	Parkland	AB	04006	Prairie
SK	79001	Parkland	AB	04007	Prairie
SK	79002	Parkland	AB	04008	Prairie
SK	79003	Parkland	AB	04009	Prairie
SK	79010	Parkland	AB	04011	Prairie
SK	79011	Parkland	AB	04012	Prairie
SK	79012	Parkland	AB	04014	Prairie
SK	79020	Parkland	AB	04019	Prairie
SK	79021	Parkland	AB	04101	Prairie
SK	79022	Parkland	AB	04102	Prairie
SK	79028	Parkland	AB	04103	Prairie
SK	79029	Parkland	AB	04104	Prairie
SK	79030	Parkland	AB	04106	Prairie
SK	79031	Parkland	AB	04107	Prairie
SK	79032	Parkland	AB	04108	Prairie
SK	79033	Parkland	AB	04109	Prairie
SK	79035	Parkland	AB	04111	Prairie
SK	79037	Parkland	AB	04112	Prairie
SK	79038	Parkland	AB	04113	Prairie
SK	79039	Parkland	AB	04114	Prairie
SK	79040	Parkland	AB	04201	Prairie
SK	79041	Parkland	AB	04203	Prairie
SK	79043	Parkland	AB	04204	Prairie
SK	79050	Parkland	AB	04206	Prairie

SK	79102	Parkland	AB	04207	Prairie
SK	79111	Parkland	AB	04208	Prairie
AB	04211	Prairie	SK	79133	Prairie
AB	04212	Prairie	SK	79204	Prairie
AB	04213	Prairie	SK	79209	Prairie
AB	04214	Prairie	SK	79217	Prairie
AB	04301	Prairie			
AB	04302	Prairie			
AB	04304	Prairie			
AB	04307	Prairie			
AB	04309	Prairie			
AB	04311	Prairie			
AB	04312	Prairie			
AB	04313	Prairie			
AB	04314	Prairie			
AB	04401	Prairie			
AB	04404	Prairie			
AB	04408	Prairie			
SK	79004	Prairie			
SK	79005	Prairie			
SK	79007	Prairie			
SK	79009	Prairie			
SK	79013	Prairie			
SK	79014	Prairie			
SK	79015	Prairie			
SK	79016	Prairie			
SK	79017	Prairie			
SK	79024	Prairie			
SK	79025	Prairie			
SK	79026	Prairie			
SK	79027	Prairie			
SK	79034	Prairie			
SK	79103	Prairie			
SK	79104	Prairie			
SK	79105	Prairie			
SK	79106	Prairie			
SK	79107	Prairie			
SK	79108	Prairie			
SK	79109	Prairie			
SK	79114	Prairie			
SK	79115	Prairie			
SK	79116	Prairie			
SK	79117	Prairie			
SK	79123	Prairie			
SK	79124	Prairie			
SK	79125	Prairie			
SK	79126	Prairie			
SK	79127	Prairie			
SK	79132	Prairie			