Species at Risk Act
Recovery Strategy Series

Recovery Strategy for the Mountain Plover (*Charadrius montanus*) in Canada

Mountain Plover

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October 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

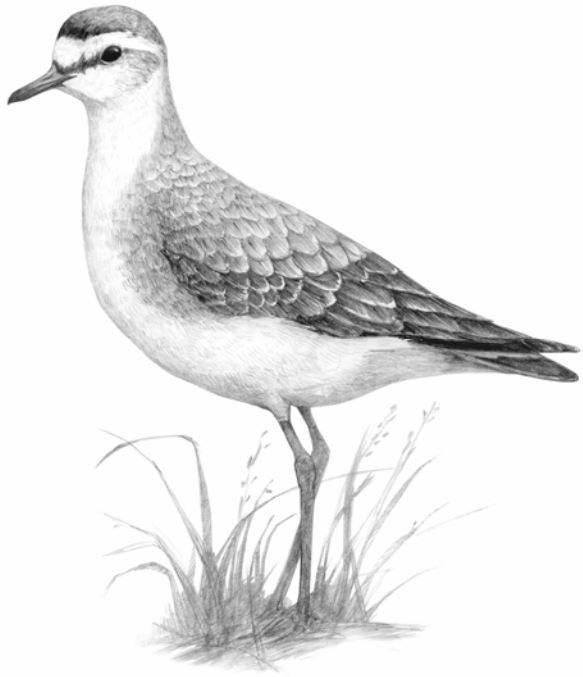
This series presents the recovery strategies prepared or adopted by the federal government under SARA. New documents will be added regularly as species get listed and as strategies are updated.

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 Mountain Plover (*Charadrius montanus*) in Canada

October 2006



Recommended citation:

Environment Canada. 2006. Recovery Strategy for the Mountain Plover (*Charadrius montanus*) in Canada. *Species at Risk Act* Recovery Strategy Series. Environment Canada, Ottawa. iv + 16 pp.

Additional copies:

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

Cover illustration: Judie Shore

Également disponible en français sous le titre
« Programme de rétablissement du Pluvier montagnard (*Charadrius montanus*) au Canada »

ISBN 0-662-44250-4
Cat. no. En3-4/8-2006E-PDF

DECLARATION

This recovery strategy has been prepared in cooperation with the jurisdictions responsible for the Mountain Plover. Environment Canada has reviewed and accepts this document as its recovery strategy for the Mountain Plover, 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 Mountain Plover and Canadian society as a whole.

RESPONSIBLE JURISDICTIONS

Environment Canada (Prairie and Northern Region)
Government of Alberta
Government of Saskatchewan

AUTHORS

This recovery strategy was prepared by Renee Franken, Ray Poulin, and Richard Knapton (Canadian Wildlife Service – Prairie and Northern Region).

ACKNOWLEDGEMENTS

Comments and advice were generously provided by Dave Duncan (Canadian Wildlife Service – Prairie and Northern Region), Geoff Holroyd (Canadian Wildlife Service – Prairie and Northern Region), Dave Prescott (Alberta Sustainable Resource Development), Sue McAdam (Saskatchewan Environment), and Walter Willms (Agriculture and Agri-food Canada). Thanks also to Canadian Wildlife Service, Habitat Conservation Section for their advice and Canadian Wildlife Service, Recovery Section for their advice and efforts in preparing this document for posting.

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 Mountain Plover. 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: 1.3 Species' Needs; 2.4 Research and Management Activities; and 2.6 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/showDocument_e.cfm?id=595

PREFACE

The Mountain Plover is a migratory bird protected under the *Migratory Birds Convention Act, 1994* and is under the management jurisdiction of the federal government. The Mountain Plover was listed as endangered under the *Species at Risk Act* (SARA) in June 2003. SARA (Section 37) requires the competent minister to prepare recovery strategies for listed extirpated, endangered, or threatened species. The Canadian Wildlife Service – Prairie and Northern Region, Environment Canada, led the development of this recovery strategy, in cooperation and consultation with Saskatchewan Environment, Alberta Sustainable Resource Development, the Parks Canada Agency, and Agriculture and Agri-food Canada. The strategy meets SARA requirements in terms of content and process (Sections 39–41).

EXECUTIVE SUMMARY

- Mountain Plovers are medium-sized shorebirds that lack the distinctive neckbands typical of many other plovers. In Canada, they are at the northern periphery of their range and are restricted to extreme southeastern Alberta and southwestern Saskatchewan. In Canada, reports are localized and irregular, with only 44 observations recorded since 1874.

- Mountain Plovers breed in areas of short or intensively grazed vegetation, bare ground, recently burned grasslands, and flat topography.

- Market hunting prior to the 1900s and loss of habitat due to cultivation were probably the primary reasons for the initial decline of the Mountain Plover in North America. There are a number of factors that may threaten Mountain Plovers, including habitat alteration, range management practices, human disturbance, changes in precipitation patterns, and pesticides.

- The recovery goal for the Mountain Plover is to maintain its recent abundance and distribution in southeastern Alberta and southwestern Saskatchewan. A more quantitative goal is precluded by the paucity of information on Mountain Plover abundance.

- Whether the Mountain Plover will ever have a viable and self-sustaining population in Canada is unknown; nevertheless, it is possible to increase the likelihood of this species persisting in Canada by maintaining the habitat that supports the small and possibly sporadic occurrences of the species.

- Owing to a lack of information, critical habitat is not identified in this recovery strategy.

- The two main objectives to meet the recovery goal are 1) to conserve significant habitat areas through stewardship and conservation agreements; and 2) to increase awareness of Mountain Plovers, their needs, their status, and threats to their survival.

- A variety of research and management activities will be necessary to meet these objectives, including monitoring the number of breeding pairs and their distribution, identifying areas of critical habitat, developing management strategies, and developing a communication and education program.

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SPECIES ASSESSMENT INFORMATION FROM COSEWIC

Date of Assessment: November 2000

Common Name: Mountain Plover

Scientific Name: *Charadrius montanus*

COSEWIC Status: Endangered

Reason for Designation: This species occurs in extremely low numbers in Canada; it is dependent on habitats resulting from overgrazing, which are very rare in Canada.

Canadian Occurrence: Alberta, Saskatchewan

COSEWIC Status History: Designated Endangered in April 1987. Status re-examined and confirmed in November 2000. Last assessment based on an update status report.

1. BACKGROUND

1.1 Description

The Mountain Plover is a medium-sized shorebird resembling a small Killdeer (*Charadrius vociferus*) without the distinctive neckbands. It has a uniform sandy-brown back and wings, a clear white breast, and whitish underparts washed with buff. Breeding birds have a white forehead, black on top of the head, and a distinctive black stripe from the black bill to behind the eye (Figure 1).

Figure 1. Mountain Plover.

1.2 Distribution and Abundance

1.2.1 Global

The natural breeding range of Mountain Plovers extends throughout much of the western Great Plains of North America (Figure 2), from southern Alberta and Saskatchewan south through Montana, Wyoming, Nebraska, Colorado, Kansas, New Mexico, Oklahoma, Texas (Knopf 1996; Knopf and Rupert 1996), and northern Mexico (Desmond and Chavez-Ramirez 2002). Their winter range is primarily in California, now primarily within the Imperial Valley (Wunder and Knopf 2003), although the species also winters in northern Mexico, southern Arizona, and southern Texas.

Estimates in the 1990s placed the global population as low as 5600 (Morrison 1994; Rose and Scott 1997). Knopf (1996) provided a revised estimate of 8000–10 000 birds for the North American population based on a doubling of the number (3346) of birds found during winter counts in California in 1994 plus an estimated wintering population of 1000–3000 in Texas and Mexico. Using more refined methodology for population estimates in Wyoming, Plumb *et al*. (2005a) revised the continental population estimate to 11 000 – 14 000 birds.

As of the year 2000, the Mountain Plover was globally ranked as G2 (imperilled) (NatureServe 2004). The IUCN (World Conservation Union) Red List of Threatened Species ranks the Mountain Plover as vulnerable (BirdLife International 2004).

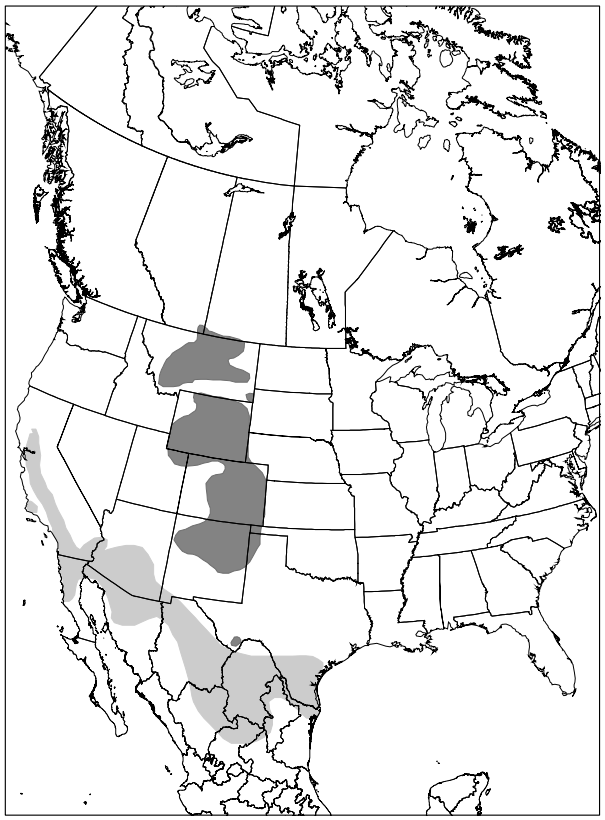

Figure 2. North American range map for the Mountain Plover (adapted from Knopf 1996). Dark area = breeding range, lighter area = wintering range.

1.2.2 United States

Breeding Bird Surveys in the United States indicate a rate of decline of 2.7% per year from 1966 to 2004 (Knopf 1994, 1996; Sauer *et al*. 2005), suggesting a two-thirds reduction in the population during that period. Breeding Bird Survey results show that the decline in this species from the 1960s to the early 1990s was larger than that of any other endemic grassland bird. Concomitant with the population decline, the breeding range has contracted, especially along its eastern edge.

The species was recommended for protection under the *Endangered Species Act* in the United States because the population declined at least 3% per year during the 1970s, 1980s, and early 1990s (Knopf 1996). The U.S. Fish and Wildlife Service concluded that listing was unwarranted because threats to the species and its habitat were not as significant as previously thought and were not likely to endanger the species in the near future or throughout a significant portion of its range (USFWS 2003).

In the United States, the species is ranked as N2 (imperilled) for both breeding and non-breeding populations (NatureServe 2004).

1.2.3 Canada

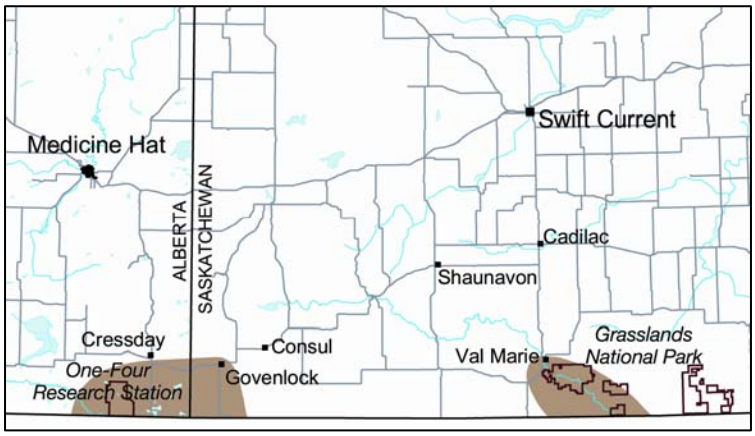

Figure 3. Canadian range for the Mountain Plover.

The species' range extends into extreme southern Canada (Figure 3) where it is considered a rare breeder in southern Alberta and Saskatchewan (Godfrey 1986). Wershler (2000) speculated that "During the last two decades there have probably been fewer than 50 adult Mountain Plovers in Canada." Morrison (2001) estimated the Canadian population to consist of about 10 pairs. Only 44 Mountain Plovers were recorded in Canada between 1874 and 2005 (Knapton *et al*. 2006).

In Canada, reports of breeding Mountain Plovers have been sporadic. Nests with eggs or adults with dependent young have been found in extreme southeastern Alberta only 16 times in the past 25 years (Wallis and Loewen 1980; Wallis and Wershler 1981; Wershler 1990; Knapton *et al*. 2006; D. Heydlauf, pers. comm., 2005). There has been one nesting record in Saskatchewan, in 1987 (Gollop 1987a; Wershler 2000). The distribution of records in Canada suggests that there are two main areas of habitation: the Lost River – Wildhorse area of Alberta and the Grasslands National Park area of Saskatchewan (Figure 3).

The species was designated as endangered in Canada by the Committee on the Status of Endangered Wildlife in Canada (COSEWIC) in 1987 (Wershler and Wallis 1987); this designation was maintained by COSEWIC following an updated status report in 2000 (Wershler 2000). The reason for the designation is given as follows: "This species occurs in extremely low numbers in Canada; it is dependent on habitats resulting from overgrazing, which are very rare in Canada" (COSEWIC 2002). It was listed as endangered under the *Species at Risk Act* in 2003. As of 2001, the species was ranked as N1 (critically imperilled) in Canada and S1 (critically imperilled) in both Alberta and Saskatchewan (NatureServe 2004). Saskatchewan's Conservation Data Centre classifies the Mountain Plover as endangered in the province, and Alberta's Endangered Species Conservation Committee has recommended that the Mountain Plover be designated as endangered in Alberta.

1.2.4 Populations in Montana (nearest to Canada)

The stable breeding population that is closest to Canada is on a large complex of black-tailed prairie dog (*Cynomys ludovicianus*) colonies in Phillips and Blaine counties in northern Montana (Olson 1984; Prellwitz 1993; Knowles and Knowles 1997, 2001; Dinsmore *et al*. 2003). The international border between Montana and southwestern Saskatchewan delineates the northern boundary of these two counties. The number of Mountain Plovers in these two counties was estimated at about 2000 individuals in the mid-1990s (Knopf and Miller 1994; Knowles and Knowles 1998), but Dinsmore *et al*. (2003) revised this figure downwards to only 700 plovers.

The most commonly inhabited area and largest populations of Mountain Plovers in these counties are between 80 and 150 km from the three most commonly used areas in Canada. It should be noted that the areas in Montana immediately adjacent to the Alberta border are intensively cultivated and unsuitable as nesting habitat for Mountain Plovers (Knowles and Knowles 1998; Shackford *et al*. 1998). The best information currently available indicates that the total population in Montana is approximately 1500 Mountain Plovers (Knowles and Knowles 1998; Dinsmore 2003; USFWS 2003).

1.3 Species' Needs

1.3.1 Breeding Habitat

Mountain Plovers have a narrow range of habitat requirements (Graul 1980) and are one of only nine bird species endemic to the North American steppe (Knopf 1988). Mountain Plovers breed in areas of flat topography with sparse (15–80% bare ground) and short (<10 cm in height) vegetation (Wershler and Wallis 1987; Parrish *et al*. 1993; Knopf and Miller 1994; Knopf 1996; Knowles and Knowles 1998).

In Canada, Mountain Plovers have nested in grazed or recently burned areas of native mixed grassland and sagebrush/bentonite flats (Knapton *et al*. 2006). In one instance, a nest was found in a field of exotic Russian wild rye (*Elymus junceus*) and native plant species that had been lightly cultivated (Wershler 2000).

Although this species nests in the shortgrass ecoregion, it appears that it is a disturbed-desert species rather than a strict-associate of the short-grass prairie (Knopf and Miller 1994; Plumb *et al.* 2005b; Knapton *et al.* 2006). This is demonstrated by its association with grazing or disturbed areas, and its occurrence on sage brush flats with extensive areas of bentonite soils (Knapton *et al.* 2006). The high-quality breeding habitat within the shrub-steppe communities is a result of poor soil quality, chronically low precipitation, and constant wind scour, which maintains persistent bare patches that are highly stable in space and time (Beauvais and Smith 2003).

Grazing animals also seem to play an important role in maintaining suitable habitat for Mountain Plovers by reducing vegetation cover. In Alberta and Montana, Mountain Plovers have often been found nesting in areas with winter or early spring cattle grazing (Wershler and Wallis 1987; Knowles and Knowles 1998). In Saskatchewan, 4 of 11 Mountain Plover sightings were on black-tailed prairie dog colonies in and around Grasslands National Park (Peart and Woods 1980; Gollop 1987a, 1987b; Wershler 2000; Knapton *et al*. 2006); in Montana, Mountain Plovers are strongly associated and seem to be at least partly dependent on prairie dogs (Dinsmore *et al*. 2003; Dinsmore *et al.* 2005). In Canada, the Richardson's Ground Squirrel (*Spermophilus richardsonii*) may also be important in maintaining nesting habitat for Mountain Plovers. While ground squirrels do not change the vegetation height to the extent that prairie dogs do, their burrowing activities could increase the amount of bare ground, potentially improving habitat for Mountain Plovers (Wershler 2000). The report of a pair of Mountain Plovers in Montana nesting in an intensively cattle-grazed grassland site occupied by Richardson's Ground Squirrels suggests that such habitat will be occupied on occasion (Knowles and Knowles 1998).

1.3.2 Wintering Habitat

The majority of winter records of Mountain Plovers are from the Central and Imperial valleys of California (Knopf and Rupert 1996; Wunder and Knopf 2003), but the plovers also winter in Arizona, Texas, and Mexico (Knopf 1996; Rojas et al 2006). During the winter, Mountain Plovers use cultivated fields, heavily grazed annual grasslands, burned fields (Knopf and Rupert 1995; Wunder and Knopf 2003), coastal prairies, and alkaline flats (Oberholser 1974; Knopf 1996).

1.3.3 Diet

Mountain Plovers forage in areas of short (<2 cm) vegetation, including prairie dog towns, heavily grazed pastures, dirt or gravel roadbeds, recently ploughed ground, and fallow fields (Knopf 1996). The diet of Mountain Plovers is almost exclusively invertebrates, including grasshoppers, beetles, crickets, and ants (Baldwin 1971; Graul 1973; Olson 1985; Knopf 1996).

1.4 Existing Protection

As of June 2003, Mountain Plovers were protected under Canada's *Species at Risk Act*. In addition, this species is protected under the *Migratory Birds Convention Act, 1994*; it is also protected in the United States. Legislation prohibits the taking (e.g., hunting or collection) of eggs, nests, or birds in Canada and the United States. Mountain Plovers occurring within the boundaries of Grasslands National Park are also protected under the *Canada National Parks Act*.

The Mountain Plover has been approved for listing as an endangered species in Alberta (R. Gutsell, pers. comm., 2004). The species is not listed in the Wild Species at Risk Regulations of *The Wildlife Act, 1998* of Saskatchewan.

1.5 Threats

Market hunting prior to the 1900s and the loss of habitat due to cultivation are thought to be the primary reasons for the initial decline of Mountain Plovers in North America. Other threats to the continental population include agricultural practices, management of domestic livestock, decline of native herbivores, and possibly pesticides (COSEWIC 2000). Possible threats to the Canadian population include grassland management, conversion of native grassland to cropland, loss of prairie dogs and possibly ground squirrels, human disturbance, and fluctuations in precipitation (see below). The number of pairs in Canada is (and likely always has been) extremely small and is likely dependent on the abundance and distribution of Mountain Plovers in the United States, particularly in Montana. The persistence of the species in Canada is also dependent on the presence of suitable breeding habitat in Saskatchewan and Alberta.

1.5.1 Grassland Management

Mountain Plover breeding habitat may be threatened by grassland management practices that fail to maintain the presence of areas of short grass or bare ground. Within grassland ecosystems, heterogeneity was once maintained by variations in weather, irregular fires, and large herds of

migrating bison (*Bison bison*). In the present day, vegetation height and habitat heterogeneity are dictated in large part by cattle grazing intensity. Some range management strategies may tend to promote grazing intensities that result in more homogeneous pastures with moderately tall grasses, features that are contrary to the needs of Mountain Plovers (Wershler 2000).

Seeding areas with exotic grasses threatens Mountain Plovers, because these grasses are typically taller than native species; crested wheatgrass (*Agropyron cristatum*) is generally unsuitable for Mountain Plovers, even when heavily grazed (Wershler and Wallis 2001). Fire suppression on the prairies has likely had negative impacts on nesting habitat for Mountain Plovers, as they will use recently burned native grassland for nesting (Wallis and Wershler 1981; Knowles and Knowles 1984, 1998; Wershler and Wallis 1987; Knopf 1996; Alberta Sustainable Resource Development 2003).

1.5.2 Conversion of native grassland to cropland

The conversion of native grasslands to cropland was prevalent throughout the prairies during much of the last century (Wershler 2000). More than two-thirds of the mixed prairie grassland in Canada was destroyed by cultivation or other development (Wallis 1987), and it is likely that some Mountain Plover breeding habitat was lost. Although cultivation of native grasslands has slowed significantly in southeastern Alberta and southwestern Saskatchewan, habitat alteration within the Canadian range of the Mountain Plover may be a threat to the species (Wershler 2000). In addition to the direct loss of habitat that occurs from cultivating native grass, crop fields can attract Mountain Plovers and may act as reproductive sinks (USFWS 1999). Currently, Canada has sufficient suitable habitat to support the number of Mountain Plovers that can reasonably be expected to occur here annually (2–3 pairs).

1.5.3 Loss of Prairie Dogs

Mountain Plovers are strongly associated with prairie dog towns in several areas of the United States (Knowles *et al*. 1982; Knowles and Knowles 1984). Black-tailed prairie dogs create and maintain habitat suitable for Mountain Plover breeding by reducing the height and cover of vegetation. In the United States, the distribution and abundance of prairie dogs have been greatly reduced, and they continue to be threatened by sylvatic plague, conversion of grassland, and extermination programs. In Canada, black-tailed prairie dogs occur only in and near the Frenchman River Valley in southern Saskatchewan. They are considered a species of Special Concern under the federal *Species at Risk Act*. The population of prairie dogs appears to be stable in Canada, although sylvatic plague is a persistent threat.

1.5.4 Human Disturbance

Human disturbance, including oil and gas exploration and development, road and trail development, and birdwatching, may have negative impacts on Mountain Plovers. Mountain Plovers often feed near roads, which can result in direct mortality through road-kill. In addition, human activities may cause distraction displays by adults, which could potentially harm chicks during brood-rearing by overheating them (Graul 1975; USFWS 1999). The effects of human disturbance on Mountain Plovers are largely unknown, and safe distances for developments

away from breeding birds have yet to be determined. Pesticide use could threaten Mountain Plovers by directly poisoning individual birds or by reducing the abundance of important prey species.

1.5.5 Fluctuations in Precipitation

Weather extremes, including fluctuations in precipitation, can dramatically change the suitability of Mountain Plover nesting habitat. For example, above-average precipitation can lead to tall, thick grass cover and subsequent unsuitable breeding habitat (Wershler and Wallis 1987). Alternatively, drought conditions may cause birds to leave the breeding grounds early (Leachman and Osmundson 1990) or may result in lower fledging rates by altering food supply and predation pressure (Knopf and Rupert 1996).

1.5.6 Threats to wintering habitat

Wintering areas in California are under pressure from conversion of cultivated fields to vineyards, orchards, and urban development, the loss of grasslands, and potentially environmental contaminants (Leachman and Osmundson 1990; Knopf 1996; Knopf and Rupert 1995). Changes in management practices in the Imperial Valley, such as reductions in the area of coverage of alfalfa, a reduction in domestic grazing, or a reduction in burning following harvest may also reduce habitat available for wintering Mountain Plovers (Wunder and Knopf 2003).

1.6 Knowledge Gaps

There are significant knowledge gaps in every aspect of Mountain Plover biology in Canada. Information is needed on:

- number and distribution of Mountain Plovers in Canada;
- habitat requirements;
- availability of habitat in Canada;
- factors limiting the breeding range in Canada;
- connectivity between U.S. and Canadian populations, and its significance;
- population dynamics at the periphery of the species' range; and
- effects of human disturbance (e.g., oil and gas development).

2. RECOVERY

2.1 Recovery Feasibility

In Canada, the Mountain Plover is at the northern periphery of its range. Breeding pairs are, and likely always have been, extremely rare and highly localized. It is unknown if the Mountain Plover can ever have a viable and self-sustaining population in Canada; however, it should be possible to maintain the small and possibly sporadic occurrence of this species. Recovery is feasible because 1) there is still an existing population of plovers; 2) there is sufficient suitable habitat available to support nesting Mountain Plovers; 3) significant threats to the species or its habitat can be mitigated; and 4) there is no reason to believe that the techniques for recovery would not be effective.

2.2 Recovery Goal

The recovery goal for the Mountain Plover is to maintain its recent abundance and distribution in southeastern Alberta and southwestern Saskatchewan. A more quantitative goal is precluded by the paucity of information on Mountain Plover abundance in Canada.

2.3 Recovery Objectives

Objective 1: Conserve significant habitat areas through management, stewardship, and conservation agreements.

Objective 2: Increase awareness of Mountain Plovers, their needs, their status, and threats to their survival.

2.4 Research and Management Activities

A description of the research and management activities recommended to meet the recovery objectives and address the identified threats is provided in Table 1. A forthcoming action plan will provide more detailed information on an implementation schedule and the actions necessary to meet recovery objectives. A number of these actions have been recommended in previous management plans (Wershler 1989, 1990) and in reports on habitat and population surveys (Wershler and Wallis 2001, 2002).

2.4.1 Broad Strategies to Address Threats

- Grassland management
    - if required, implement grazing strategies and/or prescribed burning to manage vegetation height in Mountain Plover breeding areas
    - if required, encourage establishment of native grass species in preference to exotic species
- Habitat alteration

    - initiate and develop stewardship agreements to protect and enhance current breeding locations
    - encourage landowners to protect areas with nesting Mountain Plovers
- Loss of prairie dogs and ground squirrels
    - encourage landowners and land managers to maintain black-tailed prairie dogs and Richardson's Ground Squirrels in areas of suitable Mountain Plover habitat
- Human disturbance
    - determine safe distances for disturbances, developments, and associated activities away from Mountain Plover breeding habitat
    - implement and enforce these safe distance guidelines
    - protect breeding grounds from human disturbances by encouraging people to use designated travel routes around Mountain Plover habitat and reduce the amount of motorized traffic off trails
    - limit pesticide applications near Mountain Plover breeding sites
- Fluctuations in precipitation
    - although it is not possible to adjust precipitation levels on a regional scale, there are some opportunities to address the vegetative responses resulting from changes in precipitation, including mowing, grazing, or burning vegetation when height and cover become unsuitable for Mountain Plovers

Table 1. Suggested research and management activities to effect recovery of Mountain Plover in Canada

Priority	Objective No.	Broad strategy	Threat(s) addressed	Recommended research/management activities
Urgent	1	• Monitor and inventory	• None	• conduct annual or biennial surveys in traditional breeding areas and in habitats with high suitability • conduct surveys across a wider range of habitats once every five years • when nesting birds are discovered, gather information on factors associated with habitat use
Necessary	1	• Habitat evaluation and management	• Grassland management • Habitat alteration • Loss of prairie dogs • Fluctuations in precipitation	• evaluate habitat where known breeding has occurred, and determine characteristics of preferred breeding habitat (see Wershler and Wallis 2001) • determine key habitat areas and prioritize compatible land uses at each site • if a need exists, develop adaptive management strategies and stewardship agreements to protect and enhance current and recent breeding locations • if required, implement plans to manage for short vegetation, including intensive livestock grazing in strategic areas at strategic times (Knowles and Knowles 1998), prescribed burning, and maintaining and enhancing colonies of prairie dogs (see Dechant *et al*. 1998), while considering the implications on other species • if a need exists, encourage establishment of native shortgrass prairie species in preference to taller exotic grasses • identify and protect critical habitat • collaborate with the United States on habitat conservation initiatives
Necessary	1 & 2	• Manage active nests	• Human disturbances	• implement protective measures to limit pesticide application during the breeding season in areas near Mountain Plover nests • around nesting areas, encourage landowners to leave cultivated areas unplanted until plover eggs have hatched • minimize travel routes used within Mountain Plover habitat, and reduce detrimental motorized traffic • determine a safe distance for birdwatchers/naturalists, developments, and developmental activities away from Mountain Plover breeding habitat • implement and enforce safe distance guidelines
Beneficial	2	• Increase public awareness	• Grassland management • Habitat alteration • Loss of prairie dogs	• develop and distribute media products and educational materials to landowners/land managers in the communities within the range of the Mountain Plover to inform the public about the Mountain Plover and its status, to solicit observations, and to inform people of the surveys being conducted • illustrate differences between the Mountain Plover and similar species, e.g., Killdeer

2.5 Critical Habitat

The *Species at Risk Act* defines critical habitat as "*the habitat that is necessary for the survival or recovery of a listed wildlife species and that is identified as the species' critical habitat in the recovery strategy or in an action plan for the species*" (Subsection 2(1)).

Critical habitat is not identified in this recovery strategy.

This species is relatively unstudied in Canada. There have been only 44 reported observations of this species since 1874, and there have been only 16 reported nesting sites in the past 25 years. With such limited information, it is not possible to identify critical habitat at this time.

Critical habitat will be identified through activities outlined in 2.5.1 (Schedule of Studies to Identify Critical Habitat) and will be proposed in a forthcoming action plan and/or a revised recovery strategy.

2.5.1 Schedule of Studies to Identify Critical Habitat

Studies to identify critical habitat will be concentrated within two geographic areas (Figure 3):

- Grasslands National Park area
    - Wershler and Wallis (2001) identified four areas considered highly suitable for Mountain Plovers in the Grasslands National Park area of southwestern Saskatchewan; one is located in Grasslands National Park, and three are on adjacent private and public land. All four areas are associated with black-tailed prairie dog colonies.
- Lost River – Wildhorse – Govenlock area
    - The Lost River area has suitable nesting habitat on and around Agriculture and Agri-Food Canada's Onefour Research Substation in southeastern Alberta.
    - Wershler and Wallis (2001) identified areas around the Wildhorse–Govenlock area as being of high suitability, including the southwestern corner of Saskatchewan, the southeastern corner of Alberta, and along Highway 21 south of Govenlock, Saskatchewan.

Broad studies and actions to support the identification of critical habitat are outlined in Table 1. This section outlines specific studies and actions necessary to identify critical habitat:

- By 2007, establish and implement a monitoring protocol such that species abundance and distribution can be accurately recorded and meaningful population trends can be calculated.
- By 2009, identify habitat features (e.g., using a resource selection model) associated with significant use by Mountain Plovers.
- By 2009, apply knowledge of significant habitat features to all areas within the breeding range to guide survey activities.
- By 2009, use synthesized information on abundance, distribution, and habitat use to identify critical habitat within an action plan and/or revised recovery strategy.

2.6 Effects on Other Species

Recovery actions resulting from this strategy could potentially affect other species at risk that occur within the range of Mountain Plovers. Actions that reduce grass height and grass cover might be beneficial to species such as Burrowing Owls (*Athene cunicularia*), Ferruginous Hawks (*Buteo regalis*), Long-billed Curlews (*Numenius americanus*), swift fox (*Vulpes velox*), and/or black-tailed prairie dogs, as well as rare plants and invertebrates (Wershler 2000). However, these actions could be detrimental to species such as Greater Sage-Grouse (*Centrocercus urophasianus*), Baird's Sparrow (*Ammodramus bairdii*), Sprague's Pipit (*Anthus spragueii*), and Upland Sandpiper (*Bartramia longicauda*) (Wallis 1987). It is necessary to ensure that the habitat needs of all species at risk can be met; therefore, cooperation and coordination between recovery actions aimed at various species will be important in identifying and managing potential conflicts. Actions aimed at Mountain Plovers are likely to have minimal population-level effects on other species because of the small range and very limited areas occupied by plovers.

2.7 Action Plan Timeline

The Action Plan(s) for the Mountain Plover will be completed by June 2009. Steps to achieve recovery will be ongoing in the interim.

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