

**BIODIVERSITY CONSERVATION
CONSERVATION OF MIGRATORY AND
TRANSBOUNDARY SPECIES**

WORKING DRAFT

**SPECIES OF
COMMON CONSERVATION CONCERN
IN NORTH AMERICA**

Commission for Environmental Cooperation
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Preface

Canada, Mexico, and the United States not only share many ecosystems and migratory species, but are also increasingly linked through economic, social and cultural exchange. Existing strategies for biodiversity conservation on the continent are not coping with the impacts caused by ever-increasing levels of development. Nor are they likely to address adequately the relatively new problems of climate change and increased numbers of invasive species. Quality of life, access to ecological services, and sustainable use of natural resources are at stake. It is time to seek new ways and means to protect the richness of life on our continent. New strategies must find acceptance and be implemented at national and local levels.

Importantly, it is becoming clearer that regional and continental action is not only a potentially effective approach but also an essential one. There are some remarkable precedents for such shared action, especially for migratory birds. The question is what more can be done to identify and act upon biodiversity matters of continental significance, and effectively catalyze the concerted efforts of the continent's three countries?

There is an untapped potential that arises from the three country's different socioeconomic and cultural realities, management and conservation perspectives, and institutional arrangements to conserve the continent's natural wealth. For the most part, this potential has been interpreted as an obstacle for conservation. However, obstacles can be removed, lessons can be shared, and potential can be realized—such is the primary aim of this project.

Work begun with the identification of migratory and/or transboundary species of "common conservation concern" which a trinational experts working group (hereafter referred to as the Parties) agreed on. For this set of species, the status of the species has been defined, and gaps and opportunities for collaboration have been identified.

The Parties proposed species that demonstrated both the need and opportunity of working on a continental scale. The resulting list is very diverse: ferruginous hawk, whooping crane, peregrine falcon, piping plover, mountain plover, California condor, spotted owl, loggerhead shrike, burrowing owl, golden-cheeked warbler, black bear, gray wolf, black-tailed prairie dog, Sonoran pronghorn and *Leptonycteris* bats. These species are not fifteen new problems to solve but one opportunity to collaborate. Not fifteen flagships, but the flags of the continental vessel of conservation.

What are the emergent properties as well as past and future collaboration efforts both within and between strategies for species at risk?

Perhaps an incipient sign of collaboration is the report itself. Each profile represents a synthesis of key work done over the years in collaborative arrangements or within a single country. For the most part, the work we, as conservationists, have done too often looked at the challenges ahead of us with our blinders on, stopping our vision at our borders. This report represents an opportunity to share our visions and look for the common thread. How will the basically academic and biologically intense analyses found in this report be turned into conservation action that involves all necessary stakeholders in a broader socioeconomic framework? That is the challenge for the North American conservation community.

Conservation efforts for the species of common conservation concern represent work in progress of different levels of intensity. The intent is not to change the classification within each country or seek to homogenize them, but to have a new, shared, continental vision. A new sense of purpose that may advance conservation more rapidly. Success can and will be measured using

these individual species as indicators, but the result should be an overall positive impact on biodiversity of North America as a whole.

Biodiversity and Trilateral Cooperation—Two examples

In recognition of the shared environment and the consequent shared responsibility, environmental provisions were included in the North American Free Trade Agreement (NAFTA). These provisions in NAFTA were supplemented by a side agreement, the North American Agreement on Environmental Cooperation (NAAEC). The Commission for Environmental Cooperation (CEC) was created by the NAAEC to facilitate this cooperation with the goal of conserving, protecting and enhancing the North American environment.

The work of the CEC is organized around four core program areas: Conservation of Biodiversity; Environment, Economy and Trade; Pollutants and Health; and Law and Policy. The participation of a broad spectrum of stakeholders—including all levels of government, nongovernmental organizations, indigenous groups, the private sector, scientific and professional organizations and individuals—is vital to each program. Many of the CEC programs build upon or complement efforts at the local, regional and national levels.

CEC has also supported biodiversity conservation efforts through the North American Fund for Environmental Cooperation (NAFEC). Since 1996, NAFEC has made 127 grants totaling USD 4.8 million to community-based environmental projects. Many communities have used these grants to implement innovative approaches to conserving biodiversity while strengthening their economic base. Others have collaborated to protect transboundary species and habitat.

Along with the CEC, the Canada/Mexico/United States Trilateral Committee for Wildlife and Ecosystem Conservation and Management (“The Trilateral”) also has seen the need to assist efficient and effective conservation of biodiversity in North America. Created in 1996, and comprised of members of the three national wildlife agencies, the mandate of the Trilateral is to “facilitate and enhance coordination, cooperation and the development of partnerships among the wildlife agencies of the three countries, and with other associated and interested entities, regarding projects and programs for the conservation and management of wildlife, plants, biological diversity and ecosystems of mutual interest...such projects and programs will include scientific research, law enforcement, sustainable use and any other aspect related to this purpose.”

Together, the CEC, with its connection to public and private organizations involved in the economy, trade, pollution, law, and all sectors of biodiversity, and the Trilateral, with its area of concentration primarily being wildlife conservation of the three national governmental agencies, can work to help conserve the rich biodiversity found in North America.

And although the fifteen flags offered from this report are all individually worthy, read, analyze and commit to all of them because now it is up to us to raise our flags and man this vessel.

Acknowledgements

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I. Introduction

The Commission for Environmental Cooperation:

Canada, Mexico, and the United States not only share many ecosystems and migratory species, but are also increasingly linked through economic, social and cultural exchange. In recognition of this shared environment and the consequent shared responsibility, environmental provisions were included in the North American Free Trade Agreement (NAFTA). These provisions in NAFTA were supplemented by a side agreement, the North American Agreement on Environmental Cooperation (NAAEC). NAFTA is the first trade agreement to include environmental commitments and as a result it has opened the door to unique opportunities for environmental cooperation. The Commission for Environmental Cooperation (CEC) was created by the NAAEC to facilitate this cooperation with the goal of conserving, protecting and enhancing the North American environment. CEC's mandate specifically addresses issues of biodiversity conservation. For example, the Council of the CEC is to consider developing recommendations on transboundary and border environmental issues, such as the protection of endangered and threatened species; exotic species; the conservation of wild flora and fauna and their habitat (specially protected areas).

The CEC occupies a unique role in the realm of biodiversity conservation. In this role, the CEC: focuses on the North American region; uses solid scientific information to support decision making; supports capacity building; creates bridges of understanding; acts as an honest broker and facilitator; builds on and promotes public participation; and facilitates networking of experts (themes and regions).

The objective of the Conservation of Biodiversity program within the CEC is to promote cooperation between Canada, Mexico, and the United States in fostering conservation, sound management, and sustainable use of North American biodiversity. Work towards these goals is achieved through a process that recognizes, respects, and accommodates the sovereignty of the three countries while ensuring sufficient comparability and compatibility of data to facilitate informed discussion and cooperation among them.

To date, the CEC has implemented a number of trinational biodiversity initiatives including the North American Biodiversity Information Network (NABIN), the Ecological Regions of North America, the Marine Global Plan of Action in the Gulf of Maine and the Bight of California, and the North American Bird Conservation Initiative (NABCI). In each of these initiatives, CEC has collaborated with a wide range of partners in order to make available essential information, coordinate efforts and develop regional strategies. The CEC has also played an important role in exploring the links between biodiversity conservation and economic benefits within the context of its Green Goods and Services Program, and through detailed examination of specific initiatives such as shade coffee and ecotourism.

So as to best use the CEC's capacities and take full advantage of its unique features, the biodiversity conservation program has presently set out to provide the organization with a clear sense of direction and priorities to effectively influence biodiversity conservation in North America. Its overarching objective is to develop a long-term agenda and final report entitled *Conservation of Biodiversity in North America—A Strategic Plan for the Commission for Environmental Cooperation*. This long-term agenda will commit to meeting challenges and delivering results not only concerning conservation initiatives which span borders or deal with shared species, but also those dealing with other issues such as fostering cross-country learning

and common responses to shared problems. Results from this project will be used to help set priorities in terms of issues and regions for the conservation of North America's biodiversity.

Purpose of this project:

This document is a response by the CEC to the Canada/Mexico/United States Trilateral Committee for Wildlife and Ecosystem Conservation and Management to assist in enhancing collaboration among Canada, Mexico, and United States, to conserve the biodiversity of North America. The North American Agreement on Environmental Cooperation calls for action to encourage conservation of wildlife and wildlife habitat, and specifically, the protection of species in danger of extinction. This project is part of the CEC's overall response to enhance collaborative efforts toward the conservation of North American biodiversity.

The three member countries of the CEC share species that are migratory and transboundary and the successful conservation of these species will often depend on collaborative action. The specific goal of this project is to identify binational and/or trinational collaborative actions to support or implement recovery plans or actions for migratory and transboundary species that are at risk, and species that are of conservation concern to one or more member countries. The results of this project will also be used to assist in the setting of priorities for the "Strategic Directions for Conservation of Biodiversity" project, which is identifying key conservation issues and areas within North America for the CEC to work on in the short, medium, and long-term.

The process:

Three consultants were contracted by the CEC, one from each country, to assist with this project. The consultants began by compiling tables of species of birds and mammals taken from national endangered species lists in all three countries (Annex). The tables were then used to assist in selecting species that would benefit most from collaborative action among two or all three countries. Given the respective mandates of the participating wildlife agencies in the three countries, this phase was restricted to birds and mammals.

In September 1999, a workshop with experts from the three countries was convened with the aim to reach agreement on a set of criteria to guide selection of species for consideration for cooperation and to begin to identify opportunities for collaboration. The species selection criteria agreed upon by workshop participants includes both mandatory and recommended criteria. These criteria are as follows:

Mandatory criteria:

- Species must be transboundary or migratory, and thus exist in at least two of the participating countries. Transboundary species for consideration included both shared populations, as well as populations of species that extend their range across international boundaries, but are not a shared population.
- Selected species for this pilot project must be either a bird or mammal. Birds listed under existing bilateral treaties are of particular interest.

Recommended criteria:

- Priority will be given to bird and mammal species that are endangered or threatened in one or more countries, extirpated from at least one country; or are species of special conservation concern. The latter category includes species that are designated as Rare or require Special Protection in Mexico, candidate species for listing in the United States, and species designated as being Vulnerable by COSEWIC in Canada. Species of conservation concern for this project also

includes those species that are of ecological or other significance including keystone, umbrella, flagship, indicator, and endemic species, species of taxonomic rarity, and instances where the percentage of the global population occurring in North America is high.

➤ Priority will also be given to selecting species that are likely to demonstrate successfully the importance of trilateral or bilateral cooperation, and increase awareness of biodiversity issues across North America.

Workshop participants agreed that the initial phase would identify a maximum of thirty potential species for cooperation. Each country would submit to the CEC ten species they believed would benefit from collaboration. Countries were requested to contribute as much information as possible along with providing the rationale for each species that they proposed. A set of questions was developed to assist countries develop the rationales or proposals.

In October 1999, CEC professionals, the three consultants, and the project Chair identified fifteen species from the lists submitted by the three countries. Priority was given to species recommended by more than one country and to species occurring in all three countries. In addition, taxonomic, ecological, and geographic balance was sought in selecting the fifteen species. The species selected were: ferruginous hawk, whooping crane, peregrine falcon, piping plover, mountain plover, California condor, spotted owl, loggerhead shrike, burrowing owl, golden-cheeked warbler, black bear, gray wolf, black-tailed prairie dog, Sonoran pronghorn and *Leptonycteris* bats. These species were subsequently agreed upon by the Experts Working Group to be those of common conservation concern for this project. Species profiles were then developed for each of these species by the consultants and are presented in Section II below. In preparing the species profiles, the consultants interviewed wildlife experts in all three countries, asking them to complete a questionnaire. In addition to the interviews and questionnaires, available status reports and recovery plans provided much of the information that was used to compile the species profiles.

In conducting the interviews and developing the species profiles, the following five areas for collaboration were prime considerations: 1) are there or should there be shared conservation objectives among the countries; 2) are there economic incentives, legislation, or conservation policies in effect in one country that could potentially be applied in one or both of the other countries to assist conservation efforts; 3) are bilateral or trilateral population assessments and monitoring priority activities; 4) are there education-outreach activities in effect in one country that could potentially be applied in one or both of the other countries to assist conservation efforts; and 5) what are the priority conservation actions for each species?

In terms of format, each species profile has sections containing the following information: scientific and common names, legal status, range, rationale for collaboration, background, factors affecting conservation efforts, potential areas for collaboration, and contacts. Unless otherwise noted, the status given is the official national level status for the species. In Canada, the species status is determined by the Committee on the Status of Endangered Wildlife in Canada (COSEWIC). In Mexico, the federal government passed in 1994 the Norma Oficial Mexicana (NOM-ECOL-059), which is a regulation that indicates a list of the endangered and threatened species in Mexico. The date for all species listed in Mexico is 1994. In the United States, the status under the Endangered Species Act is provided.

The species profiles will hopefully be used as a basis to identify opportunities to enhance collaboration among agencies in Canada, Mexico, and the United States that are responsible for wildlife management, and also be used by nongovernmental interests. The CEC will present the profiles to the Trilateral Committee for Wildlife and Ecosystem Conservation and Management,

seeking an agreement as to the possible next steps to be taken. This report is also contributing piece in the development of the *Conservation of Biodiversity in North America – a Strategic Plan for the Commission for Environmental Cooperation*, CEC's long term agenda for biodiversity conservation.

II. Species profiles

Scientific Name: *Buteo regalis*
Common Name: Ferruginous Hawk

Legal Status:

Canada: Listed as Vulnerable in 1995.

Mexico: Not listed, but considered a species of conservation concern.

United States: Not listed but considered a species of management concern. This species is considered a sensitive species by the Bureau of Land Management and is listed as Endangered or Threatened by virtually all states throughout its entire range.

Range:

The ferruginous hawk is endemic to North America. Breeding populations are found from the southern portions of the prairie provinces of Canada (Alberta, Saskatchewan, Manitoba) throughout the northern Rockies and western Great Plains (17 states). Year-round range is in the southern Rockies and southwestern Great Plains. Wintering range includes the southern Great Plains west to California and south into central Mexico (Central plateau to north Guanajuato) and Baja California (13 Mexican states) from October through April.

Rationale for collaboration:

The ferruginous hawk is a species that is rapidly declining in many locations throughout its range. Even though it is not formally listed in all three countries, it has been noted by all three countries as a species, about which we should be concerned. However, the data is inadequate on the basic biology and population trends to establish sound conservation and management programs for this species. Thus far, cooperation on conservation of this species among the three countries has been minimal. Because this species ranges across North America has declined in all parts of its range, and there is little basic information about it, it would benefit greatly from cooperative action among the countries. The ferruginous hawk presents a great opportunity for the United States, Canada, and Mexico to work together to prevent a species from reaching the point where drastic recovery efforts are needed to prevent the species from further decline resulting in listing in the United States and Mexico.

In addition, ferruginous hawks are prairie grassland species that have closely coevolved in the grassland ecosystems of North America. They are important sentinel species for the overall health and normal functioning of viable grasslands in North America, and, as such, require special conservation considerations. Major efforts should be placed in conserving the grassland ecosystem, and in the process, ferruginous and Swainson's hawks, mountain plovers, burrowing owls, prairie dogs, black-footed ferrets, and other species that have coevolved in this unique and special ecosystem, will be conserved as well.

Background:

The ferruginous hawk was once widespread throughout North America. Its numbers have been declining since the early 1900s, so that now the population is roughly one-quarter its original size. Overall, it is thought to still be declining. However, population estimates in 1995 in Canada indicate that the population is stabilizing or even increasing. The 1995 estimate in Canada was at least 2,500 pairs of birds. Because of this population estimate, the ferruginous hawk was down listed in Canada in 1995, from threatened to vulnerable.

The ferruginous hawk is highly associated with grassland habitats and the cause of its decline can be ascribed to the loss of this habitat. Over the last century there has been extensive

conversion of grasslands for agriculture purposes, development or other uses. This loss of grasslands caused an extensive reduction in the ferruginous hawk's range. In Canada, its range has shrunk by an estimated fifty percent.

Lack of suitable nesting sites also appears to be a cause of decline for this species. As part of the recovery program in Canada, artificial nesting sites were erected. This strategy had the desired effect, increasing the density in a number of places. This increase is a good sign that the ferruginous hawk will respond well to recovery efforts.

Even though the ferruginous hawk is not listed in either the United States or Mexico, it still deserves conservation attention. Little is known about the ferruginous hawk and its habitat needs, on both its breeding and wintering grounds.

Factors affecting the status of this species:

The dramatic decrease in native grasslands has been a primary cause of the decline of the ferruginous hawk. Current concerns include a lack of suitable breeding and wintering habitat and a lack of prey. Ferruginous hawks prey on small mammals, primarily ground squirrels, jackrabbits, and prairie dogs. The widespread control of prairie dogs and other colonial sciurids has probably contributed to its decline. Several of the ground squirrels on which it feeds are also declining in overall population size. Additionally, as other species feed on small mammals, there is concern that the ferruginous hawk is threatened by competition from other species over food. The loss of prairies to invasive species also contributes to habitat loss, in that some invasive species tend to grow over the prairie, creating dense brush, which makes it more difficult for the ferruginous hawk to find its prey.

Another threat is the loss of nest sites. Trees suitable for nesting are being lost through old age, clearing, droughts, and damage from cattle. However, it has been shown that ferruginous hawks will use artificial poles or other man-made structures as nesting sites.

Loss of habitat in both wintering and breeding areas is a concern. Shrinking grassland habitat would negatively affect the status of this species. Human disturbance is another factor affecting this species' status and efforts should be taken to limit this disturbance.

Potential areas for collaboration:

1. Form an international group to focus on the conservation of the ferruginous hawk. The Canadian Recovery Team was dismantled in 1995 when the species was down listed, and because it is not listed in the United States, there is no recovery team. An international group focusing on the status of the ferruginous hawk to take necessary conservation measures to prevent this species from declining further is recommended. Simple efforts, such as artificial nesting sites, taken early, could prevent the need from more drastic conservation measures later.
2. Conduct a range-wide assessment of the remaining habitat. In particular, the number of available nesting trees needs to be determined. To assess the prospects of the ferruginous hawk and what conservation measures might be needed, an assessment of its habitat is urgently needed. As this is a migratory species, both its wintering and breeding grounds need to be able to support viable populations. Habitats should be assessed for suitability, prey availability, and nesting sites.
3. Create a collaborative research program to help provide basic information on the biology, status, and management of this species. Little is known about this species and a cooperative research program would efficiently help fill the information gaps. Information is needed for conservation efforts in all three countries, and a collaborative approach would help ensure the sharing and constructive use of this information. Priorities for research include wintering ecology (particularly in Mexico), dispersal and the extent of nomadism, migration, prey (particularly

jackrabbits) fluctuation effects, response to management efforts, and population trends (rate of decline, reasons for decline).

4. Regularly monitor this species across the range, so that early warning of any further species decline can be detected.

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Scientific Name: *Falco peregrinus*
Common Name: Peregrine Falcon

Legal status:

Canada: Listed as Threatened in 1995.

Mexico: Listed as Threatened.

United States: Taken off the Endangered Species List in August 1999. Listed as Endangered by 34 states. Several additional states list the peregrine falcon as Threatened, Of Concern, or some other designation. Only Arizona and Colorado have state listed the species as recovered.

Range:

The peregrine falcon once ranged throughout North America from the subarctic forests south throughout Mexico and into South America. Today the peregrine falcon, a cosmopolitan species, remains wide spread, occupying areas in southern Canada through the United States to Mexico (during winter occurring practically throughout the country, and breeding from Puebla through Baja California) and Central and South America. The peregrine falcon is a highly migratory species.

Rationale for collaboration:

Recently threatened in all three countries, the peregrine falcon has been recovered in the United States and removed from the Endangered Species List. This de-listing, however, has potential negative effects on the recovery programs in Canada and Mexico, because the peregrine falcon may become available for harvesting along the Gulf Coast for falconry purposes.

Although consultation on this specific issue is underway, there may be advantage to creating a joint “post recovery” group of experts to monitor the continental population and ensure the compatibility of management programs. For species that migrate across all three countries, such as the peregrine falcon, trilateral communication would greatly aid the various in-country conservation programs, because factors affecting the status of the species in one country will affect its status in other countries.

Background:

The population of the peregrine falcon is increasing. In 1999, the species was both removed from the Endangered Species List in the United States and down listed from Endangered to Threatened in Canada. The results of Canada’s last survey (1995) revealed the largest population since the surveys were initiated. In the United States, the Fish and Wildlife Service will monitor the peregrine falcon every three years for the next thirteen years. Currently, there are an estimated 1650 breeding pairs in Canada and the United States. The species remains listed as threatened in Mexico, but little is known about its status in Mexico.

Both the United States and Canada have recovery teams and recovery plans, however, no international recovery team has been assembled. This species is a success story in that it is progressing towards recovery or is, in the case of the United States, considered recovered. The current challenge is ensuring that this recovery is long-term. Recovery was achieved in part through captive breeding and reintroduction programs. Releasing of captive-bred falcons began in 1974 in the United States, and more than 6,000 peregrine falcons have been reintroduced since this time. Some populations, particularly those in southern Canada, are comprised primarily of captive bred peregrine falcons. Therefore, it is important to monitor the status of these populations to make sure that they become self-sustaining. Population monitoring, as well as contaminant monitoring, are primary current conservation activities.

The peregrine falcon has also benefited from a number of habitat protection programs, including the North American Waterfowl Management Plan, the Western Hemisphere Shorebird Reserve Network, and the Wetlands for the Americas. In addition to broad habitat initiatives, this species has also benefited tremendously from anti-pollution measures, particularly the ban on DDT. In 1997, the CEC established a North American Regional Action Plan on DDT, which will help reduce the use of DDT in Mexico and thus help the recovery of the peregrine falcon.

Factors affecting the status of this species:

The peregrine falcon is very susceptible to DDT, as well as other contaminants. The use of organochlorine pesticides is thought to be the primary cause of decline of this species in the United States. Therefore, any removal of the ban on DDT would be detrimental to this species. Other environmental contaminants should be monitored and restricted, as well. Pesticide use in Central and South American countries, where the species winters, continues to threaten the species. Currently, there is a declining trend in the use of organochlorine in Latin American countries as well as a ban in Canada and the United States. As long as use continues to decline and the ban in North America continues, the species will likely increase in population size.

This species can also be threatened by the loss of habitat and the loss of prey. However, as long as wetlands continue to be protected, this should not be a major threat. Habitat needs to be protected in all parts of its range, including breeding grounds, wintering grounds, and all along its migratory routes.

This species could potentially be threatened by the capture of migrant peregrines in the United States for falconry. When this species was de-listed, capture of peregrine falcons in the United States became legal. However, the Fish and Wildlife Service prohibited take of the peregrine falcon until management plans are developed. Development of these guidelines is taking place in cooperation with the individual states, Canada, and Mexico. Coordination in plan development will be very important to assure that capture for falconry purposes in the United States will not affect recovery of the population in the United States, Canada and Mexico.

Potential areas of collaboration:

1. Monitor the population status of the species throughout its entire range with emphasis on Canadian breeding population. As this species is on its way to recovery, it is important that this trend continues. Because the peregrine falcon is migratory, monitoring should occur throughout its range so that the location and any causes of any potential decline can be detected early.
2. Facilitate work of informal working group established to create a continental management plan for the peregrine falcon that would address subjects of mutual concern such as population monitoring, harvest, reintroduction, long-term conservation strategies and other matters.
3. Continue long-term conservation strategies to protect wetlands throughout the species range. Current continent-wide efforts appear to be working well, and therefore should be continued. Trilateral collaboration in these efforts should be continued to ensure that these efforts are operating in both the breeding and wintering grounds.
4. Develop public education program for landowners that can be used throughout the species' range. Some educational materials exist but these should be translated into appropriate languages. It is important to educate landowners in breeding grounds, wintering grounds, and along migratory routes about the importance of wetlands to this and other species. Despite the success of habitat protection measures, habitat on private lands also needs conserving. The use of conservation easements for this purpose should be explored.

5. Throughout the species range, monitor for contaminant levels, even though their use is decreasing due to various laws and other policies. Indications of contaminant levels can be determined by analyzing unhatched eggs from representative populations. Because peregrine falcons are easily susceptible to environmental contaminants, this type of monitoring system should be implemented as part of an early warning system.

6. Assess the status of this species in Mexico. The status is well known in Canada and the United States. However, the status of this species in Mexico will affect its status in the other two countries, and therefore more information about its status in Mexico will be useful in informing conservation efforts in Canada and the United States.

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Scientific Name: *Lanius ludovicianus*
Common Name: Loggerhead Shrike

Legal Status:

Canada: The eastern population was listed as endangered in 1991, and the prairie population was listed as threatened in 1986. The species is protected under the Provincial Wildlife Act of Ontario and Manitoba.

Mexico: This species is not listed.

United States: Listed as endangered, threatened, or a species of special concern, in at least 25 states. The US Fish and Wildlife Service is currently conducting a range-wide assessment to evaluate the status of the species and compile information for potential listing under the Endangered Species Act. One subspecies, the San Clemente loggerhead shrike (*L. l. mearnsi*), is already listed as Federally endangered in the United States. Although only one subspecies is listed, the US Fish and Wildlife Service officially recognizes the loggerhead shrike as a species of management concern.

Range:

In Canada, the eastern population of the species breeds from eastern Manitoba to southern Ontario, with occasional breeders in southern Quebec. The prairie population in Canada is more extensive and ranges through western Manitoba, Saskatchewan, and Alberta. In the United States, the loggerhead shrike is extirpated from many northeastern states or has declined in abundance to just a handful of breeding pairs. The species winters in the southern United States and Mexico.

At the maximum extent of the species distribution, the breeding range of the loggerhead shrike extended from Alberta to New Brunswick in Canada, throughout the United States, and throughout most of Mexico. The current breeding range, while still extensive, is shrinking. Most notably, the species no longer breeds with regularity in the northeastern portions of its former range (as far west as Ohio) or the northern tier states of Michigan, Wisconsin, and Minnesota. In Canada, the breeding grounds for the eastern population are now restricted to southern Ontario, which has a small breeding population (less than 50 pairs), with occasional breeders in southern Quebec. However, the prairie population is much larger and breeds in Saskatchewan, and parts of Alberta and Manitoba. Throughout the range, populations have declined and remaining populations are fragmented. Suitable breeding habitats include a wide variety of plant associations and physiographic strata, but must include open grassland areas with scattered trees or shrubs. Occupied habitats include pasture, old-fields, prairie, savanna, pinyon-juniper woodlands, and shrub-steppe.

The loggerhead shrike is a partial migrant with populations in the northern half of the breeding range being largely migratory, while southern populations are resident. The winter range lies mainly south of 40° N latitude.

Rationale for collaboration:

Once widespread and common, the loggerhead shrike has experienced continent-wide declines, for which the causes are not really known. These declines as well as range retraction were first noted in the early 1960s in both eastern Canada and the northeastern United States. Currently, there is little optimism for a reversal of this declining trend, but any efforts in recovery will depend on trilateral cooperation. Before a conservation strategy can be developed, research to determine the causes of decline is needed. This will require investigation of both breeding and wintering grounds. Migratory populations of loggerhead shrikes, which include

listed Ontario populations and the subspecies *L. l. migrans* in the northeastern United States, are among the populations, which have suffered the most dramatic declines. Wintering locations of these northern migrating populations are poorly documented, and therefore research on their wintering ecology is a high priority.

In addition to a high priority need for cooperative research and communication for effective and efficient design of recovery efforts, joint captive breeding and reintroduction programs or other joint management strategies may be needed. Collaboration between the United States and Canada may particularly be needed for the Ontario and northeastern United States populations. The loggerhead shrike is a unique member of the avifauna of Canada, the United States, and Mexico, and international cooperation is needed to conserve this imperiled grassland bird.

Background:

The loggerhead shrike was once widespread throughout North America, but it has experienced a continent-wide decline, especially in the eastern portion of its range. There was wide-scale decline before the mid-1960s, and since 1966, the North American Breeding Bird Survey has documented the loggerhead shrike's decline at 3.6% per year. Christmas bird counts also indicate sharp declines on wintering grounds. Declines are evident throughout North America, thus it is hard to evaluate the exact causes.

The various working groups of Partners in Flight have been undertaking regional assessments of the species status. In all regions, it is considered to be in need of conservation action. The loggerhead shrike has been on the National Audubon Society's "Blue List" every since the creation of the list.

In Canada, the numbers vary considerably between the eastern and prairie populations. The eastern population in 1998 was estimated at 31 breeding pairs in Ontario (up from 18 pairs in 1997) and nine single birds in Quebec. On the other hand, the prairie population was estimated in 1994 and 1996 to consist of 500 pairs in Manitoba, several thousand pairs in Saskatchewan, and 2,500 pairs in Alberta.

In addition to the decline in population numbers, the range of the loggerhead shrike has also shrunk, particularly for the eastern population. This is most evident in the northeastern part of the United States, where very few loggerhead shrikes remain. The range of the eastern population in southeastern Canada has also shrunk, although a small population still exists in southern Ontario.

As a species, the loggerhead shrike is not listed in the United States, and therefore there is no recovery team or recovery plan. The states of Wisconsin and Pennsylvania, which are in the area where the range has shrunk, have state recovery plans. The San Clemente Loggerhead Shrike, a subspecies, is listed federally, and there is a recovery plan for this subspecies. In Canada, there are recovery teams for the two main populations, the eastern population and the prairie population, as well as a national level recovery plan that was approved in 1993.

The International Shrike Working Group has a North American Section, which includes Mexicans, Canadians, and Americans. This group meets annually or biennially to discuss issues related to the global decline of the shrikes, including research, management, and public education.

Several incentive and public education initiatives are underway in Canada. More than 270 landowners with loggerhead shrike habitat in Ontario have been sent information and are encouraged to protect habitat. Likewise, landowners in Alberta and Saskatchewan have been encouraged to protect habitat under several other public education campaigns.

Factors affecting the status of this species:

As the decline of the loggerhead shrike has been so widespread, the causes are largely unknown. Habitat loss and destruction probably have played a role, yet the loggerhead shrike has been known to utilize agricultural and suburban areas. However, changing agricultural practices have impacted their grassland habitats, which may be a cause of decline.

Several factors may be causing the decline of the loggerhead shrike, and therefore an analysis of the various threats is a very high priority and a necessary step before constructive conservation measures can be designed. Possible factors include loss of winter habitat, loss of breeding habitat, habitat fragmentation, vehicle collision, pesticides, predation, increased human disturbance, affects from climate change, and interspecific competition.

Potential areas for collaboration:

1. Conduct a range-wide evaluation into the causes of decline of the loggerhead shrike. As the range extends throughout North America, this evaluation should be a trilateral effort. Information from various populations should be pooled together to gain a better understanding of the threats to this species.
2. Develop a joint research plan of the loggerhead shrike. First, existing knowledge about factors affecting this species needs to be pooled together and gaps in this information need then to be identified. Then an international plan of research should be developed to fill in the gaps. Research areas should focus on 1) causes of decline, 2) winter ecology, and 3) taxonomic evaluation. This plan should include specific research objectives, as well as a strategy to secure funding for necessary research. Some joint research projects, particularly between the United States and Canada, have been initiated, but would benefit from further collaboration with Mexico. For instance, Canada initiated a project using isotope measurements to link loggerhead shrike breeding with wintering grounds. Work so far has included Texas, Florida, Georgia, and Manitoba, but needs to expand into Mexico.
3. Prepare a range-wide comprehensive management plan of the loggerhead shrike. In the United States, such a plan cannot officially be called a recovery plan, as the species is not listed. However, the species is on obvious need of coordinated conservation action across the continent. A better understanding of the threats to the loggerhead shrike will be needed in order to develop a comprehensive plan, however, work on what is known should not be delayed. Part of the plan should be to evaluate across the range habitats that are supporting healthy populations of loggerhead shrikes and implement protection measures for these habitats.
4. Conduct a modern taxonomic assessment for the entire species. The first comprehensive taxonomic assessment of the loggerhead shrike, which identified 11 subspecies, was conducted in the 1930's. This work provided the basis for most subsequent treatments of the species. There is widespread recognition of the need for a modern biosystematic survey. Identification of subspecies is complicated by the tremendous variation in color and size within populations, which is why modern taxonomic methods are needed. Lack of proper identification of subspecies has complicated legal conservation activities in the United States and Canada. Clearer understanding of taxonomic relationships would foster better protection in these two countries, and a joint research project benefiting both countries would be a wise use of resources.
5. Develop a network to exchange information and to promote loggerhead shrike joint research and management activities among the three countries. Despite the existence of international working groups, information exchange to date has not been effective. For example, the United States was unaware of whom to contact in Mexico to send a survey about the status of the loggerhead shrike. Information from Mexico is desperately needed. As little is known about

this species and information is scattered, information exchange and joint identification of new research projects is an urgent need. Such an exchange could be provided through modern communication means.

6. Focus bilateral attention to the Ontario population of loggerhead shrikes. The Ontario population is down to less than 40 breeding pairs. This population is important to both the United States and Canada, because it is the last remaining population in the northeastern part of the loggerhead shrike's range. It could serve as a source population to re-establish the loggerhead shrike in the northeastern United States.

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Scientific Name: *Charadrius melodus*
Common Name: Piping Plover

Legal Status:

Canada: Both the eastern and prairie populations listed as endangered in 1985.

Mexico: Listed as threatened.

United States: The Atlantic Coast and Northern Great Plains populations listed as threatened, and the Great Lake population listed as endangered in 1985.

Range:

Piping plovers breed on the northern Great Plains and Canadian prairies, along the Great Lakes, and along the Atlantic coast from Newfoundland to North Carolina. They winter on the Atlantic and Gulf of Mexico coasts from North Carolina into Mexico, and in the Bahamas, Cuba, and the West Indies. They are occasionally found in Sonora and Nayarit states (western Mexico).

Rationale for collaboration:

International collaboration and cooperation is essential to conserve and enhance populations of the piping plover. Past efforts have helped to stabilize and increase some populations of this endangered species while other populations continue to decline. Continued collaboration among Canada, United States and Mexico and increasingly cooperation with Cuba, the Bahamas and the West Indies is essential to ensure successful conservation of this imperiled species.

Cooperation in the conservation of the piping plover was firmly established between the United States and Canada as early as 1986. Recovery Teams for the Atlantic Coast, Northern Great Plains, and the Great Lakes Working Group coordinate exchange of information and expertise on cross-population issues such as, protection of plovers on wintering grounds. In addition, both countries exchange biologists to assist with specific projects. Canada and the United States also coordinate assessments of population status and recovery goals, and pool breeding population counts annually.

Mexico became an active partner in the 1991 International Piping Plover Census, which included many individuals and conservation organizations. Enhanced involvement of Mexico is essential to better assess the status of the piping plover and to protect wintering areas in Mexico.

Continued exchange of expertise among Canada, Mexico, and the United States is critical. Future collaboration in addition to census activities could include efforts to increase the fledging rate, joint habitat management projects, identification of protection priorities for nesting and wintering areas, and better data-sharing and integrated monitoring programs.

A five-year project for managing alkali lake habitats on the Great Plains has recently been proposed. To be successful, partnerships need to be established in both Canada and the United States, which include federal, state and provincial agencies, as well as private sector interests including many landowners, and conservation organizations.

Background:

In the United States, three breeding populations of the piping plover are recognized: the Atlantic Coast, the Great Lakes, and the Northern Great Plains populations. Canada distinguishes two populations, the Atlantic and Prairie breeding populations. Wintering areas for piping plover extend along the Atlantic and Gulf Coasts from North Carolina to Mexico, and into northern Cuba, the Bahamas and the West Indies.

Two cooperative international censuses of breeding and wintering plovers (1991 and 1996) have given Canada and the United States the first global population count of this

endangered bird. The 1996 International Piping Plover Census was a great success, with 1,100 biologists and volunteers from eight countries participating. The Census coordinated activities of participants from 11 federal, 16 provincial, 37 state, and two tribal agencies, 70 conservation and business organizations, and hundreds of unaffiliated volunteers.

Range-wide in 1996, there were approximately 5,800 breeding individual piping plovers in populations scattered across beaches in 20 states, 9 Canadian provinces, and a small number on the French islands of St. Pierre and Miquelon, just off the coast of Newfoundland. Atlantic Coast populations in the United States showed an increase between 1989 and 1995 and have remained stable since. Atlantic populations in Canada decreased over this period. Great Lakes birds are increasing slightly. Northern Great Plains populations generally display decreasing trends, however some Prairie Canada populations are increasing.

Overall, census results suggest that the status of this beach-dwelling shorebird remains precarious given its low population numbers, sparse distribution, and continued threats to habitat and reproductive success throughout its range.

Factors affecting the status of this species:

Piping plovers are highly susceptible to a wide range of human activities. The primary threats to piping plovers are habitat modification and destruction, and human disturbance to nesting adults and flightless chicks. Recreational and commercial development and dune stabilization have contributed greatly to the loss of piping plover breeding habitat along the Atlantic Coast and Great Lakes. In the Great Plains region, damming and channeling of rivers also have eliminated sandbar-nesting habitat. Wintering habitat has probably also been lost to coastal development, and inlet and shoreline stabilization features.

Recreational activities, particularly pedestrian and vehicular traffic can seriously affect breeding success. Over the past 40 years, the number of vehicles and people on beaches has increased significantly. Human presence can indirectly lower productivity by disrupting territorial establishment, courtship, egg laying, and incubation activities. Foot traffic, dune buggies, and other vehicles (including raking of beaches for trash) can damage habitat and directly crush eggs or chicks. The ruts left by off-road vehicles can trap flightless chicks.

Increased urbanization and recreational pressure along the Great Lakes and Atlantic Coast has created an unnatural proliferation of predators, including foxes, skunks, raccoons, and gulls that are attracted to large quantities of trash. The result has been higher than normal levels of predation of plover chicks and eggs, and abandonment of nesting areas. A high level of predation is also a factor in the decline of piping plovers in Prairie Canada.

Potential areas for collaboration:

1. Increase the participation of Mexican wildlife officials in piping plover conservation efforts through the Piping Plover Coordination Group, and in the future, through the North American Waterfowl Management Plan. A three-country Piping Plover Action Plan should be considered to ensure complementary approaches.
2. Enhance international collaboration to increase understanding of the status of piping plovers, conservation issues and habitat requirement in wintering areas, especially in Cuba, Texas, Mexico and the Caribbean.
3. Enhance collaboration among government agencies and conservation organizations to better share management approaches including *inter alia*: efforts to direct human traffic from around the fragile piping plover nest scrapes found on beaches; success and failures in erecting wire fencing around nests to keep out predators; and management of water levels on large bodies of water.

4. Continue and enhance collaborative research programs to increase understanding of piping plover distribution and patterns of movement, fledging rates, population assessments including genetic variability, habitat management requirements and carrying capacity, and to identify conservation priorities.
5. Enhance sharing of information and experiences with piping plover public education and volunteer beach guardian programs, stewardship and incentive programs.
6. Continue collaborative efforts to identify and conserve habitats for piping plover, including, further development and implementation of the five-year project for managing alkali lake habitat on the Great Plains where piping plovers concentrate.
7. Enhance efforts to ensure enforcement of wildlife laws and regulations.

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Scientific Name: *Charadrius montanus*
Common Name: Mountain Plover

Legal Status:

Canada: Listed as endangered in 1987.

Mexico: Listed as threatened.

United States: Proposed for listing as threatened on February 16, 1999.

Range:

Mountain plovers range from Alberta and Saskatchewan, Canada, through the high plains of the United States to Zacatecas and western San Luis Potosi, Mexico. Nesting occurs primarily in the United States in Montana, Wyoming, Colorado, Kansas, and Oklahoma. Nesting has not been confirmed in Canada since 1989 despite the observation of birds in both Alberta and Saskatchewan. Only one nest has been found in Mexico. It is estimated that 85 % of the total North America population of mountain plovers winters in California, the remainder in northern Mexico, Arizona, and Texas.

Rationale for cooperation:

Over the past century there has been a significant reduction in mountain plover habitat throughout North America, and a corresponding decline in the number of plovers. Population analysis for 1966 through 1996 showed a population decline of 2.7 % annually. International collaboration is necessary to conserve mountain plovers across its current range. Collaborative efforts to conserve remaining summer habitat are essential as is protection of wintering areas, especially in California and Mexico. Agreement on standardized inventory approaches is required to undertake a comprehensive survey to understand better the status of the mountain plover across North America. The inventory is essential to provide a solid foundation from which to establish formal international conservation objectives for this species.

Background:

The mountain plover is an endemic grassland species that has been in steady decline for most of the twentieth century. Population estimates for mountain plovers for North America in the 1970s were between 214,000 and 319,000. While this is a very rough population estimate, the decline of mountain plovers is unquestionable, as the current population estimate is 8,000 to 10,000 birds, and continues to be on the decline.

Mountain plovers depend on grassland ecosystems and are associated with prairie dogs and other ground squirrels species, and with large grazers, formerly bison and currently domestic livestock. The decline of mountain plovers can be attributed primarily to the cultivation of grasslands and ground squirrel eradication programs. Cultivation of grasslands has been extensive. For example, the total range of prairie dogs has been reduced by 98 % since European settlement in North America in large part due to habitat destruction. As a result of this conversion of grasslands, mountain plovers are increasingly forced to utilize manmade habitats such as fallow fields for breeding, complicating conservation planning for this species. The mountain plover is a good indicator species of the health of the native grasslands and could be used to evaluate conservation success in one of North America's most threatened ecosystem.

Even though the primary range is in the United States, the mountain plover ranges as far north as the southern portions of Canada, where it is considered to be a rare summer visitor and breeder. The breeding population in Alberta has fluctuated since the mountain plover was rediscovered in 1979, from a high of at least 11 adults and six nests to no observed nests in 1986. Mountain plovers have also been observed in prairie dog colonies in Saskatchewan. Population

surveys are not regularly undertaken for the mountain plover in Canada and thus it is not known whether the species is stable, increasing or decreasing. Due to the low population size and available habitat, the mountain plover has been designated since 1987 by COSEWIC as endangered in Canada, and a Recovery Team has been established.

The mountain plover has not been seen nesting in Canada since 1989. The nearest nesting sites to the area in Canada where mountain plovers can be observed are in Montana, at the Charles M. Russell Wildlife Refuge. This is approximately 210 km from the last observed breeding areas in Alberta, and 140 km from the Saskatchewan border. It is not known what relationship exist between the Montana breeding population and the Canadian population.

The mountain plover is designated as threatened in Mexico. The full extend of its occupation has not been determined in Mexico. However, it is known that portions of Chihuahua provide important wintering habitat.

Factors Affecting the Status of this Species:

The primary factors affecting the conservation of the mountain plover are believed to be continued loss of habitat resulting from conversion of grassland areas to croplands, prairie dog and other ground squirrel control and eradication programs, and nesting failure in rangelands and fallow fields.

International collaboration could make a significant contribution to the survival of this species by protecting wintering areas in Mexico and maintaining breeding habitat, including the northernmost breeding habitat for the species in Canada.

Potential Areas for Collaboration:

1. Collaborate to standardize mountain plover inventory procedures and conduct population inventories for five consecutive years in order to estimate with greater accuracy the total population size. This would provide a clearer understanding of the status of the species throughout its range and provide a basis to establish international conservation objectives.
2. Collaborate to establish regional agreements to conserve mountain plovers and their habitat across North America. Conservation of grasslands ecosystems throughout North America must be a priority to conserve species like the mountain plover, and will be the most cost-effective conservation strategy for this, and many other species. This will likely require the use of incentives and easements to assist conservation efforts on private and leased lands.
3. Collaborate to identify mountain plover wintering areas in Mexico and conservation needs in these areas.
4. Undertake collaborative research to better understand mountain plover reproductive success, and habitat selection and security. Research is required to better understand nesting failure and to better understand how to manage and to utilize grasslands for grazing without significant impacts to mountain plovers.

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Scientific Name: *Athene cunicularia*

Common Name: **Burrowing Owl**

Legal Status:

Canada: Listed as endangered in 1995. Also listed as endangered in British Columbia, Alberta, Saskatchewan, and Manitoba.

Mexico: Listed as threatened.

United States: Not designated federally but is under review. Listed as endangered in Minnesota and Iowa, and is listed as a sensitive species or a species of special concern, in several states.

Range:

The burrowing owl is distributed discontinuously throughout the grasslands region of North America. In Canada, it is a summer resident breeding in the southern regions of Alberta, Saskatchewan, Manitoba, and in the southern interior of British Columbia. Historically, the burrowing owl was found in Minnesota, throughout South and North Dakota, and west to eastern Washington, Oregon and California. It also ranged as far south as Hidalgo and the state of Mexico, as well as to Guadalupe and Clarion Islands. The northern populations regularly breed throughout Mexico, except in the Yucatan Peninsula where there are occasional wintering visitors. A non-migratory population of burrowing owls occurs in Florida, but it is not the focus of this report.

Rationale for collaboration:

Burrowing owls have declined throughout the entire range of the species in Canada and the United States. Information from Mexico is insufficient to determine population trends there. International cooperation is required to gain more information on the status of the burrowing owl and causes for its decline. Collaboration is also required to better identify wintering areas and conservation requirements in these areas. Urgent attention is required to determine the rapid decline of the breeding population in Canada, California, and the northern states. Breeding pairs in Prairie Canada are now considerably fewer than 1000 pairs, a historic low and down from about 2,500 pairs in 1990. The cause of the decline is unknown and may be related to factors outside of the breeding areas, including migration routes in the United States and wintering areas in the southern United States and Mexico.

The Canadian Recovery Team has established conservation objectives for the burrowing owl. The Recovery Plan calls for the establishment and maintenance for ten years of a prairie population of at least 3,000 pairs, and the establishment of a population in British Columbia of 50 pairs for at least ten years. International collaboration appears to be essential to achieve these recovery objectives.

Background:

The population of burrowing owls is declining in Canada and United States. Decline in the number of nesting pairs in Canada is well documented, and has been occurring at least since the mid-1900s, when modern agricultural practices began. There are now less than 1,000 pairs breeding in Prairie Canada. The decline in number of breeding pairs is well documented over the past ten years. This has prompted the Committee on the Status of Endangered Wildlife in Canada (COSEWIC) to change the status of the burrowing owl from threatened to endangered in 1995.

Surveys in the United States indicate that the burrowing owl is declining throughout most of its range. The species, while not listed under the United States Endangered Species Act, is considered a species of conservation concern. The burrowing owl is listed as endangered by the states of Minnesota and Iowa, and considered a species of concern by Washington State, Oregon,

California, Montana, Wyoming, Idaho, North Dakota, South Dakota, Utah, Oklahoma and Florida. However, because the Florida population is not migratory, it is not discussed in this report.

Although Mexico is an important wintering area for migratory owls, the status of the burrowing owl in Mexico is not well understood. Collaborative work, however, is being done with National Audubon Mexico and Holroyd, among others.

International collaboration is essential to document better the status of the burrowing owl, to determine factors causing the decline of this species, and to establish conservation priorities. Immediate action is required to prevent the further decline of breeding populations of burrowing owls in Canada. This will require collaborative international research to understand better possible reasons for their decline, and surveys to locate wintering areas and the ecology of wintering birds.

Factors affecting the status of this species:

The reasons for the population decline are not totally understood; however, intensified land use is believed to be a major part of this problem, primarily the conversion of grasslands for agricultural purposes, and prairie dog and lagomorph eradication programs. Intensification of land use has resulted in widespread loss and fragmentation of nesting habitat. Fragmentation makes it difficult to find mates and appears to interfere with juvenile dispersal. In Canada, rates of loss of burrowing owl habitat has decreased significantly, however the decline of the owl continues suggesting other factors are important. Owls nesting on remaining areas may experience higher predation and lower productivity owing to reduced hunting success and may be more vulnerable to mortality from collisions with vehicles and from pesticide use. Carbofuran is a pesticide of particular concern, as its use significantly reduces the prey base possibly affecting survival and reproduction. In addition, the migration route and wintering areas for the burrowing owl populations are not known. It is probable that factors in these areas are also contributing to higher mortality in the burrowing owl.

Potential Areas of Collaboration:

1. Collaborate to undertake a North American-wide burrowing owl population assessment and breeding survey, including aircraft telemetry surveys, to provide a basis to establish North American conservation objectives for the burrowing owl.
2. Collaborate to undertake important burrowing owl research projects. Research is required in several areas including causes of mortality, winter ecology, affects of habitat loss and fragmentation, factors affecting productivity, impacts of human activities, etc. International collaboration is necessary to identify research priorities and to implement cost-effective research efforts.
3. Enhance efforts to identify burrowing owl wintering areas in the United States and Mexico and identify conservation needs in these areas. In addition, a monitoring program should be established to better understand burrowing owl migration routes.
4. Investigate ways and means to conserve remaining burrowing owl habitat including extensive tracts of grasslands and prairie dog colonies, by using incentives, conservation easements for private lands, and by establishing protected areas. Consideration should be given for establishing an international prairie/grasslands/drylands ecosystem team to examine conservation and sustainable use strategies for this ecoregion.
5. Continue to share experiences, data, and information on the burrowing owl by continuing to hold international Burrowing Owl Symposiums and providing access to data and information.

6. Share information on successful landowner programs such as Operation Burrowing Owl in Canada to enhance public support and participation in conservation efforts.
7. Establish agreements to eliminate the use of Carbofuran in burrowing owl areas.

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Scientific Name: *Strix occidentalis caurina*

Common Name: **Northern Spotted Owl**

Legal Status:

Canada: Listed as endangered in 1986.

Mexico: Not present.

United States: Listed as threatened in 1990.

Range:

The northern spotted owl is non-migratory and breeds in the coastal mountains and eastern and western slopes of the Cascade Mountain Range from northern California through Oregon and Washington into southwest British Columbia. In Canada, northern spotted owls only occur in British Columbia and occupy old-growth coniferous forests.

Rationale for collaboration:

International collaboration would significantly enhance efforts to conserve the northern spotted owl. Research and management approaches for this subspecies are most advanced in the United States. Sharing of results of research on the ecology of the subspecies and management needs could be extremely beneficial in assisting Canadian wildlife and forest managers to develop management and conservation strategies for Canada's population of northern spotted owls.

The northern spotted owl is an old-growth or late successional species. As a result of habitat loss and fragmentation, this subspecies is considered to be at risk across North America. The current population estimate across North America is a minimum of 8,500 pairs, but with a downward trend, has been listed since 1990 as threatened under the United States Endangered Species Act, and since 1986, listed by COSEWIC as endangered in Canada.

The northern spotted owl extends only a short distance into Canada. The current population estimate for Canada is about 100 resident pairs. This subspecies is listed as endangered by COSEWIC because of its low population and relatively small area of occupation. Population trends have not been established, as this subspecies is difficult to survey. However, old-growth habitat upon which the subspecies is dependent has decreased significantly in British Columbia since the 1900s, and it is therefore likely that historical populations of northern spotted owls were larger and that the range of the subspecies was more extensive.

Background:

The northern spotted owl is a subspecies of conservation concern across its range in the United States and Canada. Because the owl is dependent on old-growth forests and late successional forests, forest harvesting has significantly reduced available spotted owl habitat. Logging has resulted in habitat fragmentation, which may affect dispersal ability. Logging also improves habitat for spotted owl predators and competitors, thus reducing owl production and survival.

Population surveys are difficult for the northern spotted owl. The North American total is estimated to be at least 8,500 pairs and declining, with approximately 100 pairs located in Canada, in the northern most portion of its range.

Concern for the loss of the northern spotted owl in the United States and impacts to the economy from potential conservation strategies, prompted significant research to understand better the biology and ecology of this subspecies. Research initiatives are also underway in Canada to improve understanding total population size, dispersal, habitat preferences and

requirements, causes of mortality, and limiting factors. Two draft management plans have also been prepared.

Factors affecting the survival of northern spotted owls are likely to be similar in both Canada and the United States. International collaboration could help improve understanding of the biology and ecology of this subspecies and its management requirements. Coordinated inventory and monitoring would help to assess better the overall status of the northern spotted owl and population trends, and help identify any relationships between populations in both countries.

Factors affecting the status of this subspecies:

The primary limiting factor for the northern spotted owl is habitat availability, including food supply. Forest harvesting has reduced available habitat and affects habitat quality by changing the configuration of the landscape. Habitat fragmentation affects dispersal capability and may increase mortality as logging can improve habitat conditions for spotted owl predators and competitors, such as great horned owls, northern goshawks and barred owls. Toxic pollution may also be a factor in reducing nesting success as a result of thinning of eggshells.

Potential areas for collaboration:

1. Enhance international collaboration in undertaking northern spotted owl inventories to determine population status and trends; habitat requirements, especially nest site preference; and to continue the leg banding program as part of long-term monitoring.
2. Enhance international collaboration in the development of management plans, especially to assist conservation planning in Canada. Experience from conservation planning in the United States could assist Canada to plan the survival of the Canadian population while minimizing impacts to economic activities.
3. Determine potential areas for collaborative northern spotted owl research including, radio-telemetry to determine home range sizes, habitat selection, and evaluations of forest stand attributes to assess and determine suitable owl habitat.

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Scientific Name: *Strix occidentalis lucida*
Common Name: Mexican Spotted Owl

Legal Status:

Canada: Not present.

Mexico: Listed as threatened.

United States: Listed as threatened in 1993.

Range:

The Mexican spotted owl is found in parts of southern Colorado and Utah south through Arizona, New Mexico, western Texas, and northwestern Mexico to the states of Michoacán and Baja California. It commonly inhabits mountains and canyons, which often contain dense, multi-storied forests with closed canopies.

Rationale for collaboration:

The Mexican spotted owl is threatened by destruction and modification of habitat caused primarily by timber harvesting and fires. Understanding of this subspecies population trends and distribution, in both the United States and Mexico, must be improved to effectively manage and conserve this species. International research and monitoring to improve understanding of the subspecies status and threats in Mexico is urgently needed to gain a fuller understanding of conservation needs and priorities. In recognition of the need for international cooperation, the United States Mexican Spotted Owl Recovery Team includes a representative from Mexico.

Background:

The Mexican spotted owl is one of three spotted owl subspecies recognized by the American Ornithologists' Union and has the largest geographic range of the three spotted owl subspecies. There are no reliable estimates of the Mexican spotted owl's historic population size, although its historic range and present distribution are thought to be similar. In 1990, the estimated total Mexican spotted owl size in the southwestern United States was 806 pairs and 548 singles, or a total of 2,160 owls. Inventories since then indicate that the 1990 estimate was likely low.

Data are insufficient to estimate the total Mexican spotted owl population in Mexico. Nevertheless, specimen and sight records obtained over the past 120 years provide a fair understanding of the owl's general distribution. A survey of major museum collections found Mexican spotted owl specimens from Mexico collected from about 1870 through 1961, which represented 14 locations in 7 states. A total of 23 owl locations in Mexico were known in 1991. The New Mexico Department of Game and Fish is currently funding an owl study in the San Juanito-Creel area of west-central Chihuahua. One pair and four single birds have been found so far in that study.

The Mexican spotted owl was listed as threatened in the United States based on threats to its forest habitat, without any population trend information. A Spotted Owl Population Monitoring Program has been initiated in the United States, but will require 10-15 years to provide reliable data on population trends.

Factors affecting the status of this species:

The two major threats that have been identified for the Mexican spotted owl are forest harvesting and catastrophic wildfires. Conservation of habitat is being addressed in the United States Recovery Plan and forest harvesting plans in the United States portion of the owl's range. Wildfire remains as a significant threat for this subspecies.

Potential areas for collaboration:

1. Collaboration between Mexico and the United States is required to better understand the status of the Mexican spotted owl in Mexico, population trends and conservation threats.
2. Collaborative research would assist in providing a better understanding of the biology and ecology of the Mexican spotted owl, which would support conservation management and planning.
3. Collaboration in the management of forested areas occupied by Mexican spotted owls, including sharing information on timber harvesting approaches and fire fuel management, would be highly desirable to better conserve Mexican spotted owl habitat, and would assist in implementing restoration programs where they are feasible.

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Scientific Name: *Dendroica chrysoparia*
Common Name: Golden-cheeked Warbler

Legal Status :

Canada : Not present.

Mexico: Listed as endangered.

United States: Listed as endangered in 1990.

Range:

The golden-cheeked warbler has a very restricted breeding range. The species breeds only in the oak-juniper forest of central Texas. Migration occurs in a variety of montane forest habitats through eastern Mexico (reports from Coahuila, Nuevo León, Tamaulipas, Hidalgo and Veracruz). The species winters from the highlands of northern Chiapas south to Nicaragua and has been scarcely reported during migration in the northeast. Breeding habitat has been severely reduced due to destruction from urbanization and agricultural practices. When a species has such limited and definable habitat requirements, habitat loss most likely results in a population decline (USFWS 1994).

Rationale for collaboration:

Protection measures for the golden-cheeked warbler are urgent. Future projections by the US Fish and Wildlife Service show expected population declines to continue. The alarming decline of populations and the fast destruction of wintering and breeding habitat continues to threaten populations of golden-cheeked warblers. The primary threat is habitat destruction due to urbanization. Additionally, nest parasitism by brown-headed cowbirds (*Molothrus ater*) has been observed and may be a threat.

The biology of the golden-cheeked warbler in its wintering grounds is largely unknown, although reports suggest that habitat requirements are wider during winter. In Chiapas, Mexico, the species has been recorded in small patches in the cloud forest that are unfortunately disappearing at alarming rates.

Both urgent protection of breeding and wintering habitats and also biological studies at the wintering grounds are needed. Conservation agreements have not been established among the United States, Mexico or any Central American country, where the golden-cheeked warbler winters, which are essential for the survival of this species.

Background:

Ongoing and imminent habitat destruction from urbanization and agricultural practices justified the emergency listing of the warbler in 1990 in the United States. A Recovery Team and Recovery Plan were established in 1992. The Golden-cheeked Warbler Recovery Plan suggests several measures in the United States. First is the protection of sufficient breeding habitat to support both viable breeding population and sufficient non-breeding habitat for the members of the viable population to migrate to. The plan also recommends that all existing golden-cheeked warbler populations on public lands in the United States be protected and managed to ensure their continued existence until at least the optimum spatial arrangement of populations needed for long-term maintenance of the species is determined.

Work towards the objectives of the Recovery Plan is occurring through several initiatives. For instance, the Fort Hood Military Reservation is protecting a large population of golden-cheeked warblers and is conducting research to determine what measures are required to protect and manage this species. In Texas, the US Fish and Wildlife Service is creating the Balcones Canyonlands National Wildlife Refuge in Travis, Burnet, and Williamson counties, and the City

of Austin and Travis County are creating the Balcones Canyonlands Preserve. Together, the Preserve and the Refuge will protect about 30% of the golden-cheeked warbler's habitat in Travis County. However, inadequate funding currently threatens both of these efforts.

In another attempt to protect golden-cheeked warbler habitat, the Environmental Defense Fund has proposed to initiate Safe Harbor Agreements with private landowners to conserve the golden-cheeked warbler on some private lands in central Texas. The Central Texas Cattlemen's Association is also beginning to form partnerships with agricultural groups and private landowners to promote conservation of the golden-cheeked warbler on private lands.

The Central Texas Cattlemen's Association, US Fish and Wildlife Service, Fort Hood, Texas Parks and Wildlife Department, and US Department of Agriculture have a Memorandum of Understanding to control brown-headed cowbirds on private lands around the Fort Hood Military Reservation in an effort to reduce the threat of cowbird parasitism on the golden-cheeked warbler and other nesting songbirds.

In February 1999, the National Fish and Wildlife Foundation sponsored a meeting in Guatemala to initiate dialogue needed to promote conservation of the golden-cheeked warbler on the wintering grounds. Attendees included representatives from the breeding grounds (The Nature Conservancy, Ft. Hood, and FWS) and landowners, government officials, and conservation representatives from the wintering grounds.

A few studies have been conducted on the wintering grounds, including studies by John Rappole and Daniel Thompson, but much more extensive research is needed in this area. There is extremely limited information about the migratory patterns of the golden-cheeked warbler through Mexico. Information on the wintering habitats in Mexico is also very limited and suggests that warblers overwinter in Cloud Forest habitat, which is disappearing at an alarming rate.

Factors affecting the status of this species:

The majority of habitat in Central Texas is privately owned. Non-government organizations have played a key role in conserving the golden-cheeked warbler and its habitat by engaging private landowners in conservation efforts. The US Fish and Wildlife Service is also working with landowners through incentive programs. Rapid urban and agricultural development is decreasing breeding habitats along the Balcones Escarpment between Austin and San Antonio. Habitat must be conserved through acquisition, public education and outreach programs, conservation easements, regional planning, incentive such as the Endangered Species Act Safe Harbor program and other strategies that are aimed at promoting the conservation of golden-cheeked warbler habitat.

Priority must be given to improve understanding of the biology of the golden-cheeked warbler in its wintering grounds and actions taken to prevent further large-scale destruction of habitat. Incentive programs need to be established to protect the warbler's wintering habitat similar to programs established in the breeding grounds. Encouraging sustainable development options for habitat in Mexico and Central America is necessary for the long-term survival of golden-cheeked warbler. Determination of migratory patterns is also needed to protect migration routes between wintering and breeding areas.

Potential areas for collaboration

An international meeting was held in Guatemala to encourage international cooperation among the United States, Mexico, and Guatemala. At present there is not an agreed international

recovery plan for the golden-cheeked warbler. However, several potential areas for collaboration have been identified and include:

1. Conducting an international assessment of the golden-cheeked warbler to better understand migratory patterns, identify any potential breeding habitat in northern Mexico, and provide a basis for establishing a long-term international monitoring program.
2. Establishing an international recovery plan and recovery team and potentially a bilateral conservation agreement between the United States and Mexico.
3. Establishing agreements to protect breeding, wintering, and migration habitats to maintain viable populations of the golden-cheeked warbler.
4. Establish collaborative research initiatives to share expertise and available data and information on the golden-cheeked warbler. A project has been proposed to map the entire wintering range of the golden-cheeked warbler using Geographical Information System (GIS) technology to support conservation efforts. Inventory work is needed to identify habitats in Central America and Mexico and then to use this information to set conservation priorities.

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Scientific Name: *Grus americana*
Common Name: Whooping Crane

Legal Status:

Canada: Listed as endangered in 1978. Also listed under the Saskatchewan Wildlife Act and the Northwest Territorial Wildlife Act.

Mexico: Listed as endangered. Considered to be extirpated from Mexico.

United States: Listed as endangered in 1967. There is also a “nonessential” (experimental) population in Florida.

Range:

The historic range of whooping cranes extends from the Arctic coast to central Mexico (north to south) and from Utah east to New Jersey, South Carolina, Georgia and Florida. The species existed in both non-migratory, resident populations and migratory populations with distinct breeding and wintering grounds. The principal breeding range of the species as documented in the mid-1800s, extended from central Illinois, northern Iowa, western Minnesota, northeastern North Dakota, southern Manitoba, and Saskatchewan to the vicinity of Edmonton, Alberta. Additional breeding occurred outside of this range in the West, but little information was gathered before the species declined rapidly with European settlement.

Three historical migratory routes from breeding grounds to wintering grounds are known. One migratory path existed between breeding grounds in Illinois, Minnesota, North Dakota and Manitoba to wintering grounds in Louisiana and Texas. Another migratory path went through west Texas and connected nesting grounds in North Dakota, the Canadian provinces and Northwest Territories to wintering grounds along the gulf coast of Texas and the central highlands of Mexico. The third route crossed the Appalachians and connected nesting areas in Hudson Bay, Canada to wintering grounds on the Atlantic coastal areas of New Jersey, South Carolina and river deltas farther south (probably Florida, Alabama, and Georgia) in the United States. The Louisiana coast contained both resident and migratory populations.

Today, only one primary migratory path exists. This path connects nesting grounds in Wood Buffalo National Park, Canada, to wintering grounds in Arkansas National Wildlife Refuge (ANWR) in Texas. The migration route passes through northeastern Alberta, south-central Saskatchewan, northeastern Montana, western South Dakota, central Nebraska and Kansas, west-central Oklahoma and east-central Texas.

Only three wild populations exist and five captive locations have been established. Wild populations include the migratory population that winters in ANWR, an established wild population in the Rocky Mountains of Idaho, Montana and Wyoming (wintering in New Mexico), and a resident population in Florida. The Florida and Rocky Mountain groups are considered an experimental effort to establish a non-migratory population.

Six captive populations are held in the United States and one in Canada, totaling just over 100 individuals. Four of the captive populations in the United States are very small, consisting of only a few individuals.

Rationale for collaboration:

International cooperation between the United States and Canada has been essential for the conservation of the whooping crane. Cooperation began in 1916 with the adoption of the Migratory Bird Treaty Act. In 1985, the two countries signed a memorandum of understanding (MOU), which provided a formal structure to the cooperative efforts of both countries. The

MOU was renewed in 1990 and 1995 for five-year periods. A recovery plan and MOU is currently under revision for 2000

As a migratory species, the whooping crane is affected by actions in Canada, the United States and Mexico. The conservation of the whooping cranes has only been possible because of collaboration between Canada and the United States. Canada protects the primary breeding area and United States protects the wintering grounds for the only migratory population. Without this collaboration the species would have likely gone extinct many years ago.

While no whooping cranes are currently known in Mexico, international cooperation will be necessary to reestablish a migratory population in the Mexican highlands. A solid history of cooperation exists between the United States and Canada for the protection of whooping cranes, could serve as the basis for collaboration with Mexico.

Background:

The whooping crane is a highly endangered species with only one historical migratory breeding population in existence. Two other wild populations are currently being established. Three primary captive populations also have been established. While populations are slowly increasing, they remain small and isolated. The species is highly susceptible to natural disasters, such as drought, hurricanes, and human caused events such as chemical spills. Hunters, who mistake them for legally hunted species, occasionally kill whooping cranes.

Whooping crane populations are very slowly increasing. In 1941 the migratory population consisted of 16 birds and a remnant non-migratory flock of 6 birds existed in Louisiana. By the year 2000, over 180 individuals were expected to be living in the wild in Canada.

Whooping cranes are being bred in *ex-situ* conditions in the United States and in Canada. Since 1993, efforts have been underway to establish a non-migratory population in Florida from captive-raised whooping cranes. 184 birds have been released since 1993. 64 whooping cranes currently exist in this non-migratory population. A migratory population has been established in the Rocky Mountains in Idaho and Wyoming, and it winters in New Mexico, and possibly in northern Mexico. This population has failed to pair and breed and currently numbers only 3 individuals. No current plans are underway to continue this reintroduction. An eastern reintroduction is currently being planned with nesting in Wisconsin and wintering in Florida.

Recovery plans for whooping cranes have been approved in the United States in 1985, and in Canada in 1987. These plans have since been revised and approved. A formal international recovery plan was established in 1985 through the Memorandum of Understanding (MOU) on the Conservation of the Whooping Crane between the United States and Canada. The MOU was renewed in 1990 and 1995. A revised and more detailed international recovery plan is currently being developed.

The long-term objective of the international plan is to increase populations to the point that the whooping crane can be removed from classification as an endangered species. The 1995 United States-Canada MOU established that a population of 1000 individuals is the desired goal. Short-term and intermediate objectives include establishing a stable or increasing population in Wood Buffalo with a minimum of 40 breeding pairs by the year 2000, and establishing two other wild whooping crane populations, each with a minimum of 25 breeding pairs, by the year 2020.

Research regarding food resources available on the breeding grounds is ongoing. Inventory and monitoring also continues in the nesting area and staging area in Saskatchewan. Other research has been conducted to determine causes of chick mortality. Research was undertaken to assess eastern Saskatchewan and the Interlake region of Manitoba as a potential reintroduction site. Another study has been initiated in Wisconsin as a potential reintroduction site.

Nongovernmental entities involved in whooping crane conservation have included the National Audubon Society, Whooping Crane Conservation Association, Calgary Zoo, Operation Migration, Texas A & M University, International Crane Foundation, National Wildlife Federation, Platte River Whooping Crane Habitat Maintenance Trust, Socorro Chamber of Commerce, and the Texas Waterways Operators Association.

Factors affecting the status of this species:

A single catastrophic event could significantly affect the small migratory and non-migratory populations of the whooping crane. Potentially disastrous events include prolonged drought, hurricanes, oil spills, or other petrochemical spills. Deteriorating winter habitat due to boat traffic, wave erosion, dredging, commercial crabbing are also ongoing concerns. The breeding habitat has been negatively impacted by droughts.

Whooping cranes have a general intolerance to human presence and are easily disturbed. They are disturbed by most aircraft, but particularly helicopters. They seem tolerant of some types of barge traffic, but intolerant of high traffic from commercial boats.

Whooping crane fatalities during migration have occurred, resulting from collisions with power lines and from birds shot by hunters. Hunting incidences appear related to legal hunting activities of other birds that whooping cranes associate with. Some illegal shooting of cranes may be occurring as a result of misidentification and lack of public understanding of the status of this bird.

Another factor affecting the conservation of whooping cranes is disease. Though not considered a major cause of mortality in previous centuries, disease could potentially have a devastating impact. Whooping cranes that are known to have diseases are immediately removed and quarantined. The population bottleneck that occurred in 1941 (only 22 remaining individuals) likely reduced the genetic diversity of the remaining population increasing its vulnerability to be significantly impacted by disease. Known diseases of greatest concern are tuberculosis, Eastern Equine Encephalitis and crane herpes, which are particularly contagious.

Potential areas for collaboration:

1. Renew and sign Memorandum of Understanding on the Conservation of the Whooping Crane - 2000 and include Mexico in a future MOU.
2. Establish additional whooping cranes populations as set out in the Canada/United States agreement, considering the establishment of a migratory whooping cranes population in the Mexican highlands.
3. Continue the long-term international monitoring program for whooping cranes and efforts to share expertise, data, and research, and begin to enhance the participation of Mexico in these activities.
4. Continue efforts to protect whooping cranes in and along migration corridors and staging areas using appropriate measures, including by maintaining public education programs for hunters to ensure identification of whooping cranes.

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Scientific Name: *Gymnogyps californianus*
Common Name: California Condor

Legal Status:

Canada: Not present

Mexico: Listed as endangered, although the species is now extirpated.

United States: Listed as endangered in 1967. Listed as endangered in the state of California. An experimental population occurs in parts of Arizona, Nevada, and Utah.

Range:

The condor's historic range extended from British Columbia south through Baja California. However, the condor's current range is limited primarily to the coastal ranges of southern California, with nesting occurring primarily in the chaparral-covered mountains of the Los Padres National Forest and foraging in the grasslands of the San Joaquin Valley. Captive birds have been released in three locations in the United States: the Vermilion Cliffs in Arizona, Ventana Wilderness Sanctuary/Big Sur, and Los Padres National Forest/Lion Canyon, California.

Rationale for collaboration:

The existence and long-term survival of the California condor hinge on successful captive breeding and rearing programs conducted in the United States. The California condor is extinct in Mexico and Canada (not designated by COSEWIC) and faced certain extinction in the United States prior to captive breeding programs. Wild populations of the condor ceased to exist in 1987 when the last free ranging condor was brought into captivity after significant population losses in the wild.

The success of captive breeding and rearing programs increased the number of California condors from 27 to 161. Successful captive breeding has led to the release of individuals to the wild, which began in 1991 and appear to be successful. Wildlife preserves to protect California condors have been designated in both the United States and Mexico.

Captive animals from the United States could potentially be used to repopulate previous habitats in Baja California, Mexico, once proper collaboration has been established. Currently, there is no cooperative programs or agreements between the two countries to support international re-introduction efforts. Successful re-introduction of the California condor in Mexico could assist the recovery and long-term survival of this imperiled species. Though the range of the species historically included British Columbia, no recovery plan or preserve has been established for the condor in Canada.

Background:

According to fossil records, California condors lived extensively along the Pacific and Atlantic coastal regions. The post-Pleistocene range of the species is restricted to areas along the Pacific Coast from British Columbia to Baja California. More recently, however, the species was confined to a horseshoe-shaped area north of Los Angeles.

Since the 1870s, over hunting and poisoning were thought to have played a major role in the decline of the species. Extensive habitat loss and degradation severely limited the area available to condors and now limits the areas in which they can be successfully re-introduced.

Numerous organizations have joined forces to save the California condor, including: the US Fish and Wildlife Service, US Forest Service, California Department of Game and Fish, the Peregrine Fund, Los Padres National Forest, the Arizona Game and Fish Department, the Utah Department of Natural Resources, the Hualapai Tribe, the Navajo Nation, the Phoenix, Los

Angeles and San Diego zoos, the Bureau of Land Management, Glen Canyon National Recreation Area, Grand Canyon National Park, Kaibab National Forest, and many private landowners and individuals.

In 1953, the species was protected by the state of California. California condors were in immediate danger of extinction by 1967 when the species was listed as an Endangered species by laws enacted in the United States prior to the Endangered Species Act. In 1975, a California Condor Recovery Team was established and the first recovery plan was adopted. In 1979, biologists initiated studies, which led to the first captive rearing of eggs in 1983. In 1985 and 1986, a dramatic loss of the last remaining wild condors forced the capture of all remaining wild animals.

Captive breeding programs have intensified since the last wild condor was brought into captivity in 1987 resulting in the number of individual condors increasing from 27 in 1987 to 161 in 1999. Reintroductions of California condors to protected habitats began in 1991 in designated condor wildlife sanctuaries. Designated sanctuaries include the Vermilion Cliffs in Arizona and in California the Los Padres National Forest's Sespe and Sisquoc Condor Sanctuaries and Ventana Wilderness Sanctuary/Big Sur. Initial releases of condors met with difficulties as four died in collisions with power lines and one died from ethylene glycol poisoning, a substance commonly found in antifreeze. More recent reintroductions have been more successful, but threats in the wild, including hunting, have not been removed entirely.

In the United States, the recovery plan for the California condor was developed and revised last in April 1996. Conservation objectives are to establish two wild populations, with 150 birds in each population, and a captive population of 150 individuals. In Mexico a recovery plan and team is currently being organized for the California condor and an international plan is in the process of being established.

Mexico has one sanctuary established as a potential reintroduction site, San Pedro Mártir National Park in Baja California.

Factors affecting the status of this species:

Currently, the primary threats to the species are poisoning from lead bullets eaten while feeding on the remains of unrecovered and field-dressed deer, collisions with power lines, and poison intended for ground squirrels and coyotes. Extensive habitat loss and degradation severely limit the potential area condors can live and be successfully re-introduced into.

The species has yet to breed in the wild since its removal in 1987, and this is an obvious threat to the long-term survival of the species and must be overcome. Reducing mortalities of re-introduced birds is also essential. Mortality may be reduced by converting to underground electrical lines in key areas, releasing birds in more remote locations where there is less contact with power lines and toxins. Incentives for hunters to use non-lead bullets should also be a priority. Hunters and the public in general must be educated to prevent accidental or intentional deaths of condors. Specific education programs to local communities, one-on-one contact with the public, and public meetings should be used throughout condor release areas.

Potential areas for collaboration

1. Because the species could potentially migrate into Mexico from southern California and Arizona release sites, establish an international recovery plan and recovery team with representation from both the Mexico and the United States to develop an international conservation agreement for the California condor.
2. Evaluate potential sites for re-introduction of the California condor in Mexico and if feasible, re-introduce captive breed condors to these locations.

3. Provide technical support to Mexico to support their efforts to re-introduce the California condor, including assisting in the necessary educational programming for local communities in Baja.
4. Consider the establishment of a California condor captive breeding facility in Mexico.
5. Establish a long-term international California condor monitoring program to evaluate the progress of re-introductions.
6. Enhance sharing of expertise and information on the California condor and establish means to develop joint research initiatives.
7. Establish international forums for discussing conservation and management needs for the California condor, such as meetings and conferences.

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Scientific Name: *Cynomys ludovicianus*
Common Name: **Black-tailed Prairie Dog**

Legal Status:

Canada: Listed as vulnerable in 1999. Prairie dogs and their habitat are protected by provincial legislation under the Saskatchewan Wildlife Act (1981) and the Critical Wildlife Habitat Protection Act (1997).

Mexico: Listed as threatened.

United States: Warranted as threatened, but precluded by higher listing priorities.

Range:

Black-tailed prairie dogs range from Canada to Mexico, however their current range and distribution represents a small percentage of their historic range. Some scientists estimate that prairie dogs occupy only 2 % of their historic range.

Rationale for collaboration:

The black-tailed prairie dog is considered by many scientists to be a keystone species, whose conservation will contribute to the conservation of the mid-grass and short-grass prairie region of the Great Plains. Collaboration among Canada, Mexico, and the United States, in the management of black-tailed prairie dogs would assist overall efforts to conserve this species and the grassland ecosystems that it occupies. Moreover, conservation of prairie dog colonies provide habitat for many other prairie species, many of which are declining or are of some conservation concern, such as mountain plovers, ferruginous hawks, burrowing owls, and swift foxes. Conservation of prairie dog colonies is also essential to the survival and re-introduction of the black-footed ferret, North America's most endangered mammal.

Background:

Five species of prairie dogs are recognized in North America. At the beginning of this century, prairie dogs were estimated to have covered between 40 and 100 million ha of grassland ecosystems in western North America. The total black-tailed prairie dog population size across North America prior to European settlement has been estimated at 5 billion individuals. By 1961, the area of occupation declined to about 165,000 ha, representing approximately a 99% decline in total habitat. Today, prairie dogs exist largely in isolated colonies throughout their former range, with notable concentrations on Tribal and Forest Service lands in the northern Great Plains and in Mexico.

The black-tailed prairie dog has the greatest distribution of any of the prairie dog species. The species historically existed in vast colonies reaching hundreds of square kilometers in size. Today, while small black-tailed prairie dog colonies continue to persist throughout much of their historic range, colonies have become fragmented and isolated, which may significantly affect the long-term conservation of the species, and affect many other species that depend on, or are associated with prairie dog colonies (burrowing owls, rattle snakes, mountain plovers, black-footed ferrets, etc.).

Black-tailed prairie dogs are the only species of prairie dog occurring in Canada, and only occupy an area in southern Saskatchewan. A 1996 prairie dog census found that there were 22 colonies totaling about 932 ha in Canada. The total number of colonies and area occupied appears to be increasing. Approximately, 96 % of prairie dog colonies will exist on lands proposed as Grasslands National Park with about 56 % of the colonies already included in land purchased by the Government of Canada for establishment of the Park. In this area, prairie dogs

and their habitat are already protected by provincial legislation under the Saskatchewan Wildlife Act and the Critical Wildlife Habitat Protection Act.

The only healthy population of black-tailed prairie dogs known in Mexico is located in Chihuahua, an area of approximately 40,000 ha. This is the largest contiguous black-tailed prairie dog complex in North America, perhaps once extending into the southern United States. This complex may provide an extremely valuable site to re-introduce the black-footed ferret as only about a half-dozen prairie dog colonies have so far been identified throughout North America, as being large enough to support ferret populations. Prairie dogs are rapidly decreasing in Mexico as a result of habitat loss due to conversion of grasslands to croplands, and prairie dog eradication efforts on rangelands.

In the United States, black-tailed prairie dogs continue to persist as remnant populations across approximately 70% of their historic range, although 37% of their range in the United States has been converted to cropland. However, eradication programs have significantly impacted them. For example, between 1980 and 1985, the largest remaining black-tailed prairie dog complex in South Dakota was reduced by more than 90%. Even public lands in the United States, including National Parks have been subject to prairie dog control programs. Approximately 10-20% of black-tailed prairie dogs across their range is controlled annually, although some recovery occurs in some areas. These programs exist primarily as a result of the perceived competition between prairie dogs and livestock. Recent cost-benefit analysis of control programs and other research have shown that there is no or little impact to livestock production from competition with prairie dogs. Such research has resulted in the decline of government-supported control programs. Disease outbreaks are also known to occur in prairie dog colonies across 66% of the range in the United States, significantly affecting the population size of colonies and sometimes resulting in the loss of entire colonies.

Factors affecting the status of this species:

There are three major threats to the long-term survival of the black-tailed prairie dog: disease, eradication programs, and habitat loss and fragmentation. Eradication programs continue despite research showing that competition between prairie dogs and cattle is low, about 4-7%. This means that about 300 prairie dogs eat as much as one cow and calf. Other research has shown that there is no significant difference in market weight between livestock raised on lands with, or without prairie dogs. Coexistence of large grazers with prairie dogs is also well documented historically. Bison, elk, and pronghorns coexisted in the millions with billions of prairie dogs.

Given the enormous reduction in total area occupied by prairie dogs in North America, urgent effort is required to avoid any further losses. While it is true that the black-tailed prairie dog continues throughout much of its historic range and is not in imminent danger of disappearing, further habitat loss will threaten not only this species but also many other associated species. Further fragmentation and loss of habitat also reduces options in terms of the re-introduction of the black-footed ferret.

Potential areas for collaboration:

1. Examine potential benefits of developing a North American conservation strategy or regional strategies or plans for the black-tailed prairie dog as a prairie keystone species, as part of broader efforts to conserve prairie grassland ecosystems. One goal would be to maintain or enhance complexes of black-tailed prairie dogs throughout its historic range to support re-introductions of black-footed ferrets (2,000-4,000 hectares and larger).

2. Establish an interagency mechanism to share experiences in the management of prairie dogs, and to better assess and monitor the status of the black-tailed prairie dog across its range. Common census approaches would assist in establishing reliable estimates of prairie dog numbers across North America and would support development of regional conservation objectives for the black-tailed prairie dog.
3. Collaborate in initiating research programs, including research that is aimed at better understanding the relationship between prairie dogs and livestock. Also, collaborative research would enhance efforts to better understand the biology and ecology of the black-tailed prairie dogs across its distribution.
4. Enhance sharing of the results of research and information regarding efforts to reduce landowner conflicts with prairie dogs. Collaboration would be particularly valuable in investigating the use and effectiveness of incentives to protect prairie dog colonies, and to determine what incentives are required to promote expansion of colonies on private and public lands.
5. Enhance sharing of education and information programs and materials to increase awareness of the many roles and values of prairie dogs and prairie dog colonies.
6. Continue collaboration in the identification of potential sites for the re-introduction of the black-footed ferret.
7. Continue efforts to determine the potential for establishing an international protected area between Mexico and the United States, aimed at conserving the largest remaining black-tailed prairie dog complex in North America.
8. Collaborate to identify measures to prevent further fragmentation of existing prairie dog complexes and the resulting isolation of colonies.

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Scientific Name: *Antilocapra americana sonoriensis*

Common Name: Sonoran Pronghorn

Legal Status:

Canada: The species is present in the Prairie Region of Canada, but this subspecies is not present.

Mexico: The species, *Antilocapra americana*, is listed as endangered.

United States: The Sonoran pronghorn listed as endangered in 1967. Listed as endangered in the state of Arizona.

Range:

The current range of the Sonoran pronghorn includes areas in the United States and Mexico. In Arizona, the Sonoran pronghorn occurs on the Cabeza Prieta National Wildlife Refuge, Barry M. Goldwater Range, and Organ Pipe Cactus National Monument, from Highway 85 west to the Cabeza Prieta Mountains (or perhaps to the Gila and Tinajas Atlas Mountains) and from approximately the Wellton-Mohawk Canal south to the Mexican border. Recent unconfirmed sightings suggest some animals may also occur on the Tohono O'odham Nation and in the Lechuguilla Desert, west of the Cabeza Prieta Mountains.

In Sonora, Mexico, the Sonoran pronghorn is known just east of Sonoyta south to the Puerto Peñasco area, east to the sandy plains around Bahia de San Jorge, and west into flats surrounding the Sierra de Pinacate. The current range of the Sonoran pronghorn is estimated to occupy more than 2 million hectares. Historically, the Sonoran pronghorn ranged in Mexico in the state of Sonora, west of Hermosillo to the Gulf of California

Rationale for collaboration:

The Sonoran pronghorn is an endangered species, experiencing declines across its range in both Mexico and the United States. In the United States, the Sonoran pronghorn is restricted to publicly owned lands. In Mexico, the pronghorn occurs on both public and private land, but livestock grazing and agriculture is limiting the amount of available habitat. In both countries, movement of the pronghorns is severely limited by fences, highways, and other barriers. The fence along the United States – Mexico border and Highway 2 are major obstacle to pronghorn movement. Given the restricted areas available to the pronghorn and the significant barriers to dispersal, extensive management is needed to ensure long-term survival of this subspecies.

Long-term survival also depends on the viability of populations in both Mexico and the United States, which requires controlling illegal hunting. Cooperation between the United States and Mexico is necessary in order to ensure protection of healthy numbers in both countries, genetic exchange, and to coordinate research and monitoring efforts. Managers need to continue collaboration, good communication and shared decision-making to address some issues, such as management of the pronghorn along the border. Collaboration will also be beneficial in undertaking captive breeding and reintroduction of the Sonoran pronghorn.

Background:

The Sonoran pronghorn is one of five subspecies of pronghorn occurring in North America. In addition to the Sonoran pronghorn, there are two subspecies, *Antilocapra americana peninsularis* and *Antilocapra americana mexicana* that are found in Mexico, which are also endangered.

In the United States, there are currently fewer than 300 Sonoran pronghorns, all of which are part of a single population occupying an area of Arizona. This population has been surveyed in Arizona every two years since 1992. In 1992, the population was estimated at 246 animals.

Several years of drought followed and the population dropped to about 172 individuals in 1998. Another drought occurred in 1999, and appears to have taken most of that year's fawns. This is the third time in five years that such extensive mortality has occurred.

All of the Sonoran pronghorns remaining in the United States occupy public, mainly federal, lands. Ownership is shared among several agencies, the military, the Bureau of Land Management, the Fish and Wildlife Service, the National Park Service, and the Arizona Fish and Game Department.

In Mexico, it is estimated that there are somewhere between 200 and 500 Sonoran pronghorns remaining in the state of Sonora, and less than 1000 individuals in all of Mexico. In 1993, a cooperative study between the Arizona Game and Fish Department and Mexico, estimated the population in Sonora to be 313 individuals, however, the study did not include the entire Mexican range. There have been no aerial surveys in Mexico since 1993, which hampers management efforts.

The Campfire Conservation Fund established the International Sonoran Antelope Foundation in 1990. This foundation aims to help protect the Sonoran pronghorn from extinction by raising funds for recovery efforts in Mexico and the United States. The Foundation has also been active in public education efforts.

International cooperation has been initiated between Mexico and the United States to conserve the Sonoran pronghorn. In 1997, a Letter of Intent was signed by the United States Department of Interior and the Mexican Secretariat of Environment, Natural Resources and Fisheries to establish joint research and management projects for the Sonoran pronghorn. The targeted area for the joint projects was in three protected areas, Cabeza Prieta National Wildlife Refuge, Organ Pipe Cactus National Monument in Arizona, and the Pinacate Biosphere Reserve in Mexico. The Pinacate Biosphere Reserve borders the Cabeza Prieta National Wildlife Refuge. In addition to this formal cooperative agreement, Mexican federal and state employees participate on the United States Sonoran pronghorn Recovery Team. Moreover, the Mexican National Committee for the Recovery of the Pronghorn has been recently formed, has met twice and is working closely with the Arizona Game and Fish Department.

Factors affecting the status of this species:

The primary factor contributing to the decline of the Sonoran pronghorn has been the loss of habitat. Today, pronghorn still suffer from habitat loss and fragmentation. Sonoran pronghorns are nomadic, and are thus vulnerable to habitat fragmentation. Major barriers are highways, including Highway 2 in Mexico, and Highways 85 and 8 in Arizona. Studies indicate that Highway 85 effectively prevents their eastward movement into useable habitat. Another significant barrier is the fence along the United States Mexican border. The fence prevents pronghorn migration preventing genetic exchange between the two populations.

In the United States, other roads, railroads, fences, and canals serve as barriers to dispersal effectively restricting the Sonoran pronghorn to existing occupied areas. Potential habitat exists on the Tohono O'odham Indian Reservation. However, fencing to control cattle prevents this land from being occupied by pronghorns. Grazing by cattle has also substantially altered the quantity and quality of vegetation, which may make some areas unsuitable for pronghorns. The effects of cattle grazing on pronghorn habitat are not fully understood, but are likely significant limiting factors.

Additional factors currently affecting the status of the Sonoran pronghorn include prolonged droughts, lack of forage, predation, military activities, agricultural development, and possibly illegal hunting. Prolonged droughts affect fawn survival by reducing available nutritious

forage to the mothers for lactation and to the fawn. Weakened animals may be predisposed to predation. Predators include mountain lions, coyotes, and bobcats. Military activity is significant in the areas being occupied by the Sonoran Pronghorn. The effect of military activities is not known at this time.

Potential areas for collaboration:

1. Examine the costs and benefits of possible modifications to the fence along the United States Mexican border to determine the feasibility of modifying the fence to allow passage of Sonoran pronghorn. Migration between the two populations on either side of the border (or some other means of exchange) would likely be beneficial to improving survival of the species by maintaining genetic diversity. Movement of pronghorns along the border is complex as there are traffic and other issues that must be addressed. Opening the fence for pronghorn movement may increase the mortality rate from vehicle collisions.
2. Strengthen collaborative management efforts, particularly for the Pinacate Biosphere Reserve, the Cabeza Prieta National Wildlife Refuge, and the Organ Pipe Cactus National Monument. As these three protected areas are contiguous, planning should occur collaboratively for the entire region. Regional planning will be particularly important if modifications are made to the border fence.
3. Collaborate on research projects to identify critical habitat needs of the Sonoran pronghorn especially to determine habitat requirements for different activities (fawning, movement corridors, etc), and to determine the impacts of grazing by cattle and other activities on habitat quantity and quality throughout the pronghorn's entire range. Data should be collected in a standardized format so that studies can be compared and contribute to a common understanding of habitat requirements.
4. Collaboration is essential to undertake a range-wide population assessment of the Mexican populations of the Sonoran pronghorn. Sharing of equipment and expertise could catalyze such an effort and common assessment techniques would allow for a comprehensive international assessment. It would also make it possible to establish a long-term joint monitoring program, which is also required.
5. Establish a bilateral task force to investigate options for a joint captive breeding program. Population Viability Assessment suggested that the Sonoran pronghorn is at high risk of extinction and thus captive breeding may be a necessary conservation activity. To maintain appropriate genetic diversity, founders from both the Mexican and United States populations should be involved in the captive breeding program. If captive breeding is undertaken, it is likely that a joint program would be advantageous to both countries.
6. Collaborate to identify, evaluate, and prioritize potential sites for reintroducing the Sonoran pronghorn. Criteria for identification, evaluation, and prioritization for these sites should be developed in a collaborative process.

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Scientific Name: *Leptonycteris curasoae yerbabuena*
Leptonycteris nivalis
Common Name: Lesser longnosed bat, murciélago magueyero
(Greater) Mexican longnosed bat; murciélago magueyero

Legal Status:

Canada: Not present.

Mexico: Both species are listed as threatened.

United States: Both species listed as endangered on September 30, 1988. *Leptonycteris curasoae yerbabuena* is listed as threatened in New Mexico and as species of special concern in Arizona (formerly listed as endangered). New Mexico and Texas list *Leptonycteris nivalis* as an endangered species.

Range:

Lesser longnosed bats are found in Arizona from the Picacho Mountains south and west to the Agua Dulces, south and east to the Chiricahuas, and into Mexico to Veracruz, Oaxaca and Chiapas. They are also found in southwestern New Mexico, Baja California, and Central America. Bats that summer in the United States winter in Mexico, but they do not hibernate.

The range of the **Mexican longnosed bat** occurs mainly from Texas and New Mexico to Guatemala. The species has been collected in 15 Mexican states. In the United States, they are found in southwestern Texas and southwestern New Mexico. In New Mexico, Mexican longnosed bats inhabit upper desert scrub - pine oak woodlands in or near mountainous areas. In Texas, the habitat of the species includes woodlands dominated by oaks and pines ranging into lower-elevation communities. In northern Mexico, the Mexican longnosed bat is known to occur from medium to high elevation—450 to 2,800 metres in desert scrub - pine oak woodlands.

Both species are migratory through Mexico. Summer breeding sites are in northern Mexico and the southern United States. Winter roost sites are in Mexico.

Rationale for collaboration:

Both bat species are migratory across the border of the United States and Mexico. Protection of these species requires both countries to protect summer and winter roost sites and migratory pathways. Factors impacting the species are similar on both sides of the border and the primary causes of the species' declines are disturbance at roost sites and loss of foraging areas.

The United States and Mexico have collaborated in conservation and research actions for the preparation of the recovery plan for *Leptonycteris nivalis*. That recovery plan was published by the US FWS in 1994, but none of the tasks listed therein have been formally pursued, although work in Mexico has continued along some of those lines. The recovery plan of *Leptonycteris curasoae yerbabuena* has been recently approved by the US FWS (1998), and entails also significant collaboration between the two countries. Currently there are important collaborative efforts that are recognized and supported by both federal governments and some local and municipal governmental offices.

The status of both species is uncertain. It appears both species are declining in Mexico, and stable or declining in the United States. However, both species are highly susceptible to any catastrophic event at a roost site. Both species have disappeared from previously known roost sites, but new sites have been found since the two species were listed in the United States.

Background:

Both species feed mainly on agave and saguaro flower nectar and pollen. They are considered primary pollinators of these plants. Both species are threatened by agave harvests (especially in Mexico, for the liquor industry) and by human disturbance of roosting colonies, especially maternal roost sites in the United States and northcentral Mexico. Because of their highly gregarious roosting behavior, these species are vulnerable to catastrophic population loss through human disturbances at roost sites.

A study summarized the status of the lesser longnosed bat in 1984-5. The study recommended that it be listed as threatened under the Endangered Species Act, mainly on the basis of (1) apparent declines in populations in Mexico and Arizona and (2) the lack of formal protection for the species and its habitat (including agaves as a food source) in Mexico. The US Fish and Wildlife Service subsequently listed this species as an endangered species throughout its range.

In the United States, the lesser longnosed bat has made a substantial recovery in numbers since surveys in 1984-85. Population sizes are far larger (by two orders of magnitude in Arizona alone) than was known in 1985, and its numbers at some locations appear to be relatively stable from year-to-year. Because of its highly gregarious roosting behavior, however, this species will always be vulnerable to catastrophic population loss through human disturbance of its roost sites.

The 1994 recovery plan for this species outlines steps necessary to down list the longnosed bat from endangered to threatened. Recovery actions stress protection of known roosts and feeding habitat (including populations of columnar cacti and paniculate agaves), population monitoring for a period of at least 5 years at key sites throughout its known range, development of a public education program on the beneficial aspects of bats in Arizona, New Mexico, and Mexico, and development of a research program to answer questions critical for its management.

The 1994 recovery plan for the longnosed bat covers the United States and Mexico. Mexico was fully represented on the recovery team when the document was being prepared. Though data for the last 3 years indicates that it is stable, expansion of livestock grazing continues to threaten foraging habitat as does harvesting of agave stalks for liquor production.

The lesser longnosed bat will be considered for down listing when three objectives are reached. (1) Three major maternity roosts in Arizona (Copper Mountain Mine, Bluebird Mine, and Old Mammon Mine) have remained stable ($\pm 10\%$) or have increased in size. (2) Three major "post-maternity" roosts (Patagonia Bat Cave, State of Texas Mine, and Hilltop Mines) have remained stable ($\pm 10\%$) or have increased in size. (3) At least four major roosts in Mexico (e.g., Pinacate Cave, Santo Domingo Cave, San Andres Cave, and Rancho Tempisque Cave) have remained stable ($\pm 10\%$) or have increased in size. Population stability or increase must occur within a period of at least five years following approval of the recovery plan.

The Mexican longnosed bat was listed at the same time as the lesser longnosed bat, but less is known about it. The United States finalized a recovery plan in 1994. The "Programa para la Conservación de los Murciélagos Migratorios" (PCMM) also has established a research and conservation agenda for these bats. The primary goal is reclassification from endangered to threatened status through:

- a) Protecting, monitoring and locating roost sites
- b) Determining foraging needs and protecting foraging habitat
- c) Determining and controlling other threats and limiting factors
- d) Modeling population viability

Full de-listing of the species has not yet been identified as a conservation objective, because there is not enough knowledge available regarding what constitutes a population or how a population migrates and uses the habitat.

Population fluctuations, movements, diet, reproduction, DNA analysis, and stable carbon isotope contents are being monitored periodically for both species in a total of 20 localities in twelve states of Mexico and one state in the United States. In Arizona, a study of foraging ecology of the lesser longnosed bat is in progress.

The Arizona-Sonora Desert Museum began a five year initiative called “Migratory Pollinators and Their Corridors: Conservation Across Borders” in May 1999 to improve conservation for these and other bats. Other entities interested in protection of the bats are Bat Conservation International, Nature Conservancy, Texas Parks and Wildlife Department, New Mexico Game and Fish, US Geological Survey - Biological Resources Division, National Park Service at Big Bend NP, and Mexican governmental agencies (primarily the *Secretaría de Desarrollo Social*). Several Mexican nongovernmental organizations and Mexican universities and research entities are also interested in participating in conservation efforts. The tequila industry is an untapped, potential interest for conserving wild populations of the “*agave azul*” (the source of tequila), which is pollinated by bats of this genus.

Factors affecting the status of these species:

The primary factor affecting conservation of both species are human activities such as cattle grazing, fire management, and roost vandalism. Foraging areas for bats in both countries are impacted by grazing and fire management. Protection of agaves and columnar cacti needs greater emphasis throughout roosting areas and migratory routes in order to protect the bats' food resources. Encouraging agave replanting after harvesting would probably be beneficial to this species. Pitaya (*Stenocereus pecten-aboriginum*, *S. queretaroensis*) growers of lowland Jalisco are now actively protecting their nectar feeding bats to increase their fruit yields, and this effort should be encouraged range-wide.

Roost vandalism at both maternity roosts and also wintering roosts is a severe and ongoing problem. Vandalism at sites can cause abandonment of the site or drastic loss of individuals. In June and July when the young are very small, disturbance can cause them to lose their grasp on the rock, falling to their death. During hibernation, disturbance will cause the bats to increase their metabolism to flee. This use of fat reserves may cause the bat to starve to death prior to spring.

Public education programs could significantly increase realization of the conservation objectives. A strong need for education exists to show the positive impact of bats on the environment and potential economic resources. Landowner incentives are needed to encourage protection of roosting sites and nectar sources. An additional factor in Mexico is vampire bat control programs.

Lack of biological knowledge is an impediment to the conservation of these species of bats. The size, location, and configuration of habitat to support viable populations should be studied. Updated population status surveys should be conducted. More research on migratory behavior and the relationship between the bats and plants is needed as well as studies on roosting feeding and reproductive behavior. Determining the extent of the impact of agave harvest on Mexican longnosed bat survival and recovery is needed.

Potential areas for collaboration:

1. Establish and fund a bilateral, long-term, major roost-monitoring program for both occupied and unoccupied sites, and protect all roosting sites.

2. Maintain an international recovery team such as existed in 1984, 1985, when the lesser longnosed bat recovery plan was written.
3. Establish and protect additional roosting and foraging sites in both Mexico and the United States.
4. Establish a comprehensive public relations program and education for landowners for protection of roost sites and nectar sources for foraging sites.
5. Establish incentive programs for private landowners to protect roosting and foraging sites.
6. Enhance sharing of data, expertise, and establish joint research initiatives.

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Scientific Name: *Ursus americanus*

Common Name: **Black Bear**

Legal Status:

Canada: Black bears are not designated by COSEWIC, as they are not a conservation concern in Canada. Two subspecies in British Columbia are protected by provincial legislation from hunting.

Mexico: Listed as endangered.

United States: The subspecies *Ursus americanus luteolus* (the Louisiana Black Bear) was federally protected as a threatened species in 1992. Other black bear subspecies protection varies in the United States by state.

Range:

Scientists recognized 16 subspecies of black bear that are found throughout most of North America from Canada and Alaska, south along the Pacific west coast through northern California, in the Rocky Mountain states to northcentral Mexico. Populations also occur in parts of Minnesota, Wisconsin, Michigan, New England, Florida, and Louisiana.

Populations of black bears were once wide spread in Mexico but now are restricted and fragmented. Black bears occur across most of Canada occupying an estimated 85 % of their historic range.

Rationale for collaboration:

While many populations of black bears are stable or increasing across North America, some populations appear to be in a state of rapid decline, especially in some southern states and in Mexico. Human occupation of the land, hunting, and ultimately habitat destruction through conversion of forests for farming combined to bring about the decline of the Louisiana black bear. These bears make long range movements and can occur in adjacent Mississippi. However, it is unknown whether breeding numbers exist outside of Louisiana. The Louisiana black bear is now restricted primarily to the Tensas and upper and lower Atchafalaya River Basins in Louisiana. Habitat destruction and road kills are two main threats to bears in Florida.

In Mexico, illegal hunting and habitat destruction by cattle ranching are primary threats to bears. Throughout the range of the species, fragmentation of existing habitat and increasing presence of humans into the bear's habitat is creating significant conflicts that threaten most bear populations.

Collaboration between the United States and Mexico is desirable to examine the decline of the black bear in the southern portion of its range and to plan conservation efforts. Collaboration should focus on both management of shared populations and understanding better the basic biology of populations in the southern United States and Mexico, including information on habitat requirements, movements, population viability, and genetic diversity. Enhanced collaboration could be achieved through the existing International Association of Bear Research and Management.

Background:

Sixteen subspecies of black bear are currently recognized and given differential protection throughout their ranges. Black bear populations are increasing in the United States in some regions, stable in some regions, and decreasing in others. Populations are declining in Mexico and are highly restricted and fragmented. In Canada, black bear populations appear to be stable or increasing in most area and it not considered a conservation concern.

The decline of one subspecies, the Louisiana black bear, led to federal protection in the United States when it was listed as a threatened species. The Louisiana black bear's threatened status warrants protection under sections 7 and 9 of the Endangered Species Act. A recovery plan has been written for the bear and conservation objectives include preserving large tracts of remaining forest and connecting large forested areas to maximize dispersal. Black bears are featured as priority species for protection and management on the Tensas and Atchafalaya River National Wildlife Refuges, state-owned lands, and on certain important privately owned tracts, such as Deltic Farms near Tallulah, Louisiana. Additionally, important research on basic life history questions is occurring on all three of the subpopulations in Louisiana.

The state of Louisiana has increased fines for illegal killing of bears. The Black Bear Conservation Committee (BBCC), a coalition of private and public interests, formed to insure necessary private landowner cooperation to restore black bear populations and to promote numerous private and public initiatives to insure conservation of this species, works together with the US Fish and Wildlife Service on restoration objectives.

Loss of habitat and illegal hunting in Mexico has also led to protection of black bears. Conservation objectives are in the process of being developed in Mexico and currently include population recovery, habitat restoration, and environmental education. INE is in the process of writing a recovery plan for black bears. The national parks Maderas del Carmen in Coahuila, Sierra Gorda in Querétaro, El Chico in Hidalgo, and Cañón de Santa Elena in the state of Chihuahua all contain black bears. Maderas and the Cañón de Santa Elena harbor the densest known population of black bears in North America and have been identified as the source for recent successful colonization of Big Bend National Park in Texas. Ecology and life history studies in Maderas del Carmen National Park and Sierra del Burro, Coahuila have been initiated.

Since black bear populations in Canada are not in any immediate danger, hunting is allowed. Populations in Canada are estimated at about 400,000, half of the total for North America. Black bears are classified and hunted as big game animals throughout Canada and trapped as furbearers in seven jurisdictions. Adjustments to hunting and trapping levels have been made when there appears to be a population decline, such as is the case in Quebec.

Many nongovernmental organizations in Mexico and the United States are interested in assisting the conservation of black bears. These groups include: *Asociación Nacional de Ganaderos Diversificados* (ANGADI), the Black Bear Conservation Committee (BBCC), *Universidad Autónoma de Nuevo León* (UANL), National Autonomous University of México (UNAM), Unidos para la Conservación, Texas A&M University in Kingsville, Defenders of Wildlife and the Sierra Club.

Landowners and cattle ranchers in Louisiana and Coahuila (Mexico) are very aware of the need to protect this species and are active participants in research and conservation activities. A Mexican incentive program, UMA (*Unidades de Manejo y Aprovechamiento*) has been beneficial to the species, and a very successful Wetlands Reserve Program in the United States provides land payments and perpetual or long-term easements to private landowners to reforest marginal agricultural lands; in Louisiana, emphasis is placed on areas adjacent to or near habitat currently occupied by bears.

A proposal to create an international recovery team is underway between Mexico and the United States. It may be desirable to include Canadian experts on the recovery team to benefit from their experience in the management of bears.

Factors affecting the status of this species:

There are two main factors that are affecting black bears. Habitat loss and human encroachment of areas occupied by black bears is the most significant concern. Large expanses of forested areas are necessary for bears, but also highly sought by humans for development of wood products, and agricultural, industrial and urban developments. Long-term planning to reduce, prevent and reverse habitat fragmentation will be necessary to protect bears, especially in areas that are densely populated with humans.

The second major threat to black bears is illegal hunting and accidental killing. Public education programs are urgently needed to reduce illegal hunting and to reduce transportation-related mortality. Humans must also learn how to prevent bears from becoming problematic or nuisance in areas where they will cohabitate, as problem bears are often shot or trapped. Illegal harvesting to meet demand for bear products in Asia must also be closely monitored to prevent the loss of populations.

Potential areas for collaboration:

1. Establish a mechanism such as an international black bear recovery team, to better understand the biology and conservation needs of the black bear in the southern United States and Mexico.
2. Examine opportunities to enhance collaboration to better manage shared black bear populations between the United States and Canada, and to identify opportunities to conserve remaining portions of the historic range of the black bear (landscape/habitat level conservation).
3. Examine the need for and benefits of establishing cooperation agreements among the three countries to establish conservation goals for North America, better share data and information, expertise, and to coordinate law enforcement efforts to better control illegal hunting of black bears and trading of bear products.
4. Determine the need for a mechanism that provides for long-term international monitoring and reporting on the black bear.
5. Share information and methods of public education to reduce conflicts between black bears and humans.
6. Examine opportunities to re-establish black bear in previously occupied areas.

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Scientific Name: *Canis lupus*
Common Name: Gray Wolf

Legal Status

Canada: Not listed. Managed as a furbearer, pest and game species and protected in national parks and other protected areas.

Mexico: Listed as endangered. Protected under the environmental law LGEEPA (*Ley General del Equilibrio Ecológico y la Protección al Ambiente*) in Mexico.

United States: Listed as endangered in 1967. The Minnesota population was listed as threatened in 1978, and the reintroduced populations are listed as experimental. The gray wolf is listed by all 48 lower states.

Range:

Gray wolves were historically distributed throughout North America, north of central Mexico to the Arctic Ocean. There are approximately 50,000 to 60,000 wolves remaining in Canada, occupying about 86% of its historic range. Wolf populations in Canada are extremely important in terms of the conservation of this species, as wolf populations have been decimated throughout much of their range in North America.

Today, wolves are extinct in Mexico and parts of the United States, including the northeast and the southwest. There is a small, reintroduced population of Mexican wolves in Arizona, and another reintroduced population of gray wolves in Idaho and Wyoming. In the early 1980s, some wolves moved from Canada into Montana, creating a population there. In total, there are about 400 wolves in the western United States. There is a population of about 3,000 wolves in Minnesota, Wisconsin, and Michigan.

Rationale for collaboration:

The gray wolf is a wide-ranging transboundary species whose historic range includes much of North America. However, it is currently extirpated from much of its historic range. Re-introduction of this species to much of its former range will depend on international cooperation. This collaboration is well established with conservation efforts for various gray wolf populations been initiated between Canada and the United States, and between the United States and Mexico.

Canada provided wolves for reintroduction into Wyoming and Idaho, and wolves moved into Montana from Canada on their own accord. Successful recovery of gray wolves and their continued genetic viability in these three states is dependent on continued exchange of individuals with nearby populations in Canada. Wolves in the midwestern United States have been able to recover, in part, because of dispersal by nearby Canadian populations. If wolf recovery is to occur in the northeastern United States, the most probable source population is Quebec. Long-term success of wolf populations in the United States will likely depend on conservation efforts in Canada and collaborative initiatives.

Recovery of the Mexican wolf and re-introduction to its former range in Mexico depends on international collaboration. This subspecies represent the most southern form the gray wolf, and is currently endangered. The last wild Mexican wolves were captured in Mexico and placed into captive facilities in both Mexico and the United States. They have provided a basis for captive breeding and the recovery of the Mexican gray wolf. Continued collaboration between United States and Mexico is necessary to ensure the wolf is successfully reintroduced into the wild.

Background:

Wolves once ranged throughout much of North America. Today, their population is only stable in Canada. There is a wild, but threatened population in the midwestern portion of the United States. Gray wolves have been extirpated from the northeastern and western United States and Mexico. However, wolves have been re-introduced into the western part of the United States and have returned to some areas through natural migration from populations in Canada.

In both the United States and Mexico, there are active wolf recovery programs. In the United States, there were three recovery teams under the auspices of the Fish and Wildlife Service. The recovery team for Idaho, Wyoming, and Montana, disbanded after developing the recovery plan. Populations of gray wolves in the midwestern and the western parts of the United States are increasing. Recovery teams remain for the Minnesota, Wisconsin, Michigan, and for the Mexican wolf. It is thought that a wolf recovery team will be established for the northeastern United States within the next year (2001).

The recovery of the wolf in the United States and Mexico is a complex and difficult challenge. Recovery in some areas and for subspecies like the Mexican gray wolf requires captive breeding and re-introductions. Recovery will also depend on public acceptance of this large predator. Public education and livestock wildlife damage compensation programs will also be necessary. As a shared species, and as an often-disliked large carnivore, the long-term survival of the gray wolf throughout its historic range will depend on collaboration among the three countries.

Factors affecting the status of this species:

The single most significant factor affecting the conservation of wolves is the high level of human caused mortality. As predators, wolves occasionally prey on livestock. This can lead to poisoning, shooting and trapping and general dislike for the wolf in rural areas. Livestock depredation can become a serious problem in areas where the wolves prey base is reduced. Thus, wolf recovery areas are ideally large blocks of natural habitat without free ranging livestock. Such areas are becoming more and more scarce in the southern portions of the gray wolves historic range.

Some livestock depredation by wolves will always occur when they overlap. Thus, problem wolf control programs and compensation programs are essential to gain the necessary public support for wolf conservation and recovery efforts. Control and compensation programs are well established in the United States, particularly the western states.

In Mexico, there are serious problems with illegal trapping, hunting, and poisoning of wolves, probably at least in part due to the lack of compensation programs and poor public understanding of wolves. Such behavior will most definitely affect conservation efforts, and will need to be addressed before any reintroduction programs can take place. Natural habitat suitable for wolves is rapidly shrinking as a result of human settlement and development, especially in Mexico.

Hybridization of the wolf with coyotes is another potential threat to recovery efforts in some portions of the gray wolves historic range.

Potential areas for collaboration:

1. Form an international wolf recovery team to examine the potential for the recovery of the gray wolf in the northeastern portion of the United States. Maine and New York still have good areas of potential wolf habitat, but any re-introduction must be carefully evaluated.

2. Develop a collaborative recovery program for the Mexican wolf between the United States and Mexico, including a captive breeding and reintroduction program. Habitat surveys are required on both sides of the border to determine potential release sites.
3. Collaborate to increase support for the conservation and recovery of the Mexican wolf, particularly in Mexico, but also in the southwestern United States, through the creation of public education and landowner compensation programs. Such efforts have proven successful in the western United States and are severely lacking in Mexico. In the United States, these efforts were primarily championed by nongovernmental organizations. Encouragement by the governments and CEC for NGOs and others to apply their experience in the United States to Mexico would be very beneficial.

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III. General Conclusions:

Although there is a long history of conservation and collaboration among Canada, Mexico, and the United States concerning threatened and endangered transboundary or migratory species, this history does not imply that conservation regimes are equal or similar. This fact, however, should not be regarded as a problem but as an opportunity to learn from our differences, share successful experiences and work towards efficient and effective conservation of our species of common concern. It is time to move from a state of describing these differences, to one of conducting conservation in spite of them, and because of them. A new paradigm is needed: one of using our differences and our various strengths together to build a common strategy. We hope that the conclusions brought forth from this report and identified in the profiles developed for the current fifteen species, from past and present initiatives, and the conservation regimes of Canada, Mexico and the United States will be considered as possibilities for future conservation action.

We need to maintain a large scale, long-term vision of biodiversity conservation in North America and the role we all play. Much of what has been documented in this report falls beyond the mandate of the CEC. However, as a document created to increase collaboration and spur action, a full picture is warranted where all those involved in biodiversity conservation can make contributions in their respective sphere of responsibility.

From the start of this project, contrasts were highlighted, with the differences between the three countries' endangered species legislation being the most prevalent. Maturity of the legislation, financial resources allocated to recovery plans, institutional infrastructure found, legislative and policy framework developed, and decentralization of decision making, enforcement, management and legal protection are all differences which bring both positive and negative consequences to the conservation of species at risk. Moreover, intriguing new mechanisms, such as economic incentive programs, conservation easements, and Fideicomisos (Trusts), as well as successful partnerships (PARC [Partners in Amphibian and Reptile Conservation], NABCI, etc.) between the three countries should become ubiquitous to better conserve species of common conservation concern.

The fifteen species described in this report, and others in the future with similar characteristics, could be viewed as "*keystone*" species for collaboration. Just as ecological keystones mediate the overall adequate function of an ecosystem, these "*keystone*" species for collaboration will do the same for continental conservation. In general, collaboration seems to be most well developed when species are endangered in two or more countries, such as the case with the whooping crane. Understandably, to date, mechanisms for collaboration appear in general to be less well developed for transboundary or migratory species that are only threatened or endangered in one country, or are not yet listed in any country, but appear to be declining.

Suggestions from wildlife officials and experts contacted during this project included many necessary elements for joint action. Examples include collaborating in habitat conservation initiatives, establishing better lines of communication to share experiences and knowledge, collaborating in range-wide population and habitat assessments, forming joint research initiatives, working as international teams to develop management strategies, and developing an early warning system to identify species at risk. Canada is presently establishing a monitoring system for all wildlife species. Their status will be evaluated every five years. The idea is to detect species in decline and intervene before they become endangered. This program could be

merged with similar monitoring program conducted by the United States and Mexico for shared species, and coordinated by the CEC.

Other common themes regarding needs in species recovery included the need for better funding, a better understanding of the species' status, particularly in Mexico, and better strategies for protecting habitat. An umbrella strategy that insures continuing collaboration between species initiatives should be the next step in the conservation of these fifteen species of common conservation concern.

For transboundary species, such as the pronghorn and spotted owl, where the viability of the populations are dependent on neighboring populations, the need for international recovery teams and joint management initiatives was clear. For the migratory species, such as the piping plover, golden-cheeked warbler, and the ferruginous hawk, there is a real need for international conferences and other means of communication so that managers of breeding grounds have a better understanding of what is happening in the wintering grounds and vice versa.

Habitat loss was a common threat identified during preparation of the species profiles. No one associated with wildlife and wildlife management would be surprised by this. While it is absolutely essential that conservation planning and research continue at the species and subspecies levels, it is also evident that collaboration would be beneficial at the ecosystem or ecoregion levels. Economic incentive programs and conservation easement initiatives, especially between two or more countries, could do a great deal to help in this area.

The prairie/grassland/dryland region is an obvious choice for working at the ecosystem/grassland/ecoregion level. Conserving as much of the remaining portion of this ecosystem, and in particular the prairie dogs and prairie dog colonies component, would seem to be an urgent priority for the conservation of the species chosen for this report. However, a higher level mechanism for managing this area, should be considered, much like the eight arctic countries that have formed high-level management bodies and developed biodiversity strategies and action plans to conserve biodiversity in the Arctic ecoregion. Likewise, the North American Bird Conservation Initiative (NABCI) has achieved similar results in its vision to achieve "regionally based, biologically driven, landscape-oriented partnerships delivering the full spectrum of bird conservation across the entirety of the North American continent." New bodies could be created, or presently existing higher-level mechanisms, like NABCI or the Joint Ventures involved in the North American Waterfowl Management Plan (NAWMP) could incorporate the findings concerning the species in this region into their plans. These initiatives could serve as models for conserving the Prairies of North America and other ecoregions, as well as other groups of wildlife.

The issue of land tenure and assigning responsibility for biodiversity conservation is perhaps the most complex challenge to resolve if it is to become a constant in North American strategies. Here again, differences need to be identified, learned from and capitalized on in order to conserve our species of common concern of North America. For example, in Canada and the western United States public land is abundant, representing more than 30% of the land surface. However in Mexico, less than 2% of land is public, with the rest about equally distributed in either traditional private property or social property—(what used to be government land now given to the *ejidos*). And whereas much of the work in the United States and Canada is about strategically protecting corridors and ecological attributes that increase the conservation value of a landscape, in Mexico, reserves, if they exist at all in an area, are of "postage stamp" size, and are, at best, nestled in a matrix of private property. Moreover, only limited restrictions on use are found within these reserves, with implementation done through private landowners.

In Mexico conservation is more commonly done on private land. In this situation, the hoped for success of establishing land owner commitments to conservation and management of species of conservation concern will be highly unlikely with *all* of the landowners needed. Clearly, cases will exist where critical areas for conservation are not prone to incentives, or compatible uses are simply not available. In these cases, acquisition and incorporation into public or private land trusts could be an appropriate measure to be taken. And because fiscal resources for conservation action are scarce in Mexico, as compared to Canada and the United States, but where benefits are accrued by the North American society as a whole, it is urgent to support Mexico in the establishment of mechanisms such as jointly funded land trusts. For example, in the last decade several million dollars per year have been spent in the worthy cause of establishing the Lower Rio Grande Valley Wildlife Corridor. However, the viability of this ecosystem and associated species at risk are still in peril for lack of connectivity to ecologically important areas in Mexico. Similar examples abound in both the US/Mexico and the Canada/United States borders. To efficiently and effectively conserve migratory and transboundary species, national boundaries, in terms of information and resources, should be of the most limited nature possible. As the wildlife of North America sees no boundaries, so neither should wildlife conservation.

In general, strategies to protect habitat both on public and private lands should be assessed in terms of their effectiveness, with this information shared among the three countries. Joint evaluation of these various strategies will help to develop a greater understanding of which strategies work best in which contexts. For example, the governmental initiative UMA (Unidad de Manejo y Aprovechamiento de la Vida Silvestre) in Mexico has been hugely successful in increasing control of, and interest in, targeted wildlife, as well as indirectly benefiting many other species, and providing a direct value to land owners. One of the great advantages of incentives and collaboration with private landowners is that they become the best managers to ensure the incentive and the best wardens to prevent free riders from profiting. Yet at the same time, new problems are created when conflicts arise between biodiversity conservation and game optimization.

A strong bias in terms of conservation still exists for “charismatic megafauna” and/or potentially “profitable” species, especially in Mexico. This is understandable in a scenario of limited resources and the need to involve private cooperation and capital in conservation. Although this is a useful first step, care must be taken not to get trapped in the “use it or lose it” philosophy. As many migratory species rely on habitat on private lands, economic incentive programs or other strategies such as private landowner development/mitigation tradeoffs, could greatly increase habitat protection along these routes, therefore benefiting all three countries. Commitments of fiscal resources would be needed to this end. Special forms of transboundary tax incentives would be in line with the nature of this purpose.

Mechanisms for increased information and technical assistance exchange should be established to enhance the flow of knowledge and know-how between species managers in the three countries. International conferences, exchange programs and training workshops, for example, would allow managers to learn about species and habitat conditions in other parts of the species range, as well as meet other experts working with the species. In particular, there appears to be a real need to better understand the status of species and their habitats in Mexico. Information sharing would also promote the exchange of research data and experiences with various management strategies. For example, the 1997 North American Conference on the

Monarch Butterfly convened experts from all sectors of society and from across the species' range.

For most of the species, range-wide assessments were called for, either to establish the species status because its condition is not fully known throughout its range, as with the peregrine falcon, or to gain a better understanding of its habitat. In some cases, such as the California condor, range-wide assessments are needed to identify possible reintroduction sites. In other cases, such as the loggerhead shrike, a range-wide assessment is needed to understand the causes of decline.

Both information sharing and range-wide assessments would be aided by a standardization of data collection. Many of the species profiles indicate a need for range-wide monitoring, which in most cases involves all three countries. The development of basic standard protocols to compile data from all three countries would help in the range-wide understanding of species as well as in the development of range-wide recovery strategies.

Monitoring must be simple and cost effective with results presented to a North American body for review. There is and always will be a need for scientific research, yet as conservation biology dictates, lack of information should not impede continual and increasing actions. Total expenditures for research and monitoring by all parties involved could be a fraction of those for actual conservation implementation and/or "opportunity savings" generated by initiating action early on. It is important to remember that research and monitoring by themselves do not achieve conservation and can actually lose meaning, by becoming simply historical records of trends, if not set up to measure conservation implementation or foster action.

Establishment of an early warning system for species in decline could also be considered. This could include listed species and species of concern not yet listed. Establishment of an early warning system should not be considered an official list that would interfere with setting national priorities for conservation; rather, it could be used to facilitate collaboration on conservation planning among the three countries. It could become a mechanism to increase awareness across North America of species at risk and in decline. Increased awareness and public support will be essential to recover species at risk and implement measures to prevent other species and ecosystems from declining and becoming threatened. In addition to the early warning system, a mechanism is needed to foster trilateral recovery teams and recovery plans for transboundary and migratory species, even when the species is not listed in all three countries. International recovery teams will help bring to bear the most current information available on a species. Having members from countries where the species is doing well will help in the design of effective strategies in other countries. Existing efforts to organize teams of experts, such as the piping plover coordinating group, should be promoted and expanded to ensure that all three countries are represented. Cooperation with all sectors of society would increase the likelihood of success of the initiative.

Public education is another area that presented itself as needing greater attention. Several of the species studied for this report, such as the bats, the California condor, and the piping plover, are susceptible to human disturbance. Public education is needed to increase habitat protection on private lands and to decrease illegal hunting and eradication measures. Again, sharing knowledge and techniques among all three countries could help to improve public education efforts overall. It could also save time and money in redeveloping educational materials and programs. Not only should species experts from all three countries collaborate, but professional educators and communicators as well. An example that can be learned from and expanded on is that of Monarch Watch, "a collaborative network of students, teachers, volunteers

and researchers dedicated to the study of the monarch butterfly.” This initiative presently involves Canada and the United States, with increasing cooperation with Mexico.

Education must not only affect curricula at all levels, but it must also go beyond the classroom and be ambitious in scope. If biodiversity conservation within and between our three countries is to achieve the level of political will and public acceptance and participation it needs, the general public must be aware and committed. When it comes to voting on, approving and demanding action, it is the public who will decide the fate of biodiversity.

The way a message is communicated and implemented is as important as the message itself at most times. Again, the differences between the three countries need to be well understood when trying to communicate the value of species to the different sectors and societies found in North America. The same can be said when protective measures are developed. For example, a strategy that works well in one area where much of the land is government owned, would not work well in another where private land-ownership is more prevalent.

Mechanisms should also be in place such that fulfilling the public mandate of conservation is neither unattainable nor at a cost borne by a small sector of society. If our solutions are not practical and grounded in reality from a political, biological, financial and social perspective, they are merely good wishes and as such do not benefit biodiversity.

The need for more funding was another common, yet unsurprising theme. Any way in which collaboration can eliminate duplication of effort, and thereby decrease costs would be beneficial. In addition, new mechanisms for raising more funds for trilateral species recovery, such as species trust funds, should be explored. Moreover, these mechanisms must incorporate mid- to long-term planning horizons in a way that they are shielded from political transitions. The concepts of mitigation in both ecological and financial terms also need to be reinforced in the legal framework of the three countries, and work to provide both incentives and disincentives.

Another very important obstacle to recognize and overcome concerns staffing. When numbers are too low and human resources are spread extremely thin, departments and organizations overlap in scope but communicate very little. Furthermore, when people in charge change every few years, thus changing and disrupting the direction and focus of conservation efforts, our nations’ wildlife and ecosystems are not helped. This is a huge challenge we must overcome.

This project has identified several opportunities to enhance communications among the three countries, strengthen public awareness of the decline of biodiversity across North America, provide mechanisms to better share data and information, and elaborate on financial and other incentives all which would greatly benefit the conservation of species of common conservation concern. To protect our migratory and transboundary species that are the most at risk, we must direct our course to seek and pursue the most efficient and effective paths and accomplish this feat together.

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BIRDS						
Common Name	Scientific Name	Status as listed by Canada (COSEWIC)	CAN population	Status as listed by the US (ESA)	US population	Status as listed by Mexico (NOM-059)
Hawk, Cooper's	<i>Accipiter cooperi</i>					T
Goshawk, Queen Charlotte	<i>Accipiter gentilis laingi</i>	C (V)				
Hawk, Sharp-shinned	<i>Accipiter striatus</i>			sub. listed		T
Hawk, Puerto Rican sharp-shinned	<i>Accipiter striatus venator</i>			E	(Puerto Rico)	sp. listed
Sparrow, Henslow's	<i>Ammodramus henslowii</i>	E				
Pipit, Sprague's	<i>Anthus spragueii</i>	T				
Heron, Pacific Great Blue	<i>Ardea herodias fannini</i>	C (V)				dif. sub. listed
	<i>Ardea herodias occidentalis</i>	dif. sub. listed				C (R)
	<i>Ardea herodias santilucae</i>	dif. sub. listed				C (R)
Owl, Short-eared	<i>Asio flammeus</i>	C (V)				T
Murrelet, Marbled	<i>Brachyramphus marmoratus</i>	T		sub. listed		
Murrelet, Marbled	<i>Brachyramphus marmoratus marmoratus</i>	sp. listed		T		
Goose, Aleutian Canada	<i>Branta canadensis leucopareia</i>			T		C (S)
Hawk, Red-tailed	<i>Buteo jamaicensis</i>					C (S)
Hawk, Red-shouldered	<i>Buteo lineatus</i>	C (V)				
Hawk, Ferruginous	<i>Buteo regalis</i>	C (V)				
Thrush, Bicknell's	<i>Catharus bicknelli</i>	C (V)				
Thrush, Black-headed Nightingale	<i>Catharus mexicanus</i>					C (R)

Common Name	Scientific Name	Status as listed by Canada (COSEWIC)	CAN population	Status as listed by the US (ESA)	US population	Status as listed by Mexico (NOM-059)
Grouse, Sage	<i>Centrocercus urophasianus phasio</i>	Ex	BC population			
Grouse, Sage	<i>Centrocercus urophasianus urophasianus</i>	E	Prairie population			
Plover, Western Snowy	<i>Charadrius alexandrinus nivosus</i>			T		
Plover, Piping	<i>Charadrius melodus</i>	E	AB, MB, NB, NF, NS, ON, PE, QC, SK	E	Great Lakes watershed in IL, IN, MI, MN, NY, OH, PA, and WI	T
Plover, Piping	<i>Charadrius melodus</i>	E	AB, MB, NB, NF, NS, ON, PE, QC, SK	T	Entire except Great Lakes watershed in IL, IN, MI, MN, NY, OH, PA, and WI	T
Plover, Mountain	<i>Charadrius montanus</i>	E		C (PT)		T
Hawk, Marsh/ Northern Harrier	<i>Circus cyaneus</i>					T
Bobwhite, Northern	<i>Colinus virginianus</i>	E		sub. listed		sub. listed
Bobwhite, Masked (quail)	<i>Colinus virginianus ridgwayi</i>			E		E
Rail, Yellow	<i>Coturnicops noveboracensis</i>	C (V)				E
Warbler, Cerulean	<i>Dendroica cerulea</i>	C (V)				
Warbler, Golden-cheeked	<i>Dendroica chrysoparia</i>			E		

Common Name	Scientific Name	Status as listed by Canada (COSEWIC)	CAN population	Status as listed by the US (ESA)	US population	Status as listed by Mexico (NOM-059)
Warbler, Kirtland's	<i>Dendroica kirtlandii</i>	E		E		E
Albatross, Short-tailed	<i>Diomedea albatrus</i>			E		
Flycatcher, Southwestern Willow	<i>Empidonax traillii extimus</i>			E		
Flycatcher, Acadian	<i>Empidonax vireescens</i>	E				
Hawk, Pigeon/ Merlin	<i>Falco columbarius</i>					T
Falcon, Northern Aplomado	<i>Falco femoralis septentrionalis</i>			E		E
Falcon, Prairie	<i>Falco mexicanus</i>					T
Falcon, Peregrine	<i>Falco peregrinus</i>	sub. listed				T
Falcon, Anatum Peregrine	<i>Falco peregrinus anatum</i>	T				sp. listed
Falcon, Peale's Peregrine	<i>Falco peregrinus pealei</i>	C (V)				sp. listed
Falcon, Tundra Peregrine	<i>Falco peregrinus tundrius</i>	C (V)				sp. listed
Owl, Ferruginous	<i>Glaucidium brasilianum</i>			sub. listed		T
Pygmy-owl, Cactus Ferruginous	<i>Glaucidium brasilianum cactorum</i>			E		sp. listed
Crane, Whooping	<i>Grus americanus</i>	E		E	(entire, except FL, where population is listed as XN)	E

Common Name	Scientific Name	Status as listed by Canada (COSEWIC)	CAN population	Status as listed by the US (ESA)	US population	Status as listed by Mexico (NOM-059)
Condor, California	<i>Gymnogyps californianus</i>			E	Entire, except specific portions of AZ, NV and UT where it is listed as XN	E
Eagle, bald	<i>Haliaeetus leucocephalus</i>			T		E
Duck, Harlequin	<i>Histrionicus histrionicus</i>	E	Eastern population			
Chat, Yellow-breasted	<i>Icteria virens auricollis</i>	T	British Columbia population			
Chat, Yellow-breasted	<i>Icteria virens virens</i>	C (V)	Eastern population			
Bittern, Least	<i>Ixobrychus exilis</i>	C (V)				T
Shrike, Loggerhead	<i>Lanius ludovicianus excubitorides</i>	T	Prairie population	dif. sub. listed		
Shrike, San Clemente loggerhead	<i>Lanius ludovicianus mearnsi</i>	dif. sub. listed		E		
Shrike, Loggerhead	<i>Lanius ludovicianus migrans</i>	E	Eastern population	dif. sub. listed		
Woodpecker, Red-headed	<i>Melanerpes erythrocephalus</i>	C (V)				
Woodpecker, Lewis'	<i>Melanerpes lewis</i>	C (V)				
Stork, Wood	<i>Mycteria americana</i>			E		T
Curlew, Long-billed	<i>Numenius americanus</i>	C (V)				
Curlew, Eskimo	<i>Numenius borealis</i>	E		E		E
Thrasher, Sage	<i>Oreoscoptes montanus</i>	E				

Common Name	Scientific Name	Status as listed by Canada (COSEWIC)	CAN population	Status as listed by the US (ESA)	US population	Status as listed by Mexico (NOM-059)
Owl, Screech / Eastern Screech-Owl	<i>Otus asio</i>					T
Owl, Flammulated	<i>Otus flammeolus</i>	C (V)				
Gull, Ivory	<i>Pagophila eburnea</i>	C (V)				
Sparrow, Savannah	<i>Passerculus sandwichensis beldingi</i>	dif. sub. listed				T
Sparrow, "Ipswich" Savannah	<i>Passerculus sandwichensis princeps</i>	C (V)				dif. sub. listed
Sparrow, Savannah	<i>Passerculus sandwichensis rostratus</i>	dif. sub. listed				C (R)
Pelican, brown	<i>Pelecanus occidentalis</i>			E		
Woodpecker, White-headed	<i>Picoides albolarvatus</i>	T				
Gnatcatcher, Coastal California	<i>Polioptila californica californica</i>			T		
Caracara, Audubon's crested	<i>Polyborus plancus audubonii</i>			T		
Eider, Steller's	<i>Polysticta stelleri</i>			T		
Warbler, Prothonotary	<i>Protonotaria citrea</i>	E				
Shearwater, Townsend's	<i>Puffinus auricularis</i>			sub. listed		T
Shearwater, Newell's Townsend's	<i>Puffinus auricularis newelli</i>			T		sp. listed
Rail, King	<i>Rallus elegans</i>	E				C (R)
Rail, Clapper	<i>Rallus longirostris grossi</i>			dif. sub. listed		C (R)
Rail, Light-footed Clapper	<i>Rallus longirostris levipes</i>			E		E

Common Name	Scientific Name	Status as listed by Canada (COSEWIC)	CAN population	Status as listed by the US (ESA)	US population	Status as listed by Mexico (NOM-059)
Rail, California clapper	<i>Rallus longirostris obsoletus</i>			E		dif. sub. listed
Rail, Clapper	<i>Rallus longirostris pallidus</i>			dif. sub. listed		C (R)
Rail, Yuma clapper	<i>Rallus longirostris yumanensis</i>			E		E
Gull, Ross'	<i>Rhodostethia rosea</i>	C (V)				
Kite, Everglade / Snail Kite	<i>Rostrhamus sociabilis</i>			sub. listed		T
Kite, Everglade snail	<i>Rostrhamus sociabilis plumbeus</i>			E		sp. listed
Waterthrush, Louisiana	<i>Seiurus motacilla</i>	C (V)				C (R)
Eider, spectacled	<i>Somateria fischeri</i>			T		
Owl, Burrowing	<i>Speotyto cunicularia</i>	E				T
Tern, Least	<i>Sterna antillarum</i>			E	(USA, incl. TX except within 80 km of coast)	E
Tern, California Least	<i>Sterna antillarum browni</i>			E		sp. listed
Tern, Roseate	<i>Sterna dougallii</i>	E		sub. listed		
Tern, Roseate	<i>Sterna dougallii dougallii</i>	sp. listed		E	Atlantic Coast south to NC	
Tern, Roseate	<i>Sterna dougallii dougallii</i>	sp. listed		T	entire except Atlantic coast south to NC	
Owl, Spotted	<i>Strix occidentalis</i>	sub. listed		sub. listed		T
Owl, Northern Spotted	<i>Strix occidentalis caurina</i>	E		T		sp. listed
Owl, Mexican spotted	<i>Strix occidentalis lucida</i>			T		sp. listed

Common Name	Scientific Name	Status as listed by Canada (COSEWIC)	CAN population	Status as listed by the US (ESA)	US population	Status as listed by Mexico (NOM-059)
Murrelet, Ancient	<i>Synthliboramphus antiquus</i>	C (V)				
Prairie Chicken, Greater	<i>Tympanuchus cupido</i>	Ex		sub. listed		
Owl, Barn	<i>Tyto alba</i>	E	Eastern population			
Owl, Barn	<i>Tyto alba</i>	C (V)	Western Population			
Vireo, black-capped	<i>Vireo atricapillus</i>			E		T
Vireo, least Bell's	<i>Vireo bellii pusillus</i>			E		E
Warbler, Hooded	<i>Wilsonia citrina</i>	T				T

MAMMALS						
Common Name	Scientific Name	Status as listed by Canada (COSEWIC)	CAN population	Status as listed by the US (ESA)	US population	Status as listed by Mexico (NOM-059)
Pronghorn	<i>Antilocapra americana</i>			sub. sp. listed		E
Pronghorn, Sonoran	<i>Antilocapra americana sonoriensis</i>			E		sp. listed
Bat, Pallid	<i>Antrozous pallidus</i>	C (V)				
Beaver, Mountain	<i>Aplodontia rufa</i>	C (V)		sub. sp. listed		
Mountain Beaver, Point Arena	<i>Aplodontia rufa nigra</i>	sp. listed		E		
Seal, Guadalupe fur	<i>Arctocephalus townsendi</i>			T		E
Whale, Bowhead	<i>Balaena mysticetus</i>	E	Eastern Arctic Population	E		
Whale, Bowhead	<i>Balaena mysticetus</i>	E	Western Arctic population	E		
Whale, Sei	<i>Balaenoptera borealis</i>			E		C (S)
Whale, Blue	<i>Balaenoptera musculus</i>	C (V)		E		C (S)
Whale, Finback (Atlantic and Pacific Oceans)	<i>Balaenoptera physalus</i>	C (V)		E		C (S)
Bison, Wood	<i>Bison bison athabascaae</i>	T		E		dif. sub. listed
Bison, Plains	<i>Bison bison bison</i>	dif. sub. listed				C (S)

Common Name	Scientific Name	Status as listed by Canada (COSEWIC)	CAN population	Status as listed by the US (ESA)	US population	Status as listed by Mexico (NOM-059)
Wolf, Gray	<i>Canis lupus</i>	Indeterminate	Eastern and Arctic populations	E	Mexico and lower 48 states, except where listed as T (MN) and XN (WY and portions of ID and MT and portions of AZ, NM and TX)	E
Wolf, Gray	<i>Canis lupus</i>	Indeterminate	Eastern and Arctic populations	T	MN	E
Bat, Mexican long-tongued	<i>Choeronycteris mexicana</i>					T
Bat, Ozark big-eared	<i>Corynorhinus (=Plecotus) townsendii ingens</i>			E		
Bat, Virginia big-eared	<i>Corynorhinus (=Plecotus) townsendii virginianus</i>			E		
Prairie Dog, Black-tailed	<i>Cynomys ludovicianus</i>	C (V)		C(C)		T
Whale, White (Beluga)	<i>Delphinapterus leucas</i>	E	S.E. Baffin Island – Cumberland Sound population			

Common Name	Scientific Name	Status as listed by Canada (COSEWIC)	CAN population	Status as listed by the US (ESA)	US population	Status as listed by Mexico (NOM-059)
Whale, White (Beluga)	<i>Delphinapterus leucas</i>	E	St. Lawrence River population			
Whale, White (Beluga)	<i>Delphinapterus leucas</i>	E	Ungava Bay population			
Whale, White (Beluga)	<i>Delphinapterus leucas</i>	T	Eastern Hudson Bay population			
Whale, White (Beluga)	<i>Delphinapterus leucas</i>	C (V)	Eastern High Arctic/ Baffin Bay population			
Kangaroo Rat, Giant	<i>Dipodomys ingens</i>			E		
Rat, Kangaroo	<i>Dipodomys merriami mitchelli</i>			dif. sub. listed		T
Kangaroo Rat, San Bernardino Merriam's	<i>Dipodomys merriami parvus</i>			E		dif.. sub. listed
Rat, Ord's Kangaroo	<i>Disodomys ordii</i>	C (V)				
Bat, Sheath tailed	<i>Emballonura semicaudata</i>			C		
Otter, Sea	<i>Enhydra lutris</i>	T		sub. sp. listed		E
Otter, Southern Sea	<i>Enhydra lutris nereis</i>	sp. listed		T	entire, except population south of Pt. Conception, CA, where it is listed as XN	sp. listed
Porcupine	<i>Erethizon dorsatum</i>					E
Whale, Gray	<i>Eschrichtius robustus</i>	Ex	Atlantic population	E	Except east N. Pacific Ocean—	C (S)

Common Name	Scientific Name	Status as listed by Canada (COSEWIC)	CAN population	Status as listed by the US (ESA)	US population	Status as listed by Mexico (NOM-059)
					coastal Bering, Beaufort and Chukchi Seas	
Whale, Right (Atlantic and Pacific oceans)	<i>Eubalaena (=Balaena) glacialis</i>	E		E		
Bat, Spotted	<i>Euderma maculatum</i>	C (V)				C (R)
Sea Lion, Steller	<i>Eumetopias jubatus</i>			E	Population segment west of 144° W. Long	
Sea Lion, Steller	<i>Eumetopias jubatus</i>			T	Entire, except Population segment west of 144° W. Long	
Squirrel, Southern Flying	<i>Glaucomys volans</i>	C (V)				T
Wolverine	<i>Gulo gulo</i>	E	Eastern Population			
Wolverine	<i>Gulo gulo</i>	C (V)	Western population			
Jaguarundi	<i>Herpailurus (=Felis) yagouarundi</i>			sub. sp. listed		T
Jaguarundi, Gulf Coast	<i>Herpailurus (=Felis) yagouarundi cacomitli</i>			E		sp. listed
Jaguarundi, Sinaloan	<i>Herpailurus (=Felis) yagouarundi tolteca</i>			E		sp. listed

Common Name	Scientific Name	Status as listed by Canada (COSEWIC)	CAN population	Status as listed by the US (ESA)	US population	Status as listed by Mexico (NOM-059)
Whale, Northern Bottlenose	<i>Hyperoodon ampullatus</i>	C (V)	Gully population			
Bat, Silver-haired	<i>Lasionycteris noctivagans</i>					C
Bat, Hawaiian Hoary	<i>Lasiurus cinereus semotus</i>			E		
Ocelot	<i>Leopardus (=Felis) pardalis</i>			E		E
Bat, Lesser (=Sanborn's) longnosed	<i>Leptonycteris curasoae yerbabuenae</i>			E		T
Bat, Mexican Longnosed	<i>Leptonycteris nivalis</i>			E		T
Lynx, Canada	<i>Lynx canadensis</i>			C (PT)	contiguous United States population	
Whale, Humpback	<i>Megaptera novaeangliae</i>	T	North Pacific population	E		C (S)
Whale, Humpback	<i>Megaptera novaeangliae</i>	C (V)	Western North Atlantic population	E		C (S)
Whale, Sowerby's Beaked	<i>Mesoplodon bidens</i>	C (V)				
Vole, California	<i>Microtus californicus</i>			sub. sp. listed		E
Vole, Amargosa	<i>Microtus californicus scirpensis</i>			E		sp. listed
Vole, Hualapai Mexican	<i>Microtus mexicanus hualpaiensis</i>			E		
Vole, Meadow	<i>Microtus pennsylvanicus</i>			sub. sp. listed		E

Common Name	Scientific Name	Status as listed by Canada (COSEWIC)	CAN population	Status as listed by the US (ESA)	US population	Status as listed by Mexico (NOM-059)
Vole, Florida Salt Marsh	<i>Microtus pennsylvanicus dukecampbelli</i>			E		sp. listed
Vole, Woodland	<i>Microtus pinetorum</i>	C (V)				
Elephant seal, Northern	<i>Mirounga angustirostris</i>					T
Seal, Caribbean Monk/ West Indian Monk Seal	<i>Monachus tropicalis</i>			E		
Ermine	<i>Mustela erminea haidarum</i>	C (V)	Queen Charlotte Islands Population			
Ferret, Black-footed	<i>Mustela nigripes</i>	Ex		E	Entire, except specific portions of AZ, CO, MT, SD, UT and WY where it is listed as XN	
Myotis, Long-eared	<i>Myotis evotis</i>					C
Bat, Keen's Long-eared	<i>Myotis keenii</i>	C (V)				
Myotis, Fringed	<i>Myotis thysanodes</i>	C (V)				
Shrew, Desert	<i>Notiosorex crawfordi crawfordi</i>			T		
Deer, Key	<i>Odocoileus virginianus clavium</i>			E		
Deer, Columbian white-tailed	<i>Odocoileus virginianus leucurus</i>			E		
Rat, Musk	<i>Ondatra zibethicus</i>					T

Common Name	Scientific Name	Status as listed by Canada (COSEWIC)	CAN population	Status as listed by the US (ESA)	US population	Status as listed by Mexico (NOM-059)
Whale, Killer	<i>Orcinus orca</i>	C (V)	“Transient” Pacific Population			C (S)
Whale, Killer	<i>Orcinus orca</i>	T	“Resident” Pacific Populations			
Rice Rat	<i>Oryzomys palustris crinitus</i>			dif. sub. listed		T
Rice Rat	<i>Oryzomys palustris cozumelae</i>			dif. sub. listed		T
Rice Rat, Silver	<i>Oryzomys palustris natator</i>			E		dif. sub. listed
Rice Rat	<i>Oryzomys palustris peninsulae</i>			dif. sub. listed		T
Sheep, Bighorn	<i>Ovis canadensis</i>			E	CA Peninsular Ranges	C (S)
Sheep, Bighorn	<i>Ovis canadensis</i>			C (PE)	Sierra Nevada population	C (S)
Sheep, Bighorn	<i>Ovis canadensis californiana</i>			E	Sierra Nevada	sp. listed
Jaguar	<i>Panthera onca</i>			E		
Mouse, Spiny pocket	<i>Perognathus amplus rotundus</i>					C(R)
Mouse, Pacific Pocket	<i>Perognathus longimembris pacificus</i>			E		
Seal, Harbour	<i>Phoca vitulina mellonae</i>	C (V)	Lacs des Loups Marins population			C

Common Name	Scientific Name	Status as listed by Canada (COSEWIC)	CAN population	Status as listed by the US (ESA)	US population	Status as listed by Mexico (NOM-059)
Porpoise, Harbour	<i>Phocoena phocoena</i>	T	Northwest Atlantic population			
Whale, sperm	<i>Physeter catodon</i> (= <i>macrocephalus</i>)			E		C (S)
Puma (=mountain lion)	<i>Puma</i> (= <i>Felis</i>) <i>concolor</i> (all subsp. except <i>coryi</i>)			T		
Panther, Florida	<i>Puma</i> (= <i>Felis</i>) <i>concolor coryi</i>			E		
Puma (=cougar), Eastern	<i>Puma</i> (= <i>Felis</i>) <i>concolor couguar</i>	Indeterminate		E		
Caribou, Woodland	<i>Rangifer tarandus caribou</i>	E	Queen Charlotte Islands			
Caribou, Woodland	<i>Rangifer tarandus caribou</i>	T	Gaspé population			
Caribou, Woodland	<i>Rangifer tarandus caribou</i>	C (V)	Western population	E	USA (WA, ID), Canada (part of SE B.C.)	
Mouse, Western Harvest	<i>Reithrodontomys megalotis megalotis</i>	C (V)	Prairie population (BC)			
Mouse, Salt Marsh Harvest	<i>Reithrodontomys raviventris</i>			E		
Mole, Eastern	<i>Scalopus aquaticus</i>	C (V)				E
Mole, Broad-footed	<i>Scapanus latimanus</i>					T
Mole, Townsend's	<i>Scapanus townsendii</i>	T				

Common Name	Scientific Name	Status as listed by Canada (COSEWIC)	CAN population	Status as listed by the US (ESA)	US population	Status as listed by Mexico (NOM-059)
Squirrel, Arizona	<i>Sciurus arizonensis</i>					T
Squirrel, Delmarva Peninsula Fox	<i>Sciurus niger cinereus</i>			E	Entire, except Sussex Co., DE, where it is listed as XN	
Shrew, Pacific Water	<i>Sorex bendirii</i>	T				
Shrew, Gaspé	<i>Sorex gaspensis</i>	C (V)				
Shrew, Ornate	<i>Sorex ornatus ornatus</i>					C
Shrew, Vagrant	<i>Sorex vagrant monticola</i>					C
Cottontail, Nuttall's	<i>Sylvilagus nuttallii nuttallii</i>	C (V)	British Columbia population			
Badger, American	<i>Taxidea taxus</i>					T
Manatee, West Indian	<i>Trichechus manatus</i>			E		E
Fox, Gray	<i>Urocyon cinereoargenteus</i>	C (V)				
Bear, Louisiana Black	<i>Ursus americanus luteolus</i>			T		sp. listed
Bear, American Black	<i>Ursus americanus</i>					E
Bear, Grizzly	<i>Ursus arctos</i>	C (V)	Entire, except Prairie population where it is listed as Ex	T		sub. sp. listed

Common Name	Scientific Name	Status as listed by Canada (COSEWIC)	CAN population	Status as listed by the US (ESA)	US population	Status as listed by Mexico (NOM-059)
Bear, Grizzly	<i>Ursus arctos</i>	Ex	Prairie population	T		sub. sp. listed
Bear, Grizzly	<i>Ursus arctos horribilis</i>	sp. listed		sp. listed		E* (believed to be extirpated)
Bear, Polar	<i>Ursus maritimus</i>	C (V)				
Fox, Kit	<i>Vulpes macrotis</i>			sub. sp. listed		T
Fox, San Joaquin Kit	<i>Vulpes macrotis mutica</i>			E		sp. listed
Fox, Swift (6 Subspecies listed in Mexico)	<i>Vulpes velox</i>	E		C (C)	US pop.	T
Sea Lion, California	<i>Zalophus californianus</i>					C (S)
Mouse, Preble's meadow jumping	<i>Zapus hudsonius preblei</i>			T		

Where,

Ex – Extirpated

E – Endangered

T – Threatened

XN –

Experimental population,
non-essential

C (–) – of Conservation Concern (including (V) Vulnerable (Canada); (R) Rare or requiring (S) Special Protection (Mexico); (C) Candidate Species for Listing, (PE) Taxa proposed for listing as endangered and (PT) Taxa proposed for listing as threatened (United States).

dif. sub. listed – different subspecies listed

sp. listed – Species listed

sub. sp. listed – Subspecies listed