1994 Update to the North American Waterfowl Management Plan

EXPANDING THE COMMITMENT

North American Waterfowl Management Plan

Plan nord-américain de gestion de la sauvagine

Plan de Manejo de Aves Acuáticas de Norteamérica

EXPANDING THE COMMITMENT

This document affirms the vision of the North American Waterfowl Management Plan to recover waterfowl populations by restoring and managing wetland ecosystems, to conserve biological diversity in the western hemisphere, to integrate wildlife conservation with sustainable economic development, and to promote partnerships of public and private agencies, organizations and individuals for conservation.

With this accord, Canada, the United States and Mexico renew their commitment in this continental effort to restore North America's waterfowl and wetland resources.

Ce document confirme les objectifs du Plan nord-américain de gestion de la sauvagine: rétablir les populations de sauvagine grâce à la restauration et à la gestion des écosystèmes des milieux humides, maintenir la diversité biologique de l'hémisphère occidental, concilier la protection de la faune et le développement économique durable et favoriser les partenariats axés sur la conservation entre les organismes privés et publics, les organisations environnementales et les particuliers.

Par cet accord, le Canada, les États-Unis et le Mexique renouvellent leur engagement et les efforts déployés à l'échelle du continent pour restaurer les milieux humides et la sauvagine de l'Amérique du Nord.

Este documento confirma el objetivo del Plan de Manejo de Humedales de Norteamérica para recuperar las poblaciones de aves acuáticas mediante la restauración y manejo de los ecosistemas de humedales, para la conservación de la diversidad biológica en el hemisferio occidental, para integrar la conservación de la vida silvestre con el desarrollo económico sostenible y para promover la asociación de agencias públicas y privadas, organizaciones e individuos para la conservación.

Con este acuerdo Canadá, los Estados Unidos y México renuevan su compromiso en este esfuerzo continental para restaurar los humedales y los recursos acuáticos de Norte América.

Minister of the Environment Canada	Secretary Of the Interior United States	Secretario de Desarrollo Social México

CONTENTS

Executive Summary 2

Introduction 4

Principles 6

Recommendations

Populations 7

Habitats 7

Policy 8

Map of Important Waterfowl Habitat Areas 9

Population Goals

Ducks 10

Geese 15

Swans 18

Habitat Objectives 20

Joint Venture Habitat Objectives 22

Timeframe and Cost to Complete the Plan 23

Plan Implementation

Habitat Joint Ventures 24

Species Joint Ventures 25

Tracking and Evaluation 25

Relationship of the Plan to Sustainable Agriculture and Other Sustainable Economic Development 26

Benefits to Conservation of Biological Diversity 26

Relationship of the Plan to Other Biological Programs and Initiatives 27

Plan Administration

International 29

National 29

Joint Ventures 29

Related Organizations 29

Appendices:

A. North American Waterfowl Management Plan Committee

B. Background to Waterfowl Habitat Issues in North America

C. Description of Joint Ventures

Habitat Joint Ventures - Canada, United States, and Mexico

Species Joint Ventures - Arctic Goose and Black Duck

D. English and Scientific Names of Waterfowl

Executive Summary

The Plan's purpose is to achieve waterfowl conservation while maintaining or enhancing associated ecological values in harmony with other human needs.

The North American Waterfowl Management Plan, signed in 1986, recognizes that the recovery and perpetuation of waterfowl populations depends on restoring wetlands and associated ecosystems throughout the North American continent. As a result, it established cooperative international efforts to reverse the declines in waterfowl populations and their habitats.

To date, the Plan has established 12 habitat joint ventures and 2 species joint ventures with a wide variety of public and private partners. The major thrust of the habitat joint ventures is ecosystem restoration and management. Not only is this the most effective and long-lasting approach to restoring waterfowl populations, but it provides the maximum benefit to conservation of biological diversity and the overall environmental integrity of affected ecosystems.

Since 1986, Plan partners have invested more than $500 million for waterfowl and wetland conservation and more than 2 million acres of habitat have been purchased, leased, restored, secured, or enhanced for wildlife.

Since 1986, Plan partners have invested more than $500 million (dollars refer to US currency) for waterfowl and wetland conservation, and more than 2 million acres (810,000 hectares) of habitat have been purchased, leased, restored, secured, or enhanced for wildlife.

In addition to advancing waterfowl conservation, implementation of the Plan has made a substantial contribution to the conservation of biological diversity, improved environmental quality, and fostered the economic well-being and conservation ethics of private landowners. The Plan exemplifies sustainable development in action by working with private landowners to integrate wildlife conservation practices with sustainable economic development. The Plan continues to advocate partnerships among public and private sectors.

This document is the first update of the North American Waterfowl Management Plan as it moves through the initial 15-year horizon to the year 2001 and beyond. Population goals and habitat objectives have been reviewed, and revised when needed, for the 1994 Plan Update.

The Plan's purpose is to achieve waterfowl conservation while maintaining or enhancing associated ecological values in harmony with other human needs.

With the 1994 Update, Mexico becomes a full partner, thus completing the continental approach to waterfowl management. The Plan is part of a larger national planning initiative to conserve biological diversity in Mexico.

This document renews and expands the commitment of the United States, Canada, and Mexico in a continental effort to restore waterfowl and wetland resources on the North American continent.

Duck Population Goals

The 1986 Plan's overall goal of 62 million breeding ducks supporting a fall flight of at least 100 million birds under average environmental conditions remains unchanged in the 1994 Plan Update.

The Plan has also established specific population goals for the 10 most common species of ducks in the mid-continent surveyed area (mallard, pintail, gadwall, wigeon, green-winged teal, blue-winged teal, shoveler, redhead, canvasback, and scaup) and for black ducks.

Of the 10 most common species, only pintails continue to decrease. Black duck populations in eastern North America appear to have stabilized following a 30-year decline.

Goose Population Goals

The Plan establishes population goals for 26 populations of 5 goose species. Eight populations have exceeded Plan goals. All other goose populations are stable or increasing toward Plan goals except for the Atlantic Flyway and Southern James Bay Canada goose populations and the Wrangel Island snow goose population, which continue to decrease.

Swan Population Goals

The Plan establishes goals for two populations of tundra swans and three populations of trumpeter swans. Two of these five populations have exceeded Plan goals and the others are stable or increasing toward Plan goals.

Habitat Objectives

The Plan identifies Important Waterfowl Areas of North America, which consist of 12 areas covered by existing joint ventures, 25 areas of major concern, and Mexico's 32 priority wetlands. Habitat objectives have been developed for each joint venture area. Specifically, the Plan calls for the protection of more than 11 million acres (4.5 million hectares), the restoration of more than 5 million acres (2 million hectares) and the enhancement of more than 9 million acres (3.6 million hectares) in joint venture areas.

The highest priority continues to be the mid-continent prairie breeding grounds in the United States and Canada.

Plan objectives cannot be achieved solely through acquisition and management of public land. Adequate wildlife habitat must be provided on private land where most wetlands are found. Persistent wetland losses must also be reversed. And significant progress must be made to integrate wildlife conservation in agriculture, trade, and other national and international policies. The single largest contribution to meeting Plan objectives is likely to be made by adjustments in national and international agricultural policy that encourage conservation practices in the context of sustainable agriculture.

Based on the first 5 years of implementation, completion of Plan objectives is likely to extend to at least the year 2010. Maintenance and management of protected and restored areas will be ongoing.

The cost of implementing the habitat objectives identified in 1986 was originally estimated to be about $1.5 billion. Because of continuing loss and degradation of wetlands, a more detailed analysis of habitat needs, and formation of new habitat joint ventures, additional habitat objectives have been identified to meet population goals.

A wide variety of traditional and non-traditional approaches will be used to achieve these objectives.

1994 Update Recommendations

The 1994 Update includes a list of recommendations to support achieving Plan goals, maintain populations and habitats when goals have been met, and evaluate and improve conservation measures undertaken as part of the Plan. The Plan contains 7 population recommendations, 13 habitat recommendations, and 2 policy recommendations.

With the 1994 Update, Mexico becomes a full partner, thus completing the continental approach to waterfowl management.

INTRODUCTION

The Plan recognizes that the recovery and perpetuation of waterfowl populations depends on the long-term protection, restoration, and management of habitat on an ecosystem basis.

Waterfowl and wetlands provide social, cultural, and economic benefits to millions of North Americans.

Healthy wetlands and associated habitats are among the world's most biologically diverse and highly productive environments. All migratory water birds, many other migratory birds, and half of all threatened and endangered species depend on wetland and associated upland habitats for their survival. Wetland basins collect runoff, thus replenishing water supplies needed to sustain natural vegetation, crops, fish, and wildlife. They also play a role in purification of surface and ground water, prevent soil erosion, and moderate regional impacts of drought and flooding.

Waterfowl are the most prominent and economically important group of migratory birds on the North American continent. More than 100 million people participate in wildlife-related outdoor recreation in North America. Of these, more than 30 million observe, photograph, hunt, and otherwise appreciate waterfowl. Recreational activities focusing on waterfowl generate a direct expenditure of several billion dollars annually.

The persistent loss of important wetlands and associated uplands throughout North America must be reversed.

Despite their many values, both waterfowl and wetlands are in urgent need of long-term continent-wide assistance. Waterfowl populations have drastically declined and wetlands are being lost at alarming rates.

In 1986, the North American Waterfowl Management Plan set a new vision for continental waterfowl and wetland conservation. The Plan recognized that the serious decline of duck populations in the 20th Century has been caused by the destruction and alteration of wetland and upland habitats needed for breeding, migrating, and wintering. It also recognized that the recovery and perpetuation of waterfowl populations depends on the long-term protection, restoration, and management of habitat on an ecosystem basis and on new long-term approaches to permanently change land-use practices on a landscape scale. Significant progress must be made to integrate wildlife conservation in agriculture, trade, and other national and international policies.

The Plan also acknowledged that the efforts to achieve waterfowl population objectives go far beyond the capability of government wildlife agencies and would require an unprecedented partnership of public and private organizations from a wide spectrum of society. In addition, the persistent loss of important wetlands and associated uplands throughout North America must be reversed and adequate wildlife habitat must be provided on private land where most wetlands are found.

1986 Plan Accomplishments

The 1986 Plan issued a challenge to the conservation community to raise $1.5 billion over a 15-year period. In 7 years, Plan partners have invested more than $500 million for waterfowl and wetland conservation, and more than 2 million acres (810,000 hectares) of habitat have been purchased, leased, restored, secured, or enhanced for wildlife.

Joint ventures have evolved as the principal vehicle for implementing projects to meet Plan goals. All eight habitat joint ventures and two species joint ventures recommended in the 1986 Plan are under way and four new habitat joint ventures have been added. A variety of partners has adopted the vision provided by the 1986 Plan and added new diversity, perspectives, and strengths.

The Plan also recognizes the importance of waterfowl as measurable indicators of a healthy environment. The diversity and abundance of species in waterfowl habitats are a reflection of biological diversity in ecosystems associated with waterfowl. Thus the major thrust of the Plan's

habitat joint ventures is ecosystem restoration and management. Not only is this the most effective and long-lasting approach to restoring waterfowl populations, but it provides the maximum benefit to the conservation of biological diversity and the overall environmental integrity of affected ecosystems.

The Plan's accomplishments to date reinforce both the effectiveness and timing of the 1986 vision. Partnerships in the conservation community and beyond have exceeded expectations. Similarly, the extensive landscape approach to habitat protection on private land in Canada and the United States is charting a new course in environmental conservation.

In addition to advancing waterfowl conservation, implementation of the Plan by joint ventures has made a substantial contribution to the conservation of biological diversity, improved environmental quality, and fostered the economic well-being and conservation ethics of private landowners. The Plan exemplifies sustainable development in action by working with private landowners, developers, and conservationists to explore innovative methods of conserving habitat while meeting local and regional economic needs.

The Plan continues to recognize harvest management as an important supplement to habitat conservation for maintaining the abundance and diversity of waterfowl resources. Ongoing efforts to minimize the annual fine-tuning of harvest regulations are encouraged so that more resources can be directed toward habitat protection, management, and improvement.

Although much has been accomplished, the job of countering 200 years of habitat degradation to ensure the future for North America's waterfowl is far from complete. For example, mallard and pintail populations on the prairies face continuing loss of wetlands and upland nesting cover. Black duck populations in eastern North America are below Plan objectives. Development is encroaching on valuable migration and wintering habitats across the continent. Rehabilitation of mid-continent breeding habitat is the key to restoring North American duck populations, but less progress has been made toward achieving habitat objectives in the prairies than in most other important waterfowl habitat areas on the continent.

1994 Update Expands the Commitment and Vision

The Plan has been updated to address these concerns and to continue the significant effort begun in 1986. The Plan's purpose is to achieve waterfowl conservation while maintaining or enhancing associated ecological values in harmony with other human needs. The 1994 Update reviews all population goals and habitat objectives and contains a list of recommendations to help achieve them. This is the first update of the Plan as it moves through the initial 15-year horizon to the year 2001 and beyond. Successive updates are planned.

Mexico Becomes a Full Partner

With the 1994 Update, Mexico becomes a full partner, thus completing the continental approach to waterfowl management. Mexico's participation will facilitate restoration of key wintering habitat for waterfowl species of international concern.

Mexico, the United States, and Canada have a unique opportunity to forge comprehensive cooperative environmental conservation programs. The North American Waterfowl Management Plan is an integral building block for enhanced continental conservation efforts.

Implementation of the Plan has made a substantial contribution to the conservation of biological diversity, improved environmental quality, and fostered the economic well-being and conservation ethics of private landowners.

PRINCIPLES

The following principles outline common philosophies and guidelines endorsed by Canada, the United States, and Mexico for waterfowl management and habitat conservation measures undertaken within the framework of the North American Waterfowl Management Plan:

Principles of the North American Waterfowl Management Plan

- Wetlands and waterfowl are among North America's most highly valued natural heritages.

- All uses of the waterfowl resource should be consistent with its long-term conservation.

- Maintenance of abundant waterfowl populations is dependent on the long-term protection, restoration, and management of habitat on an ecosystem basis. Persistent loss of important wetlands and associated uplands throughout North America must be reversed.

- Protection of waterfowl populations and their habitats in North America requires long-term planning and close cooperation and coordination of ongoing and future management activities by Canada, the United States, and Mexico.

- Population and habitat objectives for waterfowl will be met through long-term actions while maintaining or enhancing other ecological values and promoting biological diversity on a landscape basis.

- Joint ventures of private organizations, individuals, and government agencies are the primary vehicle for implementing the Plan.

- Waterfowl population responses to habitat conservation actions will be gradual and will take time to measure as the Plan seeks to overcome 200 years of habitat degradation in North America.

- Managed subsistence and recreational harvests of the renewable waterfowl resource are consistent with its conservation and will continue to be managed under regulatory processes in Canada, the United States, and Mexico to ensure they are compatible with waterfowl population needs and with attaining goals under the Plan.

RECOMMENDATIONS

The following recommendations are presented to support achieving Plan goals, maintain populations and habitats when goals have been met, and evaluate and improve conservation measures undertaken as part of the Plan. Federal, provincial, and state migratory bird management agencies will provide leadership and the principal means of meeting population recommendations. Government agencies, in cooperation with conservation organizations, corporations, and individuals, will address habitat recommendations. All partners are involved in influencing policy recommendations.

Recommendations are numbered to help distinguish one from another, not to imply any relative importance.

Population Recommendations

1. Government agencies should continue to ensure that regulations and enforcement are sufficient to maintain an adequate abundance and diversity of waterfowl populations for all users and to support Plan objectives.

2. Population status and current scientific databases for the wood duck, mottled duck, sea ducks, and fulvous and black-bellied whistling ducks should be assessed with the aim of establishing population objectives and strategies for achieving these objectives.

3. Government agencies must maintain and improve current monitoring survey systems to measure the status of North American waterfowl populations on a regular basis and to evaluate the Plan. This information is critical to measuring population response to the Plan.

4. Additional species joint ventures should be established as issues and funding sources arise from interested partners.

5. Waterfowl population and habitat management decisions should be based on scientific knowledge and information. This knowledge should be improved and updated through scientific research.

6. Research clarifying the links between waterfowl and other wildlife populations and their habitat requirements throughout North America should be encouraged and undertaken.

7. Scientific evaluation of the progress toward achieving Plan goals should be firmly established.

Habitat Recommendations

1. Re-emphasize the priority on the mid-continent prairie breeding habitats in Canada and the United States and focus continental efforts to achieve those objectives.

2. Establish a broad-scale habitat monitoring system that indexes change, particularly in the prairie landscape, and puts Plan habitat accomplishments in perspective with overall habitat change and waterfowl population trends.

3. Maintain waterfowl habitats within joint ventures and other important waterfowl areas in North America shown in Figure 1.

4. Develop and periodically adjust joint venture habitat objectives necessary to support the Plan's population goals. Adjustment of habitat objectives should be based on evaluation of population response to habitat protection, restoration, and enhancement actions, and changes in the status of populations and habitats in the joint venture.

5. At the joint venture level, develop population goals and habitat objectives, or adopt guidelines and criteria for other species of migratory birds or wildlife of regional significance. These objectives should complement waterfowl-based habitat objectives.

6. Within each joint venture, identify those ecosystems, watersheds, or landscapes that are most critical to meeting Plan goals, and among all habitat objectives, prioritize those actions and locations that are most urgent.

7. Instill a strong conservation ethic among private landowners and identify and implement practical ways to encourage them to become active partners in the effort to protect wetlands and enhance waterfowl populations by integrating soil, water, and wildlife management on a sustainable basis.

8. Continue habitat protection, restoration, and management programs on public lands.

9. Implement habitat accomplishments of enduring biological value to sustain long-term restoration of continental waterfowl populations. Less-than-permanent protection is appropriate in many situations in which permanent protection is not an option and shorter-term strategies are more likely to lead to long-term habitat conservation.

10. Track habitat accomplishments in each joint venture in a consistent manner throughout North America.

11. Implement evaluation programs to determine the effectiveness of habitat conservation actions. The results of evaluation should guide the amount, types, and locations of future habitat work. Evaluation of the treatments used on the prairies must be funded immediately. Results from evaluation studies and other research should be used to improve strategies and methods used to implement the Plan.

12. Implement communications programs and actions that facilitate communication among partners; disseminate information regarding joint venture objectives, projects, and accomplishments; foster innovative, positive, and lasting partnerships; promote achieving Plan objectives; and provide public education.

13. Plan partners in Canada and the United States should develop means of funding and provide other resources to augment the support and resources of partners in Mexico for carrying out habitat projects in Mexico that contribute to Plan objectives. Public and private organizations in the United States and Canada should cooperate in funding projects in Canada with a goal of 25 percent raised by Canadian interests and 75 percent raised by United States interests.

Policy Recommendations

1. Plan partners should undertake a major increase in the commitment to influencing government policy at all levels that affects achieving the goals outlined in this Plan. These policies include agriculture, forestry, water, trade, tax structure, and other social or economic development policies that impact Plan goals or opportunities.

2. Plan partners should work in cooperation with industry and government policy makers to achieve sustainable development objectives with respect to waterfowl, wetlands, and other human endeavors.

IMPORTANT WATERFOWL HABITAT AREAS

Please refer to full size color map at the end of this book.

Map delineations are general in nature

1 Izembek Lagoon
2 Upper Alaska Peninsula
3 Yukon-Kuskokwim Delta
4 Upper Cook Inlet
5 Copper River Delta
6 Yukon Flats
7 Teshekpuk Lake
8 Old Crow Flats
9 Mackenzie River Delta
10 Anderson River Delta (BS)
11 Banks Island No. 1 (BS)
12 Banks Island No. 2 (BS)
13 Queen Maud Gulf (BS)
14 Bylot Island (BS)
15 Dewey Soper (BS)
16 East Bay (BS)
17 Harry Gibbons (BS)
18 McConnell River (BS)
19 James Bay Lowlands
*20a Atlantic Coast JV
*20b Eastern Habitat JV
*21 Lower Great Lakes–St. Lawrence Basin JV
*22 Upper Mississippi River–Great Lakes Region JV
*23a Lower Mississippi Valley JV
*23b Gulf Coast JV
*24 Playa Lakes JV
*25a Rainwater Basin JV
25b Sandhills
*26 Central Valley Habitat JV
27 San Francisco Bay
28 Klamath Basin
*29 Pacific Coast JV
30 Intermountain West
31 Northern Great Plains
*32a Prairie Habitat JV
*32b Prairie Pothole JV
33 Peace-Athabasca Delta
34 Upper St. Johns–Upper Everglades Basin

* Joint Ventures (U.S. and Canada)
Waterfowl Habitat Areas of Major Concern (U.S. and Canada)
● Initial List of Mexican Priority Wetlands
(BS) Migratory Bird Sanctuary

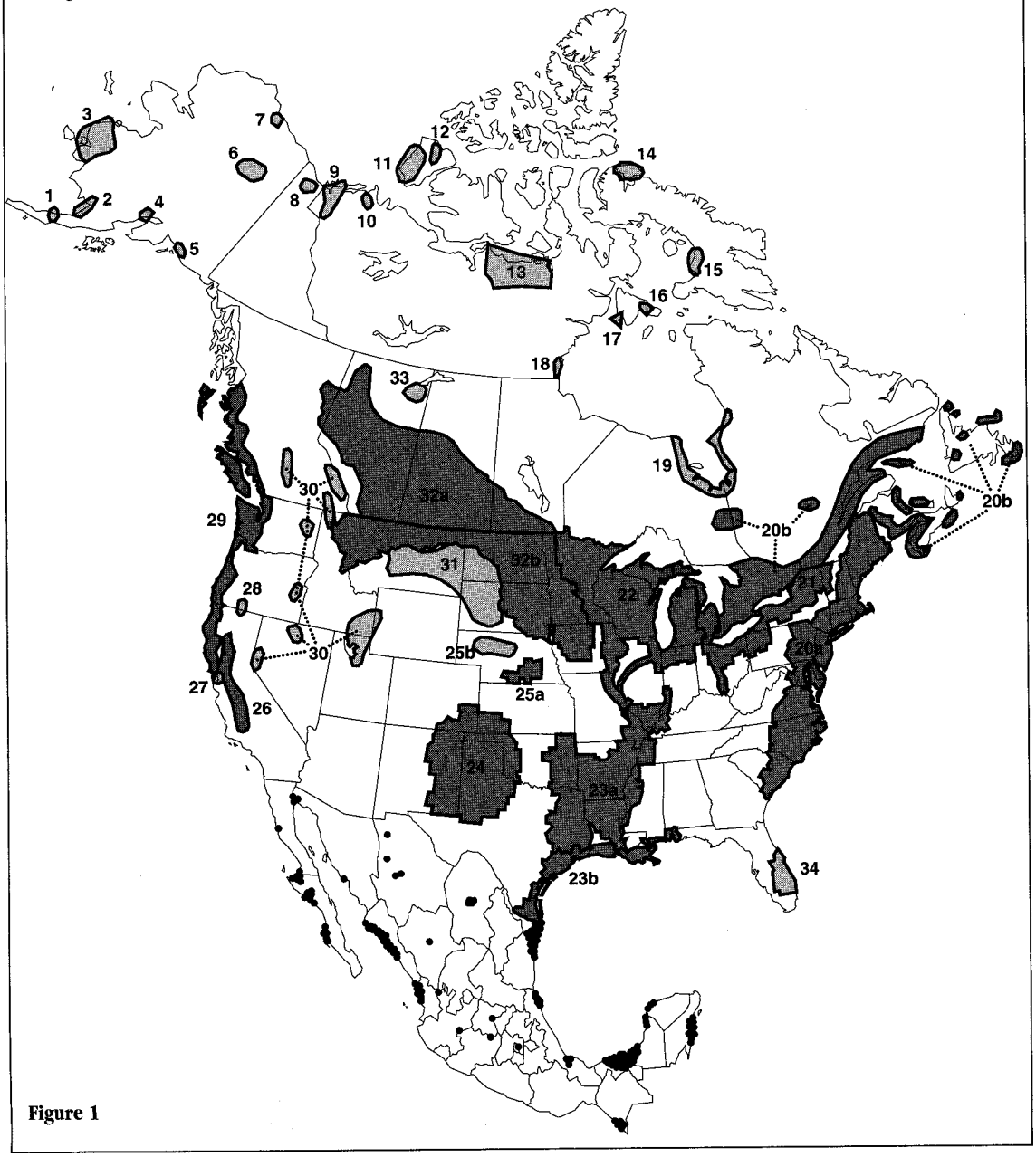


Figure 1

Population Goals

North America has 43 species of ducks, geese, and swans that depend on two or more countries on the continent to complete portions of their life cycles. Population goals have been established for most North American waterfowl and are described below. Specific goals for other wildlife species inhabiting continental wetlands may be included in joint venture implementation plans established under the Plan.

Although ducks, geese, and swans are not isolated components of wetland communities, they represent one of the best documented sources of long-term data associated with wetlands. There is no other comparable inventory of fauna or flora associated with wetlands.

The factors adversely affecting waterfowl in North America are eroding the biological diversity of entire ecosystems. Similarly, Plan population goals cannot be achieved without restoring ecosystems upon which waterfowl depend.

Duck Population Goals

The 1986 Plan's overall goal of 62 million breeding ducks supporting a fall flight of at least 100 million birds under average environmental conditions remains unchanged in the 1994 Plan Update.

The status of ducks in North America from 1970 to 1979 is the baseline reference for duck population goals under the Plan (Table 1). The 1986 Plan contended that duck numbers during the decade of the 1970s generally met the needs of

Goals:

- Maintain the current diversity of duck species throughout North America and, by the year 2001, achieve a breeding population of at least 62 million during years **with average environmental conditions.** This would support a fall flight of more than 100 million birds.
- Reach or exceed the Table 2 goals for breeding populations of the 10 most common species of ducks in the mid-continent surveyed area. In particular:
  - (a) 8.1 million mallards with an average distribution of breeding mallards in the surveyed area of 75 percent in Canada and 25 percent in the United States.
  - (b) 5.6 million pintails with an average distribution of breeding pintails in the surveyed area of 65 percent in Canada and 35 percent in the United States.
- Attain a black duck wintering population index of 385,000 birds in the Atlantic and Mississippi Flyways by the year 2001.

Table 1. Estimated average population of breeding ducks in North America, 1970-1979[a] (1,000s of ducks)

Species	Surveyed[b] Areas	Continental[c] Estimate
DABBLING DUCKS		
Mallard	8,122	11,000
Pintail	5,597	7,000
Black duck	50	1,400
Mottled duck	no estimate	no estimate
Gadwall	1,518	2,000
Wigeon	2,953	3,500
Green-winged teal	1,843	3,000
Blue-winged teal	4,654	6,000
Shoveler	1,985	2,000
Wood duck	no estimate	3,000
Fulvous and black-bellied whistling ducks	no estimate	no estimate
DIVING DUCKS		
Redhead	640	900
Canvasback	538	600
Lesser and greater scaup	6,250	8,000
Ring-necked duck	484	1,000
Ruddy duck	350	700
Bufflehead	709	1,000
Common and Barrow's goldeneye	438	1,500
MERGANSERS		
Hooded, red-breasted, and common merganser	348	1,500
SEA DUCKS		
Harlequin	no estimate	200[d]
Oldsquaw	428	2,700
King, common, Steller's, and spectacled eider	23	2,500
Black, white-winged, and surf scoter	1,468	2,000
TOTAL	**38,398**	**61,500**

a. The Mexican duck is found only in Mexico and will not be considered in this Plan.

b. Includes data from the survey strata 1-50 as reported in the annual "Status of Waterfowl and Fall Flight Forecast," published by the U.S. Fish and Wildlife Service and the Canadian Wildlife Service. Refer to Table 2 for additional information.

c. The 1986 Plan established a breeding pair goal of 62 million ducks resulting in a fall flight of at least 100 million birds under average environmental conditions. This remains unchanged in the Plan Update. However, recent changes in analysis of the waterfowl breeding survey data resulted in slightly lower estimates (historical and current) for the mid-continent breeding waterfowl surveyed area compared to methods used in 1986. Population estimates for the unsurveyed areas are added to those from the surveyed area to generate a continental population estimate. Because of the low degree of confidence for population estimates from the unsurveyed areas, the revised population estimates for the surveyed area do not warrant changing the overall duck goals established in 1986.

d. Harlequin ducks have been declared endangered in eastern Canada.

all users with the exception of a few species such as the black duck. This number of ducks and the amount of habitat required to support them throughout their annual cycle determined the major goals of the Plan.

Table 2 and Figure 2, respectively, present the North American Waterfowl Management Plan duck population goals and current status of duck breeding populations in the prairie region, where more than 60 percent of the ducks on the continent breed.

Most North American ducks breed in Canada and the United States and winter in the United States and Mexico. North American ducks are divided into three groups based on similarities in ecological requirements — dabbling ducks, diving ducks, and sea ducks.

Status of Dabbling Ducks

Dabbling ducks are the most abundant and widespread group of ducks in North America and are of greatest importance to sport hunting and viewing. Ten dabbler species include mallard, black duck, mottled duck, wigeon, pintail, gadwall, green-winged teal, blue-winged teal, cinnamon teal, and shoveler. The wood duck and fulvous and black-bellied whistling ducks, although not true dabblers, are also included in the dabbler category in Table 1. Mexican ducks are restricted to Mexico and are not considered in the Plan.

Highest densities of breeding dabblers are found on the prairies, with smaller numbers ranging north into Alaska. Early nesting species, such as mallards and pintails, have been particularly

Table 2. Breeding duck population status, trends, and goals for the 10 most common species in the survey strata 1-50 (1,000s of ducks)

Species and Population	1985 Status	1993 Status	Recent Trend (1986–1993)	Population Goals (Year 2001)
Mallard	4,754	5,708	Stable	8,100
Pintail	2,511	2,053	Decreasing	5,600
Gadwall	1,304	1,755	Increasing	1,500
Wigeon	2,040	2,053	Stable	3,000
Green-winged teal	1,435	1,694	Stable	1,800
Blue-winged teal	3,459	3,193	Stable	4,700
Shoveler	1,697	2,046	Stable	2,000
Redhead	579	485	Stable	640
Canvasback	373	472	Stable	540
Scaup	5,038	4,080	Stable	6,300

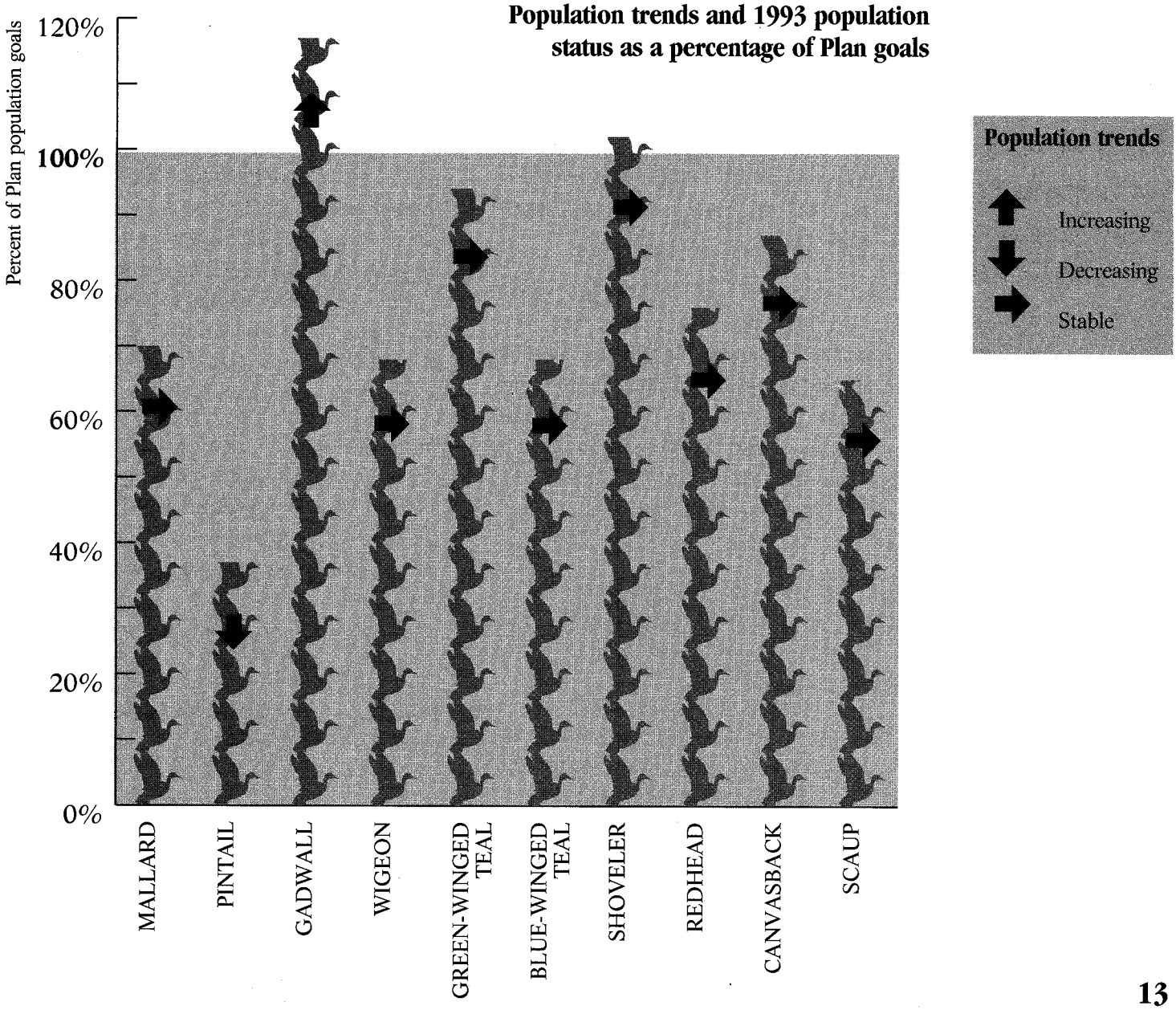
How Data Were Derived Continental population estimates of ducks in Table 1 and the mid-continent estimates (survey strata 1-50) in Table 2 are derived from several sources. The principal source of data on duck populations is a breeding survey conducted each spring. The "surveyed area" referred to in Table 1 provides the baseline used to formulate population goals and hunting regulations for most species. These data are published by the U.S. Fish and Wildlife Service in an annual report entitled "Status of Waterfowl and Fall Flight Forecast," and by the Canadian Wildlife Service in December and April Waterfowl Status Reports. Winter inventories are another source of data on duck populations. Until recently, population trends of the black duck were monitored only on wintering areas. Similarly, estimates of sea ducks and many diving duck species are based on winter counts.

A third source of duck population information is produced by regional breeding population surveys across the continent. Several states have developed their own surveys and under the Black Duck Joint Venture, a new breeding survey has been launched for this species in eastern North America.

affected by losses of upland nesting habitat on the prairies. Intensive agricultural land use on the prairie breeding grounds, combined with drought that began in 1980, continue to adversely affect large segments of breeding habitat into the 1990s. Habitat degradation and loss and land use changes that have favorably affected predator species have combined to diminish the likelihood of prairie duck populations recovering to meet Plan goals. Innovative and intensive management on private and public lands, greater efforts to preserve existing habitat, and large-scale changes in land use and agricultural practices on private lands are needed.

Figure 2. Ten Breeding Duck Populations

Population trends and 1993 population status as a percentage of Plan goals



Of the 10 most common species breeding in the prairies, only pintails continue to decrease. Pintail numbers, which declined dramatically from 5.6 million during the 1970s to 2.1 million in 1993, are currently at less than 40 percent of the Plan population goal for this species.

The black duck population in eastern North America has been decreasing for the past 30 years. Annual winter surveys which count only part of the black duck population have provided an index that averaged 489,000 in 1960-1969, decreased to 385,000 in 1970-1979, and appears to have stabilized at 290,000 in 1990-1992. Greatest decreases in black duck numbers have occurred in the Mississippi Flyway. However, the breeding population of black ducks in the Atlantic Provinces of Canada appears to be stable. The eastern population of mallards has increased over the same time period.

Of the 10 most common species breeding in the prairies, only pintails continue to decrease.

Black duck problems may be related to the conversion of breeding habitat to farmland, and to habitat loss and degradation caused by human activity in migration areas. The relative importance of habitat losses, competition with mallards, and hunting mortality in the black duck decline needs to be clarified. The Black Duck Joint Venture is addressing information needs for this species.

Mottled ducks and the two whistling-duck species occur only in the southern United States and Mexico. Changes in population status are difficult to quantify.

Mottled ducks are mainly non-migratory residents. The whistling-ducks tend to be nomadic, with erratic and unpredictable population changes. Few data currently exist on these populations, but these information gaps are being addressed.

Status of Diving Ducks and Sea Ducks

North American diving ducks include the canvasback, redhead, ringneck, greater scaup, and lesser scaup. Although not true diving ducks, ruddy ducks, two species of goldeneye, and buffleheads are included in this category. Highest breeding densities of divers occur on the prairies, although the ringneck and lesser scaup are widespread and the greater scaup breeds mainly in the sub-Arctic. Diving ducks tend to use the deeper inland marshes, rivers, and lakes of the continent for breeding and migration and coastal bays, estuaries, and offshore waters for wintering.

With the exception of lesser scaup, diving ducks are not as abundant as dabblers. Lesser scaup are still relatively abundant compared to other diving duck species, but they are below Plan objectives. The status of greater scaup is uncertain because it is difficult to distinguish this species from the much more abundant lesser scaup. In the prairies, canvasback numbers have stabilized since the 1986 Plan was signed, but this species and the redhead remain below population goals. Three species of mergansers occur in North America and are generally found on deeper lakes, ponds, and rivers.

North American sea ducks include the harlequin duck, four species of eider, three species of scoter, and oldsquaw. These species breed throughout northern regions of the continent. There are few available data on sea duck populations or harvest levels. Ancillary information has raised concerns for some species or populations.

The spectacled eider in Alaska is threatened and there is concern about populations of Steller's eider. The harlequin duck population has been declared endangered in eastern Canada. Breeding habitat conditions for most sea duck species have not changed in recent times. However, many traditional wintering areas have been degraded by industrial and urban development on both coasts. Effects of this habitat degradation on the populations are unknown. There is an immediate need to supplement current knowledge of sea ducks

with reliable information on population status, production, harvest, and factors affecting mortality and survival.

Goose Population Goals

Goals:

- Reach or exceed the Table 3 winter index goals by the year 2001.

The United States, Canada, and Mexico share a responsibility to maintain and manage continental populations of white-fronted, snow, Canada, and Ross' geese and brant. The Plan establishes population goals for 26 populations identified in Table 3 and Figure 3. Goose populations breed in the same areas, migrate along the same corridors, and return to the same wintering areas each year. This offers the possibility for managing each population on the basis of a plan that establishes goals for individual population size and harvest. Each country has different user groups and can best design national plans to address their individual needs.

The Arctic Goose Joint Venture has been developed under the Plan to foster greater research and monitoring of the Arctic and sub-Arctic nesting geese in an effort to enhance their management from a breeding ground perspective. This includes developing a better understanding of population sizes and distribution, production, harvest, habitat interactions, and survival rates.

Canada geese are widely distributed across the continent, with nesting areas extending from the mid-continent United States to the Arctic. Their wintering areas range from southern Canada through the central United States into Mexico. The four other species of geese nest exclusively in the Arctic, wintering along both coasts and in the southern part of the United States and in Mexico. Most populations of geese have adapted to agricultural practices and respond well to management actions such as harvest regulations, refuges, and manipulation of food.

Eight goose populations have exceeded Plan goals. All other goose populations are stable or increasing toward Plan goals except for two Canada goose populations and one snow goose population which continue to decrease. These populations, as well as some other populations, are being addressed in flyway management plans.

Status of Canada Geese

Most populations of Canada geese are either increasing or are stable. Two have exceeded Plan goals. The Atlantic Flyway and Southern James Bay populations are decreasing.

Status of Snow Geese

Most snow goose populations have increased in recent years. The greater snow goose has recovered from a few thousand at the turn of the century to a winter index of 181,700 in 1993. The spring census of greater snow geese on migration habitat in Quebec revealed 420,000 birds in 1993. Wrangel Island lesser snow geese are shared among Canada, the United States, and Russia. The population is decreasing and, at 70,000, is little over half of the Plan goal. The Ross' goose population has increased since 1986 and now exceeds the original Plan goal.

Status of White-fronted Geese

All four whitefront populations in North America are increasing or stable. Tule whitefronts now exceed the Plan goal and concern for Pacific whitefronts expressed in the 1986 Plan is now diminished.

Status of Brant

Atlantic brant have recovered from a population crash in the 1970s but remain below Plan goals. Pacific brant that breed in Alaska, the western Canadian Arctic, and Russia have stabilized.

Eight goose populations have exceeded Plan goals. All other goose populations are stable or increasing toward Plan goals, except for two Canada goose populations and one snow goose population which continue to decrease.

Table 3. Status of and goals for North American goose populations[a]

Species and Population	Winter Population Index (1984–1985)	1992–1993	Recent Trend (1986–1993)	Winter Index Goals (Year 2001)
CANADA GOOSE				
Atlantic Flyway	814,200	569,200	Decreasing	850,000
Southern James Bay	129,300	104,400	Decreasing	150,000
Mississippi Valley	477,200	673,400	Stable	900,000
Eastern Prairie	168,400	146,400	Stable	300,000[b]
Western Prairie/Great Plains	230,000	318,000	Increasing	285,000
Tallgrass Prairie	207,000	238,700	Stable	250,000
Shortgrass Prairie	179,100	328,200	Increasing	150,000
Hi-line	76,400	118,500	Increasing	80,000
Rocky Mountain	90,300	115,700[e]	Increasing	50,000
Pacific	no estimate	no estimate		29,000
Lesser Pacific Flyway	no estimate	no estimate		125,000
Dusky	7,500	16,600	Increasing	20,000
Cackling	25,800	149,300	Increasing	250,000
Aleutian	3,800	6,600	Increasing	7,500[c]
SNOW GOOSE				
Greater	187,000	181,700	Increasing	185,000
Mid-continent	1,973,100	1,744,200	Stable	1,000,000
Western Central Flyway	49,200	45,100	Stable	110,000
Wrangel Island (Russia)	90,000[b]	70,000	Decreasing	120,000[b]
Western Canadian Arctic Lesser	no estimate	205,000[d]	Stable	200,000
ROSS' GOOSE	no estimate	221,000	Increasing	100,000
WHITE-FRONTED GOOSE				
Eastern Mid-continent	81,300	172,900[e]	Increasing	65,000
Western Mid-continent	72,700	115,900[f]	Stable	250,000
Tule	5,000	7,000	Increasing	5,000
Pacific Flyway	102,000	230,900	Increasing	300,000
BRANT				
Atlantic	146,000	100,600	Stable	124,000
Pacific	144,800	124,400	Stable	185,000

a. The emperor goose is found only in Alaska and will not be considered in this Plan. The Vancouver Island Canada goose population is also not considered.

b. Breeding population goals.

c. Currently listed as an endangered species. Recovery plans specify maintaining a wild population at a level of 7,500 or greater and re-establishing self-sustaining populations of geese (50 breeding pairs per area) on three former breeding areas in addition to Buldir Island..

d. 1987 air photo inventory. Additional information now suggests the Ross' goose population may substantially exceed this estimate.

e. 1992 data; 1993 survey incomplete.

f. 1991 data; 1992 and 1993 survey incomplete.

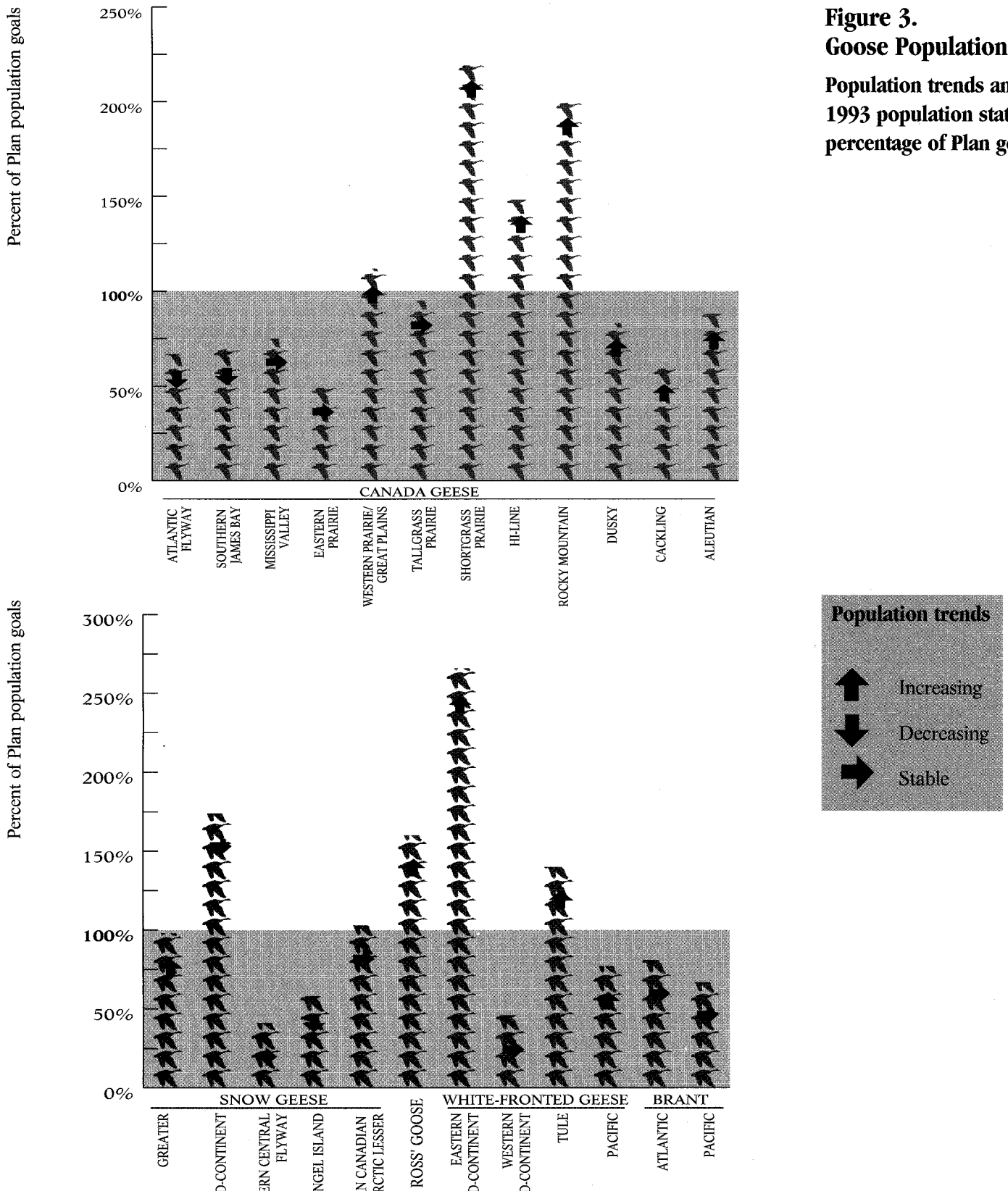


Figure 3.
Goose Populations

Population trends and 1993 population status as a percentage of Plan goals

Swan Population Goals

Goals:

- Maintain eastern populations of tundra swans at numerical levels listed in Table 4 and increase the western population to meet Plan goals.
- Increase trumpeter swan populations to the goals listed in Table 4.

Four species of swans are found in North America. Best known are the tundra swan and the trumpeter swan, both native to the continent (Table 4 and Figure 4). The whooper swan is found in North America only as a winter resident in the western Aleutian Islands. The introduced mute swan is becoming increasingly common through releases and escapes from captivity. The latter two are not considered in this Plan.

Status of Tundra Swans

Tundra swans are widely distributed and abundant in North America. For management purposes, they are divided into a western population (WP) and an eastern population (EP), based on winter distribution.

Swans from the WP breed in western Alaska. They winter in California and to a lesser degree in other western states and British Columbia. EP swans breed mainly along the Arctic coast and islands of Canada and winter primarily in the Chesapeake Bay area and coastal North Carolina.

Winter indices of WP and EP tundra swans in the United States averaged 59,000 and 80,000 swans, respectively, during 1984-1985. The EP has increased by an average of 2-3 percent annually since the late 1940s and the 3-year population estimate now stands at 95,000. The WP has been stable since 1986, but has shown a long-term upward trend since the late 1940s.

WP tundra swans are currently managed according to guidelines in a plan cooperatively developed by states and provinces with the Pacific Flyway Council, the Canadian Wildlife Service, and the U.S. Fish and Wildlife Service. EP tundra swans are managed in the United States according to guidelines in a plan that was

Table 4. Status of and goals for North American swan populations[a]

Species and Population	3-Year Winter Population Average (1990–1992)	Recent Trend (1986–1990)	Winter Index Goals (Year 2001)[c]
TUNDRA SWANS			
Eastern Population	95,000[b]	Increasing	80,000
Western Population	58,000	Stable	60,000
TRUMPETER SWANS	(1990)		
Pacific Coast	13,500[c]	Increasing	10,000
Rocky Mountain	1,750	Increasing	2,000
Interior	420	Stable	1,500

a. The whooper swan is found only in Alaska and the mute swan is an introduced species in North America; neither is considered in this plan.
b. Three-year running average.
c. Trumpeter swan surveys in September conducted at 5-year intervals.

developed cooperatively by the four flyway councils and the U.S. Fish and Wildlife Service.

Status of Trumpeter Swans

Trumpeter swans were once distributed across the entire continent. However, when the land was settled, nearly all trumpeters were extirpated. By 1933, only 66 could be located in the lower 48 United States.

Other remnant flocks were known to occur in Alaska and Alberta. Fear of extinction of the trumpeter swan and a desire to restore extirpated ranges in some states led to a substantial conservation effort, including propagation, relocation, law enforcement, public education, and land acquisition. As a result, trumpeter swans are now relatively abundant on the Pacific Coast and generally appear to be increasing in other areas. Carrying capacity of winter ranges may inhibit growth of inland populations, particularly the Rocky Mountain population.

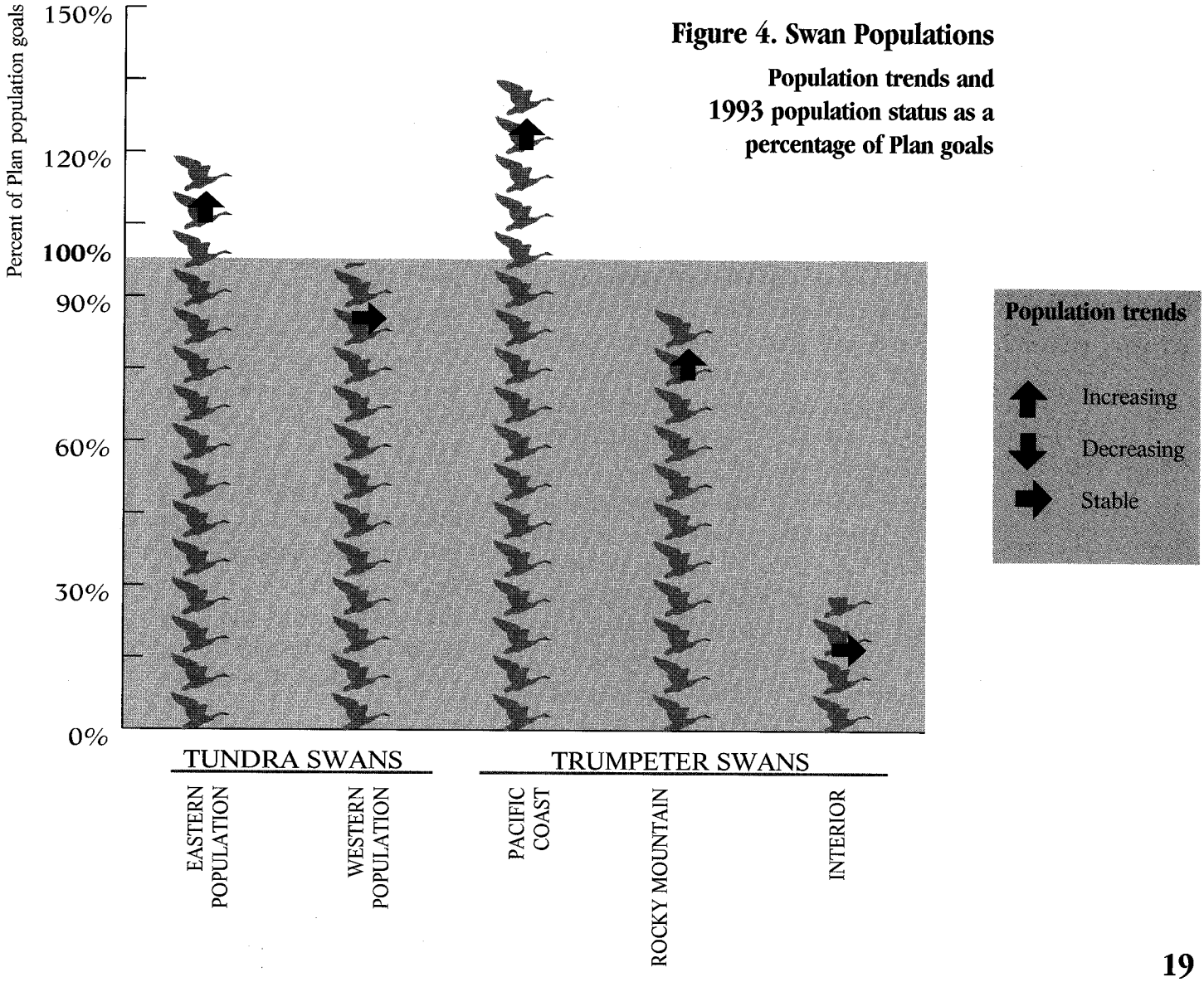


Figure 4. Swan Populations

Population trends and 1993 population status as a percentage of Plan goals

HABITAT OBJECTIVES

All migratory water birds, many other migratory birds, and nearly half of all threatened and endangered species depend on wetland and associated upland habitats for their survival.

All migratory water birds, many other migratory birds, and nearly half of all threatened and endangered species depend on wetland and associated upland habitats for their survival. The loss and degradation of this habitat is the major migratory bird management problem in North America.

Restoring waterfowl populations to the levels of the 1970s will require continental habitat characteristics similar to those present during the early 1970s.

Wetland losses continue in Canada, Mexico, and the United States. Losses in each important waterfowl habitat area persist and wetland restoration and enhancement accomplishments are not keeping up with these losses. Continued wetland losses at rates observed in the 1960s through 1980s will prevent recovery of waterfowl populations and will threaten the status of other wetland-dependent migratory birds.

Nevertheless, conservation of wetlands and associated habitats has progressed tremendously since the Plan was signed in 1986. Changes in public attitudes toward wetlands have resulted from a better understanding of the functions wetlands provide. Many of the public policies and programs that encouraged and financed wetland destruction are being reoriented to consider wetland values. Landowners, private conservationists, and public conservation agencies have taken significant steps to integrate wetland and wildlife conservation into profitable sustainable agriculture. These recent advances provide hope for a brighter future for the continent's wetland wildlife.

The Plan recognizes that the only feasible approach to permanently restoring continental waterfowl populations is through ecosystem management at a landscape level and on a scale greater than current habitat losses. Also, the distribution and diversity of protected and restored habitats throughout the flyways must be appropriate to support waterfowl breeding, migration, and wintering. Because the Plan is focused on landscape level changes, the habitats that are protected, restored, and managed provide multiple benefits for soil, water, plant, and wildlife conservation.

Predation problems must be addressed as habitat problems and the solutions lie with insightful landscape-level management programs. Where excessive predation is negating the benefits of habitat improvement for waterfowl and other upland nesting species, more effective predation management strategies may be considered to allow a balanced diversity of species to exist within the ecosystem.

Breeding habitat objectives are based on the assumption that restoration of upland cover in an amount and distribution similar to that present during the 1970s will be sufficient to improve recruitment and allow populations to recover. Evaluation studies must address this assumption as changes in a dynamic predator community, global climate, and other factors may limit this strategy. Ongoing field evaluations should identify management options for addressing factors that affect changes in predation patterns.

The Plan is unable to establish habitat objectives for other migratory water birds because no corresponding continental population data are available on non-waterfowl species inhabiting wetlands. Joint ventures are encouraged to develop habitat objectives, guidelines, or criteria for other migratory species that will complement waterfowl-driven habitat objectives and provide an integrated management approach. These objectives, guidelines, or criteria can be adjusted when corresponding continental population data on these additional migratory species become available.

Table 5. North American Waterfowl Management Plan joint venture objectives (acres)

Joint Venture Area	Protection	Restoration	Enhancement
UNITED STATES			
Prairie Pothole	1,891,515	744,898	3,669,500
Central Valley	80,000	120,000	735,000
Gulf Coast	689,000	104,000	958,000
Lower Mississippi Valley	473,000	864,000	1,182,000
Lower Great Lakes/St. Lawrence Basin	407,000	67,500[1]	67,500[1]
Atlantic Coast	880,000	83,000[1]	83,000[1]
Rainwater Basin	50,000	30,000[2]	8,333
Playa Lakes	51,000	10,000	25,000
Pacific Coast[3]	116,600	21,000[1]	22,000[1]
Upper Mississippi R./Great Lakes	1,329,000	605,200[1]	605,200[1]
TOTAL U.S.	**5,967,115**	**2,649,598**	**7,355,533**
CANADA			
Prairie Habitat	3,600,000[4]	3,600,000[1]	
Eastern Habitat	1,435,230	1,221,550[1]	
Pacific Coast[3]	132,400	66,000[1]	
TOTAL CANADA	**5,167,630**	**4,887,550[1]**	
MEXICO[5]	**To be determined**		
PLAN TOTAL[6]	**11,134,745**	**5,093,373**	**9,799,308**

1. Habitat improvement objectives do not distinguish between restoration and enhancement. For this table, such acres are assumed to represent restoration and enhancement at a 1:1 ratio.
2. Includes 24,000 acres restoration and 6,000 acres of habitat creation.
3. International joint venture.
4. Habitat objective is to secure and improve prairie habitat, both wetlands (760,000 acres) and uplands (2,840,000).
5. Joint ventures and associated habitat objectives in Mexico are in a developmental stage.
6. Many areas are first protected and later restored or enhanced. Therefore, overlap exists between the three categories of habitat objectives.

The Plan calls for the protection of more than 11 million acres, the restoration of more than 5 million acres, and the enhancement of more than 9 million acres in the joint venture areas.

The highest priority continues to be the mid-continent prairie breeding grounds in the United States and Canada.

Joint Venture Habitat Objectives

The 1986 Plan identified 34 Waterfowl Habitat Areas of Major Concern in the United States and Canada. Nine of those areas have become habitat joint ventures and 25 remain as areas of major concern. In Mexico, 32 Priority Wetlands have been identified based on their value to water birds. The 12 existing joint ventures, the remaining 25 waterfowl habitat areas of major concern, and Mexico's 32 priority wetlands are identified as Important Waterfowl Areas of North America and are displayed in Figure 1. Additional information on priority ecosystems, watersheds, and landscapes is available in individual joint venture plans.

Joint ventures have been developed as the principal vehicle to implement these approaches on a regional basis (see Plan Implementation section for more information on joint ventures).

Habitat objectives have been developed for each joint venture area incorporating the broad population goals and habitat objectives of the Plan on a regional level (Table 5). Specifically, the Plan calls for the protection of more than 11 million acres (4.5 million hectares), the restoration of more than 5 million acres (2 million hectares), and the enhancement of more than 9 million acres (3.6 million hectares) in the joint venture areas. Joint venture implementation plans contain more precise descriptions of the needed actions and preferred strategies than are contained in the Plan. Habitat objectives established at the joint venture level are based on more intimate knowledge of waterfowl habitat needs, local habitat loss trends, and wetlands conservation objectives of joint venture partners, often extending beyond priority waterfowl habitat.

For example, in the Central Valley and Lower Mississippi Valley joint ventures, habitat objectives have been calculated based on the energy requirements of wintering waterfowl populations and regional wetland habitat loss rates. In the Prairie Habitat Joint Venture, objectives are based on a mallard recruitment model to generate optimal restoration and management guidelines to meet waterfowl production needs. Joint venture habitat objectives should consider continuing habitat loss rates and the expected duration of protection, restoration, or enhancement strategies.

Joint venture objectives in Table 5 build on 1986 Plan objectives to address broad concerns for habitat conservation in each joint venture area. In each joint venture, priorities are established for the most urgent types and locations of habitat protection and restoration. Among these objectives, the highest priority continues to be the mid-continent prairie breeding grounds in the United States and Canada because of their importance to continental duck populations, the intensity of habitat loss that has occurred in this region, and the potential for improved recruitment through conservation actions.

The important waterfowl habitat areas identified in Figure 1 cover extensive areas of the continent that vary greatly in geography, land use, political jurisdictions, and biological and cultural diversity. An array of potential methods of restoring and maintaining waterfowl habitats is available, including acquisition, conservation easements, management agreements, incentives, favorable tax adjustments, and changes in agricultural and trade policy. These approaches should be evaluated carefully, with prescribed methods selected to fit individual geographic, political, and cultural circumstances.

Habitat objectives are estimates that should be adjusted periodically based on waterfowl population data, population responses to habitat accomplishments, habitat loss rates, and other habitat-related factors.

For example, the current trend of global warming is predicted to have a significant impact in North America on the prairie region. Coastal marshes along the Gulf of Mexico are already in serious decline and would be devastated by only a slight sea-level rise. Therefore review of Plan objectives may be warranted as patterns of global climate change become more apparent.

Timeframe and Cost to Complete the Plan

Progress of each joint venture toward achieving habitat objectives has been summarized in a March 1993 report, *North American Waterfowl Management Plan: A Review of the First Five Years*. Copies of this report are available from the national Plan implementation offices in each country. The original time period for implementing Plan habitat objectives and meeting population goals was 15 years, between 1986 and 2001. Plan and joint venture implementation progress will be monitored annually. Because habitat objectives have been established based on biological needs of populations, not on fiscal appropriations, the timeframe for completing the Plan will need to be reconsidered periodically in light of progress and current population and habitat data. Based on the first 5 years of implementation, completion of Plan objectives is likely to extend to at least the year 2010. Maintenance and management of protected and restored areas will be ongoing.

The cost of implementing the high-priority habitat objectives identified in 1986 was originally estimated to be about $1.5 billion. Because of continuing loss and degradation of wetlands, more detailed analysis of habitat needs developed by joint ventures, and formation of new habitat joint ventures, additional habitat objectives have been identified since 1986 to meet population goals (Table 5). These revised objectives increase the total cost estimate significantly. If only traditional habitat securement and restoration methods were employed, meeting the current joint venture objectives would cost about $6 billion. However, expenditures at this level are not foreseen because a wide variety of traditional and non-traditional approaches will be used to achieve these objectives. Approaches include policy adjustments and incentives to change land use on a broad scale, habitat acquisition, restoration, and management and tax incentives.

The single largest contribution to meeting Plan objectives is likely to be made by adjustments in national and international agricultural policy that encourage conservation practices in the context of sustainable agriculture. Recent progressive agricultural conservation programs such as the Conservation Reserve Program and the Wetland Reserve Program in the United States and the Permanent Cover Program under the Prairie Farm Rehabilitation Administration in Canada provide highly significant wildlife benefits in addition to economic and soil and water conservation benefits. These programs provide direction for future policy adjustments that will institutionalize wildlife conservation in mainstream agriculture.

Nevertheless, new funding will be required beyond that which has already been secured. Future updates to the Plan should assess cost estimates for completing the Plan based on the effectiveness of habitat accomplishments, contemporary policy perspectives, and remaining habitat goals and objectives.

The single largest contribution to meeting Plan objectives is likely to be made by adjustments in national and international agricultural policy that encourage conservation practices in the context of sustainable agriculture.

Plan Implementation

The Plan is one element of many global efforts to protect and restore the biological and functional integrity of natural systems on which wildlife, humans, and all other life forms depend.

The North American Waterfowl Management Plan is being implemented by many public and private partners cooperating in habitat joint ventures that plan, fund, and implement habitat conservation projects and through species joint ventures that develop species information and management recommendations.

Habitat Joint Ventures

Transforming the concepts and goals of the Plan into on-the-ground actions relies on a cooperative new approach to conservation known as a joint venture. A joint venture is a regional public/private partnership composed of individuals; corporations; conservation organizations; and local, state, provincial, and federal agencies drawn together by common conservation objectives oriented around a particular physiographic region. Partners, motivated to protect and restore habitat for many reasons, come together under the Plan to accomplish collectively what is often difficult or impossible to do individually.

There are currently 12 active habitat joint ventures, as shown in Figure 1, in addition to 2 species joint ventures. During the next 5 years, several additional joint ventures are expected to be organized in some remaining areas of major concern. For example, planning is in progress and a coordinator has been designated for the Intermountain West Joint Venture.

Organizational efforts have also been initiated for Northern Great Plains, San Francisco Bay, and Klamath Basin areas. A brief description of each joint venture is found in Appendix C and includes a discussion of objectives, dominant conservation strategies, and waterfowl and other species of importance in the region.

The diversity of joint venture partnerships and projects is remarkable. Literally hundreds of partners have joined hands to implement a variety of actions to conserve wetlands and associated habitats. The diversity of partners is matched by the diversity of habitat projects conceived, financed, and implemented by joint venture partners.

Protection actions range from acquisition by public agencies and private organizations to conservation easements, leases, and management agreements with private landowners to timber management plans with major timber corporations.

Restoration activities include coastal salt marshes along the Gulf of Mexico and Atlantic and Pacific coasts, emergent wetlands and prairies in the mid-continent prairie pothole region, bottomland hardwoods on the Mississippi River delta, and vernal pools in California's Central Valley.

Habitat enhancement activities include rest/rotational grazing practices on range lands, seasonal flooding of active crop lands, construction of nesting islands and structures for waterfowl and songbirds, and wildlife-friendly agricultural practices such as delayed haying.

Joint venture projects, while meeting needs for waterfowl habitat, are being designed and implemented to benefit a range of wildlife that reflects the diverse interests of the joint venture partners. Such interests include federal- and state-listed threatened and endangered plants and animals; shorebirds; wading birds; other neotropical migrants; resident wildlife such as mammals, reptiles, amphibians, and invertebrates; and plants of local or regional interest. The effectiveness and variety of joint venture projects are the product of the expertise, priorities, finances, and support brought forward by each partner.

Joint venture partners assume many responsibilities: establishing and maintaining coordination among all partners, refining waterfowl population goals, establishing habitat objectives, preparing a joint venture implementation plan, and identifying priority strategies to achieve the objectives; coordinating project development, funding, and implementation; communications; tracking habitat accomplishments; and evaluating the effectiveness of habitat accomplishments.

Additional habitat joint ventures are encouraged in those areas where no joint venture currently operates when a coalition of partners emerges with resources, capabilities, and expertise to engage in habitat work that contributes to Plan objectives. Where feasible, existing administrative infrastructure should be used to implement new joint ventures. New joint ventures must stimulate new resources to accomplish habitat conservation.

Of particular interest is establishing joint venture partnerships in Mexico. Mexico has identified 32 priority wetlands of national importance (Figure 1) that are considered to be important habitat areas for water birds. These areas are likely to form the basis for joint ventures in Mexico in the future. The extraordinary biological diversity of Mexico's wetland habitats and their importance to wintering migratory birds underscores the need for Mexican participation in the Plan. Within the context of the Plan, Mexico will establish conservation and management strategies geared toward wetlands, species at risk, and endemic and migratory species. Joint ventures are expected to result from these processes.

Wetland conservation accomplishments in Mexico since 1989 are summarized in Appendix C.

Species Joint Ventures

In addition to the habitat joint ventures, two species joint ventures (Arctic Goose and Black Duck) are operating to improve the databases needed to manage these species of international importance. Each of these species joint ventures is described in Appendix C. Additional species joint ventures will be considered for species or groups of species of international concern whose management is limited by a significant lack of information and where a coalition of partners emerges with resources, capabilities, and expertise to carry out the necessary research.

Tracking and Evaluation

Plan implementation requires tracking habitat accomplishments, monitoring waterfowl populations, and evaluating the relationship between the two. It is essential that each country track accomplishments associated with the Plan to determine progress toward achieving habitat objectives. Databases have been developed in Canada and the United States to track progress in meeting habitat objectives.

An evaluation team has been established to evaluate progress toward Plan goals and recommend actions based on biology to improve Plan implementation. The evaluation strategy consists of three interrelated activities: tracking, monitoring, and assessing program effectiveness. Of foremost importance is that joint ventures identify the limiting factors affecting waterfowl in their joint venture areas. Efforts can then be focused on alleviating these limiting factors and tracking progress in achieving objectives. At the same time, it is important to monitor the status of habitat and indicator wildlife species. Finally, evaluation requires feedback, validation, and other assessments necessary for determining program effectiveness in achieving objectives. Adjustments to implementation strategies can then be made to ensure that Plan objectives are achieved.

Joint venture projects, while meeting needs for waterfowl habitat, are being designed and implemented to benefit a range of wildlife that reflects the diverse interests of the joint venture partners.

As fiscal pressures build globally to reduce agricultural production incentives, there is emerging support for conservation incentives that provide long-term benefits for soil, water, crop production, market stability, and wildlife values.

Relationship of the Plan to Sustainable Agriculture and Other Sustainable Economic Development

Historical relationships among waterfowl management, agriculture, water management, and trade policies have often been adversarial. Much of the continent's best waterfowl habitat is found in areas of rich agricultural lands such as the mid-continent prairie pothole region, the Mississippi Alluvial Valley, and the Central Valley of California. Agricultural subsidies, land use incentives, water management, and crop quota systems based on international trade requirements have not traditionally considered wildlife habitat needs.

North American agriculture has spent many billions of private and public dollars over the past two centuries draining and converting wetlands in agricultural areas. Until recently, the principal strategy to deal with habitat loss has been public acquisition of important remaining wetland areas. It is now even more clear that waterfowl population goals and habitat objectives at the levels set in this Plan cannot be achieved solely through acquisition and management of public lands. If adequate wildlife habitat is not provided on private lands as well and significant progress is not made to integrate wildlife conservation in agricultural, trade, and other land and water policies, wildlife populations including waterfowl will continue to decline.

A major habitat initiative to rehabilitate duck populations will require an effective crop damage mitigation program in Prairie Canada. Canadian partners will underwrite the cost of maintaining a crop damage, prevention, and compensation program.

In the past century, federal agricultural policies in Canada and the United States have had a greater effect on wetland wildlife habitat than have federal wildlife policies. The soil and water that support North America's remarkable agricultural productivity also sustain its wildlife diversity. The future of wildlife is dependent on agricultural policy. Recent trends in federal agricultural subsidy and incentive programs are beginning to stress progressive soil and water conservation practices that are having the effect of benefitting agricultural and wildlife resources. The concept of sustainable agriculture is becoming part of mainstream agriculture. As fiscal pressures build globally to reduce agricultural production incentives, there is emerging support for conservation incentives that provide long-term benefits for soil, water, crop production, market stability, and wildlife values.

In Mexico, there is a pressing need for sustainable economic development that is compatible with long-term conservation of the country's natural resources. Compatible uses of wetland habitats may include such activities as timber harvest, wild rice harvest, tourism, water treatment, or other activities conducted in a manner and intensity that preserves the biological integrity of wetlands.

Benefits to Conservation of Biological Diversity

The Plan is not an autonomous document independent from other biological plans, programs, and initiatives. Rather it is one of many global efforts to protect and restore the biological and functional integrity of natural systems on which wildlife, humans, and all other life forms depend.

Management for biological diversity requires maintenance of viable populations of native plants and animals that are well distributed throughout their range; maintenance of genetic variability within and among populations of native species; and maintenance of functional representative examples of the full spectrum of ecosystems, biological communities, habitats, and their ecological complexes. Management should also involve solutions that integrate human activities with the conservation of biological diversity. These are the basic ingredients of the North American Waterfowl Management Plan's goals to recover and maintain populations of a group of species well distributed throughout their range by restoring and maintaining the variety of biological communities and habitats on which they depend.

The North American Waterfowl Management Plan is not the sole agent for conservation of biological diversity but one link in the chain of programs that support it. The Plan is one of the most clearly defined links because of plentiful historical data on waterfowl compared to other wetland species and because quantitative habitat protection, restoration, and enhancement objectives have been established.

Relationship of the Plan to Other Biological Programs and Initiatives

The Plan's relationship to other biological programs and initiatives, or other links in the biodiversity chain, is through common purposes, strategies, or habitats of interest. For example the Western Hemisphere Shorebird Reserve Network works to achieve international conservation of shorebirds and the habitats they depend on by recognizing critical breeding, migratory, and wintering sites in several countries. All of the sites are predominantly wetland habitats that are also important to migratory waterfowl.

The Neotropical Migratory Bird Conservation Program is a cooperative Latin and North American initiative to focus resources on improving monitoring, research, management, and education programs involving forest, grassland, and wetland birds and their habitats. The North American Waterfowl Management Plan's habitat protection and restoration projects are within the range of neotropical migrants and contribute significant benefits to conservation of these species. In Mexico, protection of priority wetlands under the Plan will secure habitat for neotropical migrants. In the Lower Mississippi Valley of the United States, the Plan's objective to restore more than 500,000 acres (202,000 hectares) of bottomland hardwood forests is the most ambitious plan to date providing benefits to migrant forest birds of the Mississippi Flyway. In the prairies of Canada and the United States, restoration of prairie grasslands and wetlands provides feeding and breeding habitat for plovers, killdeer, avocets, yellowlegs, sandpipers, godwits, dunlins, dowitchers, phalaropes, burrowing owls, and Baird's sparrows.

The Convention on Wetlands of International Importance, known as the "Ramsar Convention," seeks to stem the loss of wetlands and ensure their conservation through international recognition and national protection programs. Eleven Ramsar sites have been designated in the United States, 33 in Canada, and 1 in Mexico. Numerous joint venture projects occur in and adjacent to these sites. For example, the Maurice River, New Jersey, acquisition and restoration project was implemented along the southeastern shore of the Delaware Bay Estuary, a Ramsar site that is also a designated shorebird reserve of hemispheric significance.

Plan projects are providing many habitat benefits to threatened and endangered species, particularly in wetland and prairie ecosystems.

The Plan complements other international migratory bird conservation programs, including the Ramsar Convention, Partners in Flight, and the Western Hemisphere Shorebird Reserve Network.

North American Waterfowl Management Plan projects are providing many habitat benefits to threatened and endangered species, particularly in wetland and prairie ecosystems. About 250 endangered or threatened species of wildlife, fish, and plants are directly associated with aquatic habitats in the United States alone. Project planning must continue to include analysis of threatened and endangered species and species of regional concern that occur in the project areas and to investigate habitat features that could be incorporated into project designs specifically to benefit these species.

Examples of species benefitting from Plan projects include piping plover nesting at Chase Lake, North Dakota; greater sandhill crane, Swainson's hawk, Aleutian Canada goose, chinook salmon, valley giant garter snake, valley elderberry longhorn beetle, and California hibiscus in Llano Seco Rancho, California; king rail, sedge wren, and bald eagle in Pickerel Creek, Ohio; wood stork, shortnose sturgeon, loggerhead turtle, and Wilson's plover in ACE Basin, South Carolina; piping plover, whooping crane, Baird's sparrow, and Hudsonian godwit at Quill Lakes, Saskatchewan; and jaguar, two crocodile species, and several species of sea turtles at Sian Ka'an Biosphere Reserve in Mexico.

Plan projects provide a critical link to inland and marine fisheries and shellfish resources. Wetland ecosystems play an important role in the life history of the majority of estuarine and freshwater species because they provide spawning and rearing habitats. Protection and restoration of these habitats contributes to the conservation of fish populations.

PLAN ADMINISTRATION

The Plan is a cooperative international endeavor involving governments at all levels, non-government organizations, and individuals. This approach does not rely on a traditional administrative pyramid of authority. Instead, the Plan embodies a collegial relationship among its partners. The federal governments of Canada, Mexico, and the United States coordinate roles in concert with several partner organizations, boards, councils, and committees.

International

The North American Waterfowl Management Plan Committee, consisting of representatives from provincial, state, and federal governments in Canada, the United States, and Mexico, monitors and updates the Plan, coordinates international communications and evaluation, approves new joint ventures, and recommends actions to the lead federal agencies. A description of the purpose, membership, and operating procedures of the Plan Committee is found in Appendix A.

National: Canada

The North American Waterfowl Management Plan National Implementation Office of the Canadian Wildlife Service in Ottawa, Ontario, represents the government of Canada and other Canadian partners in administering the Plan and coordinating with the other two partner countries.

The North American Wetlands Conservation Council (Canada) is the senior Canadian body advising the Minister of the Environment on all aspects of coordinating and administering the funding, implementation, and evaluation of Canadian habitat joint ventures under the Plan. The Council is also the principal point of contact regarding all projects funded under the North American Wetlands Conservation Act.

National: United States

The North American Waterfowl and Wetlands Office of the U.S. Fish and Wildlife Service in Arlington, Virginia, represents the government of the United States in administering the Plan and coordinating with the other two partner countries.

The U.S. Implementation Board, a coalition of private interests formed in 1988, advises and assists the United States in policy and legislative issues related to the Plan.

National: Mexico

The National Institute of Ecology, Secretariat of Social Development, represents the government of Mexico in administering the Plan and coordinating with the other two partner countries.

Joint Ventures

Joint Venture Management Boards, comprised of partner agencies and organizations, coordinate and manage each joint venture. State or provincial steering committees coordinate joint venture actions on a statewide or provincewide basis. In some focus areas within joint ventures, local coordinating bodies organize particular projects.

Related Organizations

The Migratory Bird Conservation Commission was established in the United States to approve areas recommended by the Secretary of the Interior for migratory bird refuges and to approve the price at which lands may be purchased or leased. Under the North American Wetlands Conservation Act, the Migratory Bird Conservation Commission approves, rejects, or reorders the list of wetland conservation projects submitted by the North American Wetlands Conservation Council. The North American Wetlands Conservation Council was established by the North American Wetlands Conservation Act in 1989 to recommend wetlands conservation projects to the Migratory Bird Conservation Commission for approval. The Act provides the

The Plan's approach does not rely on a traditional administrative pyramid of authority. Instead, it embodies a collegial relationship among its partners.

largest single source of Federal matching funds for Plan and other wetland projects in Canada, Mexico, and the United States. Section 11 of the Act requires the Secretary of the Interior to undertake with the appropriate officials in Canada to revise the goals and other elements of the Plan at 5-year intervals.

Four flyway councils were established in 1952 to represent their member states on matters regarding cooperative state-federal management, research, and regulation of migratory waterfowl within each of their respective flyways. The government of Canada cooperates with provincial and territorial wildlife agencies to address these issues in Canada and participates at federal and provincial levels on the flyway councils in the United States.

The Committee on North American Waterfowl Management Plan Implementation was formed in 1987 by the International Association of Fish and Wildlife Agencies to coordinate state and provincial interests in the Plan and to secure additional sources of non-federal funds.

Other Waterfowl Agreements

The Plan works in concert with other waterfowl agreements. The Convention for the Protection of Migratory Birds was signed by the United States and Great Britain (on behalf of Canada) in 1916 to ensure conservation of migratory birds. The Convention provides the basic foundation for cooperative waterfowl management programs that have since evolved in each country. Migratory birds in North America have also benefitted from protection and other conservation measures afforded under subsequent treaties with Mexico (1936) and other countries. A Tripartite Agreement signed by Mexico, Canada, and the United States in 1988 has resulted in cooperative conservation projects to protect wetlands and aquatic birds in Mexico.

APPENDIX A

North American Waterfowl Management Plan Committee

The North American Waterfowl Management Plan Committee was established in 1986 to:

1. Serve as a forum for discussion of major long-term international waterfowl issues and problems and translate those discussions into recommendations for consideration by the cooperating countries.
2. Update the Plan approximately every 5 years in response to new information, policy development, or opportunities.
3. Review scientific and technical data on the status and dynamics of waterfowl populations and their habitats as they relate to the objectives of the Plan.
4. Review and monitor progress toward achieving population goals and habitat objectives contained in the Plan.
5. Review management plans for waterfowl populations requiring coordinated international action and make recommendations for additions or revisions.
6. Review scientific and technical data to determine whether other species require coordinated international action within the Plan framework.
7. Approve new joint ventures and review and approve joint venture implementation plans and evaluation plans to ascertain that they further the Plan's intent.
8. Consider and, if needed, recommend additional actions to the federal governments of Canada, Mexico, and the United States.
9. Provide guidance and a framework for communication and evaluation functions.

The Plan Committee directs all recommendations to the Canadian Wildlife Service, the National Institute of Ecology in Mexico, and the U.S. Fish and Wildlife Service. These recommendations are reviewed by each agency and, if necessary, by their executive and legislative branches. Approved changes are incorporated formally by updating the Plan.

Committee Membership

The Committee consists of 18 members selected from agencies responsible for waterfowl management. Six are appointed by the Director General of the Canadian Wildlife Service, six by the Mexican National Institute of Ecology, and six by the Director of the U.S. Fish and Wildlife Service. Of these, four Canadian members represent the provinces and territories, four U.S. members represent the flyway councils, two each are from the federal wildlife services of Canada and the United States, and six are from Mexico's Institute of Ecology.

Operating Procedures

One federal agency member from each country serves as a co-chair of the Plan Committee as designated on an annual basis by the respective appointing authority. Representatives of non-government organizations are encouraged to participate in Plan Committee operations at the invitation of the co-chairs.

Co-chairs of the Committee furnish secretarial services to keep minutes and provide distribution of materials. Each federal agency also provides the scientific and technical services of migratory bird population and wetland habitat ecologists to offer technical advice and consultation.

State and provincial members of the Committee serve staggered 3-year terms. Any member can be reappointed at the discretion of the appointing authority. Appointments become effective January 1 of each year. If a replacement to an expired membership is not appointed, the retiring member continues to serve until replaced or reappointed.

The Committee meets twice annually, rotating meetings among the three countries. Additional meetings may be arranged as needed. The Committee operates by consensus. A 60-day notice, including time and location of meeting and an agenda, is sent to all members of the Committee.

Periodically, each federal agency co-chair provides the Committee with information that facilitates tracking and monitoring the population goals and habitat objectives of the Plan.

APPENDIX B

Background to Waterfowl Habitat Issues in North America

Waterfowl conservation embraces three distinct areas: 1) habitat preservation and restoration, 2) the establishment of waterfowl regulations that permit a harvest commensurate with the capabilities of the species to replace these losses, and 3) the control of disease. Of these three, habitat preservation and restoration is the most important. Other factors limiting waterfowl abundance are transitory compared to the long-lasting effect of habitat destruction and deterioration.

Waterfowl depend on a variety of wetland and associated habitats in North America. These habitats are shared by a host of other plants and animals. Most waterfowl are migratory, moving in seasonal cycles to take advantage of shifting patterns of food resources and water conditions across the continent. The principal reason for the drastic decline of ducks in the 20th Century has been destruction of wetland and upland habitats needed for breeding, migrating, and wintering.

The impacts of agriculture, industry, flood control, navigation, and recreational use have reduced the quantity and quality of waterfowl habitat in many parts of Canada, the United States, and Mexico.

The loss and degradation of habitat is the major waterfowl management problem in North America.

In the far north of Canada and in Alaska, waterfowl tend to be concentrated on a small percentage of the land where environmental conditions favor high productivity. For example, thousands of Arctic-nesting geese form dense colonies on small areas of suitable lowland habitats. To date, these continentally important areas have escaped serious impacts, but land-use decisions affecting these sites should be made carefully and with full consideration of possible effects on waterfowl populations. Residents of these areas of Canada and Alaska, many of whom hunt for subsistence purposes, should be consulted early in the decision-making process. They are allies with a strong vested interest in maintaining waterfowl resources and are in a position to help secure this important waterfowl habitat for the future.

Similarly, formerly secure waterfowl habitats in the vast continental boreal forests of Canada used by breeding, molting, and staging ducks are now faced with possible negative impacts by hydroelectric power, recreational development, certain forestry practices, industrial pollution, and atmospheric contamination. When drought prevails on the prairie breeding grounds, many ducks emigrate northward into the boreal-lake region, a less productive but more stable environment.

Problems in the Prairie Region

Waterfowl breeding habitat in the mid-continent prairie region also has been severely impacted by agriculture, urbanization, and industrial development. More than half of the original wetlands in the United States have been lost and the same factors are diminishing wetlands in Canada. Intensive agricultural land use has resulted in major environmental problems, including soil erosion, water quality degradation, siltation, and chemical contamination. Wetland drainage and other poor soil management practices have increased salinization. These problems have been manifested in decreased productivity of the land for both agricultural crops and wildlife.

Wetlands are an integral part of the prairie ecosystem. The many scattered basins collect and hold runoff water vital to this semiarid region. Wetlands replenish aquifers and contribute to the maintenance of groundwater needed to sustain native vegetation, farm crops, and wildlife. Natural wetlands purify water and prevent erosion and encroachment of salts in topsoil. Through a recurring cycle of

wet and dry years, nutrients lodged in wetland plant material are released, thus stimulating a rejuvenation of the prairie food chain. Life cycles of prairie ducks have evolved closely with this variable water regime.

Agricultural development of the prairies has interrupted the natural relationships that have evolved between ducks and their environment. Losses of upland nesting cover and small ephemeral prairie wetlands have concentrated ducks and their predators in remaining patches of suitable habitat. As a result, recruitment of young in much of the prairie pothole region is inadequate to maintain or build certain waterfowl population levels even in years of favorable water conditions.

The most important nesting habitat of prairie mallards and pintails is the remnant tracts of native grassland communities that have persisted mainly as pastures on otherwise intensively farmed land. Losses of these grasslands also continue, although the Conservation Reserve Program in the United States has helped to reverse these losses.

Agricultural development of the prairies has interrupted the natural relationships that have evolved between ducks and their environment.

Changing Land-use Practices

Most prairie production areas have already been converted to intensively farmed land. While it is unrealistic for government wildlife agencies to acquire vast tracts of agricultural land for duck production, smaller-scale changes in land-use practices that improve waterfowl recruitment rates over vast areas could result in large gains in the fall duck flight. Many recommendations for improving soil and water conservation and range management may greatly benefit prairie-nesting ducks. Where maintaining valuable waterfowl production habitat is in direct conflict with agriculture, strategies should be developed to provide incentives to the landowner for maintaining waterfowl habitat. Field-feeding mallards and pintails are most frequently the cause of crop depredation problems. Initiatives to maintain or increase the population sizes of these species in agricultural areas of prairie Canada should also consider measures to reduce the economic impact of crop losses.

Maximum effectiveness of a program designed to maintain and enhance duck production on the prairies will depend on a high degree of integration of programs among government agencies, private groups, and individual citizens. Wetland habitats have been set aside primarily for waterfowl production within the mid-continent prairie region by the combined efforts of state, provincial, and federal governments of the United States and Canada. Private organizations also play an important role in the total effort to conserve waterfowl habitats and should be considered a key component and partner in future habitat development and enhancement strategies.

Habitat Needs in the East

Habitat requirements for breeding waterfowl in eastern North American are complex but generally fall into two broad categories. Black ducks, wood ducks, goldeneyes, green-winged teal, and several other species appear to thrive in unaltered, natural environments along the Great Lakes-St. Lawrence lowlands, in boreal forests, and in coastal lowlands and estuaries. These natural wetlands are being lost or degraded by agriculture, urbanization, industrial development, pollution, water control projects, and certain forestry practices.

The decline in black duck numbers and increased concern for the status of goldeneyes are related to these factors. On the other hand, mallards, gadwalls, blue-winged teal, and other species have become well-established in the farmlands of southern Ontario, southwestern Quebec, and several Great Lakes states. For example, because of the relatively more abundant nesting cover and less nest predation, eastern mallards are currently more than twice as successful at hatching nests as are prairie-nesting mallards. However, wetlands in the eastern farmlands are also being drained and cultivated. Unless steps are taken, eastern dabbling duck populations on the farmlands will eventually be subject to the same downward trends as their western counterparts.

Migrating and Wintering Habitat

Waterfowl tend to concentrate more during molting, migration, and wintering than during the nesting season, so habitat loss or degradation and outbreaks of disease on concentration areas such as marshes, deltas, or coastal bays and estuaries can have serious consequences for waterfowl populations. Studies indicate that habitat conditions along migration routes and in wintering areas may directly affect the survival of migratory birds and influence reproductive success the following spring. Many key areas of migration and wintering habitat have been lost to other land uses and the quality of much of the remaining habitat has decreased substantially.

Methods to protect migration and wintering habitat may differ from those used on the breeding grounds.

Methods to protect migration and wintering habitat may differ from those used on the breeding grounds. Discrete areas of high importance should be acquired for long-term use by waterfowl. Acquired areas should be managed to restore habitat values and minimize risk of disease. Agricultural and industrial practices that impact migration and wintering areas should be examined and alternative practices developed that benefit waterfowl and complement other land uses. Private landowners should be encouraged to continue their important contribution of maintaining habitat for migrating and wintering waterfowl.

Value of Waterfowl

Waterfowl are valued by a great number of people in Canada, the United States, and Mexico. Public interest in perpetuating healthy waterfowl populations and the biological diversity of the wetlands that support these birds is widespread and includes hunters, naturalists, casual wildlife observers, and other conservationists.

In the United States alone, more than 76 million people spent more than $18 billion participating in non-consumptive wildlife recreation during 1991. Of 51 million people who observed wild birds in the United States in 1991, more than 19 million traveled away from home to observe or photograph waterfowl and shorebirds. Another 12 million people observed and photographed reptiles or amphibians, most of which occur in wetlands.

More than 35 million anglers age 16 and older spent $24 billion during 1991. Another 13.7 million anglers were between the ages of 6 and 16. Many of the inland and coastal fishery resources depend on wetland habitats. Three million migratory bird hunters in the United States spent nearly $700 million in 1991 and about 60 percent of these people hunted waterfowl.

Canadians are also highly supportive of wildlife conservation, with 86 percent of the population indicating that it is important to them that abundant wildlife populations be maintained. A similar level of support exists for the maintenance of abundant waterfowl.

Public interest in perpetuating healthy waterfowl populations and the biological diversity of the wetlands that support these birds is widespread and includes hunters, naturalists, casual wildlife observers, and other conservationists.

In Canada, 19 million people (90 percent of the population) participated in a wide range of fish- and wildlife-related activities during 1991. More than 15 million of them spent nearly $3 billion participating in non-consumptive wildlife recreation. This activity took place at a variety of natural sites, including wetland areas. Waterfowl encounters enhanced the enjoyment of 4.8 million Canadians during trips or outings taken for some other purpose.

Nearly 5.2 million Canadian anglers and another 1 million visitors spent $5.6 billion during 1991 directly on fishing in Canada's lakes, rivers, streams, and oceans. There were 1.5 million hunters in 1991, many of whom sought birds and mammals in marsh, wetland, or swamp areas. Nearly half a million of these hunters sought waterfowl. In total, hunters spent $1.2 billion, with waterfowl hunting accounting for $178 million. Significant benefits to the Canadian economy result from spending on recreational activities associated with fish and wildlife. The economic stimulus provided by fish and wildlife contributes more than $12 billion U.S. to Canada's economy each year and sustains more than a quarter of a million jobs.

Many wetland areas on the continent have been restored and maintained with funds received directly or indirectly from hunters. Active waterfowl hunters have been as numerous as 2.4 million in 1970 and as low as 1.4 million in 1991, with approximately 20 percent in Canada and 80 percent in the United States. In 1991-92, more than 24,000 waterfowl hunting permits were issued in Mexico. Numbers of duck hunters tend to fluctuate with the extent of hunting opportunities.

Annual harvests in the United States and Canada have varied from a low of 10.8 million ducks in 1968 to a high of 20.2 million in 1970, with a drop to a historical low of 7 million in 1988. Distribution of harvest has been 80 percent United States and 20 percent Canada.

Subsistence harvest of ducks for food and for down used in clothing occurs mainly in the northern part of the continent in the spring and fall. This amounts to an estimated 5 percent of the total continental duck harvest.

Geese are highly valued quarry of recreational hunters. The annual goose harvest averages 2.3 million birds in North America, varying from 1.8 million in 1991 to 2.5 million in 1980-1981. About 72 percent of the harvest occurs in the United States. Harvest can serve to keep populations in balance with the carrying capacity of habitat and within tolerance limits of private landowners, especially those raising agricultural crops.

Geese are the most important waterfowl group used in northern native subsistence economies. Subsistence kill of geese in North America amounts to approximately 7 percent of the total continental harvest; however, it can have a substantial impact on some goose populations.

Primary utilizations of the tundra swan are public viewing and subsistence harvest, although a limited hunting season using tightly controlled harvest quotas takes place in some states. There are no open seasons for swans in Canada. An annual subsistence harvest of 2,600-5,600 western-population tundra swans occurs in Alaska. A subsistence harvest of eastern-population tundra swans also occurs in Canada, but the size of the harvest is unknown.

APPENDIX C

Description of Joint Ventures

Twelve habitat joint ventures are described below. They are presented in alphabetical order progressing from Canada south to Mexico. Two species joint ventures are described at the end of this appendix.

Canada

EASTERN HABITAT JOINT VENTURE: The Eastern Habitat Joint Venture encompasses six eastern Canadian provinces from Ontario to Newfoundland. The priority areas include wetlands along the Great Lakes-St. Lawrence System and coastal salt marshes. More than 80 percent of this area consists of boreal terrain typified by vast areas of wetlands that produce large numbers of black ducks, mallards, and Canada geese. The primary threat to waterfowl populations in eastern Canada is the loss of breeding and migration habitat caused by such factors as acid rain, hydroelectric development, industrial development, urbanization, agricultural land-use, forest management practices, and mineral extraction.

Strategies to meet direct program goals focus on integrated land-use management through leasing, cooperative agreements with private landowners, and acquisition and development of sites for waterfowl. Indirect program strategies include public education, wetland designation agreements, and policy changes.

PRAIRIE HABITAT JOINT VENTURE: This joint venture covers the most productive waterfowl breeding habitat in North America and includes parts of Manitoba, Saskatchewan, and Alberta. The primary threat to this area is the loss of critical waterfowl breeding habitat due to the destruction and drainage of wetlands and the alteration of uplands for agricultural purposes. The continued deterioration and loss of upland cover, which results in increased predation, is being addressed through close working relationships with agriculture policy development that will lead to sustainable landscape and habitat management. Education and awareness programs are advancing.

Strategies to meet the habitat objectives focus on improving nesting cover; securing large wetland complexes through purchase, easements, or leases; and encouraging the use of sound soil and water conservation practices. Protection of key habitat sites for shorebirds and the needs of rare and endangered species are deliberately accommodated in program design. A major component of the effort is to establish agreements with landowners to manage lands of marginal value to agriculture and their wetlands for waterfowl and other related species.

Canada and the United States

PACIFIC COAST JOINT VENTURE: The Pacific Coast Joint Venture encompasses coastal areas from northern California to northern British Columbia and is the first truly international habitat joint venture. From the waterfowl perspective, this area consists of "islands" of quality habitat, including estuaries, freshwater wetlands, and agricultural land on floodplains, in a largely inhospitable zone of rugged terrain and rocky shores. Habitats in this joint venture support tremendous numbers of migrating and wintering birds.

Coastal habitats are used by a wide variety of other non-waterfowl species including shorebirds, bald eagles, deer, elk, grizzly and black bears, killer whales, northern and California sea lions, and harbor seals. In addition, these areas support thriving commercial, native, and recreational fisheries and many other outdoor activities.

The primary threats to Pacific coast waterfowl habitats are human settlements, development, and increasing demand to develop estuarine areas. Goals and objectives of the Pacific Coast Joint Venture are based on securing, restoring, and enhancing wetland habitat, as well as influencing policy, modifying development trends, and providing public information and incentives to retain wetlands.

United States

ATLANTIC COAST JOINT VENTURE: The Atlantic Coast Joint Venture extends from Maine to South Carolina and provides breeding, migration, and wintering habitat for virtually all species of waterfowl, spawning areas for fish, and critical habitat for many endangered and threatened species. Throughout the region, the coastal and intercoastal wetland and nesting areas are threatened by industrial development, urbanization, and water pollution. Priority objectives are providing black duck wintering habitat as well as maintaining habitat for endangered and threatened species such as the bald eagle, piping plover, and several species of sea turtles.

Efforts focus on the acquisition of wetland habitat in New Jersey, Virginia, Maine, and South Carolina. The carrying capacity for wintering black ducks will be increased by 25 percent on 382,000 acres (154,000 hectares) of existing wildlife refuges and management areas. Private and public lands in 13 coastal states will be protected and enhanced with emphasis on salt marshes, riverine and inland wetlands, and associated uplands on the coastal plain.

CENTRAL VALLEY HABITAT JOINT VENTURE: This area provides wintering habitat for 60 percent of the waterfowl in the Pacific Flyway. It is comprised of California's San Joaquin and Sacramento valleys and includes the primary wintering area for cackling Canada geese, the threatened Aleutian Canada goose, and a number of other endangered species. Almost 4 million acres (1.6 million hectares) (95 percent) of wetlands in the Central Valley have been lost to drainage and conversion to agricultural land. Only about 300,000 acres (121,500 hectares) remain to support and maintain waterfowl and other wildlife species.

Efforts focus on protecting and enhancing remaining wetlands, restoring or creating additional wetlands, enhancing private agricultural lands, and securing dependable water supplies for wetland areas.

GULF COAST JOINT VENTURE: The Gulf Coast Joint Venture spans the Gulf states from Alabama to Texas and is one of the most important wintering and migration habitats on the continent, supporting nearly one-quarter of all dabbling ducks, 57 percent of diving ducks, and more than one million geese. It is also a haven to a host of other wildlife species, some of which are endangered. More than half of all avian species found in the United States frequent the Gulf Coast. The area is especially important to wading birds, shorebirds, rails, alligators, mammals, fish, and shellfish.

The joint venture's diverse wetland habitat is threatened by both natural and human-induced activities. Navigation canals, industrial development, reservoirs, levee systems, and other land-use changes coupled with natural deterioration of barrier islands, losses of marshlands through storms, saltwater intrusion, and rising sea levels are gradually eroding coastal habitats. Habitat efforts will focus on protecting and restoring wetlands on private and public lands to benefit all the fish and wildlife species that depend on coastal wetland ecosystems.

LOWER GREAT LAKES/ST. LAWRENCE BASIN JOINT VENTURE: The wetlands surrounding the Great Lakes and along the St. Lawrence River provide breeding and migration habitat for various species of migratory birds, especially the black duck. This area also supports an abundance and diversity of wildlife and serves as spawning grounds for sport and commercial fish. Nearly 20,000 acres (8,100 hectares) of wetlands are lost or degraded annually due to agricultural expansion, urbanization, and waterfront development. The joint venture focus is on acquiring high-priority wetlands, conserving and restoring wetlands on private lands, and improving habitat through management of public lands.

LOWER MISSISSIPPI VALLEY JOINT VENTURE: The 22-million-acre Lower Mississippi Valley spans 10 states and provides wetland habitat for mid-continent waterfowl, especially mallards, pintails, and wood ducks. Over 80 percent of the forested wetlands in this region have been drained and cleared for agriculture and urban development. Habitat loss continues and is aggravated by federally supported flood control and drainage activities.

The joint venture habitat objectives are to protect existing wetlands; restore bottomland hardwood forests and emergent wetlands; and enhance agricultural lands for waterfowl, songbirds, shorebirds, mammals, and many threatened and endangered species including the bald eagle, wood stork, and Louisiana black bear. Integrating wildlife management into sustainable agriculture is a priority.

PLAYA LAKES JOINT VENTURE: Covering portions of Texas, New Mexico, Colorado, Kansas, and Oklahoma, the Playa Lakes region includes more than 25,000 permanent and seasonal shallow lakes or playas ranging in size from 10 to 100 acres (4 to 40 hectares). These playas support migrating, wintering, and breeding waterfowl; shorebirds; and many other wetland species.

Most playas are privately owned. Some are pumped dry for irrigation and others are used as dump sites for waste from towns, oil fields, and feed lots. Their value to waterfowl is greatly diminished in many instances.

PRAIRIE POTHOLE JOINT VENTURE: This joint venture encompasses parts of Montana, North and South Dakota, Minnesota, and Iowa. It supports more than 200 species of migratory birds and is the primary breeding habitat for ducks in the United States. The major threat to this area is the loss of nesting habitat resulting from drainage and conversion of adjacent grassland to agricultural crops. These changes have resulted in a high loss of nesting hens and eggs to predators.

Habitat objectives are focused on nesting and migration habitat for waterfowl and shorebirds and protecting habitats for various endangered species such as the peregrine falcon, piping plover, and whooping crane. The most important aspect of this joint venture is the protection, restoration, and enhancement of prairie wetland ecosystems on private lands through habitat management agreements, technical assistance programs, partnership habitat projects, and conservation easements. In addition, the joint venture focuses on more intensive management of habitats on public lands and on land acquisition. One goal is to achieve a recruitment rate of 0.6 young per adult for upland-nesting ducks by 1995. Short- and long-term education programs are being used to foster favorable land-use changes.

RAINWATER BASIN JOINT VENTURE: The Rainwater Basin covers 4,200 square miles within 17 counties of south-central Nebraska. The area is internationally recognized as a focal point for spring migrations of millions of ducks, geese, shorebirds, and other species. The basin provides critical migrating habitat for whooping cranes and breeding habitat for blue-winged teal and mallards. The joint venture's strategy is to restore, enhance, and maintain habitat in the basins.

UPPER MISSISSIPPI RIVER/GREAT LAKES REGION JOINT VENTURE: Parts of seven states make up this joint venture. The objective is to increase populations of waterfowl and other migratory birds in the region. Strategies include protecting, restoring, and creating wetlands and associated habitats; influencing policy decisions; and providing information and public education assistance. Habitat work is being concentrated in priority watersheds in cooperation with joint venture partners.

POTENTIAL FUTURE JOINT VENTURES: During the next 5 years, several additional joint ventures are expected to be organized in some of the remaining areas of major concern. Organizational planning meetings have begun and a joint venture coordinator has been designated for the Intermountain West Joint Venture (Area of Major Concern 30). Wetland problems include losses from drainage and diversion, inadequate water rights, contaminants, management of livestock grazing, exotic species, and disturbance from recreation and disease. Draft goals include restoring and/or maintaining migratory bird populations throughout the intermountain region, providing permanent protection for at least 50 percent of the wetland habitat within the joint venture, and restoring and enhancing drained or degraded wetlands throughout the joint venture. The objective of the joint venture is to enhance habitat for migratory birds through cooperative efforts among public and private landowners and the joint venture partners. These projects are designed to reduce degradation and improve ecological functions of playas in the region. Enhanced habitat will provide secure wintering areas, improve distribution of wintering waterfowl, reduce the severity of diseases, and improve duckling survival.Organizational efforts have also been initiated for the Northern Great Plains (Area of Major Concern 31), San Francisco Bay (Area of Major Concern 27), and Klamath Basin (Area of Major Concern 28).

Mexico

The following table summarizes the number of acres affected by wetlands conservation projects in Mexico:

Year	Number of Projects	Location of Wetlands	Areas Benefitted (acres)
1989	12	Ría Lagartos, Yucatan	115,000
		Pantanos de Centla, Tabasco	724,000
		Complejo Lagunar de Alvarado, Veracruz	600,000
		Laguna de Términos, Campeche	720,000
			total 2,160,000
1990	4	Laguna Madre, Tamaulipas	480,000
		La Encrucijada, Chiapas	192,000
		Delta del Río Colorado, Baja California, Sonora	720,000
		Zonas Húmedas de Sian Ka'an, Quintana Roo	1,080,000
			total 2,472,000
1991	1	Humedales de la Costa de Sinaloa	648,000
			total 648,000
1992	1	Ría Lagartos, Yucatan	115,000
		Ría Celestun, Yucatan	144,000
			total 259,000
1993	7	Laguna Madre, Tamaulipas	480,000
		Chuburná Yucatan	120,000
		Humedales Costeros del Sur de Sonora	960,000
		Ría Lagartos, Yucatan	115,000
		Ría Celestun, Yucatan	144,000
			total 1,819,000

Mexico has identified 32 priority wetlands of national importance (Figure 1). These areas are analogous to the areas of major concern for waterfowl that have been identified in Canada and the United States and are likely to form the basis for joint ventures in the future.

In Mexico, the general objective of participation in the Plan is to conserve, maintain, and increase the wild flora and fauna that occur in wetland ecosystems, giving special emphasis to the waterfowl species in conjunction with the conservation of such habitats. Mexico will establish habitat conservation programs for priority wetlands for species at risk, endemic species, and migratory species. Of the waterfowl species identified in the Plan, 22 species of ducks and 4 species of geese occur in Mexico.

Species Joint Ventures

In addition to the habitat joint ventures, two population joint ventures are operating to improve the database needed to manage several populations of Arctic geese and the black duck.

ARCTIC GOOSE JOINT VENTURE: The goal of this joint venture is to foster greater and more coordinated research and monitoring of Arctic and sub-Arctic nesting geese in an effort to enhance the management of these populations from a breeding-ground perspective. This includes developing a better understanding of population sizes and distribution, production, harvest, habitat interactions, and survival rates. The joint venture has identified the most important information needs, established working relationships with other agencies to fund and participate in priority projects, and continues to provide a focus for contacts and cooperators. A total of 40 high-priority research projects have been identified for 16 target populations since 1990.

BLACK DUCK JOINT VENTURE: The goal of the Black Duck Joint Venture is to implement a cooperative international program of population monitoring and research to improve the management of black ducks. As summarized in the joint venture's strategic plan, the primary objectives are to: 1) provide statistically reliable indices of waterfowl population trends throughout the primary breeding range of black ducks, 2) determine the distribution of the harvest of black ducks and measure harvest and survival rates, and 3) determine, through research, the important factors influencing population status and dynamics of black ducks.

Systematic surveys have been developed through joint venture partnerships throughout the breeding range of the black duck to develop statistically reliable indices of populations in eastern North America. The level of preseason banding of black ducks is not representative of breeding populations, thus complicating attempts to estimate regional survival rates. The Black Duck Joint Venture will continue to rely on existing banding stations and will phase in additional banding sites as funding becomes available.

The role of the research program is to prioritize and fund studies to investigate the extent to which production, mortality, habitat change, and hybridization with mallards have affected the status of black duck populations. Approximately 10 priority studies have been funded each year since 1990.

APPENDIX D

English and Scientific Names of Waterfowl

A.O.U.Number	Tribe	English Name	Scientific Name
132.	Anatini	Mallard	Anas platyrhynchos
133.		American Black Duck	Anas rubripes
133.1		Mexican Duck	Anas diazi[1]
134.		Mottled Duck	Anas fulvigula
135.		Gadwall	Anas strepera
137.		American Wigeon	Anas americana
139.		Green-winged Teal	Anas crecca
140.		Blue-winged Teal	Anas discors
141.		Cinnamon Teal	Anas cyanoptera
142.		Northern Shoveler	Anas clypeata
143.		Northern Pintail	Anas acuta
144.	Cairinini	Wood Duck	Aix sponsa
146.	Aythyini	Redhead	Aythya americana
147.		Canvasback	Aythya valisineria
148.		Greater Scaup	Aythya marila
149.		Lesser Scaup	Aythya affinis
150.		Ring-necked Duck	Aythya collaris
129.	Mergini	Common Merganser	Mergus merganser
130.		Red-breasted Merganser	Mergus serrator
131.		Hooded Merganser	Lophodytes cucullatus
151.		Common Goldeneye	Bucephala clangula
152.		Barrows Goldeneye	Bucephala islandica
153.		Bufflehead	Bucephala albeola
154.		Oldsquaw	Clangula hyemalis
155.		Harlequin Duck	Histrionicus histrionicus
157.		Steller's Eider	Polysticta stelleri
158.		Spectacled Eider	Somateria fischeri
159.		Common Eider	Somateria mollissima
162.		King Eider	Somateria spectabilis
163.		Black Scoter	Melanitta nigra
165.		White-winged Scoter	Melanitta fusca
166.		Surf Scoter	Melanitta perspicillata
167.	Oxyurini	Ruddy Duck	Oxyura jamaicensis
177.	Dendrocygnini	Black-bellied Whistling duck	Dendrocygna autumnalis
178.		Fulvous Whistling duck	Dendrocygna bicolor
169.	Anserini	Snow Goose	Anser caerulescens
170.		Ross' Goose	Anser rossii
171.		White-fronted Goose	Anser albifrons
172.		Canada Goose	Branta canadensis
173.		Brant	Branta bernicla
175.		Barnacle Goose	Branta leucopsis
176.		Emperor Goose	Anser canagicus
178.2		Mute Swan	Cygnus olor
180.		Tundra Swan	Cygnus columbianus
181.		Trumpeter Swan	Cygnus buccinator

[1] *No longer considered a separate species from the mallard*