United States
Department of the Interior

Fish and Wildlife Service

Environment Canada

Canadian Wildlife Service

Environnement Canada

Service canadien de la faune

NORTH AMERICAN WATERFOWL MANAGEMENT PLAN

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A Strategy for Cooperation

May 1986

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Preface

In planning for the future of waterfowl, we must reflect upon the past, consider the present, and recognize and appreciate the tremendous efforts that have been made since the turn of the century on behalf of ducks, geese and swans by thousands of individuals, numerous private conservation organizations, and the state, provincial, territorial and federal governments of Canada, the United States and Mexico. Because of the dedication and spirit of these many people who have worked long and hard, millions of acres of wetlands have been saved from destruction, a large chain of waterfowl refuges spanning the flyways has been established, treaties and laws protecting waterfowl have been enacted and rigidly enforced, thousands of research projects have been undertaken, disease outbreaks have been fought, and millions of dollars have been expended to preserve and manage waterfowl habitat across the continent.

Despite these accomplishments, however, major waterfowl conservation problems have surfaced in recent years that should be addressed promptly. For example, losses of breeding, migration and wintering habitat have resulted in alarming declines in some waterfowl species. To cope with this, current programs are in critical need of expansion, and new initiatives should be devised and carried out.

This Plan presents what wildlife managers in the two countries believe to be appropriate waterfowl population goals to meet public demand, and actions needed to achieve those goals. It has been reviewed by public and private conservation organizations, and the general public; and many of their comments have been incorporated in the text. It provides information for those who enjoy and value waterfowl, and describes the actions and the size of the task necessary to achieve the goals.

The total cost of achieving the goals stated here is clearly too great to be borne by the national governments of the two signatory countries alone. It must be understood that this Plan is not a commitment by either signatory government to expend funds beyond its borders or to bear the total cost or responsibility for its execution; rather, it is a challenge to all those who enjoy and benefit from waterfowl to contribute their share toward its attainment.

Minister of the Environment
Canada

Secretary of the Interior
United States

Introduction

Waterfowl are the most prominent and economically important group of migratory birds in North America. They are highly prized as gamebirds by millions of hunters in Canada, the United States and Mexico, and attract the attention of even larger numbers of people who enjoy observing them. Waterfowl generate a direct expenditure in excess of several billions of dollars annually.

North America is blessed with an abundance and diversity of wetland ecosystems. Wetland complexes and associated uplands are an integral part of the landscape and provide immeasurable ecological, social and economic benefits.

Wetland basins collect and store runoff, thus replenishing aquifers and ground-water supplies needed to sustain natural vegetation, crops and wildlife. Wetlands play a role in purification of water supplies, prevent soil erosion, and moderate regional impacts of drought and flooding. The wetlands of North America provide habitat for 37 species of waterfowl which together constitute an important component of the continent's natural heritage.

Although most of this plan concentrates on particular problems of concern to man, it also recognizes the importance of waterfowl as indicators of a healthy environment. In the face of major alterations to the landscape by man, the continued maintenance and restoration of wetlands will be necessary to provide suitable habitat for waterfowl and many other wildlife species.

The *Convention for the Protection of Migratory Birds* was established between 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 in accordance with changing needs and perceptions. Migratory birds in North America have benefited from protection and other conservation measures afforded under this treaty and subsequent treaties with Mexico (1936) and other countries. For example, wood ducks have been brought back from precariously low numbers in former years to abundance today. Greater snow geese have recovered to high population levels. Sanctuary and refuge systems developed throughout North America have contributed to a sustained recovery of most continental goose populations.

Despite these accomplishments, significant changes have occurred on the North American waterfowl scene. Large-scale alterations of the wetland and grassland habitat base by agriculture, urbanization and industrial activities have affected the distribution and abundance of several species, resulting in new opportunities and problems. Although some goose populations have benefited from agricultural land use and protection afforded by expanding urban environments, most duck populations have not. Loss of nesting cover, wetland drainage, and degradation of migration and wintering habitat have contributed to long-term downward trends in some important duck populations.

Reversing or modifying activities that destroy or degrade waterfowl habitat is imperative to the future success of waterfowl management. Efforts to resolve problems facing waterfowl have evolved from a focus on limiting the harvest to a need for creative action if current benefits from this resource are expected to continue. All other efforts will be in vain if the ongoing trend of habitat loss and degradation is not reversed.

Although the conservation of habitat is the pressing imperative if waterfowl are to be maintained, other factors should also be addressed. Harvest management is clearly important and 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. The widespread use of toxic chemicals can cause significant impacts, and the use of lead shot continues to be a concern in some areas. Environmental pollution can affect waterfowl, whether it be through broad-scale degradation of habitats or through direct impact on birds such as may follow spills of oil or other chemicals. Predation and disease are important factors in population management.

The Minister of Environment for Canada and the Secretary of the Interior for the United States recognize that the conservation of North American waterfowl should be pursued through cooperative planning and coordinated management. This document provides the framework for a waterfowl conservation and management effort by describing population and habitat goals and suggesting recommendations that will resolve problems of international concern. It is a broad approach utilizing a 15-year horizon, with review and updating at 5-year intervals. This phase of the Plan extends to the year 2000, with the first review in 1990. It is anticipated that the Plan may be implemented through national, flyway, provincial, territorial and state plans, which will set out the specific management details for pursuing waterfowl conservation in both countries.

Nothing in this Plan is intended to change either the fiscal or regulatory processes used in each country to establish funding availability or rules governing the harvest of waterfowl. Rather, the Plan serves to identify desirable goals and some general recommendations that should be considered in developing additional governmental and nongovernmental measures aimed at the protection of North American waterfowl. As these recommendations are developed, analyzed, and considered, further possibilities will doubtless become apparent. This Plan is not meant to preclude assessment or adoption of those possibilities, or to preclude either country's discretion in evaluating the full range of potential actions which may become available in the future.

This Plan will serve as a guide for the participation of various private organizations and the public in the conservation and management of waterfowl. Active involvement by the public — whether hunters, naturalists, landowners or subsistence users — is essential if waterfowl management is to be effective.

For the purposes of this document, "waterfowl" refers to the 37 species of the family Anatidae — ducks, geese and swans — that regularly occur in both the United States and Canada. Nine other species are not mutually shared by the two countries but will be dealt with in national and local management plans. Although other wildlife species are not addressed in this Plan, many are associated with water and wetlands and must be considered in developing operational plans for habitat preservation. This Plan focuses on the value of maintaining an adequate habitat base to ensure perpetuation of North American waterfowl populations.

Principles

1. Protection of waterfowl and their habitats requires long-term planning and the close cooperation and coordination of management activities by Canada, Mexico and the United States, within the framework of the 1916 and 1936 Migratory Bird Conventions.

2. In waterfowl management decisions and actions, first priority should be to perpetuate waterfowl populations and their supporting habitats. Management actions should be at intensities required to prevent the individual waterfowl populations from decreasing to low levels and to encourage optimum use of all available habitat.

3. The maintenance of abundant waterfowl populations is dependent on the protection, restoration and management of habitat. The persistent loss of important waterfowl habitat should be reversed.

4. Waterfowl populations should be managed by identifiable subpopulations where these can be biologically justified and for which management regimes are feasible.

5. Joint ventures of private and governmental organizations should be considered as an approach to financing high-priority research and management projects of international concern that can only be addressed through a pooling of resources.

6. The managed subsistence and recreational harvests of the renewable waterfowl resource are desirable and consistent with its conservation.

7. Recreational hunting will continue to be managed under existing regulatory processes in Canada and the United States. These processes will be subject to continuous review to ensure they are compatible and consistent with waterfowl population needs on a continental basis, and to evaluate their environmental impacts and to ensure public participation.

8. The concept of stabilizing hunting regulations — with review at five-year intervals and provisions for predetermined responses to substantive waterfowl population fluctuations — is desirable to encourage long-term waterfowl management efforts.

Ducks

This Plan discusses 29 species of ducks (Table 1) that depend on both Canada and the United States to complete portions of their life cycle. Seven other species breed only in the United States or are shared between the United States and countries other than Canada. These species which occur solely within one country are considered resident and will be dealt with in local management plans.

The status of ducks in North America is presented in Table 1. The continental population estimates are the average of 1970-1979 information from strata 1-50 (Figure 1) – the states of Wisconsin, Minnesota, Nebraska, Colorado, Wyoming and California – as well as estimates based on other surveys including harvest, parts collection and bandings. These estimates indicate a breeding duck population of about 62 million, which produced an average fall flight in excess of 100 million during the 1970-1979 time period. This number of breeding ducks and fall flight provides the benchmark on which total duck goals for North America are based.

For purposes of this Plan, North American ducks are divided into three groups based on similarities in ecological requirements – dabbling ducks, diving ducks and sea ducks.

Dabbling Ducks

Dabbling ducks are the most abundant and widespread group of ducks breeding in North America and are of greatest importance to sport hunting and viewing. Ten species are considered in this category – mallard, black duck, wigeon, pintail, gadwall, green-winged teal, blue-winged teal, cinnamon teal, shoveler and wood duck (not a dabbler).

Highest densities of breeding dabblers are found in the central part of the continent from the Dakotas and eastern Montana in the United States, ranging north through the prairie provinces and territories of Canada into Alaska. The "surveyed area," as referred to in this report, is monitored annually to determine the size of the breeding population. Monitoring includes aerial survey information from strata 1-50 (Figure 1) and data provided by the six cooperating states as presented in the annual "Status of Waterfowl and Fall Flight Forecast." These data offer the most reliable index to the abundance of the major species of this group, and provide the primary basis for decisions on waterfowl harvest regulations (Table 2). Early nesting species, such as mallards and pintails, currently are at the lowest levels since the survey began in 1955. Intensive agricultural land use on the major breeding grounds, combined with drought which began in 1980 and has continued through 1985, has curtailed duck reproductive success.

Mallard, pintail, and blue-winged teal breeding populations in the surveyed area have significantly decreased as of 1985 from averages of the 1970s. This includes decreases in mallards from 8.7 million to 5.5 million, pintails from 6.3 million to 2.9 million, and blue-winged teal from 5.3 million to 3.8 million. Continuing habitat degradation and loss since the early 1960's have diminished the likelihood of these populations recovering to former abundance without innovative and intensive management on private and public lands, greater efforts to preserve existing habitat, and changes in land use and agricultural practices on private lands.

Mallards breeding in eastern North America have dramatically increased over the past 25 years. They are now one of the most abundant breeding dabbling ducks in southern Ontario, southwestern Quebec and several northeastern states. Mallards, black ducks and their hybrids form a complex of large dabbling duck populations in eastern North America of greatest importance to sport harvest in the Atlantic Flyway. Wood ducks are also an important component of the dabbling duck harvest in eastern North America. Populations of this species are in good condition, but there is concern about the loss of wood duck breeding and wintering habitat.

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 has ranged from 750,000 in 1955 to lows of less than 300,000 in 1983 and 1984. However, the breeding population of black ducks in Atlantic provinces of Canada appears to be stable.

Black duck problems in the western and central portions of the species' range may be related to the conversion of natural breeding habitat to farmland, and to habitat loss and degradation caused by human activity in migration areas. Competition and hybridization with pioneering mallards may have also contributed to the black duck decline. Deterioration of wintering habitat along the east coast of Canada and the United States has occurred. The relative importance of these factors and the role of hunting mortality need to be clarified in the population decline.

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

Species	Surveyed Areas[b] U.S.	Canada	Total	Unsurveyed Areas	Continental Estimate
Dabbling ducks					
Mallard	2,066	6,675	8,741	1,926	10,667
Pintail	2,332	3,927	6,259	745	7,004
Black duck		88	88	1,340	1,428
Gadwall	512	1,102	1,614	380	1,994
Wigeon	956	2,315	3,271	216	3,487
Green-winged teal	482	1,889	2,371	740	3,111
Blue-winged and cinnamon teal	1,719	3,571	5,290	856	6,146
Shoveler	654	1,415	2,069	100	2,169
Wood duck				3,230	3,230
Diving ducks					
Redhead	221	539	760	120	880
Canvasback	119	459	578	64	642
Lesser and greater scaup	1,333	6,243	7,576	322	7,898
Ring-necked duck	16	533	549	419	968
Ruddy duck	216	316	532	120	652
Sea ducks					
Hooded, red-breasted and common merganser	9	578	587	915	1,502
Bufflehead	82	805	887	195	1,082
Common and Barrow's goldeneye	126	603	729	740	1,469
Harlequin				165	165
Oldsquaw	600	828	1,428	1,275	2,703
King and common eider	22	1	23	2,443	2,466
Black, white-winged and surf scoter	346	1,065	1,411	579	1,990
Total	11,811	32,952	44,763	16,890	61,653

[a] In thousands of ducks.

[b] Includes data from Strata 1-50 and the six states that contribute information to the annual "Status of Waterfowl and Fall Flight Forecast."

Figure 1. Transects and strata for principal areas of waterfowl breeding population and production surveys which provide data for the annual report, "Status of Waterfowl and Fall Flight Forecast." Other areas included in the report are California, Colorado, Minnesota, Nebraska, Wisconsin and Wyoming.

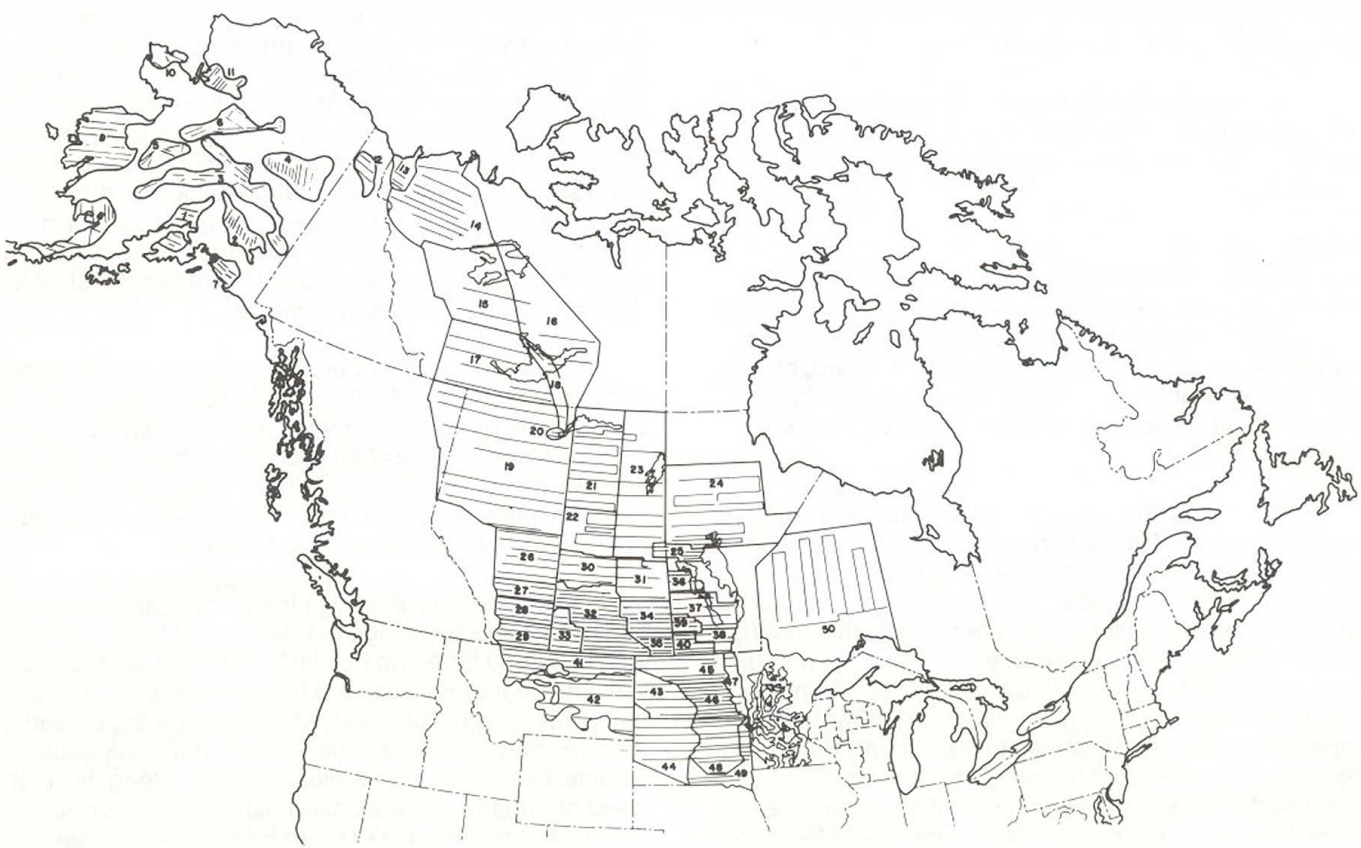


Table 2. Breeding duck population status, trends and goals for the 10 most common species in the surveyed area [a, b]

Species	Status (1985) United States	Canada	Total	Population Trend (1970-1985)[c]	Goals (year 2000)[d]
Mallard	1,597	3,878	5,475	Decreasing	8,700
Pintail	1,339	1,596	2,935	Decreasing	6,300
Gadwall	464	946	1,410	No change	1,600
Wigeon	969	1,537	2,506	No change	3,300
Green-winged teal	433	1,440	1,873	No change	2,300
Blue-winged and cinnamon teal	1,190	2,566	3,756	Decreasing	5,300
Shoveler	769	1,156	1,925	No change	2,100
Redhead	167	539	706	No change	760
Canvasback	126	285	411	No change	580
Scaup	1,339	4,893	6,232	No change	7,600

[a] In thousands of ducks.
[b] The surveyed area includes Strata 1-50 and data from the six states that contribute information to the annual "Status of Waterfowl and Fall Flight Forecast."
[c] Status of several species declined significantly in 1985 from previous trends.
[d] The average of 1970-1979 for Strata 1-50 plus six cooperating states.

Diving Ducks

This group includes the canvasback, redhead, ringneck, greater scaup, lesser scaup and ruddy duck. 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 Arctic. Diving ducks tend to use the deeper inland marshes, rivers and lakes of the continent for breeding and migration and winter in coastal bays, estuaries and offshore waters.

With the exception of the lesser scaup, diving ducks are not as abundant as dabblers, although most are of major importance to viewing and recreational harvest. Lesser scaup and ringnecks are most frequently harvested. Redheads and canvasbacks continue to be of special interest because of their status. Annual results from the surveyed area from 1970-84 reveal that redhead and canvasback numbers were fairly stable. However, recent information on canvasbacks indicate that breeding populations are below objectives and may need special attention. The status of the greater scaup is uncertain, because it is difficult to distinguish this species from the much more abundant lesser scaup.

Sea Ducks

Sea ducks comprise the most diverse group of waterfowl species. Most breed in northern tundra or boreal forest habitats and winter in coastal bays and estuaries in the northern half of the continent. Breeding and wintering habitats of sea ducks are stable and have been least affected by activities of man. These ducks are not abundant relative to dabblers.

There are a number of sea duck subgroups, which vary in importance to sport and subsistence harvests. All are of interest to viewers because of their relative scarcity and because of the elaborate plumages of some males.

Adults, eggs and nest down of king and common eiders are of major importance to subsistence hunters on the species' breeding grounds. There is a significant harvest of eiders off Newfoundland and a small harvest of these birds occurs elsewhere. Better population estimates of common eiders are needed, as is a careful assessment of the impact of harvest on the population.

Comparatively little is known about the North American breeding distribution and basic biology of scoters. Black, surf and white-winged scoters are of some importance to sport and subsistence harvests.

Common and Barrow's goldeneye and the bufflehead are the most heavily hunted species of sea ducks. The sport harvest of common goldeneye has decreased in eastern Canada. Not enough is known about the small eastern population of Barrow's goldeneye to establish its status reliably.

Common and red-breasted mergansers are widespread but not important gamebirds. The smaller and much-less-abundant hooded merganser is a significant part of the bag in local areas.

The harlequin duck is locally abundant in its northwestern range, spectacular for viewing but seldom observed by most North Americans. It is not often harvested. The eastern population of harlequins is very small.

Circumpolar in distribution, the oldsquaw is by far the most abundant sea duck. Oldsquaws are lightly harvested for sport and subsistence.

Use

The duck resource is enjoyed by a great number of people in Canada, the United States and Mexico. Public interest in perpetuating this resource is widespread and includes such diverse goups as hunters, naturalists and other conservationists. Many wetland areas on the continent have been restored and maintained with funds received directly or indirectly from hunters. Active waterfowl hunters in both countries have been as numerous as 2.4 million in 1970 and as low as 1.8 million in 1982, with approximately 20 percent in Canada and 80 percent in the United States. Hunter information is not available for Mexico. Numbers of duck hunters tend to fluctuate with the extent of hunting opportunities. Annual harvests 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 14.9 million in 1982. Distribution of harvest has been 80 percent United States and 20 percent Canada. Estimates of the duck harvest in Mexico are not available.

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.

Millions of people derive enjoyment and recreation through viewing, studying and photographing ducks. These people also have a high interest in maintaining the numbers and health of waterfowl populations.

Goals

The goals in this Plan should be sufficient to maintain populations of ducks of various species and their habitats at levels acceptable to people who use and enjoy them. Duck population goals are based on species numbers during the decade of the 1970's. During this period, duck production varied from excellent (1970-1972) to average (1973-1979). These goals are not meant to limit the concerns of the sponsors for migratory waterfowl, but to propose a target, reasonable at this time, for which specific plans and proposals may be formulated. The goals are as follows:

1. Maintain the current diversity of duck species throughout North America and, by the year 2000, achieve a breeding population level of 62 million during years with average environmental conditions. This would provide a fall flight of over 100 million birds during average years.

2. Reach or exceed the Table 2 goals for breeding populations of the 10 most common species of ducks in the surveyed area. More specific recommendations are listed below for mallards, pintails and black ducks.

3. By the year 2000, achieve and maintain in the surveyed area a breeding population index level of 8.7 million mallards during years of average environmental conditions. Average distribution of breeding mallards in the surveyed area would be 75 percent Canada and 25 percent United States.

4. By the year 2000, achieve and maintain in the surveyed area a breeding population index level of 6.3 million pintails during years of average environmental conditions. Average distribution of breeding pintails in the surveyed areas would be 65 percent Canada and 35 percent United States.

5. The goal for black ducks is to attain, by the year 2000, a wintering population index of 385,000 birds in the Atlantic and Mississippi Flyways.

Meeting these goals would provide the opportunity for 2.2 million hunters in Canada and the United States to harvest 20 million ducks annually. The harvest would include 6.9 million mallards, 1.5 million pintails and 675,000 black ducks. It would also provide benefits to millions of people interested in waterfowl for purposes other than hunting. An overall objective of management agencies is to accommodate the diverse public interests in waterfowl and to assure that all citizens can benefit from abundant waterfowl populations.

Geese

Whitefronted, snow, Ross', Canada and brant are species commonly shared by the United States and Canada. They are comprised of 18 subspecies and races, which have been divided for management purposes into 27 continental populations (Table 3).

Canada geese are widely distributed across the continent, with nesting areas extending from central United States to the Arctic. Their wintering areas range from southern British Columbia through the central United States into Mexico. The four other species of geese nest exclusively in the Arctic. They winter along both coasts and in the southern part of the United States and Mexico. All geese are of major importance to sport harvest and viewing. The Arctic-nesting species are of importance to native subsistence hunters in spring and fall. Some populations of geese have benefited from agricultural practices and most respond well to management actions, such as harvest regulations, refuges and manipulation of food.

Status

In recent years, Canada geese have reached unprecedented high population levels, with the exception of three populations — the Aleutian, cackling and dusky. These three populations breed in Alaska, utilize coastal areas of British Columbia during migration and winter in the western United States.

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 more than 200,000. Wrangel Island lesser snow geese are shared among Canada, the United States and the Soviet Union. The population has decreased because of six years of consecutive breeding failures, but the population has stabilized and is showing signs of recovery. The Ross' goose population appears to be increasing in size and range.

Of the four whitefront populations in North America, only the Pacific population has decreased and is of concern. Pacific and Tule whitefronts breed in Alaska and winter in the western United States and Mexico. Although Canada is not involved to any great extent in harvest of these geese, because of a southward coastal migration, areas in British Columbia are important to these birds during spring migration. Interior whitefront populations, including the eastern midcontinent and western midcontinent, appear to be thriving.

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

Species and Population	Winter Population Index (1984-1985)	Recent Trend (1980-1984)	Winter Index Goals (Year 2000)
Canada Goose			
Atlantic Flyway	814,000	Increasing	850,000
Tennessee Valley	130,000	Stable	150,000
Mississippi Valley	477,000	Increasing	500,000
Eastern prairie	168,000	Stable	200,000
Western prairie	135,000	Increasing	200,000
Great Plains	17,000[b]	Increasing	50,000[c]
Tallgrass prairie	197,000	Increasing	250,000
Shortgrass Prairie	194,000	Stable	150,000
Hi-line	93,000	Stable	80,000
Rocky Mountain	90,000	Increasing	50,000
Pacific	25,000[b]	Increasing	29,000[c]
Lesser Pacific Flyway	150,000	Stable	125,000
Dusky	7,500	Decreasing	20,000
Cackling	23,000	Decreasing	250,000
Aleutian	3,800	Increasing	Delist[d]
Snow Goose			
Greater	250,000[e]	Increasing	185,000[c]
Midcontinent lesser	1,974,000[e]	Increasing	1,000,000[c]
Western Central Flyway	107,000	Increasing	110,000
Wrangel Island (U.S.S.R.)	No estimate	Stable	120,000[c]
Western Canadian Arctic lesser	185,000[b]	Stable	200,000[c]
Ross' Goose	106,000	Increasing	100,000[c]
White-fronted goose			
Eastern midcontinent	71,000	Increasing	65,000
Western midcontinent	201,000	Increasing	250,000
Tule	5,000	Stable	5,000
Pacific Flyway	100,000	Stable	300,000
Brant			
Atlantic	146,000	Increasing	124,000
Pacific	145,000	Increasing	185,000

[a] The emperor goose is found only in Alaska and will not be considered in this Plan. The Vancouver Canada goose population is also not considered.
[b] Breeding population information only available.
[c] Breeding population goals.
[d] Currently listed as an endangered species. Recovery plans specify maintaining a wild population at a level of 1,200 or greater and reestablishing self-sustaining populations of geese (50 breeding pairs per area) on three former breeding areas in addition to Buldir Island.
[e] Spring inventory.

Brant nest farthest north of all geese, so are particularly susceptible to adverse spring weather. Unlike other geese, brant feed almost exclusively in aquatic habitats in staging and wintering areas and are more vulnerable to changes in food supply caused by environmental degradation or natural phenomena. Vegetative changes caused by degradation of coastal estuaries in the eastern United States, coupled with severe winter weather in the 1970's, caused dramatic losses in the Atlantic brant population, which has since recovered.

Pacific brant from the western Canadian Arctic and Alaska have decreased but appear to be stabilizing. These birds have shifted from primary wintering areas in British Columbia, Washington, Oregon and California to Baja, California and the west mainland coast of Mexico.

Management

Subpopulations of geese can be identified that breed in the same areas, migrate along the same corridor and return to the same wintering area each year. This offers the possibility for managing each population separately on the basis of a plan that establishes goals for individual population size and harvest.

Goose management in Canada and the United States differs according to varying needs and constraints imposed by climate, geography, migration paths and user groups. Most geese originate from breeding areas in Canada, and there is little competition among territories and provinces for harvest of a particular population. Geese migrating or wintering in some portions of the United States must be apportioned through intensive flyway management plans, including harvest quotas, along a latitudinal gradient of states. This is currently accomplished through goose population management plans developed and implemented by the flyway councils and this procedure should be encouraged.

The United States and Canada share a responsibility to maintain and manage continental goose populations. Each country has different user groups and can best design national plans to address their individual needs. Goose population problems of major interest in this Plan are those which will require international cooperation to resolve. Five such populations are initially identified — the cackling, dusky and Aleutian Canada goose populations, plus the Pacific brant and whitefront populations. When additional populations warrant coordinated international management actions, they should be identified to the North American Waterfowl Management Plan Committee, as indicated in the section on "Administration." Once special management plans for each of these populations are approved, they will be appended to this Plan and become a part of it.

Use

The numbers of people who use geese in North America and the types of benefits they enjoy vary greatly. The sight and sound of migrating geese are valued experiences to many people — they can provide a brief moment of wilderness indulgence for the city dweller and represent

a welcomed harbinger of spring in temperate climates. Many people travel long distances to view and photograph the spectacle of geese on spring and fall staging areas.

Geese are highly valued quarry of recreational hunters. The annual goose harvest averages 2.3 million birds in North America, varying from 1.9 million in 1974-1975 to 2.5 million in 1980-1981. About 75 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. The spring arrival of geese and then their egg laying coincide with a period of protein deficit in native diets, so these foods traditionally have been used to meet this nutritional need. Geese also are captured and utilized during the molt and prior to fall departure.

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. Efforts are currently underway to amend the Migratory Bird Treaty to provide for the managed subsistence use of waterfowl.

Goals

Goals for specific populations of geese are listed in Table 3. Most populations are at or near those numerical levels, but there are several in the western part of the continent that are declining and require attention by both Canada and the United States. These are the cackling, dusky and Aleutian Canada goose populations and the Pacific whitefront and brant populations. The procedures for handling this situation are given in the "Recommendations" section.

There are numerous other goose populations that require attention. These should be handled by flyway plans.

Swans

Four species of swans are found in North America. Best known are the tundra (whistling) swan and the trumpeter swan, and both are native to the continent (Table 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.

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

Species and Population	Winter Population Index (1984-1985)	Recent Trend (1980-1985)	Winter Index Goal (Year 2000)
Tundra swans			
Eastern population	80,000	Increasing	80,000
Western population	59,000[b]	No change	60,000
Trumpeter swans			
Pacific coast	8,000	Increasing	10,000
Rocky Mountain	1,460	No change	2,000
Interior	500	No change	600

[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.

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 of Canada, and winter primarily in the Chesapeake Bay area and coastal North Carolina, where they cause some crop damage. There is limited exchange between the two populations. During migration, tundra swans stop over in most provinces and northern states.

Winter indices of WP and EP tundra swans in the United States averaged 59,000 and 80,000 swans, respectively, during 1982-1985. The EP has increased by an average of 2-3 percent annually since the late 1940's. The WP has been decreasing since 1982, but has shown a long-term upward trend since the late 1940's. As with any Arctic-nesting waterfowl, successful annual production of tundra swans depends on favorable weather conditions.

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

States according to guidelines in a plan that was developed cooperatively by the four flyway councils and the United States Fish and Wildlife Service.

Primary utilizations of the tundra swan are observation and subsistence harvest, although four states — Utah, Nevada, Montana and North Carolina — held a limited recreation hunting season during 1985 using tightly controlled harvest quotas. Collectively, the states issued about 11,000 permits to regulate the size of harvest and obtain reliable estimates of hunter activities and harvests. There are no open seasons for swans in Canada.

An annual subsistence harvest of 2,600-5,600 WP swans occurs in Alaska. A subsistence harvest of EP swans also occurs in Canada, but the size of the harvest is currently unknown.

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 continental United States. Other remnant flocks were known to occur in Alaska and Alberta. Fear of extinction of the trumpeter swan led to a substantial conservation effort, including law enforcement, public education and land acquisition. As a result, trumpeters in the wild and captivity currently number about 10,000, and are no longer considered in danger of extinction.

A North American Trumpeter Swan Management Plan is being developed cooperatively by states, provinces, the four flyway councils, the Canadian Wildlife Service and the United States Fish and Wildlife Service. The plan builds on individual population plans developed earlier and features proposed restoration efforts.

Goals

Maintain all populations of tundra swans at numerical levels listed in Table 4. Trumpeter swans are an international priority, and management plans should be developed to meet the year 2000 population levels listed in Table 4.

Habitat

The loss and degradation of habitat is the major waterfowl management problem in North America. 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 and the United States. Waterfowl habitats of major importance in the United States and Canada are shown in Figure 2.

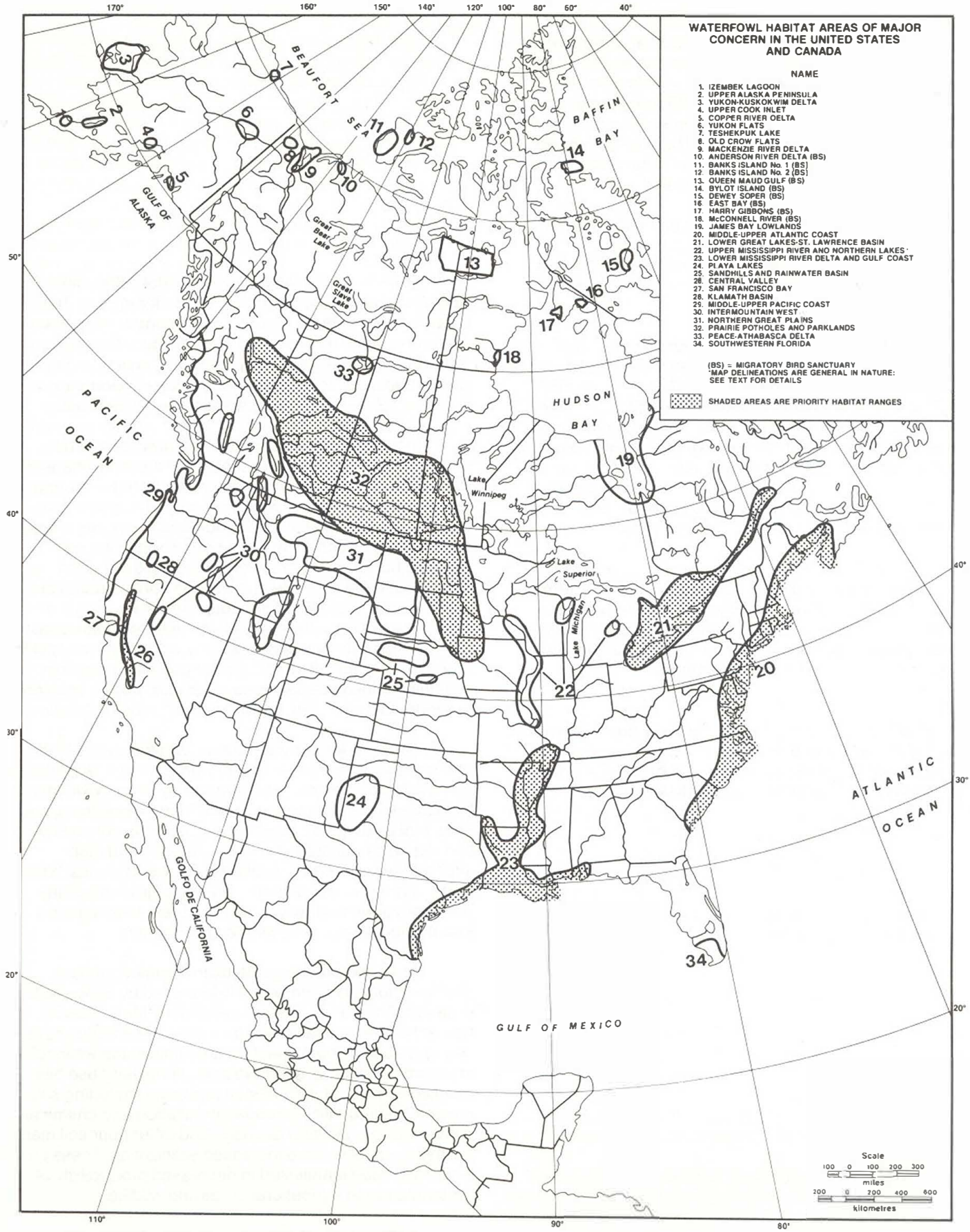
In the far north of Canada, waterfowl tend to be concentrated on a small percentage of the land where environmental conditions favor high productivity. For example, thousands of Arctic-nesting geese form dense colonies on small areas of suitable lowland habitat. To date, these continentally important 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, 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 the waterfowl resources and are in a position to secure this important waterfowl habitat for the future.

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

Waterfowl breeding habitat in the midcontinent prairie region has been severely impacted by agriculture, urbanization and industrial development. More than 50 percent of the original wetlands in the United States have been lost, and the same factors are diminishing wetlands in Canada (Figure 3). 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 which is vital to this semiarid region. Ponds replen-

Figure 2. Waterfowl habitat areas of major concern in Canada and the U.S., 1985



ish aquifers and contribute to the maintenance of groundwater needed to sustain native vegetation, farm crops and wildlife. Natural wetlands purify the water and prevent erosion and the 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, in much of the prairie pothole region, recruitment of young 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 communitites that have persisted mainly as pastures on otherwise intensively farmed land. Losses of grassland continue at the rate of 2 percent annually and, in the last decade, one-third of the remaining grassland was converted to cropland.

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 duck recruitment rates over vast areas could result in large gains in the fall duck flight. Many recommendations for improving soil conservation and range management would greatly benefit prairie-nesting ducks. Where maintaining valuable duck 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. Inititatives to maintain or increase the number of these species in agricultural areas of prairie Canada should also consider measures to reduce the economic impact of consequent 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 midcontinent 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 habitat and should be considered a key component and partner in future habitat development and enhancement strategies.

Public and private waterfowl habitat programs in prairie Canada have tended to focus on larger individual wetlands, providing not only protection but potential for intensive management. Although all wetlands are important, this approach should be continued and combined with the priorities outlined in this Plan to protect complexes of smaller wetlands and upland nesting cover. A high degree of coordination and cooperation by all agencies will be required to achieve the desired result.

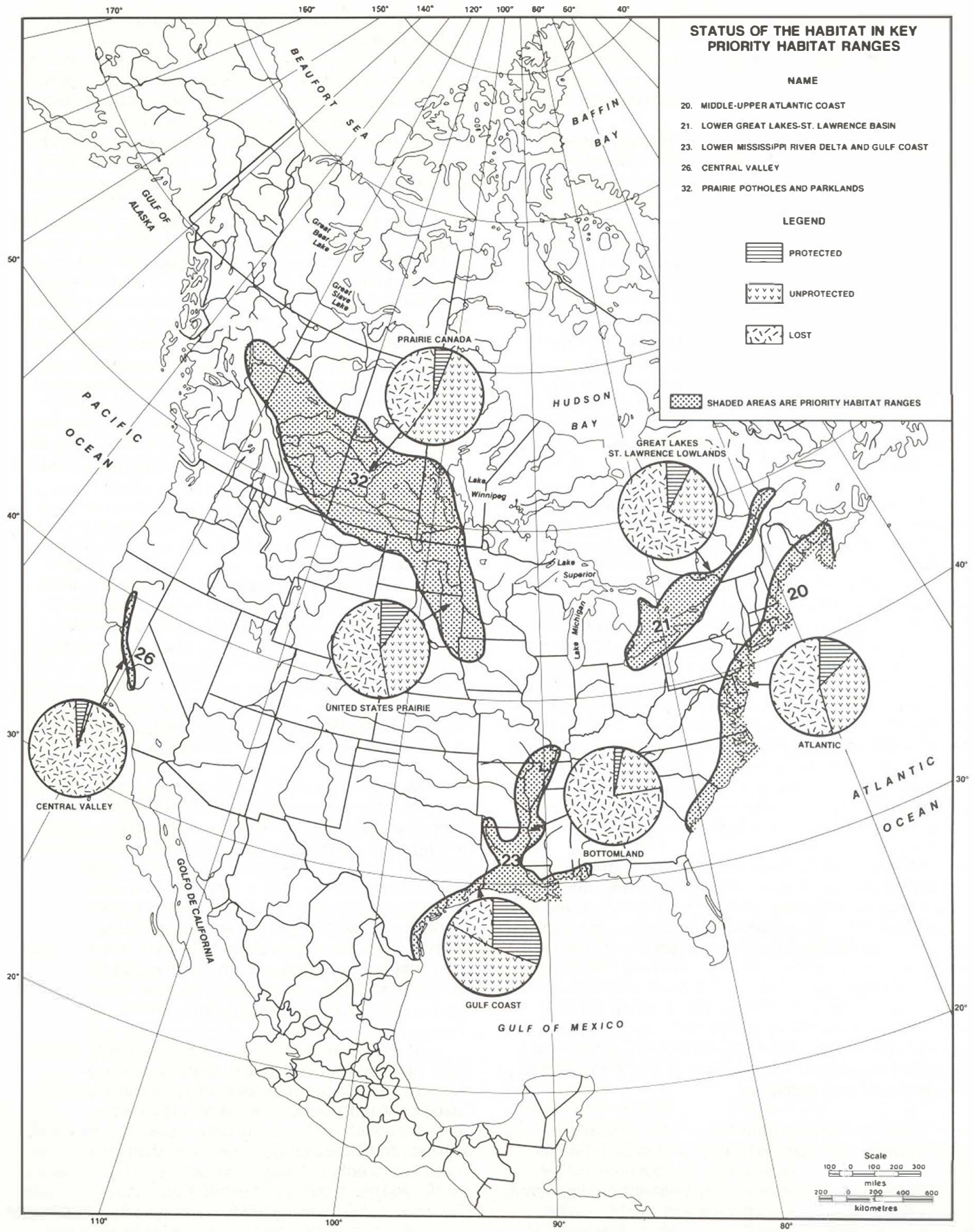
Habitat requirements for breeding waterfowl in eastern North America are complex but generally fall into two broad categories. Black ducks, wood ducks, goldeneye, green-winged teal and several other species appear to thrive in unaltered, natural environments along the Great Lakes-St. Lawrence lowlands, in the boreal forest, and in coastal lowlands and estuaries. These natural wetlands are being lost or degraded by agriculture, urbanization, industrial development and pollution, water control projects and certain forestry practices. The decline in black duck numbers and increased concern for the status of goldeneye and green-winged teal 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 their relatively more abundant nesting cover, eastern mallards currently are more than twice as successful at rearing young as are prairie-nesting mallards. However, wetlands in the eastern farmlands are also being drained and cultivated at an increasing rate. Unless steps are taken, eastern dabbling duck populations on the farmlands will eventually be subject to the same downward trends as their western counterparts.

Waterfowl tend to concentrate more during molting, migration and wintering than during the nesting season, so habitat loss or degradation or outbreaks of disease on critical concentration areas such as marshes, deltas or coastal bays and estuaries can have serious consequences for waterfowl populations. Habitat conditions along migration routes and in wintering areas may directly affect the survival of migratory bird populations and influence reproductive success the following spring. Many key areas of migration and wintering habitat have been lost to other land uses (Figure 3), 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. Discrete areas of critical importance should be acquired for long-term use by waterfowl. Acquired areas should be managed to improve habitat quality, minimize risk of disease and increase carrying capacity of overwintering sites. 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 ducks.

The major requirement for waterfowl conservation in North America is to influence land-use practice on extensive areas across the continent. This program cannot be based only upon fee acquisition of lands. It also must be generally beneficial or neutral with respect to agricultural activities and industrial land uses. The efforts required to maintain and enhance waterfowl habitat in North America are beyond the capability of public natural resource agencies alone. Long-term solutions will require the coordinated action of governments, private organizations, landowners and other citizens.

Figure 3. Status of waterfowl habitat in priority breeding and wintering areas of Canada and the United States



Habitat Priorities

The conservation of waterfowl habitat should be undertaken on a broad front by Canada and the United States to achieve the population goals in this Plan. Midcontinent mallard, pintail and black duck populations are designated as immediate international priorities. The top priority for protection is the prairie pothole breeding habitat for mallards and pintails in both Canada and the United States. Deterioration of habitat in this prairie area has been the principal cause of decline in abundance of these species. Special attention should also be given to their migration and wintering areas in the lower Mississippi River - Gulf Coast region, the Central Valley of California, and Mexico.

Priority should be placed on habitats essential for the black duck, including breeding, molting and migration areas within the Great Lakes - St. Lawrence lowlands and the migration and wintering habitats along the Atlantic coast of the United States and Canada.

Many other waterfowl habitat problems exist, affecting several other species. An example is wood duck breeding and wintering habitat in eastern North America. Canada and the United States should maintain national waterfowl habitat management plans in which national priorities should be addressed. Other urgent habitat problems should be ranked as high priorities in the national plans. In addition to the targeted species and populations, many nontarget waterfowl and wildlife species living in or otherwise using aquatic environments would benefit from the work proposed in these plans. Such specific plans should lay the groundwork for actual commitment of resources to habitat problems.

Goose population habitat requirements should be addressed in individual population management plans. Where appropriate, recommendations from these plans should be incorporated into the habitat objectives of this North American Waterfowl Management Plan at a later date. Goals and recommendations outlined for ducks will be of substantial benefit to many goose populations.

The two habitat areas of highest priority identified in this Plan cover extensive areas of the continent that vary greatly in geography, land use and political jurisdiction. Several potential methods of maintaining waterfowl habitats are available, ranging from acquisition and easements to various forms of subsidies, incentives or favorable tax adjustments for landowners. These approaches should be evaluated carefully, with prescribed methods selected to fit appropriately to the individual geographical and political circumstances. For these and other associated reasons, the North American Waterfowl Management Plan can only outline the scope of work to be done on a continental basis and provide broad guidelines for habitat protection and management actions. Implementing this Plan depends on responsible expertise existing in each country, province, state and region to formulate reasonable action plans for habitat preservation and management within their respective jurisdictions.

Goals

The overall aim of this continental habitat program is to maintain and manage an appropriate distribution and diversity of high quality waterfowl habitat in North America that will (1) maintain current distributions of waterfowl populations, and (2) under average environmental conditions, sustain an abundance of waterfowl consistent with goals listed in Tables 2, 3 and 4. In broad terms, this Plan should help ensure habitat for 62 million breeding ducks on the continent and a fall flight of more than 100 million birds. Habitat also will be necessary to support more than 6 million overwintering geese.

The goals for maintenance, restoration and rehabilitation of duck habitat in the midcontinent prairie production area are based on the amount of habitat present during 1970-1979. Habitat maintenance in eastern North America should focus on protecting breeding and migration habitat for black ducks and mallards, and wintering habitat for black ducks.

The proposed time period for meeting these goals spans a 15-year period — 1986 to 2000. Action plans within each habitat priority area should focus on these specific objectives and be designed in five-year stages. These plans are expected to contain much more precise descriptions of the needed actions.

1. To restore mallard and pintail breeding habitat in the midcontinent region to 1970-1979 levels by protecting and improving 3.6 million additional acres in Canada and about 1.1 million additional acres in the United States for duck production. These estimates are based on a ratio of three acres of upland nesting cover per acre of water.

2. To protect 686,000 additional acres of mallard and pintail migration and wintering habitat in the lower Mississippi River-Gulf Coast region and increase the carrying capacity for wintering birds on lands and waters already acquired for waterfowl.

3. To improve the quality of publicly managed habitat and protect and restore 80,000 additional acres of wintering habitat for pintails and other waterfowl in the Central Valley of California.

4. To protect 60,000 additional acres of breeding and migration habitat in the Great Lakes - St. Lawrence lowlands for black ducks and other waterfowl in Canada and 10,000 additional acres in the United States.

5. To protect and enhance migration and wintering habitat for black ducks by:
   (a) protecting 50,000 additional acres of migration and wintering habitat on the east coast of the United States;

   (b) protecting 10,000 additional acres on the east coast of Canada;

   (c) improving habitat quality of other areas in the region; and

   (d) effecting a 25 percent increase in carrying capacity on 382,500 acres of land managed for waterfowl use by wildlife agencies in eastern United States.

6. To maintain the habitat value of designated areas of international significance to waterfowl listed in Figure 2.

7. To maintain waterfowl habitats of acceptable quality and minimize exposure to contaminants.

Recommendations for Future Action

This section of the Plan lists a number of actions recommended to help achieve the population goals identified by wildlife managers and presented in earlier sections.

Habitat

Maintenance and, where possible, enhancement of habitat are the most important factors in enabling waterfowl populations to grow to the levels called for in the goals. The following actions are believed to be important to the restoration and maintenance of the habitats needed to achieve population goals.

General Recommendations

- Responsibilities for achieving the recommendations in this Plan must be shared by the governments of the United States and Canada and by nongovernmental entities in both countries. Costs of achievement of this Plan greatly exceed the levels currently budgeted by the governments of both countries for waterfowl management. Major governmental budget increases for waterfowl management, especially in the United States, should not be anticipated in the near future, given competing demands and projected budget levels. Therefore, the primary source of increased funding for this Plan must be private organizations and individuals who enjoy and benefit from achieving and maintaining the waterfowl population levels set forth herein.

- Financial incentives may be needed to induce farmers and ranchers to manage their lands for waterfowl production – nesting and rearing habitat are most needed.

- Certain lands of extraordinary value as waterfowl habitat can best be preserved when they are acquired in fee title and retired from other uses. Only a limited amount of habitat can be preserved this way because of the high cost of fee acquisition and subsequent management costs.

- Local governments and public land management agencies should be encouraged to zone or otherwise regulate land uses to prevent the destruction or degradation of waterfowl habitats.

- Soil, water and wetland conservation should be promoted on private lands.

- The financial participation of private conservation organizations, such as Ducks Unlimited and Wildlife Habitat Canada, is critical to the implementation of the North American Waterfowl Management Plan.

- Existing public natural resource lands should be managed to increase their productivity and carrying capacity for waterfowl.

- Public works projects planning should include the prevention or mitigation of destruction or degradation of waterfowl habitats.

- Joint ventures should be encouraged as a means for governments and private organizations to cooperate in the planning, funding and implementation of projects to preserve or enhance waterfowl habitat.

Specific Recommendations

1. Both public and private organizations in the United States and Canada should be encouraged to cooperate through joint ventures in the planning, funding and implementation of projects to improve waterfowl habitat by changing the land-use practices on 3.6 million acres in prairie Canada. The estimated cost of achieving such changes on 3.6 million acres approaches $1 billion during a 15-year period of which 25 percent should be attempted to be raised by Canadian interests and 75 percent attempted to be raised by United States interests. This should not be construed as a commitment by the government of the United States to finance activities in Canada. Clearly, as many participants as possible are needed to help raise the funds for such an endeavor.

   Before the governments of Canada or the United States could participate in a joint venture, specific authorization and appropriation of funds by the respective legislative bodies would be required.

   The goal would be to protect and improve prairie wetlands for duck production by ensuring that wetland basins are conserved, along with an adequate amount of nearby upland nesting cover. It is envisaged that a major component of the program should be pursued by entering into agreements with landowners to manage their wetlands and other lands of marginal value to agriculture for waterfowl. It is estimated that less than 14 percent of the land in question should be acquired in fee title. This program is intended to benefit both waterfowl and agricultural production by emphasizing soil and water conservation, maintaining water quality and avoiding other major problems such as salinization. By effecting small changes in land-use practices over a large area, this program should demonstrate that agriculture and wildlife production are compatible pursuits. It is recog-

nized that efforts to prevent, minimize and mitigate crop damage in Canada are needed as an integral part of the program.

The first agreement between Canadian and United States interests that sets out details of the habitat program should be struck by 1987. Responsibility for managing lands in Canada should reside with Canadian agencies. It is not intended that any funds raised in the United States be used for crop damage compensation payments in Canada.

This endeavor is not intended to replace or supersede any portion of the extensive and critically important habitat work carried out in Canada by any of several federal and provincial agencies and private conservation organizations working there now. This work should be in addition to the current level of public and private conservation expenditures in the two countries.

2. Protection and improvement of 1,084,000 additional acres of mallard and pintail breeding habitat in the pothole area of the northcentral United States are also needed. Improving duck recruitment should be an important focus on such lands in the United States. A variety of management techniques should be considered to reduce the effects of agricultural practices and predation on nesting ducks and their eggs. The needed result is to achieve a nest hatching success of 50 percent by 1995. The estimated cost of implementing this recommendation of habitat protection would be about $237 million 1985 U.S. dollars.

3. Farther south, 686,000 acres of mallard and pintail migration and wintering habitat in the lower Mississippi River - Gulf Coast region and 80,000 acres of wintering habitat for pintails and other waterfowl in the Central Valley of California are needed. Public lands and waters in these areas already managed for waterfowl should be developed further to increase their carrying capacity for wintering waterfowl, and financial incentives should be used to induce private landowners to protect wintering habitat. The cost to implement this recommendation would probably exceed $217 million 1985 U.S. dollars.

4. Black ducks need an additional 50,000 acres of migration and wintering habitat along the east coast of the United States and 10,000 acres in the Great Lakes - St. Lawrence lowlands in the United States at an estimated cost of $23 million 1985 U.S. dollars. Better methods to increase the carrying capacity of wintering habitat are needed, and when developed, should be used to increase the carrying capacity 25 percent on 382,000 acres of existing wildlife refuges.

5. The protection of 60,000 acres of breeding and migration habitat for black ducks and mallards is also needed in the Great Lakes - St. Lawrence lowlands of Canada. The work here should focus on maintaining farm ponds and marshes for all ducks in the western portion of the area and preserving natural nesting habitat and marshes, primarily for black ducks, in the eastern portion of the basin. Approximately $20 million 1985 Canadian dollars would be required to carry out this recommendation.

6. Protection of 10,000 additional acres of black duck migration and wintering habitat in the Atlantic region of Canada is also needed at an estimated cost of $5 million in 1985 Canadian dollars.

7. There should be an improvement in the inventory and monitoring of waterfowl habitat in North America in cooperation with states, provinces, territories and conservation organizations. Understanding the relationship between duck numbers and their habitats is very important to validation and adjustment of population and habitat objectives at five-year intervals. Status reports on accomplishments in meeting waterfowl habitat and population goals should be prepared for the review and updates of the Plan at five-year intervals.

8. Research should be conducted on the effects of land-use practices on the breeding success of waterfowl. In cooperation with such conservation organizations as Ducks Unlimited and the Delta Waterfowl and Wetland Research Station, methods of integrating sound agricultural land use with duck production should be developed and demonstrated to farming interests.

9. Factors affecting the carrying capacity of migration and wintering areas should be examined to develop information needed to enhance habitat and control waterfowl losses to disease, lead poisoning and other contaminants.

Duck Harvest

Recreational duck harvests should be managed through the use of stabilized regulations. Stabilized regulations are defined as regulations which remain unchanged for a specified period of years and govern sport harvest of ducks in Canada and the United States. It includes conventional and point-system frameworks, bag limits and season lengths. No changes to these regulations should be made unless waterfowl population levels trigger predetermined prescriptive changes or a dramatic change in the population level necessitates joint action by the two countries. Prescriptive changes in stabilized hunting regulations may be brought into effect for any species or population by agreement between Canada and the United States. The purpose of this approach would be to minimize the annual fine-tuning of regulations by both countries during years with average fall duck flights, so more time can be directed toward such important waterfowl activities as habitat protection, management and improvement.

Pending the analysis and evaluation of the five-year (1980-1984) stabilized regulations study in 1987, the following *interim* prescriptive restrictions should be in effect subject to compliance with regulatory and environmental review statutes in both countries.

1. If the breeding population index of mallards in the surveyed area of Canada and the United States falls below 6.5 million, the provinces of Alberta, Saskatchewan and Manitoba and all states of the Pacific, Central, Mississippi and Atlantic Flyways should decrease harvest of this species (with special emphasis on hens, where possible) by at least 25 percent from that which would have been expected from stabilized regulations that were in effect during 1980-84. These restrictions should

remain in effect until the mallard breeding population exceeds 7.5 million birds; however, in any year when the fall flight index of mallards exceeds 11 million, the prescriptive restrictions should not apply.

2. If the breeding population index of pintails in the surveyed area of Canada and the United States falls below 4.0 million, the provinces of Alberta, Saskatchewan and Manitoba and all states of the Pacific, Central, Mississippi and Atlantic flyways should decrease harvest of this species (with special emphasis on hens, where possible) by at least 25 percent from that which would have been expected from stabilized regulations that were in effect during 1980-84. These restrictions should remain in effect until the pintail breeding population exceeds 4.7 million birds.

   Harvest regulations to implement these restrictions should be handled using the normal regulatory process of each country. Documented biological differences in duck populations regionally and by flyway (such as the High Plains Unit of the Central Flyway and the Columbia Basin in the Pacific Flyway) should be recognized in implementing harvest management strategies.

3. A management plan currently in effect for black ducks in the Atlantic Flyway calls for maintaining a 25 percent overall reduction from the five-year average harvest (1977-1981) of total black ducks occurring in states of the Atlantic and Mississippi Flyways.

   In Canada, the greatest restriction has been placed on black duck harvest in the western portion of the range (Ontario, western Quebec) where the population is declining. Restrictions were less severe in the eastern portion of the black duck range where the population is stable. These restrictions should remain in effect in Canada for five years (1984-1988), and be extended pending evaluation of their effectiveness in arresting the decline in black duck numbers. Restrictive regulations should remain in effect in the United States until population levels exceed those of 1971-1975 in the Mississippi (125,480) and Atlantic (258,600) Flyways.

Goose and Swan Population Management Plans

Management plans should be prepared by 1987 for the following populations of international concern — cackling, dusky and Aleutian Canada goose populations, Pacific whitefront and brant populations, and the trumpeter swan population. Individual plans for each of these populations can best be written by a committee composed of representatives from those territories, provinces and states that participate in the management of these populations, in cooperation with representatives from the Canadian Wildlife Service and the United States Fish and Wildlife Service. Federal representatives from the two countries would act as co-chairmen of the committees. Flyway representatives would be selected by the appropriate councils. Provinces and territories would select their own representatives.

Plans developed by the committees would be transmitted to the North American Waterfowl Management Plan Committee for review. After approval and compliance with appropriate environmental and regulatory review requirements in each country they would be appended and become part of the North American Waterfowl Management Plan. If agreement cannot be reached within the committee, it would be the responsibility of the federal representatives of each country to put together a plan using the best information available from cooperating management agencies and other reliable sources. The plans should answer the following questions: (1) What is the current status and trend of the population? (2) What are the population and harvest objectives (stated in numbers of birds)? (3) Is all available breeding habitat being utilized at optimal levels? (4) What problems affect the management of this population? (5) What are the recommendations for resolving these problems and achieving the objectives? (6) What information would be used to monitor the status of the population and what agency would be responsible for providing that information? The management plan may contain additional information that the representatives feel is necessary.

Subsistence

Canada and the United States should continue to expand subsistence harvest surveys. The two countries should ensure that subsistence users are cooperatively involved in management of the waterfowl resource and protection of its habitat. Efforts are currently underway on a protocol to amend the Migratory Bird Treaty to provide for the managed subsistence use of waterfowl in northern Canada and Alaska.

Population Management and Research

The following recommendations are intended to address the most important needs for new information and technology to improve waterfowl management:

1. Continue to (a) conduct the annual cooperative breeding-ground surveys in the surveyed area, (b) standardize procedures and improve their accuracy from both continental and flyway perspectives, (c) monitor the conditions of prairie wetlands, and (d) initiate expanded surveys, where required, to meet management needs outside surveyed areas.

2. Undertake a joint venture, beginning in 1986, to (a) monitor population trends of black ducks throughout the breeding range in Canada and (b) determine, through research, the important factors influencing population status and dynamics. Improvements should also be made to the winter inventories. The research effort should focus particularly on interrelationships of black ducks and mallards and on habitat requirements and availability throughout the range. The probable cost of this effort during the next 15 years would be $15 million in 1985 Canadian dollars.

3. Delineate subpopulation characteristics of the continental mallard and black duck populations for the purposes of developing more specific population or flyway management plans.

4. Develop a joint venture to monitor the status and productivity of colony-nesting geese in the far north. This research may include environmental impact assessments of proposed developments, as well as further delineation and evaluation of key habitats on which goose populations depend.

5. Maintain and improve national waterfowl harvest surveys.

6. Continue to take concerted action to minimize the illegal kill of migratory waterfowl by maintaining properly trained law enforcement officers.

7. Continue to expand research on the effects of hunting mortality on waterfowl populations because of concerns over the effects of harvests on key populations with declining breeding populations. Completion of the evaluation of results of the five-year stabilized regulations period is expected to provide new information on the role of hunting harvests and should be used to guide future management and research.

8. Institute appropriate action to prevent signficant losses of ducks to disease, environmental contamination and poisoning (including that caused by lead shot).

Implementation of the North American Waterfowl Management Plan

The Plan is a broad policy framework that describes the overall scope of requirements for management of migratory waterfowl in Canada and the United States. Mexico's full participation is very important for management of North American waterfowl, and both nations should actively encourage it. To implement this important agreement, these nations should establish national, provincial, territorial, state and flyway plans which convert international objectives to operational plans as follows:

1. *National Waterfowl Management Plans* outline recommendations for accomplishing broad objectives within each nation including both international and domestic planning priorities. With respect to achieving the North American goals, these recommendations should establish how the operational program should be conducted between the federal government, states and flyway councils in the United States, and the provinces, territories and federal government in Canada.

2. *United States state and flyway action plans and Canadian provincial and territorial action plans* translate national planning priorities into operational programs within the respective jurisdictions and should be the principal vehicles for practical implementation of general strategies. These plans require specific details for implementing activities within management units, and should be designed according to local considerations but coordinated nationally.

3. *Joint venture projects* should be implemented through facilitating agreements negotiated and agreed to by all those wishing to participate. A joint venture action group should be established for each joint venture. The planning, ongoing management funding, implementation method and evaluation of joint ventures should be set out as a proposal which would detail the contributions of private organizations, individuals, states, provinces, territories and official proposed budgets of the two governments. Each project should be forwarded to the North American Waterfowl Management Plan Committee for its review and recomendation.

4. *The proposed initial implementing actions are as follows:*

(a) The North American Waterfowl Management Plan Committee would be established during June 1986.

(b) The Plan Committee would review the recommendations for proposed joint ventures and recommend participants for each joint venture action group at the first meeting during July 1986.

(c) Joint venture action groups may be established by July 1986.

(d) The Plan Committee would review joint venture progress reports during November 1986.

(e) The Plan Committee would review the list of actions proposed to carry out the Plan by March 1987.

North American Waterfowl Management Plan Committee

The North American Waterfowl Management Plan is a comprehensive document that needs constant review and update to remain viable and effectively deal with international problems. In this planning process, there is an additional need for continuity and coordination to allow wildlife management agencies to initiate short- and long-term projects that are consistent with the overall Plan.

In view of these needs, a North American Waterfowl Management Plan Committee should be established to monitor and update the Plan, coordinate current work and review new proposals and joint ventures. Federal, state, provincial and territorial wildlife agencies should provide representation to this Committee. The Committee would suggest recommendations for actions within the scope of the Plan. It will not have regulatory authority nor alter the functions of flyway councils in the United States (see Appendix).

Appendix

Coordination and Administration of the North American Waterfowl Management Plan

A committee known as the North American Waterfowl Management Plan Committee would be established 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 North American Waterfowl Management Plan in 1990 and every five years thereafter.

3. Review the scientific and technical data on the status and dynamics of waterfowl populations and their habitats as they relate to the aims of this Plan.

4. Review and monitor progress toward achieving goals 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 waterfowl populations require coordinated international action.

7. Review joint venture drafts to ascertain that they further the intent of the Plan.

8. Consider and, if needed, recommend additional actions to the federal governments of Canada and the United States.

The Committee would direct all recommendations to the Canadian Wildlife Service and the United States Fish and Wildlife Service. These would be considered by each agency, reviewed as necessary by their executive and legislative branches, and the approved changes would be incorporated formally by updating the Plan.

Committee Membership

The Committee would consist of 12 members – 6 appointed by the Director General of the Canadian Wildlife Service to represent Canada and 6 appointed by the Director of the United States Fish and Wildlife Service to represent the United States. Four representatives would be nominated by provinces and territories, and one representative would be nominated by each of the four flyway councils. Committee members would be selected from agencies having responsibilities for managing the waterfowl resource.

Membership of the Committee should include two representatives from the federal wildlife service of each country. The remaining four members from each country should be chosen from states (one from each flyway), provincial and territorial governments.

Operating Procedures

A federal agency member should serve as chairman of the Committee, as designated by the respective appointing authority on an annual rotating basis. The first chairman in 1986 would be from the United States, with the vice chairman from Canada. This order would be reversed in alternate years.

The chairman of the Committee would furnish a secretary to keep notes and minutes as well as provide necessary assistance to prepare and distribute all materials, such as letters and reports, produced or used by the Committee.

Members of the Committee would serve staggered three-year terms, except when the Committee is first formed. At the outset, two members from each country should be appointed to three-year terms, two members to two-year terms and two members to one-year terms. Thereafter, all appointments would be for three years. Any member can be reappointed at the discretion of the appointing authority. Appointments would be effective January 1. If a replacement to a vacated membership is not appointed, the retiring member would continue to serve until replaced.

The Committee would meet twice annually, once in the United States and once in Canada. Additional meetings can be arranged by the Committee as needed, except that the first meeting would be called by the chairman to convene in Washington, D.C. Locations and dates of the meetings shall be decided by the Committee.

The Committee would operate under "Robert's Rules of Order." Under this system, a quorum consisting of seven or more duly appointed members must be present to conduct business officially. In any voting procedure, a majority would consist of the most votes cast for or against any issue by a quorum or more of members present.

A 60-day notice, including time and place of meeting and an agenda, would be sent to all members of the Committee.

Committee Operations

The following implementing actions would be proposed by both countries:

1. The federal agency of each country would provide a coordinator to work with the Committee.

2. Annually, each federal agency would provide the Committee with information that would facilitate monitoring the goals of the Plan. The types, kinds and amounts of information needed would be agreed to by the Committee and requested of the agencies.

3. The federal agency of each country would be responsible for submitting to the Committee for review and acceptance waterfowl population management recommendations for populations that have been designated as requiring coordinated international action. The two agencies would agree on lead responsibility for each population plan and request that these be prepared and approved by representatives of the responsible management agencies in Canada and of the flyway councils in the United States.