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Issuance of Annual Regulations Permitting the Hunting of Migratory Birds
2010 Draft Supplemental Environmental Impact Statement

U.S. Fish & Wildlife Service

Issuance of Annual Regulations Permitting the Hunting of Migratory Birds

2010 Draft Supplemental Environmental Impact Statement

United States Department of the Interior

FISH AND WILDLIFE SERVICE
Washington, D.C. 20240

JUN 07 2010

In Reply Refer To:
FWS/AMB/DMBM/045124

Dear Reviewer:

The U.S. Fish and Wildlife Service (Service) is pleased to provide you with this copy of the Draft Supplemental Environmental Impact Statement (SEIS) for the Issuance of Annual Regulations Permitting the Hunting of Migratory Birds.

The Service is requesting comments on the alternatives described in the draft SEIS and all agencies, groups, and individuals are urged to provide comments on the Proposed Action along with any suggestions for improvement. All comments received before March 31, 2011 will be considered in preparation of the final SEIS.

One of the chief missions of the Service is the management of our nation's migratory bird resources. Since the passage of the Migratory Bird Treaty Act in 1918, the Federal Government has had the ultimate responsibility for managing these valuable natural resources on behalf of the citizens of the United States. The Federal Government shares this responsibility with its State partners and has always worked closely with the States, non-governmental organizations and the nation's citizens to insure the long term conservation of migratory birds. The primary focus of this draft SEIS is on the administrative process that is used to annually evaluate and establish appropriate levels of take for those species that are hunted by millions of Americans for both food and recreation.

The draft SEIS evaluates seven components of the annual regulatory process used in the United States to establish annual hunting regulations for migratory birds. Several alternatives are considered for each of these components, including a No Action Alternative, in accordance with National Environmental Policy Act regulations. The draft SEIS addresses impacts of the various alternatives with regard to their potential impacts on migratory bird populations, other wildlife species, natural resources, socioeconomics and species of special status.

Comments should be sent to Robert Trost, Pacific Flyway Representative, Division of Migratory Bird Management, U.S. Fish and Wildlife Service, 911 NE 11th Ave., Portland, Oregon, 97232. Alternatively, comments can be sent by electronic mail to: huntingEIS@fws.gov. If you should have any questions, please contact Robert Trost at 503-231-6162.

Sincerely,

Acting Deputy DIRECTOR

Enclosure

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DRAFT ENVIRONMENTAL IMPACT STATEMENT:

Issuance of Annual Regulations Permitting the Hunting of Migratory Birds

RESPONSIBLE AGENCY:	Department of the Interior U.S. Fish and Wildlife Service
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PROPOSED ACTION

The proposed action of the 2010 Supplemental Environmental Impact Statement (SEIS 2010) is to adopt a process for authorizing migratory bird hunting in accordance the Migratory Bird Treaty Act (16 U.S.C. §703-712) and the four bilateral conventions. Regulations allowing the hunting of migratory game birds in the families Anatidae (waterfowl), Columbidae (doves and pigeons), Gruidae (cranes), Scolopacidae (snipe and American woodcock) and Rallidae (rails, coots, gallinules and moorhens) currently are promulgated annually. These ‘annual’ regulations include framework regulations and special regulations, and take into consideration factors that change from year-to-year, such as abundance and distribution of birds, times of migration, and other factors. In contrast, ‘basic’ regulations (e.g., those that govern hunting methods, such as the gauge of shotgun that can be used, the number of shells a gun can hold, regulations about possession and transportation of harvested birds, etc.) are promulgated and changed only when a need to do so arises. Therefore, basic regulations are not addressed in SEIS 2010.

The Service believes that there are seven components of the proposed action for which alternatives can be considered regarding how annual regulations are established for the hunting of migratory birds. The first six components deal with the fall-winter hunting season and include: (1) the schedule and timing of the general regulatory process, (2) frequency of review and adoption of duck regulatory packages, (3) stock-specific harvest strategies, (4) special regulations, (5) management scale for the harvest of migratory birds, and (6) zones and split seasons. In addition, a seventh component of the proposed action concerning the subsistence-hunting regulations process for Alaska is considered, and the impact of cumulative harvest of migratory bird hunting on National Wildlife Refuges also is discussed.

The Service is committed to moving toward establishing increased coordination (coherence) between harvest and habitat management for migratory birds. The components of the proposed action presented in this assessment are designed to help move migratory bird management in that direction.

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List of Acronyms

AHM	Adaptive Harvest Management
ALUS	Alternative Land Use Services
AMBCC	Alaska Migratory Bird Co-management Council
AP	Atlantic Population
ASG	Alaska Shorebird Group
BBS	Breeding Bird Survey
BPOP	Breeding Population Size
CBC	Christmas Bird Count
CCC	Commodity Credit Corporation
CCS	Call-count Survey
CFR	Code of Federal Regulations
CMU	Central Management Unit
CPRV	Central Platte River Valley
CREP	Conservation Reserve and Enhancement Program
CRP	Conservation Reserve Program
CVP	Central Valley Population
CWS	Canadian Wildlife Service
DEIS	Draft Environmental Impact Statement
EA	Environmental Assessment
EIS	Environmental Impact Statement
FEIS	Final Environmental Impact Statement
FES	Final Environmental Statement
FR	Federal Register
HIP	Harvest Information Program
IP	Interior Population
JV	Joint Venture
LCRVP	Lower Colorado River Valley Populations
LRGV	Lower Rio Grande Valley
MBTA	Migratory Bird Treaty Act
MCP	Mid-continent Population
MQS	Mail Questionnaire Survey
MSA	Metropolitan Statistical Areas
MSS	Mineral Site Survey
MSY	Maximum Sustained Yield
NAWMP	North American Waterfowl Management Plan
NEPA	National Environmental Policy Act
NGO	Non-governmental Organization
NRCS	Natural Resources Conservation Service
NWF	National Wildlife Federation
NWR	National Wildlife Refuge
PCP	Pacific Coast Population
PCS	Parts Collection Survey
PHJV	Prairie Habitat Joint Venture
PPR	Prairie Pothole Region
RMP	Rocky Mountain Population
RWB	Rainwater Basin
SAV	Submerged Aquatic Vegetation

List of Acronyms (*continued*)

SEIS	Supplemental Environmental Impact Statement
Service	United States Fish and Wildlife Service
SGS	Singing-ground Survey
SRC	Service Regulations Committee
WBPHS	Waterfowl Breeding Population and Habitat Survey
WCS	Wing-collection Survey
WGC	Western Gulf Coast
WHS	Waterfowl Harvest Survey
WMU	Western Management Unit
WPA	Waterfowl Production Areas
WRP	Wetland Reserve Program

* Common names for hunted migratory bird species are used throughout this document. Scientific names are provided in Appendices 3 and 4.

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CHAPTER 1
PURPOSE OF AND NEED FOR ACTION

1.1 INTRODUCTION

Supplemental Environmental Impact Statement 2010 (SEIS 2010) has been developed to ensure that the proposed management action continues to be in compliance with the National Environmental Policy Act (NEPA). Furthermore, this process will ensure that the proposed action does not adversely affect populations of species covered under the Migratory Bird Treaty Act (MBTA) or listed species and their critical habitats under the Endangered Species Act (ESA). This chapter discusses the purpose of and need for action, background on the U.S. Fish and Wildlife Service (Service), the planning process, which includes scoping of issues and identification of alternatives, and the legal basis for the action.

1.2 U.S. FISH AND WILDLIFE SERVICE MISSION

1.2.1 Service Mission Statement

The mission of the Service is:

> Working with others, to conserve, protect and enhance fish, wildlife, and plants and their habitats for the continuing benefit of the American people.

The U.S. Fish and Wildlife Service is the only agency of the U.S. Government with this primary mission.

1.3 PURPOSE OF AND NEED FOR ACTION

The purpose of and need for SEIS 2010 is to adopt a process for authorizing migratory bird hunting in accordance with the MBTA (16 U.S.C. §703-712) and the four bilateral conventions (see section 1.5.2). The process employs resources and information available to the Service, States, and public that allows for adequate public involvement and timely adoption and publication of annual regulations by the Department of the Interior for the hunting of migratory birds. The purpose will be achieved by consideration of the following:

A. Updating the previous 1975 Final Environmental Statement for the Issuance of Annual Regulations Permitting the Sport Hunting of Migratory Birds (FES 75; U.S. Department of the Interior 1975) and the 1988 Final Supplemental Environmental Impact Statement: Issuance of Annual Regulations Permitting the Sport Hunting of Migratory Birds (SEIS 88; U.S. Department of the Interior 1988),

B. Addressing the changes brought about by amendments to the migratory bird treaties between the U.S. and Great Britain (for Canada - hereinafter referred to as the Migratory Bird Treaty between the U.S. and Canada) in 1995 and between the U.S. and Mexico in 1997,

C. Considering new information and approaches to issuing annual regulations for the hunting of migratory birds, and

D. Moving toward establishing increased coordination (coherence) between harvest and habitat management for migratory birds.

FES 75 proposed that the Service continue the longstanding practice of issuing annual regulations allowing the hunting of migratory birds. Several alternatives to the proposed action were considered, including not allowing any hunting of migratory birds. FES 75 addressed the NEPA requirements for an assessment of issuing migratory bird hunting regulations, an environmentally-related activity of considerable socio-economic importance considered to be a major Federal action. FES 75 fulfilled the NEPA requirements for issuing annual regulations that permit hunting during the time period then allowed by the MBTA, from September 1–March 10 of each year. FES 75 has served as the general programmatic foundation on which numerous Environmental Assessments (EAs) of specific regulatory actions (Appendix 1) have been based using the NEPA principle of tiering (48 FR 34267 [July 28, 1983]). FES 75 identified areas where additional management efforts were needed and, until the issuance of SEIS 88, served as the standard NEPA reference for the issuance of annual regulations for the hunting of migratory birds.

SEIS 88 updated the information in FES 75 and continued to serve the purposes identified in that document. Both documents were limited to consideration of the regulations governing the non-subsistence hunting of migratory birds as specified in Title 50 Code of Federal Regulations (50 CFR), Part 20, Subpart K and commonly referred to as "annual" hunting regulations. Since then, a number of technical advances and analytical procedures have occurred that have been incorporated into the process of estimating populations and developing predictive models to determine allowable harvest levels. In addition, new administrative procedures have been adopted to guide the decision-making process. SEIS 2010 examines these changes and developments.

1.4 SCOPE

1.4.1 Regulatory Issues to be Addressed

SEIS 2010 will address the process used by the U.S. Department of the Interior (DOI) and the Service to issue annual regulations for the hunting of migratory birds. Regulations governing the hunting of migratory birds are specified in 50 CFR. FES 75 and SEIS 88 addressed only those regulations described in 50 CFR, Part 20, Subpart K, commonly referred to as “annual” regulations. The migratory bird treaties with Canada and Mexico were amended in 1995 and 1997, respectively, to address the harvest of migratory birds in Alaska and Canada by subsistence users. New U.S. regulations were developed to address this aspect of migratory bird harvest and can be found in 50 CFR Part 92, Subpart D. Since many of the same migratory bird populations are harvested under both sets of regulations, consideration of the process for issuing annual regulations for subsistence harvest in Alaska is included in SEIS 2010 (Appendix 6). Finally, annual regulations for migratory bird hunting specific to the National Wildlife Refuges (NWRs) also are issued annually under the provisions of 50 CFR, Part 32, Subpart A. To the extent that these regulations also apply to the harvest of migratory birds from the same populations, consideration of this process is included in SEIS 2010 as well.

Therefore, the scope of SEIS 2010 has been broadened in comparison to FES 75 and SEIS 88 to address the issuance of annual regulations for the hunting of migratory birds under the provisions of 50 CFR, Part 20, Subpart K; 50 CFR, Part 92, Subpart D; and 50 CFR, Part 32, Subpart A. This has been done to address the cumulative impacts of the entire process of issuing annual regulations for migratory bird hunting and to address changes brought about by the amendments to the migratory bird treaties between the U.S. and Canada and the U.S. and Mexico.

1.4.2 Regulatory Issues That Will Not be Addressed

Several issues were identified during the scoping process (section 1.6) that are beyond the intended scope of SEIS 2010. Several identified issues are discussed in additional detail here, and an explanation of why these issues are beyond the scope of SEIS 2010 is provided below in 1.4.2.1 through 1.4.2.6.

1.4.2.1 Basic Regulations

SEIS 2010 does not address those regulations often referred to as the “basic” regulations contained in 50 CFR, Part 20, Subpart C, which specify such issues as hunting methods. Basic regulations ordinarily are unchanged from year-to-year and are not subject to annual consideration.

1.4.2.2 Falconry

Falconry is considered one of the legal methods of take for migratory birds under the provisions of the basic regulations (50 CFR §20.21). Such activity must conform to all of the applicable permit regulations that apply specifically to falconry (50 CFR §21.28-21.30). The Service recognizes that the taking of migratory birds by falconry is a legitimate and legal use that has very limited harvest and therefore has a negligible impact on the resource. As such, falconry bag limits have been set as three migratory birds per day for which open seasons have been established (43 FR 22425 [July 25, 1978]). The

Service recognizes the desire of falconers to have times available for falconry when taking by guns is not permitted. Historically, this desire has been addressed through the establishment of extended falconry seasons (42 FR 13317 [March 10, 1977]), essentially opening specific seasons for falconry equal to the number of days allowed by treaty minus the number of days for which the gun season is permitted for each migratory bird species. When the length of the gun season is equal to the treaty limit there are no days available for extended falconry seasons, and this has been the case in some areas and in some recent years. The treaty establishes that seasons must occur between September 1 and March 10 of a given fall-winter period. Additionally, the treaty requirement that seasons must not exceed three and one-half months for any species in any area is interpreted by the Service to be a total of 107 days. Therefore, because falconry is considered simply one method of take, the Service has no latitude to offer additional opportunity in season opening and closing dates and total season length.

1.4.2.3 Spinning-Wing Decoys

These motorized devices are of recent origin (Caswell and Caswell 2004; Ackerman et al. 2006) and are not specifically addressed under 50 CFR §20.21 as an illegal method of take. Therefore, these devices are considered legal by Federal regulation, although some States have instituted prohibitions of various types. Consideration of spinning-wing decoys would require consideration of all of the various methods and means of take of migratory birds (i.e., a review of basic regulations), which would significantly expand the scope of SEIS 2010. For this reason, the Service has chosen to not include a review of these decoys.

1.4.2.4 Non-toxic Shot Regulations

The use of non-toxic shot for waterfowl hunting is the subject of two previous EISs (U.S. Department of the Interior 1976; 1986). Since 1991, non-toxic shot has been required for all waterfowl hunting in the U.S. The Service does not intend to alter the preferred alternative presently in place that prohibits the use of anything other than non-toxic shot for waterfowl hunting. If this action were to be modified in any way, the Service would prepare a separate SEIS to address the issue, due to the significance of such a change to migratory birds and bird hunters. For a complete list of approved shot types, please visit http://www.fws.gov/migratorybirds/currentbirdissues/nontoxic.htm.

1.4.2.5 Migratory Bird Hunting on Tribal Lands within the Conterminous United States

The Service also has developed a separate process for determining annual migratory bird hunting regulations on ceded and Tribal lands (U.S. Department of the Interior 1985; 52 FR 35762 [September 3, 1985]). Although this process also is conducted annually, SEIS 2010 will not address this process in any additional detail because no changes to the existing process are envisioned or have been recommended. For more information, consult Appendix 8.

1.4.2.6 Conservation Orders

Conservation orders are not hunting seasons, but recent innovations that allow times of the year outside the period during which hunting seasons may be open (September 1 to March 10). Conservation orders are instituted when a species or population has reached a level that is injurious to itself, other migratory bird populations, and/or their habitats. To date, mid-continent light geese (i.e., lesser snow and Ross' geese), greater snow geese and resident Canada geese in the Central, Mississippi and Atlantic Flyways are the only stocks that have reached levels requiring additional control measures. Each of these specific cases was examined in detail in separate EISs; thus, these orders and the process of issuing regulations for them are not addressed in this document.

1.5 AUTHORITY AND RESPONSIBILITY

1.5.1 U.S. Fish and Wildlife Service

The Service is the primary Federal agency responsible for conserving, protecting, and enhancing the Nation's fish and wildlife resources and their habitats. Responsibilities for some of these are shared with other Federal, State, Tribal, and local entities. However, the Service has specific responsibilities for threatened and endangered species, migratory birds, inter-jurisdictional fish, and certain marine mammals, as well as for lands and waters that the Service administers for the management and protection of these resources.

1.5.2 Policy, Authority, and Legal Compliance

The Secretary of the Interior is authorized and directed by the MBTA to determine when it is compatible with conventions to issue regulations that allow the take of migratory birds and their nests and eggs (Appendix 3 provides a complete list of the hunted game bird species). All of the four migratory bird conventions are applicable to the adoption of annual regulations for the hunting of migratory birds: the *Convention for the Protection of Migratory Birds* with Canada (1916), the *Convention for the Protection of Migratory Birds and Game Mammals* with Mexico (1937), the *Convention Between the Government of the United States of America and the Government of Japan for the Protection of Migratory Birds and Birds in Danger of Extinction, and Their Environment* (1974) and the *Convention Between the United States and the Union of Soviet Socialist Republics* (now Russia) *Concerning the Conservation of Migratory Birds and Their Environment* (1978).

When two or more conventions are applicable to the Service's adoption of regulations, the Service must ensure the action is compatible with each or, where conventions have different provisions on the same specific issue, with the more stringent of the provisions. Each of the conventions, negotiated at different times with four different countries, address particular issues important to each country and, because of differing perspectives and needs, contain agreements on similar actions that are presented in uniquely different ways.

All of the conventions include provisions for both allowing and controlling hunting. The convention with Canada was amended in 1995 to address the issue of subsistence harvest by native peoples of Canada and Alaska. Article II of the amended convention established several conservation principles by which migratory birds will be managed by the two countries. Included among these conservation principles are the following statements, which maintain that migratory bird populations shall be managed, "To ensure a variety of sustainable uses," and "To sustain healthy migratory bird populations for harvesting needs." The convention also established that the closed period for migratory birds shall be between March 10 and September 1. It further established that the season for hunting shall not exceed three and one-half months. The Service has interpreted this in regulation to be no more than 107 days in any geographically-defined area for any species on which open seasons are authorized. The 1995 amendment to the convention also provides a specific exception to the closed-period requirement for subsistence users in Alaska. This exception allows migratory birds and their eggs to be harvested by indigenous inhabitants of Alaska. It further provides that seasons and other regulations implementing the non-wasteful taking of migratory birds and eggs shall be established, and that indigenous inhabitants of Alaska will be provided an effective and meaningful role in both the establishment of such regulations and in the conservation of migratory birds.

The convention with Mexico (1937: Article I) provides for the protection of migratory birds "by means of adequate methods which will permit, in so far as the respective high contracting parties may see fit, the utilization of said birds rationally for purposes of sport, food, commerce and industry." This convention also established a maximum period for hunting of four months and mandated the same closed period between March 10 and September 1. However, the closed period was limited to wild ducks only (Article II, Part D). The 1997 amendment to this convention provided for an exemption to the closed period for indigenous inhabitants of Alaska and Canada for the take of migratory birds and their eggs, similar to the amendment to the convention with Canada.

The convention with Japan (1974) states among other provisions under Article III, "The taking of migratory birds or their eggs shall be prohibited…" Further, "exceptions to the prohibition of taking may be permitted in accordance with the laws and regulations of the respective Contracting Parties in the following cases:

(c) During open hunting seasons established in accordance with paragraph 2 of this Article;

2. Open seasons for hunting migratory birds may be decided by each Contracting Party respectively. Such hunting seasons shall be set so as to avoid their principal nesting seasons and to maintain populations in optimum numbers."

The convention with Russia (1978) addresses the issue of hunting and regulations in a fashion very similar to the treaty with Japan (1974), in that all take is prohibited unless permitted under specific provisions that allow for the establishment of hunting seasons or other purposes. The treaty with Russia employs language very similar to that used in the treaty with Japan. The treaties with both Russia and Japan provide a specific exclusion from the closed period for subsistence use by indigenous people in Alaska and the Pacific Islands.

All four conventions clearly provide for issuance of regulations governing hunting during the fall-winter period (September 1 through March 10). In addition, the amended treaties allow for the establishment of regulations for the use of migratory birds by indigenous people in Alaska and Canada as an exception to the constraints outlined for fall-winter season. The issuance of annual hunting regulations helps ensure the preservation of migratory birds while providing for the sustainable use of the migratory bird resource.

This SEIS and the planning process are in compliance with NEPA, which requires Federal agencies to consider all environmental factors related to their proposed actions. This draft of the SEIS will be made available for public review and comment. All comments received will be summarized and addressed in the final SEIS that should be available in 2011-12.

1.6 SCOPING/PUBLIC PARTICIPATION

1.6.1 Summary of Scoping Efforts

Scoping is the initial stage of the EIS process used to design the extent and influence of an action. On September 8, 2005, the Service published a Notice of Intent to prepare a SEIS on the Hunting of Migratory Birds under the authority of the MBTA (70 FR 53376-53379). On March 9, 2006, the Service subsequently announced a total of 12 public meetings to be held across the U.S. to accept public and agency comment on the scope and relevant issues that should be addressed in the SEIS (71 FR 12216-12217). In addition to these public meetings, the Service established a website to receive electronic comments and solicited written comments. The Service also announced that all comments received from the initiation of this process on September 8, 2005 until May 30, 2006 would be considered in the development of the SEIS. A report summarizing the scoping comments and scoping meeting was prepared and made available on the Service's website at: http:www.fws.gov/migratorybirds.

1.6.2 Issue Identification

The Service sought suggestions and comments regarding the scope and substance of SEIS 2010, particular issues to be addressed and why, and options or alternatives to be considered. In particular, with regard to the scope and substance of SEIS 2010, the Service requested comments on the following:

A. Harvest-management alternatives for migratory game birds to be considered,

B. Limiting the scope of the assessment to fall-winter hunting (i.e., exclusion of the Alaska migratory bird subsistence process), and

C. Inclusion of basic regulations (methods and means).

1.6.2.1 Public Scoping Meetings

Twelve public scoping meetings were held on the following dates at the indicated locations and times:

- March 24, 2006: Columbus, Ohio, at the Hyatt Regency Columbus, 350 North High Street; 1 p.m.
- March 28, 2006: Memphis, Tennessee, at the Holiday Inn Select Downtown, 160 Union Avenue; 7 p.m.
- March 30, 2006: Rosenburg, Texas, at the Texas Agricultural Extension Service Education Center, 1402 Band Road, Suite 100, Highway 36; 7 p.m.
- April 5, 2006: Anchorage, Alaska, at the Howard Johnson Motel, 239 North 4th Avenue; 7 p.m.
- April 6, 2006: Denver, Colorado, at the Colorado Department of Wildlife, Northeast Region Service Center, Hunter Education Building, 6060 Broadway; 7 p.m.
- April 10, 2006: Hadley, Massachusetts, at the Northeast Regional Office of the U.S. Fish and Wildlife Service, 300 Westgate Center Drive; 7 p.m.
- April 12, 2006: Charleston, South Carolina, at the Fort Johnson Marine Laboratory, 217 Fort Johnson Road, James Island; 7 p.m.
- April 19, 2006: Fargo, North Dakota, at the Best Western Doublewood Inn, 3333 13th Avenue South; 7 p.m.
- April 20, 2006: Bloomington, Minnesota, at the Minnesota Valley NWR Visitors Center, 3815 American Boulevard East; 7 p.m.
- April 24, 2006: Salt Lake City, Utah, at the Utah Division of Wildlife Resources, 1594 West North Temple; 7 p.m.
- April 26, 2006: Arlington, Virginia, at the U.S. Fish and Wildlife Service, 4401 North Fairfax Drive, Room 200; 1 p.m.
- April 27, 2006: Sacramento, California, at the California Department of Fish and Game, Auditorium, Resource Building, 1416 Ninth Street; 7 p.m.

1.6.3 Issues and Concerns Identified During Scoping

Two hundred and sixty eight communications (verbal, written or electronic) were received from individuals, agencies, and organizations. Letters were received from 17 individuals, eight non-governmental organizations (NGOs), nine public fish and wildlife agencies, and three non-agency governmental entities. A total of 43 individuals spoke at the 12 public scoping meetings. Of these, 10 individuals were representatives of a public fish and wildlife agency, eight represented NGOs, five were affiliated with a guiding/outfitter business or a fish/game/falconry club, and one was a State legislator. In addition, 188 comments were received by electronic mail at the web site established for this purpose. In total, 683 individual comments were received, of which 244 addressed a unique issue of concern.

The majority of individual comments received concerned falconry regulations, most generally aimed at requesting increased opportunities for falconry take outside the period that hunting with firearms is allowed (Table 1.1). Additional comments were received regarding the use of electronic decoys. The majority (26) opposed the use of these devices, but several (6) were in support of their continued use. Finally, 11 respondents recommended inclusion of annual regulations governing Alaska subsistence, tribal or both of these processes in the SEIS.

1.6.4 Overview of Comments

After summarizing the various comments, they were grouped into the following categories (number of unique issues/concerns falling under that category is given in parentheses):

- Scope of SEIS (70) – comments that mentioned specific items to be included in the SEIS or that referred to the SEIS in some manner.
- Specific species (40) – comments that mentioned a specific species (e.g., Canada geese, American woodcock, pintails, etc.).
- Falconry (12) – comments pertaining to some aspect of the sport of falconry (mostly regarding a desire for a longer, and separate, hunting season and the use of raptors for abatement purposes).
- Regulations and Adaptive Harvest Management (AHM) (13) – comments pertaining to the hunting regulations process or to AHM.
- NWRs (7).
- Hunting opportunities (11) – comments having to do with improving hunting opportunities.
- Seasons and daily bag limits (27) – comments on desired changes in seasons and daily bag limits, many being highly localized.
- Methods and technology (14) – comments related to various technologies (esp. spinning-wing duck decoys) and methods of hunting, baiting, etc.
- Shot issues (6).
- Federal Duck Stamps and taxes (5) – comments related to Duck Stamp fees and hunting-related taxes.
- Habitat and climate issues (14) – comments related to habitat conditions and effects of changing weather patterns.
- Public involvement (3).
- Avian influenza (2).
- Miscellaneous (20).

Table 1.1. Summary of comments and concerns that were raised by more than five individuals.

Comment	Frequency of occurrence
Need an extended season for falconry waterfowl hunting (i.e., that is not concurrent with gun hunting)	73
The Service should issue special use permits for falconers to take migratory birds	56
Falconers should be able to hunt for more than 107 days	52
Expand the falconry seasons for all migratory game bird species in all flyways	34
Motorized decoys should be made illegal	26
The Service should evaluate the effects of spinning-wing decoys on waterfowl harvest	14
Falconry should be the method of choice for control of depredating and pest species; the Service should authorize the use of raptors held for falconry purposes to take depredating birds	12
Include Tribal hunting regulations and Alaska subsistence harvest in the SEIS	11
California should be able to shoot more pintails; populations should be better evaluated	11
Falconry season should run later into the year	8
Scope of SEIS should not include the Alaska migratory bird subsistence process	8
Regulations should be more conservative any time the welfare of duck populations is in question	7
Cost of Duck Stamps should be raised	6
SEIS should include an evaluation of AHM process and recommended frameworks for duck harvest, with parameters needed to set frameworks for other migratory birds	6
Daily bag limits should be more conservative	6
Do not outlaw spinning duck decoys	6

SEIS – Supplemental Environmental Impact Statement

CHAPTER 2

BACKGROUND

2.1 EVOLUTION OF THE ANNUAL REGULATORY PROCESS: FALL-WINTER SEASON

Hunting of migratory birds was regulated by only a few States, or not at all, prior to 1918. State regulations varied widely, and conflicts inevitably developed. Early attempts to establish Federal control over migratory bird hunting had been unsuccessful because no clear basis for Federal authority existed (Hawkins et al. 1984). The 1916 treaty with Canada provided the needed authority and the MBTA of 1918 implemented provisions of the Treaty. In 1918, the newly established Federal authority was exercised by issuing annual regulations allowing hunting. The regulations were simple and brief. Most States were offered 107-day waterfowl seasons. Daily bag limits were liberal, and generally allowed 25 ducks (any species and combination) per day. The regulations were relatively uniform among States, affording (in principle) an equitable opportunity to hunt migratory birds. Such opportunity varied, however, due to a number of biological and environmental factors such as climate, habitat, and the abundance of birds.

The influence of harvest regulations on waterfowl population status has been an issue throughout the entire history of the process. The MBTA was established on the strong belief that some regulatory control was necessary. However, as early as 1926, Ed Nelson, Chief of the Bureau of Biological Survey, asserted that the basic issue was not one of harvest regulation, but of habitat quantity and quality. Nelson stated that waterfowl could not be legislated into abundance (Leitch 1978). The limitations of the MBTA to address habitat concerns were recognized early on. This recognition led to the development of the Migratory Bird Conservation Act of 1929, which provided for needed habitat acquisition, and the Migratory Bird Hunting and Conservation Stamp Act (Duck Stamp Act) of 1934, which provided a steady source of funding for refuge acquisitions under the Conservation Act.

For several years, migratory bird hunting regulations remained liberal, relatively simple, and uniform throughout the U.S. The regulations were issued annually by the Secretary of Agriculture with little apparent deliberation or outside influence. The pronounced period of drought in the 1930s, however, reduced waterfowl abundance substantially, and regulations became more restrictive in recognition of the reduced abundance. When the drought period ended, regulations were again liberalized somewhat. In the early 1940s, severe winter weather adversely affected snipe and American woodcock populations. In response, the snipe season was closed for several years and the American woodcock season was substantially reduced. No quantitative measures of population status for any migratory bird species are available for the early period in which hunting seasons were established. Regardless, following the drought years of the 1930s, regulations never completely returned to the previous liberal levels. Concerns about habitat conditions and a growing interest in the welfare of migratory birds fostered an approach to regulations that was relatively conservative compared to the earlier years. For example, in 1935 the duck season was only 30 days instead of 107 and the daily bag limit was 10 birds instead of 25. Throughout the 1930s and 1940s, regulations remained relatively simple and uniform among the States.

Important developments that influenced the process of issuing annual hunting regulations occurred in the 1940s and 1950s. As the new field of wildlife management gained stature, State and Federal agencies responsible for managing migratory birds expanded. Reliable funding sources, such as the Pittman-Robertson program, enabled agencies to develop monitoring programs and conserve habitat and establish management programs based on sound biological information. Among these programs were banding projects and survey programs for waterfowl, American woodcock and mourning dove populations. For the first time, these programs provided quantitative population data on which to base regulatory decisions. The Duck Stamp program, initiated in 1934 as a source of revenue for habitat conservation, also provided a means of sampling waterfowl hunters because all hunters aged 16 years or older were required to purchase a Duck Stamp. Beginning in 1952, the Service's Waterfowl Harvest Survey (WHS) began providing annual estimates of the waterfowl harvest.

As State involvement and investment in migratory bird programs grew, expectations for greater State participation in the annual regulatory process also developed. Rather severe restrictions issued by the Service in the late 1940s, for example, when the duck daily bag limit went from ten to two in two years, increased the States' interest in having a greater voice in the process. In recognition of this interest, and due to regional differences in hunting conditions and the increased information regarding population status, the Service developed a new approach to setting annual regulations. Beginning in 1947, the Nation was divided into four "flyways" (Figure 2.1) for the purpose of setting hunting regulations. In 1948, Central Flyway States formally organized as the Central Flyway Council to achieve goals more effectively and to participate fully in the formulation of annual hunting regulations for migratory birds (Appendix 2). In 1952, the other States organized along flyway lines into Flyway Councils, and the National Waterfowl Council was established in 1953.

As a result of the developments of the 1940s and 1950s, management capabilities increased, knowledge of migratory bird populations was improved, and State interests were organized along flyway lines. These developments led to hunting regulations that were more complex and less uniform across the U.S. Flyway-specific regulations were developed in response to differences in abundance of birds, hunter demography, climate, and other factors within each flyway. The result was a gradient, wherein the Pacific

Flyway had the most liberal regulations (e.g., longer season lengths and higher daily bag limits) and the Atlantic Flyway had the least. Although these differences resulted in different levels of opportunity to hunt migratory birds among flyways, the rationale for the differences generally was accepted. In essence, the rationale was that there were fewer hunters relative to the abundance of birds in the western flyways than in the eastern flyways and hence, less pressure on western stocks (a stock is a species, population, or portion of a population that is treated separately for harvest management purposes). Regulatory equity within flyways was maintained. The implementation of the flyway concept and increased State participation did not resolve all matters associated with issuing annual regulations, but it was viewed as being substantially better than before when the Service unilaterally set regulations that were nationally uniform, with the exception of the dates during which birds could be hunted.

Figure 2.1. The Waterfowl Administrative Flyways.

The regulatory process continued to evolve during the 1960s. Mourning dove management units (Figure 2.2), similar to waterfowl flyways and based on knowledge of mourning dove demographics, were established and differentiation of dove regulations among units ensued. Special studies and survey improvements advanced knowledge and increased management capabilities. The belief that mortality due to hunting was additive to natural mortality generally was accepted and this belief was reflected in the setting of annual hunting regulations. Waterfowl season lengths and daily bag limits were adjusted annually in response to population changes based on this widely held belief.

Throughout most of the 1960s, waterfowl populations were low and, consequently, regulations were restrictive. The lack of harvest opportunity led to an interest in enhancing opportunity by exploiting stocks perceived to be lightly harvested through the use of new harvest strategies, such as special regulations and bonus bag limits. Some of these new strategies were developed through experimental seasons and data-gathering, while others were based more on the presumption that the additional harvest would not negatively impact the targeted stocks. The low level of waterfowl populations accelerated public and private efforts to preserve habitat and to assure their sustainability. In an effort to provide additional harvest opportunity on lightly-harvested mallard stocks, the Columbia Basin (Pacific Flyway) and the High Plains (Central Flyway) Mallard Management Units were established within the two western flyways. These regional harvest units resulted in intra-flyway regulatory differences.

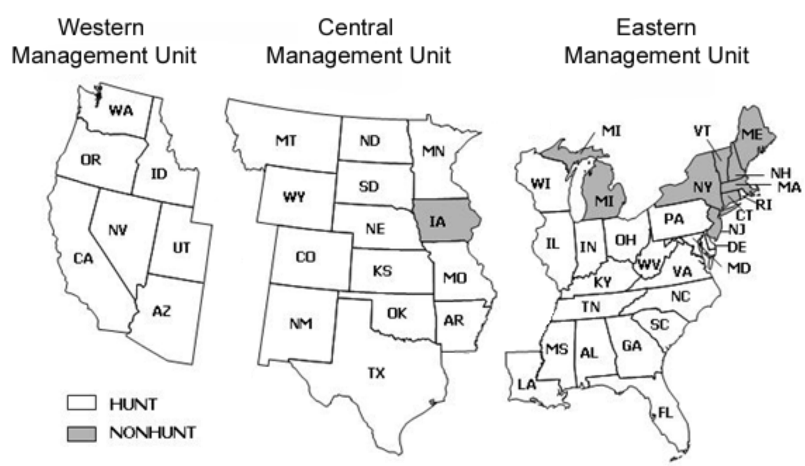

Figure 2.2. Mourning Dove Management Units showing hunting and non-hunting States.

American woodcock abundances declined during the 1970s and two management units were created (Figure 2.3), leading to differential woodcock regulations in the two units. Migratory bird survey information continued to improve and numerous additional studies led to increased understanding of migratory bird populations. Technological advances, particularly the expansion of computer technology, led to new, more powerful analytical techniques that assisted in both describing and understanding the data regarding migratory bird populations. A competing view of the impact of harvest on subsequent migratory bird populations was developed, and suggested that harvest mortality was largely compensated for by other forms of mortality in migratory bird populations. That is, harvest pressure up to a certain level would not negatively impact populations because natural mortality would decline in response to the additional birds removed from the increased harvest. Population management was refined to smaller scales and defined in plans. Annual regulations were issued more on the basis of population goals and harvest guidelines and less in automatic response to population change. Waterfowl abundances were higher in the 1970s than they were in the 1960s, but had not reached the large sizes of the 1950s. Harvest demand was high, with record numbers of waterfowl hunters participating. The use of special harvest strategies, such as the point system, increased considerably in order to more effectively exploit the "lightly utilized" stocks. Some restrictions were imposed to protect declining species, such as the American black duck. Within flyways, a third level of differential regulations came into being, with State-specific exceptions, such as special duck seasons in some individual States. A fourth level of differentiation became common as the use of zoning (see section 2.1.1.6) within States was developed and significantly expanded. In response, annual hunting regulations increased in complexity and length.

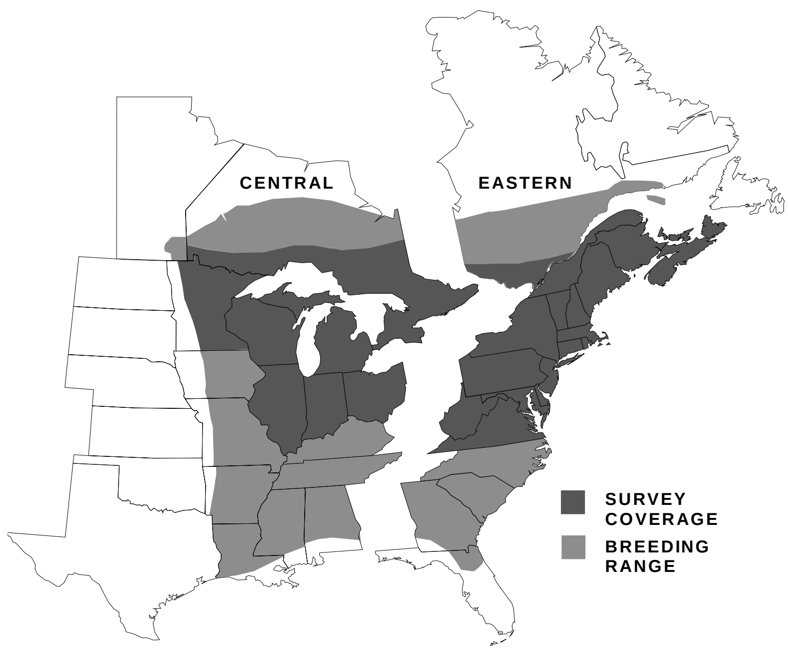

Figure 2.3. American woodcock Management Units showing breeding range and Singing-ground Survey coverage.

Flyway Councils began to play a much larger role in the development of annual regulations during the 1970s. Awareness of environmental issues by the general public increased, as did greater interest in the annual regulatory process. The regulatory process came under the purview of NEPA and was conducted in a more open manner. Consequently, not only did regulations become complex during the 1970s, but the associated administrative process became more intricate as well. The 1970s was the peak period for special regulations, as more States took advantage of existing harvest opportunities and sought additional ones.

Beginning in 1979 in Canada and in 1980 in the U.S., the two Federal governments initiated the Stabilized Regulations Program to better understand the relationship between harvest and natural processes in determining waterfowl abundance in the absence of annual changes in season lengths and daily bag limits. This program lasted through the 1984–85 hunting season. The results of the program reaffirmed the need to emphasize both habitat and harvest management to ensure the future welfare of hunted migratory bird populations. The program also greatly enhanced the understanding of mallard population dynamics. The conclusion of the stabilized regulations period coincided with another drought period and waterfowl populations declined markedly. This decline led to the development of more restrictive regulations, and many special regulatory alternatives (i.e., point system and bonus bag limits) were suspended. American woodcock numbers also declined during this period, particularly in the Eastern Management Unit, and woodcock regulations became more restrictive. In addition, indices of mourning dove abundance were declining at this time, particularly in the Western Management Unit, and regulations became more restrictive for this species as well. Additional restrictions were imposed in 1988, and season structures were modified to further curtail harvest by restricting framework opening and closing dates and shooting hours. These restrictive measures were very unpopular and were relaxed in subsequent years.

Waterfowl populations began to rebound in the early 1990s, due, in part, to better habitat conditions. These improved conditions were the result of wildlife-friendly agricultural programs, natural variation in weather, and intensive efforts to conserve and restore important habitats for waterfowl. This rebound resulted in interest on the part of waterfowl hunters and State organizations in restoring many of the special harvest opportunities that had been restricted in the late 1980s. The Service reviewed several approaches, including the use of framework dates, shooting hours, teal seasons, the point system, special scaup seasons and scaup bonus bag limits. During this same period, the Service prepared and finalized the 1988 Supplemental Environmental Impact Statement (SEIS 88), updating the original 1975 Environmental Impact Statement regarding the hunting of migratory birds. When considering alternatives for regulating the hunting of migratory birds, the Service's preferred alternative was the use of stabilized regulations (SEIS 88, page 80) with the controlled use of special regulations. Based on the Service's review of many of these special regulations, most were eliminated or constrained to some degree. During discussions regarding framework dates and shooting hours, the Service concluded that these regulations could be used to help regulate harvests, but also recognized the pronounced desire of the Flyway Councils to standardize and stabilize these regulations. This review also led to considerable discussion among the Service, Flyway Councils, and several individual States regarding what appropriate framework dates should be employed. The end result of these discussions was the establishment of a set of framework dates that would be reviewed annually, but would remain constant under most population levels experienced historically. Shooting hours were approached in the same way and standardized at one-half hour before sunrise until sunset for most regular waterfowl seasons.

The Service and the Flyway Councils began a technical review of potential methodologies to determine appropriate stabilized harvest regulations for waterfowl following the adoption of SEIS 88, and established a working group to address this issue. After several years, results of assessments from this group resulted in a recommendation to depart from the concept of stabilized regulations, and culminated in the adoption of an adaptive process for the management of duck harvests (see section 3.1). This AHM process has been used to determine appropriate duck harvest regulations since that time. Although this process has continued to evolve, the general approach is believed to be the best mechanism for establishing appropriate harvest regulations, not only for ducks but for other waterfowl and other migratory birds as well.

2.1.1 Components of Annual Regulations

The MBTA specifies that when adopting hunting regulations, the Secretary give “due regard” to the distribution, abundance, and flight lines of migratory birds, among other considerations. These considerations, especially abundance, can change from year to year, providing the logic for promulgating regulations annually. Thus, an assessment of the status of migratory bird populations is conducted annually before regulations are developed. This annual assessment helps assure that regulations are appropriate while achieving the objective that harvests of migratory birds are kept at levels compatible with the birds’ ability to withstand such harvest pressure, and at the same time maintain abundances specified in management plans.

2.1.1.1 Framework Dates for Fall-Winter Seasons

Framework dates are defined as the earliest and latest dates within which States may hold hunting seasons. Although the MBTA requires dates to fall between September 1 and March 10, most framework dates have been more restrictive, such as October 1 through January 20, or September 1 to September 30. The strategy employed by each State is to select a season within the allotted framework dates that best satisfies their hunting public and generally coincides with the greatest number of birds available. For the past several years, framework dates for waterfowl in all flyways (except for the State of Alaska) have been the Saturday nearest September 24th and the last Sunday in January.

2.1.1.2 Season Length

Season length is the number of days of hunting that may occur within the framework dates. Interpretation of the various migratory bird treaties is that season length may not exceed 107 days and usually has been less than this limit for most species in many parts of the U.S. In general, the number of days available for waterfowl hunting traditionally has been the longest in the Pacific Flyway and the shortest in the Atlantic and Mississippi Flyways, reflecting differences in the abundance of ducks, numbers of hunters, and other factors. In recent years, the opposite has been true for mourning doves, with the longer seasons being afforded in the central and eastern units. Regulating season length is considered the most effective means of controlling migratory bird harvest and, as such, has received much attention over the years in annual deliberations.

2.1.1.3 Daily Bag Limit and Possession Limit

The daily bag limit is the maximum number of migratory game birds of single species or combination (aggregate) of species permitted to be taken by one person in any one day during the open season in any one specified geographic area for which a daily bag limit is prescribed. Traditionally, daily bag limits have been generous for birds that are highly productive, abundant, short-lived and/or harvested in relatively low numbers. As with season length, flyway differences have prevailed; for example, daily bag limits for ducks have been more liberal in the Pacific Flyway and more restrictive in the Atlantic Flyway. This imbalance is based on a higher duck-to-hunter ratio in the Pacific Flyway versus the Atlantic Flyway. In combination with season length, the daily bag limit is considered an effective method of managing waterfowl harvests and the two elements often are changed in concert.

Between 1970 and 1987, the point system was used as an alternative to the conventional daily bag limit for waterfowl. The objective of the point system was to focus harvest on various species, depending on their abundance, by assigning point values according to the degree of protection biologists perceived they needed. Beginning in 1988, this option was not offered to any of the flyways and no longer is in use because it was determined to be ineffective and cause enforcement complications.

The daily possession limit is the maximum number of migratory game birds of a single species or a combination of species permitted to be possessed by any one person when lawfully taken in the U.S. in any one specified geographic area for which a possession limit is prescribed. Possession limits are established annually and, generally, they are twice the daily bag limit. Unlike daily bag limit regulations, which are annually established to limit or control harvest and based on species status, the possession limit regulations [50 CFR §20.33] are primarily for law enforcement purposes. Possession limits are sometimes the only tool law enforcement personnel have to combat over-bag limit violations, due to the remoteness of some hunting locations and the difficulties officers/agents encounter while conducting surveillance of hunter compliance. Further, possession limits act as an important deterrence to bag limit violations. It is likely that daily bag limit violations would be substantially reduced by increasing traditional possession limits.

2.1.1.4 Shooting Hours

Shooting hours restrict the time of day when migratory birds may be legally hunted. Normally not considered a regular means of controlling harvests, shooting hours rarely have been changed. Since 1918, one-half hour before sunrise to sunset has been the common period for shooting hours in the U.S., with the exception of September teal seasons and a few other instances when species identification limited shooting hours from sunrise to sunset. In 1988, shooting hours were moved back to a sunrise opening in all flyways for most seasons to protect less abundant species and those with sex-specific bag limit restrictions. Shooting hours were restored to one-half hour before sunrise to sunset in 1989 and have remained constant since then. Shooting hours are not established for subsistence harvest that occurs in Alaska, except in certain limited areas and times.

2.1.1.5 Split Seasons

States have been allowed to divide their hunting season for most species and groups of birds into two, and sometimes three, nonconsecutive segments in order to take advantage of peaks of abundance. As part of the Service’s review of regulatory strategies for ducks, undertaken after the adoption of SEIS 88, the Service established guidelines for both split seasons and zones that allow changes only once every five years, and changes must conform to these established guidelines. States were allowed to grandfather their pre-existing split and zone configurations for ducks, provided no changes were made. However, if a state with a grandfathered split/zone configuration wishes to change, it must conform to the guidelines.

2.1.1.6 Zoning

Zoning is the establishment of independent seasons in two or more areas (zones) within States for the purpose of providing more equitable distribution of harvest opportunity for hunters throughout the State. An important condition is that zoning shall not detrimentally change the harvest distribution pattern among species or populations at either the State or flyway level. Because of this, most zoning initiated in the 1970s was experimental. Until recently, few requests for zoning have been denied by the Service and no penalties currently are in place when zones are selected. Zoning is utilized extensively in all flyways. Many States use both zones and split seasons in combination to most effectively position seasons within the established framework dates.

2.1.1.7 Special Season Regulations

Generally, special regulations focus on species considered to be less-utilized than others. Occurring most frequently in eastern flyways where regulations have traditionally been more conservative, special regulations are in addition to the regular season but still subject to the 107-day limit. The most familiar special regulation has been the September teal season. Other examples include sea duck seasons in the Atlantic Flyway, and special "resident" Canada goose seasons in all flyways. Kentucky, Tennessee, and Florida have a five-day September teal and wood duck season in lieu of a longer teal-only season. In 1988, most special season regulations were discontinued, but those listed above subsequently have been reinstated.

2.1.2 Other Regulations

2.1.2.1 Closed Seasons

By Treaty, hunting seasons on migratory birds are closed beginning March 11 of each year and cannot be opened again until September 1. Further, seasons cannot be opened on September 1 unless specific actions (i.e., the regulations setting process) are taken and the Service publishes regulations permitting the seasons to be open. Thus, hunting seasons are now closed each year (as of March 11) and remain so until opened by the Service. The Service has also chosen to keep some seasons closed since first allowing seasons in 1918. These species/population specific closed seasons were to protect certain migratory game birds. Various criteria prompt season closure, usually related to low population status. Since 1918, the most notable season closures for species of waterfowl have been for trumpeter swans, wood ducks, and, more recently, canvasbacks (periodically in all flyways). Closed seasons are not popular in most cases, but they are an effective protective measure.

2.1.2.2 Permit Hunts

Permits are effective regulatory mechanisms that allow hunters to take a limited number of birds of a certain species. Recent examples of permits include the controlled harvest of Canada geese in the Pacific Flyway associated with the protection of the dusky Canada goose, tundra swans in several States, and sandhill cranes in the Central and Pacific Flyways.

2.1.2.3 Quotas

Quotas are defined as a predetermined apportionment of a limited resource. The most familiar use of this regulatory action is the allocation of harvest by quota for dusky Canada geese in the Pacific Flyway, Rocky Mountain sandhill cranes in the Central and Pacific Flyways, and trumpeter swans in Nevada and Utah. The best known use of the quotas involves the Mississippi Flyway Population of Canada geese, which were put in place in the 1960s to provide more control of the harvest than that provided by changes in season length and daily bag limits. Successful implementation of this mechanism requires considerable cooperation and effort by all of the States involved.

2.1.2.4 Special Harvest Units

The High Plains Mallard Management Unit in the Central Flyway and the Columbia Basin Mallard Management Unit in the Pacific Flyway are examples of special harvest units. These units were developed to address unique harvest opportunities afforded by biological factors that do not occur throughout an entire flyway.

2.1.3 The Regulations Process

Successful promulgation of annual hunting regulations depends on the execution of certain procedures and events according to a rigid timetable. Under the current process, the time available to gather pertinent biological information, interpret the results, develop appropriate regulatory strategies and conform to the administrative and legal requirements of establishing Federal rules currently places this process under very tight time constraints. The regulations process currently in use takes into account the objectives in setting hunting seasons, participants in the process, and the process itself, including policy constraints, scheduling, and the final product. In effect, the process has evolved in response to all these factors and has become a well-defined but rather inflexible series of events. The overall intent of the process is to access and use sound management based on reliable data, to assure that the public can participate directly, and to comply with all laws, administrative acts, and executive orders attendant to the process.

2.1.3.1 Objectives

The following six basic objectives are associated with the establishment of migratory bird hunting regulations (723 FW 1 §1.7):

(1) To provide an opportunity to harvest a portion of certain migratory game bird populations by establishing legal hunting seasons.

(2) To limit harvest of migratory game birds to levels compatible with their ability to maintain their populations at objective levels.

(3) To avoid the taking of endangered or threatened species so that their continued existence is not jeopardized, and their conservation is enhanced.

(4) To limit taking of other protected species where there is a reasonable possibility that hunting is likely to adversely affect their populations.

(5) To provide equitable hunting opportunity in various parts of the country, within limits imposed by abundance, migration, and distribution patterns of migratory game birds.
(6) To assist, at times and in specific locations, in preventing depredations on agricultural crops by migratory game birds.

2.1.3.2 Participants in the Process

Each year States, via their respective Flyway Councils, work with the Service in the regulations-development process. Selected members from each Flyway Council serve as consultants to the Service on regulatory matters, while Service representatives in each flyway function as liaisons with the Councils. Technical Committees in each flyway provide Council members and consultants with advice on biological matters for use during their deliberations. A Service Regulations Committee (SRC), comprised of a portion of the Service directorate, reviews information provided to them each year on regulatory issues and submits recommendations to the Director of the Service, and ultimately to the Secretary of the Interior, for final action.

The Service's Division of Migratory Bird Management is responsible for collecting and compiling much of the relevant biological data and coordinating the regulatory effort with States and the public. Finally, the public participates in the process through interaction with State and Federal agencies and by providing input during the public comment period.

2.1.3.3 The Process

Three primary factors constrain the process each year. Legal and administrative considerations dictate how long the process will last. These include, in addition to the mandate formalized by various treaties, requirements outlined under NEPA, the ESA, and a series of administrative Acts, such as the Administrative Procedure Act, and the Regulatory Flexibility Act (see Chapter 6). Most importantly, the biological cycle of migratory birds controls the timing of data-gathering activities, which determines when information on population status is available for consideration.

The process currently includes two separate regulations-development schedules, based on 'early' and 'late' hunting-season regulations (Appendix 5). The two-cycle system evolved due to a combination of two factors; (1) the time when biological information becomes available, and (2) the availability of harvest opportunity. Thus, seasons for webless species (e.g., doves, woodcock, rails, snipe) with relatively early migration chronologies are set earlier, and seasons for geese, ducks, and swans are set later. Early seasons generally begin prior to the last week in September and pertain to species or groups such as doves, American woodcock, rails, gallinules, cranes, snipe, sea ducks, some early-migrating duck species, and all migratory game bird seasons in Alaska, Puerto Rico and the Virgin Islands. Late seasons generally start during or after the last week in September and include other seasons not already established. There are no differences in the processes for both early and late hunting seasons. For each cycle, Service biologists gather, analyze, and interpret survey data and provide this information to all those involved in the process through a series of published status reports and presentations to Flyway Councils and other interested parties. The following discussion of the late season cycle illustrates this process.

Each July, Service biologists prepare and distribute a series of reports detailing the results of the various surveys. Based on this assessment, the Service proposes harvest guidelines and other criteria for consideration by the Flyway Councils. The Flyway Councils and Technical Committees then convene in their respective flyways to consider the biological information and develop harvest recommendations for the Service to consider for the upcoming hunting season. Flyway consultants and the SRC then meet in Washington, D.C., where the SRC considers the status of the resource and weighs recommendations from the Flyway Councils and Federal waterfowl managers prior to forwarding its own recommendations for action to the Director. From these discussions a set of proposed frameworks, or outside limits within which States may select their hunting seasons, is developed and published in the *Federal Register* according to a schedule that assures adequate public notification of the regulatory intent and adequate time for public comment. Following the comment period, the Service then finalizes the frameworks and forwards them to the Assistant Secretary of the Interior for Fish and Wildlife and Parks, representing the Secretary, for final approval. After approval, each State selects its seasons, usually following its own schedule of public hearings and other deliberations. Within the Federal frameworks, a State may be more restrictive than Federal frameworks in its selections, but not more liberal. After State selections are completed, the Service adopts them as Federal regulations by publication in the *Federal Register*.

By late August for early-season hunting regulations and mid-September for late-season hunting regulations, the annual regulatory cycle has been completed. The public may review files that are maintained from each regulations cycle, which include the minutes of all public meetings, comments and responses, *ex parte* communications, references, and all other pertinent documents. The distribution of late-season regulations information is handled by the respective State fish and wildlife agencies. The period for public review and comment is constrained, due to the limited amount of time between when the biological information becomes available and the beginning of the administrative process needed to establish the Federal regulations frameworks. Despite these limitations, however, strict adherence to the schedule has been maintained and regulations have been developed successfully each year to provide the legal basis for harvesting migratory birds in the U.S. Subsistence harvest regulations follow a similar cycle, with proposals being considered during the late season process for general hunting seasons, and a separate proposed rule is then published for public comment and review (Appendix 6). This rule usually is not finalized until late-winter because subsistence seasons do not begin until April 1 at the earliest.

2.2 NATIONAL WILDLIFE REFUGE HUNTING REGULATIONS

2.2.1 Refuge-specific Hunting Regulations

Under the National Wildlife Refuge Administration Act (16 U.S.C. §668dd-668ee), as amended, NWRs in the lower 48 States are closed to hunting and/or fishing unless opened by regulation. An exception to this occurs on Waterfowl Production Areas (WPAs) which, by regulation (50 CFR §32.1), are open to the hunting of migratory birds, upland game and big game, and to sport fishing under relevant State laws and regulations and the provisions of 50 CFR §25-31.

Many NWRs were established under, or to fulfill the purpose of, the Migratory Bird Conservation Act (16 U.S.C. §715a-715r), or through approval of the Migratory Bird Conservation Committee, as an “inviolate sanctuary for migratory birds, or for any other management purpose, for migratory birds.” On units of the Refuge System, or portions thereof established as an “inviolate sanctuary,” the Service may allow hunting of migratory game birds on no more than 40% of that refuge, or portion, at any one time, unless the Service finds that taking of any such species in more than 40% of such area would be beneficial to the species (National Wildlife Refuge Administration Act (16 U.S.C. §668dd(d)(1)(A)); MBTA (16 U.S.C. §703-712); Migratory Bird Conservation Act (16 U.S.C. §715a-715r).

In order to open a refuge to hunting or to expand an existing refuge hunting program, the Service must follow procedures in accordance with the Administrative Procedure Act (5 U.S.C. §553). The Service must publish in the *Federal Register* any proposed and final refuge-specific regulations pertaining to that hunting program prior to implementing them. Once finalized, refuge-specific hunting regulations are published in the Code of Federal Regulations (50 CFR, part 32). The refuge-specific regulations are one portion of an “opening package” required by Service policy (605 FW 2). An opening package must also include the following elements: (1) hunting chapter of the refuge Visitor Services Plan; (2) compatibility determination; (3) NEPA documentation (i.e., categorical exclusion, EA or EIS); (4) appropriate decision document (e.g., finding of no significant impact or record of decision); (5) ESA Section 7 evaluation; (6) copies of letters requesting State and, where appropriate, Tribal involvement and the results of the requests; (7) draft news release; (8) outreach plan; and (9) draft refuge-specific regulations.

Refuge managers must prepare and provide a copy of the opening package for approval through the Regional Director to the Refuge Headquarters *Federal Register* liaison by January 31 of each year (unless otherwise requested by the Director), for inclusion in the annual refuge hunting and sport-fishing regulations published in the *Federal Register*. Once a refuge is open to hunting, refuge managers must annually review refuge-specific hunting regulations and the refuge hunt chapter of the Visitor Services Plan to ensure continued compatibility and consistency with existing laws and regulations. When necessary, modifications to existing refuge-specific regulations in 50 CFR, Part 32 also are submitted for approval by the Regional Director and forwarded to Refuge Headquarters, again by January 31 of each year. The rulemaking(s) for new openings and modifications is assembled by the Refuge Headquarters *Federal Register* liaison, reviewed by other Service divisions and the Office of the Solicitor, and presented for signature by the Assistant Secretary for Fish and Wildlife and Parks. Typically the Service publishes the proposed rule(s) in July with a 30-day public comment period, and the final rule(s) are published and effective by September 30 (Appendix 7).

Compliance with refuge hunting regulations by the public is necessary to conserve the resource, provide assistance in managing the resource, and ensure public safety. Generally, State hunting regulations are sufficient to meet these purposes and, under Service policy (605 FW 2), refuge-specific hunting regulations must be consistent, to the extent practicable, with State regulations. Hunters on refuges must comply with applicable provisions of laws and regulations of the State in which the refuge is located, unless further restricted by Federal law or regulation (50 CFR §32.2(d)). The Service requires that hunters on refuges possess all applicable Federal, State, and Tribal licenses, permits, and stamps.

Refuge-specific hunting regulations cannot be more liberal than existing State laws and regulations (50 CFR §32.3(c)). Therefore, migratory bird hunting regulations adopted by the States, relative to the Federal frameworks, apply to hunting on NWRs within those States. Some refuges have adopted more restrictive regulations, generally in order to meet a resource conservation need and/or to protect public safety. Other provisions of refuge-specific regulations have similar purposes, such as to ensure compatibility of the hunting program with the refuge establishment purpose(s) and the Refuge System mission by protecting wildlife and habitats, reducing conflicts with other compatible refuge uses, maintaining the quality of the visitor experience, and protecting public safety. Examples of such provisions include regulations governing means of access to a refuge hunt area, regulating hunting-party size, and establishing reservations for hunts. Many refuges require hunters to obtain a refuge permit and some provide refuge hunt brochures which detail the refuge-specific hunting regulations.

Provisions exist in 50 CFR §32.3(f) for amendments or new conditions to be imposed at any time on a refuge during the hunting season when unpredictable changes occur in wildlife populations, habitat conditions, or in other factors affecting a refuge’s wildlife resources. Changes in refuge-specific hunting regulations made under these conditions can be in force only for the season to which the changes apply. Additionally, in the event of a threat or emergency endangering the health or safety of the public or property, or to protect the resources of the area, the refuge manager may close or curtail refuge uses of all or any part of an opened area to public access and use in accordance with the provisions of 50 CFR §25.21(3). Limiting access is accomplished by notifying the public with posted signs, issuing special regulations under the provisions of 50 CFR §26.33, making maps available, or using other appropriate methods to give the public notice of the permitted or curtailed public access, use, or recreational activity.

2.3 SUBSISTENCE HARVEST

The original migratory bird treaties with both Canada and Mexico prohibited the taking of migratory game birds from March 11 to August 31 of each year. Neither of these treaties, however, considered the traditional harvest of migratory birds by northern indigenous people during the spring and summer months. This harvest, which had occurred for centuries, was necessary to the subsistence lifestyle of the Northern people and continued despite this prohibition.

U.S. treaties with Canada, Mexico, Japan and Russia have been implemented in the U.S. through the MBTA. Recognizing the importance of migratory birds as food to native peoples, the Service, by longstanding policy and practice, had not enforced the closed season provisions of the MBTA against subsistence hunters. However, the courts have construed the MBTA as prohibiting the Federal Government from permitting any harvest of migratory birds that is inconsistent with the terms of any of the migratory bird treaties. The restrictive terms of the Canada and Mexico treaties thus prevented the Federal Government from permitting the traditional subsistence harvest of migratory birds during spring and summer in Alaska. To remedy this situation, the U.S. negotiated protocols amending both the Canada and Mexico treaties to allow for spring-summer subsistence harvest of migratory birds by indigenous inhabitants of identified subsistence harvest areas in Alaska and Canada. The U.S. Senate approved the amendments to both treaties in 1997.

The major goals of the amended treaty with Canada were to allow for traditional subsistence harvest and improve conservation of migratory birds by allowing effective regulation of this harvest. The amended treaty with Canada allowed permanent residents of villages within subsistence harvest areas, regardless of race, to continue harvesting migratory birds from March 11 to August 31 as they have done for thousands of years. A list of the species available for subsistence harvest (as of 19 May, 2009) is provided in Appendix 4. The Letter of Submittal from the Department of State to the White House declares that lands north and west of the Alaska Range and within the Alaska Peninsula, Kodiak Archipelago, and the Aleutian Islands qualify as subsistence harvest areas (Appendix 9). Treaty language provides for further refinement of this determination by management bodies.

The amendments, however, were not intended to cause significant increases in the take of migratory birds relative to their continental population sizes. Therefore, the Letter of Submittal (Appendix 9) places limitations on who is eligible to harvest, and where they can harvest migratory birds. Road-accessible areas of Anchorage, the Matanuska-Susitna and Fairbanks North Star Boroughs, the Kenai Peninsula, the Gulf of Alaska, and Southeast Alaska generally do not qualify as subsistence harvest areas. Limited exceptions have been made so that some communities within these excluded areas now participate in the regulated harvest.

2.3.1 Development of the Regulatory Process for Subsistence Harvest

The amended treaty with Canada called for creation of management bodies to ensure an effective and meaningful role for Alaska's indigenous inhabitants in the conservation of migratory birds. According to the Letter of Submittal, management bodies are to include Alaska Native, Federal, and State of Alaska representatives as equals. Management bodies were charged with developing recommendations on, among other things: seasons and bag limits, methods and means of take, law-enforcement policies, population and harvest monitoring, education programs, research and use of traditional knowledge, and habitat protection. The management bodies also were charged with involving village councils to the maximum extent possible in all aspects of management.

In 1998, the Service began a public-involvement process to determine how to structure management bodies in order to provide the most effective and efficient involvement for subsistence users. A notice was published in the *Federal Register* stating that the Service intended to establish management bodies to implement the spring and summer subsistence harvest (63 FR 49707 [September 17, 1998]). Public forums, attended by the Service, the Alaska Department of Fish and Game, and the Native Migratory Bird Working Group, were held to provide information regarding the amended treaties and listen to the needs of subsistence users. The Native Migratory Bird Working Group was a consortium of Alaska Natives formed by the Rural Alaska Community Action Program to represent Alaska Native subsistence hunters of migratory birds during the treaty negotiations. Forums were held in Nome, Kotzebue, Fort Yukon, Allakaket, Naknek, Bethel, Dillingham, Barrow, and Copper Center. Additional briefings and discussions were held at the annual meeting of the Association of Village Council Presidents in Hooper Bay and for the Central Council of Tlingit and Haida Indian Tribes in Juneau. Staff members from Alaska NWRs conducted public meetings in the villages within their refuge areas and discussed the amended treaties at those meetings.

On July 1, 1999, the Service published in the *Federal Register* (64 FR 35674) a notice of availability of an options document, entitled "Forming Management Bodies to Implement Legal Spring and Summer Migratory Bird Subsistence Hunting in Alaska." This document described four possible models for establishing management bodies and was released to the public for review and comment. Copies of the document were mailed to approximately 1,350 individuals and organizations, including all Tribal councils and municipal governments in Alaska, Native regional corporations and their associated nonprofit organizations, the Alaska Department of Fish and Game, Federal land-management agencies, representatives of the four Flyway Councils, conservation and other affected organizations, and interested businesses and individuals. An additional 600 copies were distributed at public meetings held in Alaska to discuss the four models. The document also was made available on the Service's web page.

On March 28, 2000, the Service published in the *Federal Register* (65 FR 16405) the Notice of Decision, "Establishment of Management Bodies in Alaska to Develop Recommendations Related to the Spring/Summer Subsistence Harvest of Migratory Birds." This notice described the way in which management bodies would be established and organized. Based on the views expressed on the options document, the decision was made to establish one Statewide management body consisting of one Federal member, one State member, and 7–12 Alaska Native members, with each component serving as equals. The management body named itself the Alaska Migratory Bird Co-management Council (AMBCC) at its initial meeting on October 30, 2000.

2.3.2 The Regulatory Process for Subsistence Harvest

On August 16, 2002 the Service published regulations (50 CFR, Part 92) in the *Federal Register* (67 FR 53511-53520) entitled, "Procedures for Establishing Spring/Summer Subsistence Harvest Regulations for Migratory Birds in Alaska." The regulations: (1) provide the authority for the AMBCC to operate; (2) establish the procedures by which the AMBCC conducts its business; (3) provide the authority to the AMBCC to make recommendations regarding applicability and scope of subsistence harvest, and determine who is eligible to participate in subsistence harvest; (4) give the AMBCC the authority to establish a process by which migratory birds can be used and possessed under subsistence-harvest regulations; (5) define regional management areas; (6) describe the relationship the rule has to the process for developing national hunting regulations for migratory birds; and (7) allow for future development of regulations pertaining to methods and means of harvest traditionally used for subsistence purposes.

Decisions and recommendations of the AMBCC are by consensus whenever possible. If a vote is necessary, however, each component (Federal, State, and Native) will have one vote. The AMBCC works with 11 regional bodies, consisting of local subsistence users, to develop and review proposed regulations. The AMBCC acts on all proposed regulations and forwards their recommendations to the Service and Flyway Councils prior to their respective late season meeting. The Flyway Councils may comment on the AMBCC recommendations, but may not alter or edit them. The first regulated spring and summer harvest of migratory birds occurred in 2003.

2.3.3 Subsistence-Harvest Regulations

2.3.3.1 Authority and Process

Authority to promulgate regulations to implement an Alaskan subsistence harvest comes from the MBTA (16 U.S.C. §712) which states

> *"In accordance with the various migratory bird treaties and conventions with Canada, Japan, Mexico, and the Union of Soviet Socialist Republics, the Secretary of the Interior is authorized to issue such regulations as may be necessary to assure that the taking of migratory birds and the collection of their eggs, by the indigenous inhabitants of the State of Alaska, shall be permitted for their own nutritional and other essential needs, as determined by the Secretary of the Interior, during seasons established so as to provide for the preservation and maintenance of stocks of migratory birds."*

Subsistence seasons are closed unless specific action is taken to open them each year, following the precedent established for the traditional fall-winter seasons. Unlike the fall-winter season system, however, frameworks regulations are not issued. The State of Alaska does not promulgate its own regulations nor does it regulate the subsistence bird hunt. Under the authority given above, the annual regulations adopted by the Service are final, apply to all eligible lands within Alaska, and are made available directly to subsistence hunters.

2.3.3.2 Annual Regulations for Subsistence Harvest

Annual regulations consist of opening and closing dates of the season, bird species that may be harvested, regional dates for closure periods to protect nesting birds, and region-specific closures, exceptions, or restrictions. Unlike fall-winter hunting, subsistence regulations do not include daily bag limits. The customary and traditional forms of taking migratory birds for subsistence in Alaska differ greatly from fall-winter hunting. Birds often are the first new food supply available after an Alaskan winter. Subsistence users harvest birds not only for themselves and their immediate families but to share with other members of their community as well. The tradition of sharing is a critical element of the subsistence way of life, as is the custom of harvesting what a community needs when resources are available. Birds are collected by the most efficient methods available, often following traditions within most Alaska Native cultures. The adoption of daily bag limits would require great changes to the customary and traditional use practices. Subsistence users have a tradition of conservation and have elected to take measures, other than bag limits, to reduce the harvest of species for which there is concern (see section 2.3.3.4, Other Regulations, below).

2.3.3.3 Season Length for Subsistence Harvest

The Letter of Submittal (Appendix 9) which accompanies the Protocol Amending the Migratory Bird Treaty with Canada indicates that, "The traditional subsistence is provided for as an exception to the closed season…" Hence, the available dates for hunting are those of the closed season, March 11 through August 31. However, the length of the season is restricted further by the treaty with Mexico, in which the signatories agreed to, "The limit of their hunting to four months in each year as a maximum…" Four months has been interpreted to be 124 days by the Department of the Interior, Office of the Solicitor. An additional restriction on hunting dates and season length comes from the treaty with Japan, which states that, "Open seasons for hunting migratory birds may be decided by each Contracting Party respectively. Such hunting seasons shall be set so as to avoid their principal nesting seasons and to maintain their populations in optimum numbers." In response to this provision, the Service has chosen to close the harvest for a minimum of 30 days during the principal nesting periods. The regional representatives to the AMBCC were requested to consult with their regional management bodies to select closures to protect nesting birds for the first regulated harvest in 2003. The Service's Office of Migratory Bird Management in Alaska also developed a list of regional closure dates for the 2003 season. The proposed dates from the Service and regions were similar, and minor differences were reconciled as part of developing regulations for the first managed season. Minor adjustments to the regional closure dates have been made as a result of proposals to adjust the dates in the years since the initial season. In order to meet the required 124-day season requirement within the available March 11 through August 31 period, the season must be closed for the required 30-day nesting period plus an additional 20 days. The AMBCC recommended that the additional 22 days be taken off at the beginning of the available dates, which resulted in a season running from April 2 through August 31.

2.3.3.4 Other Subsistence Harvest Regulations

Other regulations for the subsistence harvest include area closures and extended season closures to protect nesting or staging birds. These regulations have been the result of conservation concerns expressed at a regional or local scale. Examples of these regulations include a closure on the taking of black brant from August 16 – 31 in Izembek and Moffet Lagoons within the Aleutian/Pribilof Islands region. This closure is intended to protect brant while staging for their southward migration. An extended closure during the nesting season has been implemented on the Yukon/Kuskokwim Delta to protect black brant and cackling geese from laying to fledging. An area closure was adopted within the Aleutian/Pribilof Islands region to close the harvest of a distinct, local, and non-migratory population of tundra swans. Another full-season area closure has been implemented for the Kodiak road system to prevent the over-harvesting of all birds. Additional regulations may be adopted as more conservation needs are identified.

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CHAPTER 3

ISSUES RELATED TO HARVEST MANAGEMENT OF MIGRATORY BIRDS

3.1 HARVEST MANAGEMENT THEORY AND THE ADAPTIVE HARVEST MANAGEMENT PROCESS

[The following section has been abstracted from Runge, M.C., F.A. Johnson, M.G. Anderson, M.D. Koneff, E.T. Reed and S.E. Mott. 2006. The need for coherence between waterfowl harvest and habitat management. Wildl. Soc. B. 34(4):1231-1237.]

3.1.1 The Role of Harvest in Determining Waterfowl Population Size

The purpose of this section is to provide a general description of the underlying theory of harvest management and briefly describe what the AHM process is, and how it is used as a tool to help select appropriate regulatory actions for general waterfowl seasons. It is not intended to be an exhaustive technical review of the mechanics and mathematics of harvest management theory or model development and optimization processes. The AHM process, and many of the specifics of how it has been applied to waterfowl populations, is well documented in the scientific literature (Anderson 1975; Walters 1975; Nichols et al. 1995; Williams and Johnson 1995; Johnson and Williams 1999; Johnson 2001; Runge et al. 2006).

The harvest of renewable natural resources is predicated on the theory of density-dependent population growth (Hilborn et al. 1995). This theory predicts a decreasing rate of population growth with increasing population density (i.e., number of individuals per unit of limiting resource) due to intra-specific competition for resources. Density dependence must operate at some level in waterfowl populations, perhaps through a variety of mechanisms operating at different spatial and temporal scales. These mechanisms generally are described as involving changes in annual survival and/or recruitment rates. However, empirical evidence for density-dependence in waterfowl has been elusive, probably in part because of the adaptability of waterfowl and their ability to move among habitats when resources become limiting. At a continental scale, however, there is at least circumstantial evidence for density-dependent recruitment. For example, there is a negative relationship between the fall age ratio (young/adult) and the size of the mid-continent mallard breeding population the preceding spring (Figure 3.1).

The logistic growth curve depicts a trajectory for a population regulated by density dependence (Figure 3.2). As the population grows, it approaches and stabilizes at the carrying capacity (K), the population size that can be supported by the available habitat, in the absence of harvest. When a population closed to immigration and emigration reaches K, recruitment equals mortality. According to the logistic model, populations respond to harvest through increased reproductive output or decreased natural mortality because more resources are available per individual. Managers seek an equilibrium population size in the presence of harvest, at which the harvest, if not too great, can be sustained without reducing the breeding stock below desired levels. The relationship between equilibrium population size and harvest is referred to as a "yield curve" (Figure 3.3). A yield curve depicts how the size of the population and the sustainable harvest change as harvest rate is increased from 0 (on the right of the graph) to the maximum renewal capacity of the population (on the left of the graph).

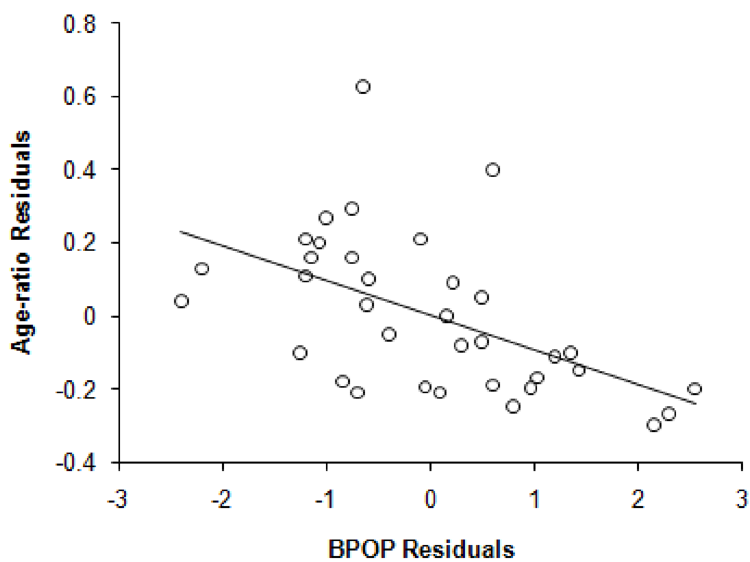

Figure 3.1. The relationship between fall age ratios and breeding-population size (BPOP) of mid-continent mallards, after accounting for the effect of variation in May ponds in Canada.

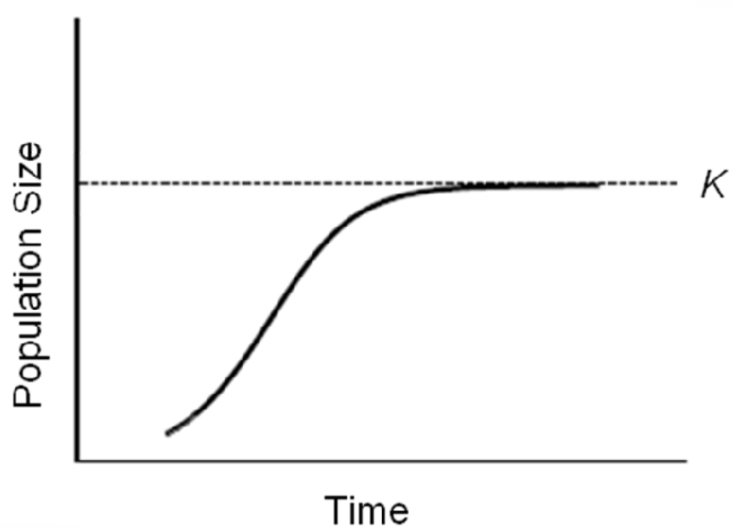

Figure 3.2. A logistic curve depicting the growth of a population regulated by density-dependent factors.

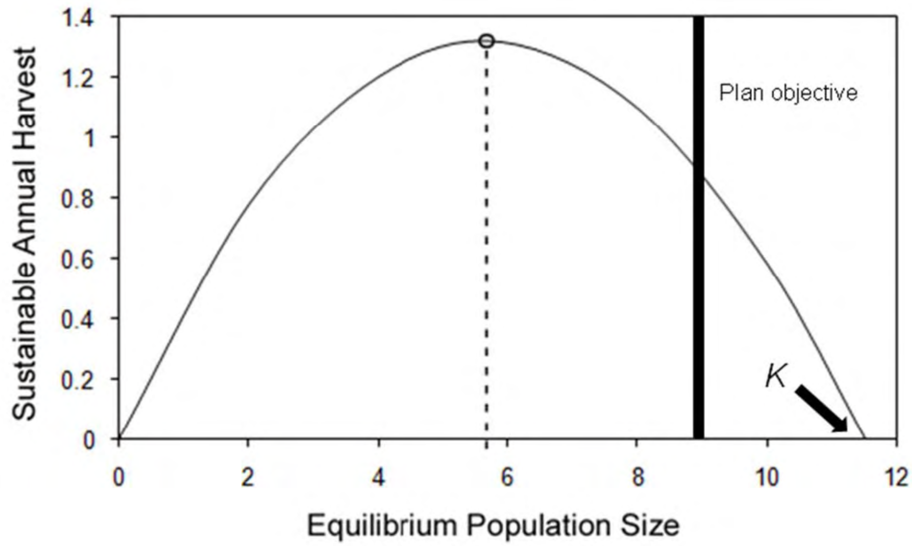

Figure 3.3. Sustainable annual harvest as a function of equilibrium population size (in millions of ducks) for mid-continent mallards (including Wisconsin, Michigan, and Minnesota). This model suggests a carrying capacity (K) under the average number of Canadian ponds of 11.5 million ducks, and a maximum sustainable harvest when the breeding-population size averages 5.9 million ducks. The North American Waterfowl Management Plan objective for mid-continent mallards, including the three Great Lakes States, is 8.5 million.

To demonstrate these concepts, information about mid-continent mallards is typically used, but mallards merely serve as an example. Although the strength and form of density dependence undoubtedly vary among species, the basic concepts of habitat limitation and sustainable harvesting should apply broadly to all migratory bird populations. For mid-continent mallards, the current AHM models predict K = 11.5 million (i.e., the average population size in the absence of harvest and under average Canadian pond numbers; Figure 3.4). If this population were harvested at an annual rate of about 12% (on adult males), the average breeding population size (BPOP) would fall to about 5.9 million, recruitment would be higher than natural mortality, and the sustainable annual harvest would reach 1.35 million mallards. This particular sustainable annual harvest level corresponds to the apex of the yield curve (Figure 3.3). Although sustainable harvests fall at any point along the curve, if the harvest rate were increased beyond 12%, the average population size would continue to take on lower values, but the sustainable annual harvest would drop as well. Thus, given our current understanding of mallard population dynamics, the maximum sustainable annual harvest occurs when the population size averages 5.9 million birds (under average pond numbers).

Figure 3.4 illustrates how population size depends on the harvest policy and, in particular, on the harvest rate. Thus, it should be possible to design a harvest policy to achieve any desired point on the yield curve. For example, if a management policy is chosen whose sole objective is to maximize sustainable harvest, then that policy will seek to hold the mallard population at around 5.9 million birds. On the other hand, a harvest policy could be chosen to hold the population around 8.5 million, which represents the North American Waterfowl Management Plan (NAWMP) objective of 7.9 million plus an objective of 0.6 million mallards in Minnesota, Wisconsin, and Michigan. However, this policy might be accompanied by a loss of about 30% of the maximum sustainable harvest.

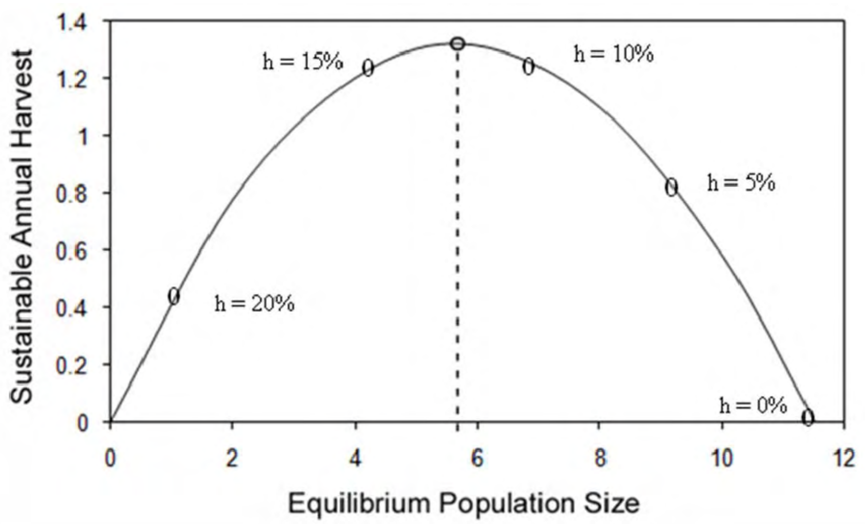

Figure 3.4. Five possible fixed-harvest-rate strategies for mid-continent mallards, each of which would result in a unique equilibrium population size. The maximum sustainable harvest is at the apex of the yield curve at an annual harvest rate of about 12% on adult males.

The current AHM models and weights suggest that some harvest opportunity must be foregone to keep the mallard breeding population closer to the NAWMP objective. In effect, current harvest policy splits the difference between the harvest rate that would maximize harvest at a breeding-population size of 5.9 million and one that would hold population size near the NAWMP objective of 8.5 million. At this point, a caveat about the concept of "maximum sustained yield" (MSY) is warranted. In fisheries management, policies were implemented that attempted to manage at the apex of the yield curve and, notably, to extract a fixed annual harvest. For reasons that are now apparent, this MSY approach was too simplistic and in some cases proved detrimental to fisheries resources (Punt and Smith 2001). The shortcoming of the traditional MSY approach was in its failure to account for variable environmental conditions and thus account for temporal variation in harvest potential. The application of harvest theory as discussed above for waterfowl is not to be confused with the traditional MSY approach. The traditional approach does not take into account annual variation in population status or habitat carrying capacity. Modern harvest management relies on state-dependent harvests (i.e., harvest levels that are managed in accordance with uncontrollable changes in population size) or, at a minimum, a constant harvest rate, which ensures that harvest is proportional to population size.

3.1.2 The Adaptive Harvest Management Process

[The following section has been abstracted from Williams, B.K., and F.A. Johnson. 1995. Adaptive management and the regulation of waterfowl harvests. Wildl. Soc. Bull. 23:430-43.]

The annual process of setting duck-hunting regulations in the U.S. has been outlined in the background section of this document and is based on a system of resource monitoring, data analyses, and rule-making. Each year, monitoring activities provide information on harvest levels, population size, and habitat conditions. Data collected from these activities are analyzed each year, and proposals for duck-hunting regulations are developed by the Flyway Councils, States, and the Service. After extensive public review, the Service announces a regulatory framework within which States may set their hunting seasons.

The Service began to implement the stabilized-regulations preferred alternative outlined in SEIS 88 immediately following the final approval of the document. However, in consultation with the four Flyway Councils and the public, it became evident that general agreement on the actual choice of appropriate levels for stabilization was lacking. The Service and cooperators then developed a process to objectively determine appropriate regulations and a way to objectively determine when such regulations might be changed. A general process to achieve this goal had been proposed earlier by Anderson (1975) for waterfowl, and Walters (1975) for salmon fisheries. This general process is termed Adaptive Harvest Management (AHM) and is based on an optimization process that explicitly takes into account the various sources of uncertainty faced by decision makers.

After several years of background evaluation and advances in computer technology, the Service advanced the concept of AHM for informing duck harvest management in the U.S. (Williams and Johnson 1995) based on the earlier proposed approach of Anderson (1975). The following overview is taken from Williams and Johnson (1995).

> "The adaptive approach explicitly recognizes that the consequences of hunting regulations cannot be predicted with certainty, and provides a framework for making objective decisions in the face of that uncertainty. Inherent in the adaptive approach is recognition that management performance can be maximized only if regulatory effects can be predicted reliably. Thus, adaptive management relies on an iterative cycle of monitoring, assessment, and decision-making to clarify the relationships among hunting regulations, harvests, and waterfowl abundance."

> "In regulating waterfowl harvests, managers face four fundamental sources of uncertainty:

(1) Environmental variation - the temporal and spatial variation in weather conditions and other key features of waterfowl habitat; an example is the annual change in the number of ponds in the Prairie Pothole Region (PPR), where water conditions influence duck reproductive success;
(2) Partial controllability - the ability of managers to control harvest only within limits; the harvest resulting from a particular set of hunting regulations cannot be predicted with certainty because of variation in weather conditions, timing of migration, hunter effort, and other factors;
(3) Partial observability - the ability to estimate key population attributes (e.g., population size, reproductive rate, harvest) only within the precision afforded by existing monitoring programs; and
(4) Structural uncertainty - an incomplete understanding of biological processes; a familiar example is the longstanding debate about whether harvest is additive to other sources of mortality or whether populations compensate for hunting losses through reduced natural mortality. Structural uncertainty increases contentiousness in the decision-making process and decreases the extent to which managers can meet long-term conservation goals."

"Adaptive Harvest Management (AHM) was developed as a systematic process for dealing objectively with these uncertainties. The key components of AHM include:

(1) A limited number of regulatory alternatives (otherwise referred to as 'packages' when referring to those used in general duck hunting seasons), which describe flyway-specific season lengths, bag limits, and framework dates;
(2) A set of population models describing various hypotheses about the effects of harvest and environmental factors on waterfowl abundance;
(3) A measure of reliability (probability or "weight") for each population model; and
(4) A mathematical description of the objective(s) of harvest management (i.e., an "objective function"), by which alternative regulatory strategies can be evaluated."

"These components are used in a stochastic optimization procedure to derive a regulatory strategy, which specifies the appropriate regulatory alternative for each possible combination of breeding population size, environmental conditions, and model weights. The setting of annual hunting regulations then involves an iterative process:

(1) Each year, an optimal regulatory alternative is identified based on resource and environmental conditions, and on current model weights;
(2) After the regulatory decision is made, model-specific predictions for subsequent breeding population sizes are determined;
(3) When monitoring data become available, model weights are increased to the extent that observations of population size agree with predictions, and decreased to the extent that they disagree; and
(4) The new model weights are used to start another iteration of the process."

"By iteratively updating model weights and optimizing regulatory choices, the process should eventually identify which model is most appropriate to describe the dynamics of the managed population. The process is optimal in the sense that it provides the regulatory choice each year necessary to maximize management performance. It is adaptive in the sense that the harvest strategy "evolves" to account for new knowledge generated by a comparison of predicted and observed population sizes."

The Service, States and cooperators all have reached a consensus that this process is the appropriate one for determining general duck harvest regulations. With regard to the general use of the AHM process, Anderson (1985) stated: "The recursive theory of stochastic dynamic programming is the only realistic approach to determining optimal harvest strategies." The Service will continue to employ AHM as a tool to help determine the appropriate regulatory decisions regarding migratory bird hunting that will be consistent with long-term conservation. Continued evolution regarding the technical inner workings of this process (i.e., model structures, model weight updating, optimization procedures, etc.) will be subject to annual review and modification as warranted by increased understanding and new information. Such reviews and modification will be discussed with Flyway Councils and subject to public review through the annual *Federal Register* process for establishing annual regulations.

3.2 DEFINING POPULATIONS FOR HARVEST MANAGEMENT PURPOSES

The protection and management of migratory birds is a responsibility of the Federal Government. This responsibility is, in turn, vested in the Department of the Interior and ultimately the Service. The Service has a goal to conserve migratory birds and their habitats in order to ensure that the American people will enjoy continued usage, both consumptive and nonconsumptive, of these resources. This trust responsibility is shared with the States through cooperative working relationships with the Flyway

Councils, which were established by 1952. This system of conservation was first implemented for waterfowl, but over the years has now been expanded to encompass other game and non-game birds.

One of the greatest challenges in the implementation of the flyway approach to cooperative management of these resources requires the development and implementation of population and habitat strategies. Beginning in the early 1980s, the Service and the Flyway Councils initiated a comprehensive planning program for migratory bird populations and habitat management. Since that time, cooperative efforts to develop, implement, and update planning documents have been very successful, and this work continues at the flyway level. As a result, a large number of planning documents for population and habitat management have been prepared and implemented.

The delineation of specific groups of birds that are targeted for specific management actions required a definition of unambiguous population boundaries in time and space. This poses unique challenges for migratory birds, because their distribution is not static. However, the identification, delineation, and grouping of species that include subspecies and distinct population segments are central to the management and conservation of migratory birds.

The delineation of a specific group of migratory birds and the geographic area targeted for management requires that the terminology for this application be defined, because there are differences from those strictly based on biological interpretations. For example, the U.S. Endangered Species Act (ESA) protects species of wild fauna and flora "in danger of extinction throughout all or a significant portion of their range." The term "species" in the ESA includes subspecies and distinct population segments (vertebrates only) which interbreed when mature. The Secretary of the Interior has the final determination in what is considered "significant," and the term "range" refers to the geographic area where the species currently exists, not the species' historical distribution (U.S. Department of the Interior 2004). The biological species concept is probably the most widely accepted species concept, and defines species as groups of organisms capable of breeding and producing fertile offspring (Mayr 1942). A "population" refers to a group of individuals of the same species that is "demographically, genetically, or spatially disjunct from other groups of individuals" (Wells and Richmond 1995). A population can include several metapopulations or genetically disjunct populations (Wells and Richmond 1995). A population of geese for management purposes was defined by Trost et al. (1990) as, "a group of geese, of a single species, whose breeding site fidelity, migration routes and wintering areas are temporally stable, sufficiently distinct geographically (at some time of the year), and adequately described so that the population can be monitored when various management strategies or other factors act to alter the population status."

A managed migratory bird population may include one or more biological populations and is an aggregation of individuals of the same species (or in some cases "look-alike" or closely-related species) that occupy a particular area at a given time. Aggregations of individuals or populations most useful for management or conservation purposes should occur during breeding, migration, or wintering time periods in a defined area and are at times distinct from conspecifics temporally or spatially. Managed migratory bird populations also exhibit unique population demographic attributes or vital rates (e.g., recruitment/mortality rates, age and sex composition, or numerical abundance), which can be influenced through differential management practices. The population, as such, should be capable of being monitored separately from other such groups of birds.

The remarkable mobility of migratory birds makes it difficult to delineate populations on both large and small geographic scales. Many bird populations include a network of subpopulations, wherein groupings of birds are demographically independent, but dispersal among these subpopulations occurs over short distances. The challenge in defining a population for management in this case lies with determining the level of connectivity of the various subpopulations. At a larger geographic scale, birds from different populations typically overlap as they traverse large distances during annual migration, and subsequently intermingle at different periods during the annual cycle. Specific population units are difficult to identify within this large amalgamate population, especially for hunters who rely primarily on morphological characters for identification. The genetic diversity of a small population comingling within a larger group of morphologically similar birds may be threatened if the entire group is managed as a single unit.

The Service and Flyway Councils obtain the biological data necessary for delineating migratory bird populations by using a combination of the following techniques:

A. <u>Population surveys</u>. Annual aerial surveys across the U.S. and Canada provide a measure of the density and distribution of waterfowl populations as well as an opportunity to assess habitat conditions. In addition, various ground surveys, particularly for webless species, are conducted annually to assess population status and distribution, as well as to monitor habitat conditions.

B. <u>Harvest surveys</u>. Harvest surveys provide an estimate of the number of waterfowl taken each year. Estimates of harvest rates are determined from banding data and require the cooperation of hunters to obtain the necessary information.

C. <u>Banding and recovery data</u>. Birds are banded (neck or leg bands) each year according to established protocols and then are monitored regularly throughout their life span. Band data are useful for identifying breeding, migration, and wintering ground "affiliations," determining population size of flocks, and defining migration corridors.

D. Radio-telemetry. Telemetry involves the use of a small portable transmitter attached to a free-ranging bird that emits radio waves, which are picked up by a receiver. Given their transient nature, migratory birds are difficult to observe directly. Radio-telemetry allows long-range monitoring of specific individuals within a population as the birds move from place to place.

E. Genetic assessments. When used in conjunction with ecological population data, molecular genetics can provide a powerful tool for defining population boundaries and estimating population dynamics for management purposes. Genetic assessments should include as many molecular markers as possible (i.e., microsatellites, mtDNA, paternally inherited markers, other nuclear genes). The type of molecular marker and the analyses of the data take into account the type of evaluation being performed (e.g., population vs. subspecies). Genetic data do not take precedence over morphological, behavioral, ecological, geographic and other life-history differences (Fallon 2007).

The Service has managed migratory bird harvests at multiple scales based on the preceding information. The intent of the Service is to continue this multiple-scale management approach in the future. The Service, flyways, and international partners will continue to evaluate the scale of harvest for specific stocks as presently defined and make adjustments to these scales as warranted by new or changing information on distribution, genetics, and other factors.

3.3 STOCK-SPECIFIC MANAGEMENT STRATEGIES

Stock-specific harvest strategies have been developed to address management of stocks that present unique management challenges or opportunities. The AHM protocols for the three populations of mallards determine the general duck season length and daily bag limit for each flyway in a given year. For some stocks, however, the general season length and daily bag limit could result in harvest rates higher than desired. In those cases, stock-specific harvest strategies are utilized to determine the appropriate season length and/or daily bag limit for that stock. Separate harvest strategies also exist for some stocks to provide additional harvest opportunities beyond regular seasons (e.g., September teal season). A distinction is made between harvest strategies that are developed cooperatively and adopted by the Service (e.g., northern pintail example follows below), and those that are contained in management plans developed by Flyway Councils (e.g., RMP cranes example follows below). Although the Service typically implements regulatory actions called for in management plans, the Service does not formally endorse such plans and reserves the option to deviate from them if compelling biological evidence is presented that the Service believes would warrant a change from that prescribed in the management plan.

The following species have specific harvest strategies developed (or in development): teal, northern pintail, canvasback, wood duck, American black duck, Canada goose (most populations), white-fronted goose, brant, scaup, tundra swan, mourning dove, American woodcock and sandhill crane. The descriptions presented below illustrate the two types of harvest strategies currently in use. The following is not intended to be a complete description of all of the strategies.

Northern Pintail

The northern pintail has experienced a dramatic population decline, especially since the mid-1970s. The Service adopted a cooperatively-developed Northern pintail harvest strategy in 1997. The strategy is a prescribed, objective process for arriving at an appropriate harvest regulation choice for any given population level each year. The original strategy relied on an additive hunting-mortality, density-dependent production model with an explicit allowance for population growth as follows:

$$N_{t+1} = [\, N_t\, S_s + N_t S_s R_t(0.8) - H] * S_w = (1.06)\, N_t$$

where:

- N = Breeding population estimate from all surveyed strata
- S_s = Summer survival (assumed to be 0.70)
- R_t = Recruitment (modeled separately based on geographic distribution of the spring breeding population)
- H = Estimated harvest adjusted for crippling loss (0.2) and harvests in Alaska and Canada
- S_w = Late-winter survival (assumed to be 0.93)

The population models require knowing the BPOP and the mean latitude of the breeding population. These aspects are determined annually in the Waterfowl Breeding Population and Habitat Survey (WBPHS) conducted in May-June in the traditional survey areas. Based on a desired population growth of 6%, a harvestable surplus is determined and allocated among the flyways according to historic distribution of harvest. Several constraints were placed on the process to allow for limited harvest, even if little or no population growth is expected. However, a bag limit greater than one bird per day requires projected population growth to be at least 6% with the increased bag limit. The strategy mandated a season closure in the lower 48 States if the northern pintail breeding population fell to 1.5 million or fewer, and when the fall flight was predicted to be fewer than two million birds.

Since adoption, the strategy has had a number of policy and technical modifications as additional data and insights have become available. The harvest strategy was revised in 2002 when flyway-specific harvest models were updated (67 FR 40131). In 2004, the harvest strategy was formally modified to include a partial season option (69 FR 43696 and 52971). After additional review, the strategy was revised in 2006 to include updated flyway-specific harvest models, an updated recruitment-rate model, and the addition of a procedure for removing bias in the annual estimate of BPOP based on its mean latitude (71 FR 50227 and 55656). Pursuant to requests from flyways and other stakeholders, a compensatory-harvest model was added to the strategy in 2007 (72 FR 18334) as an alternative to the existing additive-harvest model. In the future, the current prescribed strategy likely will be replaced with a derived strategy that is based on specific management objectives. A draft of a potential approach to a derived strategy was prepared by the Service (U.S. Fish and Wildlife Service 2007a) and is undergoing Flyway Council review and input.

Rocky Mountain Population of Sandhill Cranes

The harvest strategy contained in the Flyway Management Plan for RMP cranes stipulates that an allowable annual harvest will be calculated and allocated among hunting States based on pre-determined distributions (Subcommittee on Rocky Mountain Greater Sandhill Cranes 2007). The total allowable harvest for the entire population is based on the formula:

$H = C \times P \times R \times L \times f$

where:

H = Total allowable harvest;
C = Average of the three most recent, reliable fall population indices;
P = Three-year average proportion of fledged chicks in the fall population in the San Luis Valley
R = Estimated recruitment of fledged chicks to breeding age (current estimate is 0.5);
L = Retrieval rate of 0.80 (allowance for an estimated 20% crippling loss); and
f = Variable factor used to adjust the total harvest to achieve a desired effect on the entire population $(C/16{,}000)^3$

The allowable harvest is then allocated among States based on approximate, relative abundance in the cranes' summer and migration/winter ranges (Subcommittee on Rocky Mountain Greater Sandhill Cranes 2007).

3.4 RELATIONSHIP OF HARVEST MANAGEMENT TO HABITAT MANAGEMENT

[The following section has been abstracted from Runge, M.C., F.A. Johnson, M.G. Anderson, M.D. Koneff, E.T. Reed and S.E. Mott. 2006. The need for coherence between waterfowl harvest and habitat management. Wildl. Soc. B. 34(4):1231-1237.]

The relationship between harvest and habitat in determining migratory bird population sizes has been recognized since the beginning of modern wildlife management. As described in the introductory section of this SEIS, the MBTA was initiated because of the strong belief that some form of coordinated harvest regulation was necessary to ensure perpetuation of migratory birds for future generations. Although the relationship between bird harvest and habitat is applicable to all hunted species, this relationship has been studied most intensely for waterfowl. From the earliest period of Federal regulations, many professionals recognized that waterfowl (and other migratory birds) could not be legislated into abundance solely through harvest regulation (Leitch 1978). In recognition of the role of habitat in sustaining waterfowl (and other wetland bird species), the U.S., Canada and Mexico developed the NAWMP to preserve and enhance upland and wetland habitats in North America (U.S. Department of the Interior and Environment Canada 1986, U.S. Department of the Interior, Environment Canada and Secretario de Desarrollo Social Mexico 1994). Much of the habitat conservation and management for waterfowl and other wetland-dependent birds are currently conducted under the auspices of this plan. The NAWMP also established population objectives for most major waterfowl populations based on the average population sizes observed during the 1970s. The following section describes how these two factors, harvest and habitat management, are related.

In simple terms, changes in abundance of hunted bird populations are controlled (albeit to varying degrees) by three factors: (1) intrinsic density-dependence, which ultimately depends on the quantity and quality of available habitat and the biology of each species; (2) density-independent effects on mortality and reproduction; and (3) regulated harvest. The interaction of these three factors can be understood by considering a simple description of the harvest dynamics of mid-continent mallards (Figure 3.5). This graph shows a range of equilibrium breeding-population sizes for mid-continent mallards and their corresponding levels of sustainable annual harvest under average pond conditions on the breeding grounds. On the right side of the graph, in the absence of harvest, current population models predict the BPOP would average 11.5 million mallards, and the sustainable annual harvest would of course be zero. At this point, intrinsic density-dependent factors reduce recruitment so that it just matches mortality; there is no harvestable surplus. If this population were harvested at about 12%, the average BPOP would drop to about 5.9 million, recruitment would be higher than natural mortality, and the sustainable annual harvest would reach 1.35 million ducks.

If the harvest rate were increased beyond 12%, the population size would continue to decline, but the sustainable annual harvest would drop as well. Given our current understanding of mallard population dynamics, the maximum sustainable annual harvest thus occurs when the population size averages 5.9 million birds (under average pond conditions).

Theoretically, a harvest policy can be designed to achieve any point on the quadratic curve in Figure 3.5. Importantly, the observed average population size will depend on the harvest policy, particularly the average harvest rate. If a harvest policy is chosen whose sole objective is to maximize sustainable harvest, then that policy will seek to hold the average population size at around 5.9 million. On the other hand, a harvest policy could be designed to hold the average population around 8.5 million, which represents the

NAWMP objective of 7.9 million plus an objective of 0.6 million mallards breeding in the States of Minnesota, Wisconsin, and Michigan. However, this policy would be accompanied by a loss of about 30% of the maximum sustainable harvest. The current objective in AHM foregoes some harvest to keep the mallard population closer to its NAWMP goal. In effect, current harvest policy splits the difference, resulting in a population, on average, about halfway between 5.9 and 8.5 million. Harvest policy can affect whether population objectives of the NAWMP are met, irrespective of the success of the plan's habitat-conservation efforts.

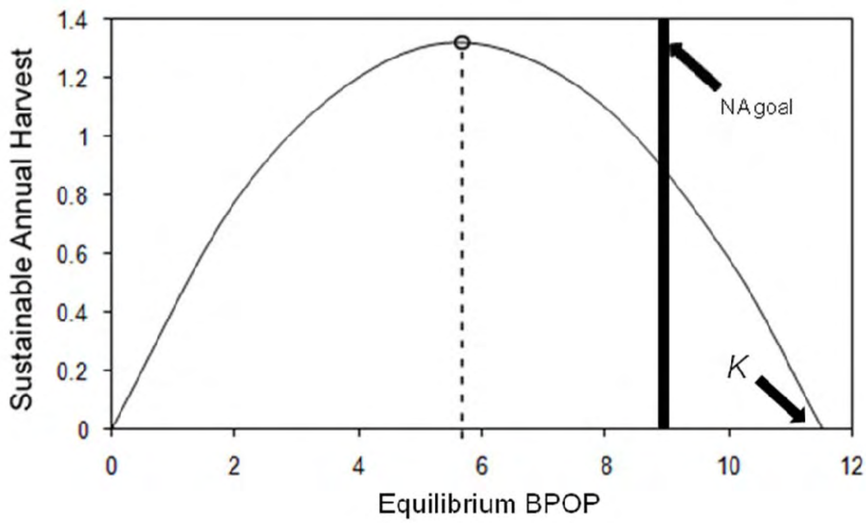

Figure 3.5. Sustainable annual harvest (in millions of ducks) as a function of equilibrium breeding population size (BPOP), for mid-continent mallards (including Wisconsin, Michigan, and Minnesota), using the weighted 2003 Adaptive Harvest Management model. This model suggests a carrying capacity (K), under average Canadian pond conditions (3.4 million ponds), of 11.5 million ducks, and a maximum sustainable harvest when the BPOP averages 5.9 million ducks. The North American Waterfowl Management Plan goal for mid-continent mallards, including the three Great Lakes States, is 8.5 million.

Conversely, NAWMP activities can influence harvest potential and therefore the harvest-management policy. Habitat conservation could increase the carrying capacity of the environment, thereby stretching the quadratic curve to the right (Figure 3.6). For example, if enough of the landscape were restored so that the mid-continent mallard population size, in the absence of harvest (the carrying capacity), increased to 16 million ducks (instead of the current 11.5 million), then the optimal sustainable harvest would be expected to occur when the population size was about eight million ducks (instead of the current 5.9

million). Two points are salient: (1) habitat management leading to an increase in carrying capacity will increase the population size at which harvest is maximized and increase the size of the maximum sustainable harvest; and (2) the observed population size under improved habitat conditions can only be used for evaluating NAWMP success if the harvest policy is considered. Biologists recognize that Figure 3.5 is a greatly simplified representation of mallard population dynamics. In reality, mallard population growth rates, carrying capacity, and harvest potential vary significantly with the wet-dry fluctuations on the prairie breeding grounds. Nevertheless, Figure 3.5 can be interpreted as the central tendency of mid-continent mallard population dynamics. Under average conditions (or on average over-fluctuating conditions), the relationship between population size and sustainable harvest is described by Figure 3.5, at least to the extent that our current understanding of mallard population dynamics is correct.

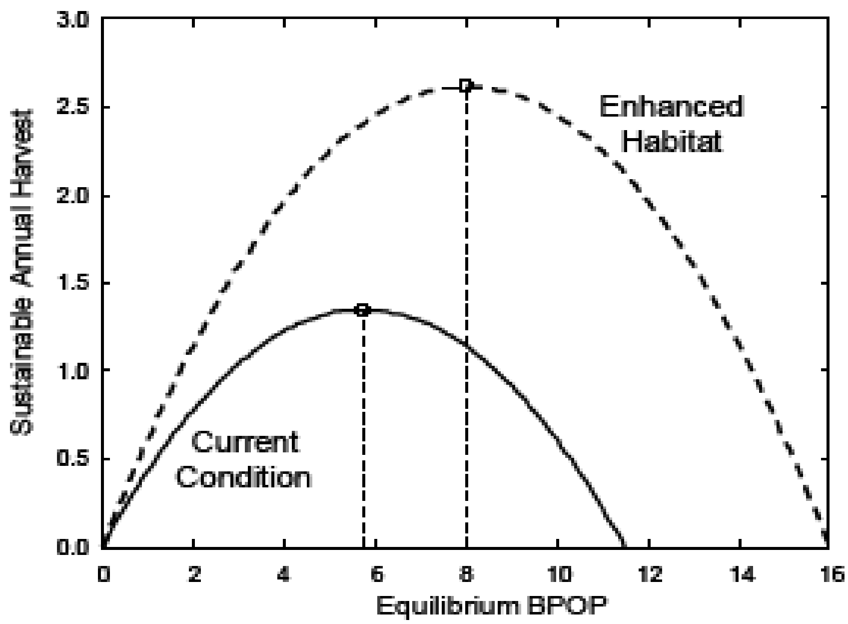

Figure 3.6. Sustainable annual harvest (in millions of ducks) as a function of equilibrium breeding population size (BPOP). The solid curve (Current Condition) is identical to the curve in Figure 3.5. The dashed curve (Enhanced Habitat) represents the sustainable harvest if the carrying capacity were increased to 16 million.

Habitat conservation and harvest management are inextricably linked. Habitat conservation can affect the size of the harvestable surplus by enhancing the potential for population growth. Harvest policy can affect the degree to which available habitat is used and also how much habitat is needed. Observed population sizes can only be interpreted in relation to objective levels by considering the impacts of both habitat and harvest management.

The above discussion is a simplification of a very complex system. Managers are currently considering how to explicitly link the habitat and population goals in the NAWMP to the annual harvest-regulations process. Basically, goals for average sustainable harvest will determine total habitat goals or habitat goals will determine the average sustainable harvest. The challenge that managers face in the coming years is to determine obtainable and sustainable habitat goals that will provide acceptable levels of sustainable harvest.

3.5 MANAGEMENT PLANS

Initially, the Flyway Councils and the Service focused their collective attention on hunting regulations and habitat protection. As knowledge of biological processes and management capabilities increased, attention expanded to include maintaining and/or enhancing migratory bird populations. Implementation of harvest programs with an overall goal of providing maximum hunting opportunity led to the collaborative development of population management plans, primarily for species other than ducks.

A National Waterfowl Management Plan for the United States (1982) advocated that the Service should cooperatively work with the Flyway Councils and other interested parties to identify distribution problems and develop joint management guidelines (plans) to solve them. Beginning with this direction, Cooperative Flyway Population Management Plans have been developed and are regularly updated for various populations of ducks, geese, swans and cranes. The NAWMP (U.S. Department of the Interior and Environment Canada 1986) reaffirmed this population level of management in stating that "waterfowl populations should be managed by identifiable subpopulations where these can be biologically justified and for which management regimes are feasible."

The Service has strongly encouraged the development of flyway-endorsed management plans for important migratory bird species and populations. These management plans have been commonly referred to as Cooperative Flyway Management Plans (Flyway Plans). Although closely associated with other planning efforts, Flyway Plans are distinct from National Species of Special Emphasis Plans, National Resource Plans, National Recovery Plans, Contingency Plans, the NAWMP, and other similar planning efforts. The Flyway Plans have been developed cooperatively with staff participation from the Service and State Game and Fish Agencies, with input from agencies in Canada, and on occasion from Mexico, Japan, and Russia, other invited authorities and scientists, and rarely with input from aboriginal interests or the public at large.

Delineation of management populations has resulted in several intra-flyway management plans that often are international in scope. Harvest on most populations occurs during the migration and wintering portions of the annual cycle. As a result, many management populations initially were delineated as aggregations of wintering birds. Exceptions to this general statement do exist, for example, the majority of the Pacific black brant harvest occurs during subsistence seasons.

Although their format and content vary, most Flyway Plans attempt to integrate habitat and population planning at the flyway or management unit level. These documents usually address annual mortality associated with the hunting process and contain biological guidance on when and to what extent hunting will occur. Some Flyway Plans treat the subject in a cursory manner by simply stating that harvest opportunities will be kept at levels commensurate with population status, whereas others recommend threshold population levels or other conditions beyond which hunting opportunity may be changed.

Flyway Councils have endorsed 47 Flyway Plans, some of which were endorsed by two or more Councils. Of this total, the Pacific Flyway has endorsed 28, the Central Flyway has endorsed 17, the Mississippi Flyway has endorsed 10, and the Atlantic Flyway has endorsed 9 (Table 3.1). Functionally, the Flyway Plans are valuable documents for Flyway Councils, the Service, other agencies/organizations, and individuals in coordinating and guiding comprehensive management activities for certain migratory bird species or populations. Appropriate Service staff members participate in planning efforts to develop, revise, and implement Flyway Plans. Flyway Plans are also effective mechanisms in dealing with international harvest allocation questions. The Service does not sign, or in some cases explicitly follow, harvest-management guidelines in all Cooperative Flyway Management Plans, but strongly considers their provisions when establishing regulations. In addition, Flyway Councils also may occasionally make regulatory recommendations that are not consistent with these Flyway Plans.

The Service supports the use of Flyway Plans for both hunted and non-hunted migratory bird species, subspecies and discrete population units. However, harvest-management guidelines contained in the Flyway Plans do not supersede the existing process for setting annual hunting season regulations, as guided by the Administrative Procedure Act, NEPA, MBTA, or other legal constraints. Harvest strategies contained in Flyway Plans should be considered as guidelines, along with other input, in making annual hunting season recommendations to the Secretary of the Interior. The Service will continue to provide input into their development and updating.

Table 3.1. Cooperative Flyway Management Plans and date endorsed (month/year) by the respective Flyway Councils for specific populations/species recognized within one or more of the four flyways.

	Pacific	Central	Mississippi	Atlantic
Canada Geese				
Eastern Prairie Population			3/00	
Mississippi Valley Population			6/98	
Mississippi Flyway Giant Canada Geese			7/96	
Hi-Line Population		3/98		
Short Grass Prairie Population		3/82		
Rocky Mountain Population	7/01			
Western Prairie and Great Plains Populations		5/88		
Pacific Population	7/00			
Tall Grass Prairie Population		7/85		
Central Flyway Resident Population		3/00		
Atlantic Flyway Resident Population				7/99
Dusky Canada Goose	3/08			
Cackling Canada Goose	7/99			
Aleutian Canada Goose	7/06			
Atlantic Population				3/08
North Atlantic Population				7/08
Southern James Bay Population			3/08	3/08
Snow and Ross' Geese				
Greater Snow Goose				7/09
Mid-continent Population of Light Geese		3/82	3/82	
Western C.F. Snow and Ross' Geese		7/82		
Wrangel Island Lesser Snow Geese	7/06			
Western Arctic Lesser Snow Geese	7/92			
Ross' Geese	7/92			
White-fronted Geese				
Mid-continent White-fronted Geese	7/05	7/05	7/05	
Pacific Flyway White-fronted Geese	7/03			
Tule White-fronted Geese	7/91			
Other Geese/Brant				
Pacific Population of Brant	7/02			
Atlantic Population of Brant				7/02
Emperor Geese	7/06			
Sandhill Cranes				
Mid-continent Population	3/06	3/06		
Central Valley Greater Sandhill Cranes	7/97			
Rocky Mountain Greater Sandhill Cranes	3/07	3/07		
Pacific Flyway Lesser Sandhill Cranes	3/83			
Lower CO River Valley Gr. Sandhill Cranes	3/95			
Trumpeter Swans				
High Plains Flock		11/05		
Rocky Mountain Population	7/08			
Pacific Coast Population	7/06			
Interior Population		1/98	1/98	
North American Trumpeter Swan	7/84	7/84	7/84	7/84
Tundra Swans				
Eastern Population	7/07	7/07	7/07	7/07
Western Population	7/01			
Mourning Doves				
Mourning Dove Harvest Management Plan	7/03	7/03	7/03	7/03
Western Management Unit	3/92			
Central Management Unit		6/98		
White-winged Doves				
Western Population	3/04			
Band-tailed Pigeons				
Pacific Coast Population	3/94			
Four Corners Population	3/01	3/01		
TOTAL	28	17	10	9

3.6 ILLEGAL HARVEST

Some illegal harvest of migratory game birds occurs in addition to the legal harvest that hunters report through the annual Service harvest surveys, but the magnitude of unreported illegal harvest is difficult to ascertain. It is possible that some birds shot illegally are reported by survey participants, as long as reporting that harvest does not result in self-incrimination. For example, baiting and shooting-hour violations cannot be detected from the date and location harvest data that hunters provide; therefore, hunters have no incentive to withhold that harvest information. In contrast, hunters who do not comply with the Harvest Information Program (HIP) registration requirement are excluded from the HIP sample frame. Thus, all of their harvest goes unreported. Furthermore, hunters probably do not report illegal harvest resulting from exceeding the daily bag limit or hunting during closed seasons, because those violations can be detected from their reports.

Waterfowl hunter compliance with the HIP registration requirement was >90% during the first few years of the program, but compliance by dove, American woodcock, and other migratory bird hunters was lower (Padding et al. 2002). More recent information collected by Service law enforcement personnel on NWRs and other public lands suggests that compliance by waterfowl and dove hunters is >95% (U.S. Fish and Wildlife Service, unpublished data). Compliance by sandhill crane, band-tailed pigeon, and tundra swan hunters likely is very high because they are required to obtain special permits. Thus, unreported harvest by people who fail to obtain HIP registration probably is minimal.

Gray and Kaminski's (1994) study of illegal waterfowl hunting in the Mississippi Flyway indicated that 20–33% of duck hunters and 5–7% of goose hunters violated daily bag limit regulations at least once during the hunting season. Although the number of illegal birds those hunters shot could not be verified, Gray (1992) estimated that harvest resulting from daily bag limit violations was at least 5–7% of the total duck harvest and 2–4% of the legal goose harvest. Martin and Carney (1977) noted that daily bag limit violations observed during hunter performance studies were more frequent when bag limits were smaller. The number of birds harvested illegally was 7% of the number killed legally when the daily bag limit was one mallard, but fell to about 3% when the mallard bag limit was two or more. Daily bag limit violations also are limited somewhat by opportunity (Martin and Carney 1977). It seems likely that, in general, unreported harvest due to daily bag limit violations is <10% of the reported harvest.

Hunting during closed seasons probably is an insignificant source of unreported harvest for most migratory bird species since game birds are not present in heavily harvested areas during closed seasons. However, when species-specific closures are prescribed during open duck seasons, illegal harvest of the protected species occurs. Much of this harvest apparently is due to hunters' inability to identify ducks on the wing (Smith and Dubovsky 1998), and most of it probably goes unreported. For example, Korschgen et al. (1996) found when the duck hunting season was closed on canvasbacks, illegal harvest of canvasbacks during the duck season probably was significantly greater than the number estimated by the Service's WHS.

The available evidence suggests that as a whole, illegal, unreported harvest is much less than the reported harvests that are used to help determine appropriate hunting regulations. Estimating the magnitude of illegal harvest remains a challenge that invites further investigation.

3.7 CRIPPLING LOSS

Hunting mortality includes both harvest (retrieved kill) and crippling loss (unretrieved kill), which consists of birds that are shot by hunters and die as a result of their wounds, but are not retrieved. Crippling loss is difficult to quantify because the observer's perception of a shot's outcome can be subjective, and because the ultimate fate of a wounded, unretrieved bird is unknown (Schulz et al. 2006). The two primary methods used to estimate crippling loss are: (1) mail surveys, such as the Service's annual harvest surveys, which ask hunters to report crippling loss; and (2) direct observations of hunters, such as the waterfowl hunter-performance studies conducted by the Service (Martin and Carney 1977) and the Canadian Wildlife Service (CWS; Boyd 1971) in the 1960s, and Haas' (1977) study of dove hunters. Both methods typically use "birds shot down within sight, but not retrieved" as a surrogate for actual crippling loss. Martin and Carney (1977) found that mail surveys and hunter-performance studies gave similar crippling-loss estimates in some cases, but in general, observed crippling rates were greater than reported rates. Thus, they concluded that although the annual Service WHS provided consistent, reliable indices of crippling loss, it probably underestimated the magnitude of unretrieved kill. For population analyses purposes, managers typically consider crippling loss to be a constant proportion (0.20) of total hunting mortality (e.g., Anderson and Burnham 1976; Johnson et al. 1997).

The Service's WHS results indicate that reported crippling-loss rates (unretrieved kill as a proportion of total kill) for ducks decreased from about 0.19 in the early 1950s to about 0.14 in the early 2000s (Figure 3.7), a steady decline that was interrupted briefly by a temporary increase when nontoxic shot requirements were implemented during the late 1980s and early 1990s (Schulz et al. 2006). Goose crippling rates followed a similar trajectory over that 50-year period, declining from about 0.16 to about 0.11 (Figure 3.7). Likewise, the annual rate for MCP sandhill cranes has declined from 0.16 in 1975 to 0.06 in 2008 (Kruse et al. 2009).

Recent waterfowl crippling-rate indices derived from the HIP harvest surveys are lower, averaging 0.12 for ducks and 0.09 for geese (Padding et al. 2006; Moore et al. 2007). Crippling rate indices for mourning doves (0.12), American woodcock (0.11), Wilson's snipe (0.12), rails (0.07), gallinules (0.14), and American coots (0.11) are similar in magnitude. The recent apparent reduction likely is due to methodology differences between HIP surveys and the former Service WHS, rather than a real reduction in crippling loss. Thus, the estimate of 0.20 used in many population models probably is a reasonable estimate of crippling rate for most North American migratory game bird species.

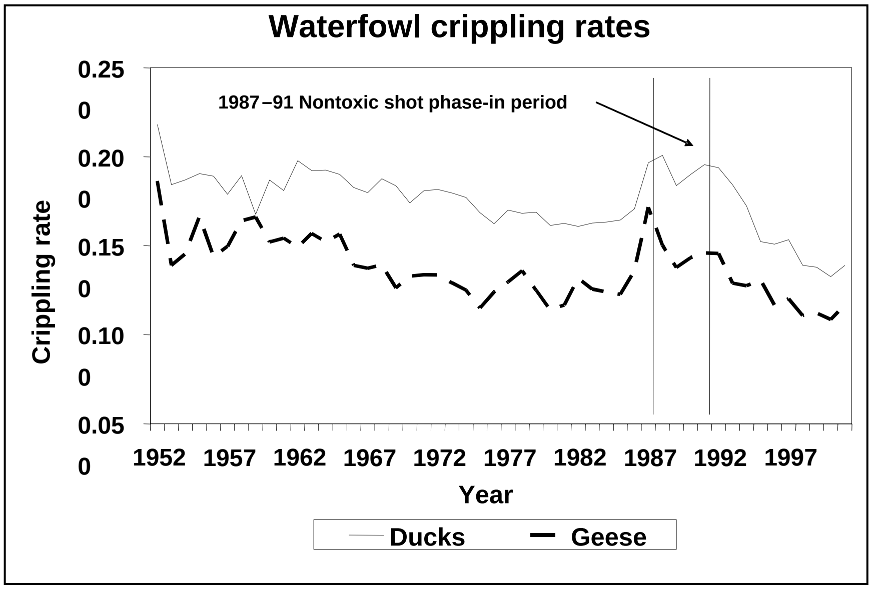

Figure 3.7. Duck and goose reported crippling rates from the U.S. Fish and Wildlife Service Waterfowl Harvest Surveys, 1952–2001. Reproduced from Schulz et al. (2006).

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CHAPTER 4
AFFECTED ENVIRONMENT

4.1 MIGRATORY BIRDS AND HABITATS

4.1.1 Ducks

4.1.1.1 Habitats

Ducks are highly dependent on the quantity and quality of wetland habitats at almost all stages of their life cycle. From 1780 to 1980, approximately 53% of the estimated 221 million wetland acres originally present in the conterminous U.S. were lost, principally due to conversion to agricultural use, but also through urban and industrial development and deforestation (Dahl 1990). Over the same time frame, Alaska lost just under 1% of its original wetland habitat (estimated at 170 million acres). Much wetland loss in the lower 48 States likely occurred prior to the 20th century (Dahl 1990). Wetland loss rates averaged 458,000 acres/year between 1950 and 1970. Annual losses averaged 290,000 acres/year during 1970–1985, and 58,500 acres/year during 1986–1997. Some of the improvement in wetland-loss trends since the 1970s can be attributed to wetland protection measures, elimination of some incentives for wetland drainage, and public education (Dahl 2000). From 1998 to 2004, wetland gains exceeded losses in the conterminous U.S. for the first time since European settlement (Dahl 2006). However, this reversal should be viewed with caution, because many areas included as wetlands were created by human activities for storm-water retention, aquaculture, and/or irrigation, and typically have less value for wildlife (Dahl 2000; 2006).

Since 1955, the Service has conducted aerial surveys of important duck breeding areas (Figure 4.1). The traditional survey area covers the PPR of the north-central U.S. and prairie Canada, the western Canadian boreal forest, and portions of Alaska. The PPR is the most important area in North America for breeding ducks, hosting up to 50% of the continental duck population in some years. This area features high densities of shallow wetlands, and is characterized by extended wet-dry cycles (Figure 4.2) that are a good predictor of many duck populations. Good wetland conditions improve duck production by reduced territoriality and competition for resources, improved nesting and renesting effort, and higher brood survival (Rotella and Ratti 1992; Guyn and Clark 1999; Krapu et al. 2000; Pietz et al. 2003).

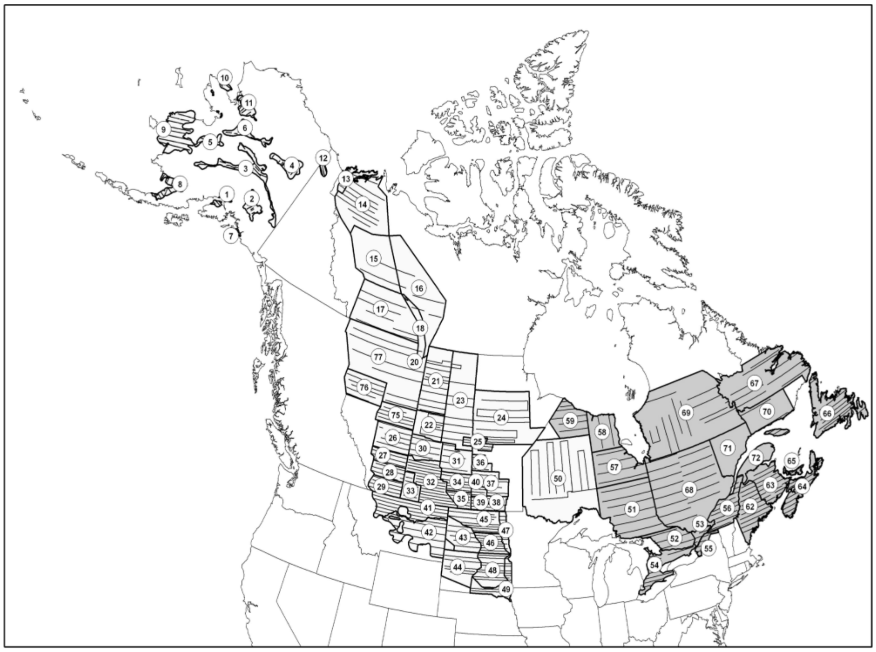

Figure 4.1. Strata and transects of the Waterfowl Breeding Population and Habitat Survey (light shading [strata 1–18, 20-50, 75–77] = traditional survey area; dark shading [strata 51–59, 62–72] = eastern survey area).

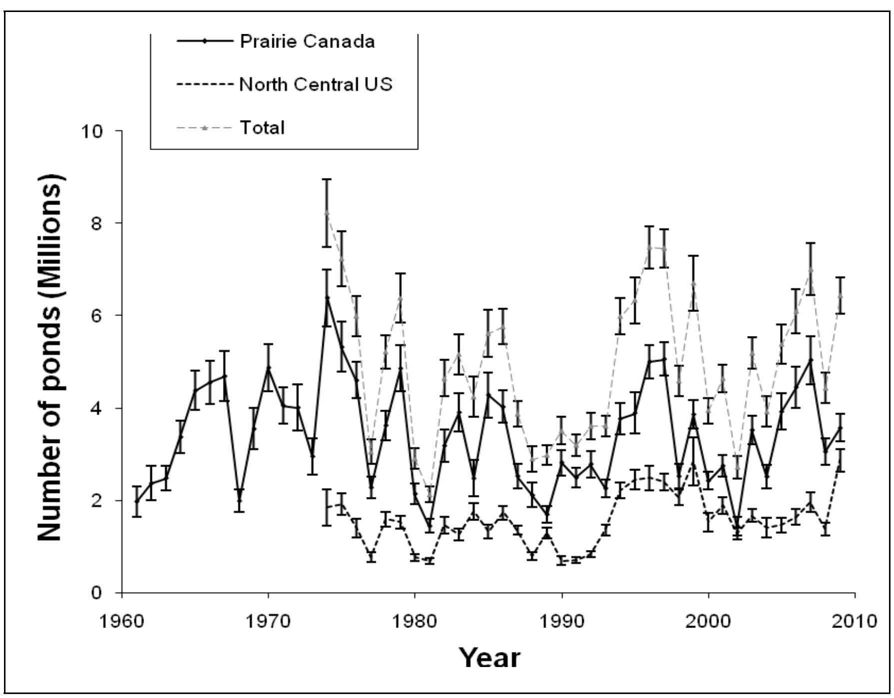

Figure 4.2. Number of ponds in May and 90% confidence intervals in prairie Canada (southern Alberta, southern Saskatchewan and southern Manitoba) and the north-central U.S. (North and South Dakota and eastern Montana), 1961–2009, estimated from the Waterfowl Breeding Population and Habitat Survey.

In 1986, in response to declining waterfowl populations and continuing habitat degradation (Figure 4.3), the NAWMP was endorsed by the U.S. and Canada to target desired population levels and identify critical habitats. Subsequently endorsed by Mexico in 1994, the NAWMP organized private and public waterfowl habitat conservation efforts under the umbrella of regional organizations called Joint Ventures (JVs). In 1994, dry conditions from the mid-1980s to the early 1990s in the U.S. portion of the PPR region ended, and a period of above-average water conditions ensued that continues to the present. In addition, wetland incentive programs, such as the Wetland Reserve Program (WRP), and regulatory control measures, such as the Swampbuster provision in the 1985 Farm Bill, provided strong disincentives for landowners to drain wetlands in this heavily agricultural region. This trend of discouraging wetland conversion represented a reversal of many decades in which agricultural incentives conflicted directly with wildlife interests.

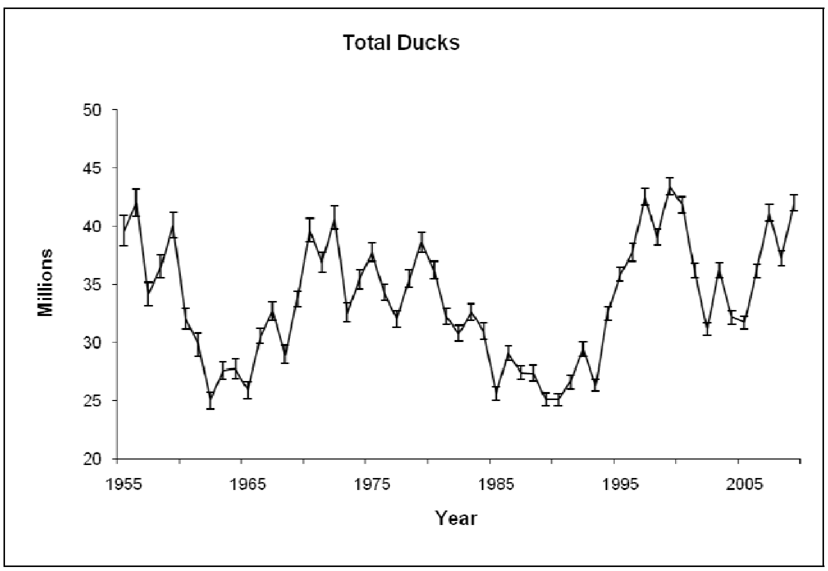

Figure 4.3. Total breeding ducks (includes mallard, gadwall, American wigeon, green-winged teal, blue-winged teal, northern shoveler, northern pintail, redhead, canvasback, greater and lesser scaup combined, ring-necked duck, common and Barrow's goldeneye combined, bufflehead and ruddy duck) and 90% confidence intervals in the traditional survey area, 1961–2009, estimated from the Waterfowl Breeding Population and Habitat Survey.

Many of the duck species that nest in the PPR rely on upland grass cover for nesting. Fragmentation of this habitat makes nesting ducks more vulnerable to predation (Duebbert and Lokemoen 1976; Greenwood et al. 1995; Phillips et al. 2003). By the early 1980s, in many portions of the PPR, nest-survival rates were below the estimated 15–20% (Cowardin and Johnson 1979; Cowardin et al. 1985) necessary for stable populations (Klett et al. 1988; Greenwood et al. 1995). Concern about duck nest survival led to public and private programs for the addition of grassland cover, such as on WPAs. However, nest survival rates remained low, presumably because these patches often were isolated within large expanses of cropland (McKinnon and Duncan 1999). Much of the U.S. portion of the PPR benefited from the Conservation Reserve Program (CRP), a soil-conservation measure that provides landowners an annual subsidy payment over a 10-year contract period for planting marginal cultivated land with tame or native grasses or trees. Begun as part of the 1985 Farm Bill, 4.7 million acres in North and South Dakota and northeastern Montana were enrolled in CRP by 1992, planted primarily in non-native grasses such as brome (*Bromus* spp.) and wheatgrass (*Agropyron* spp.). The addition of CRP has had a positive impact on duck nest survival (Reynolds et al. 2001). A key component was a dramatic increase in the proportion of the landscape in grassland cover, because duck nest survival increases with the proportion of upland cover (Garrettson and Rohwer 2001; Reynolds et al. 2001; Stephens et al. 2005). Reynolds et al. (2001) estimated that 40% grassland cover was necessary for maintaining duck populations, and estimated that an additional two million ducks were produced each year during 1992 to 1997 as a result of CRP. In 1994, the U.S. portion of the continental duck breeding population exceeded 25%, and generally remained at 25–30% through 2007, higher than the historical proportion of 15% or so, and CRP likely played a large role in this shift.

The return of water to the PPR, combined with improved grassland habitat in the U.S., were major factors in the transition from continental duck numbers that were at record lows during 1985 to 1992, to the record high abundances recorded between 1994 and 2002. Although the vagaries of weather cannot be controlled, the importance of wildlife-friendly agricultural policies cannot be overemphasized. An important feature of the 1996 and 2002 Farm Bills was the explicit consideration of wildlife value in the negotiation of CRP contracts. In addition, a funding option within the Conservation Reserve and Enhancement Program (CREP) was used to restore wetlands on lands under contract. CRP benefited other species as well, most notably grassland songbirds (Johnson and Igl 1995; Herkert 1998) and upland gamebirds (Clark and Bogenschutz 1999).

Although CRP has been a conservation success, agricultural commodity prices have increased dramatically due to increased global demand for grain and policies that favor the development and use of corn-based ethanol and other bio-fuels. Higher commodity prices and resulting increases in cropland rental rates already have led to a decline in acreage under contract in CRP and increased conversion of existing native prairie and other rangelands to cropland (Stephens et al. 2006). At present, losses as high as 50–60% of current totals, and as many as 3.5 million acres in North and South Dakota and Montana alone, are projected for 2007–2012 (Mcleod 2008).

Habitat-improvement programs in prairie Canada have been implemented largely through the Prairie Habitat Joint Venture (PHJV) of the NAWMP. Until recently, Canada lacked a large-scale agricultural conservation program, and rates of wetland drainage and loss of grassland cover exceeded those in the U.S. since the advent of CRP. However, a CRP-like program, known as Alternative Land Use Services (ALUS), has been implemented in pilot form in parts of Canada.

Breeding habitat in the boreal forest generally is considered to be more stable but less productive than the PPR. Though duck densities typically are low in boreal regions, they are important breeding areas for many species, including lesser and greater scaup, American black duck, American wigeon, green-winged teal, ring-necked duck, goldeneyes, and several species of mergansers. In addition, northern pintails readily forgo prairie nesting areas in dry years and nest instead in boreal areas. Concern about large- and small-scale human impacts on boreal habitat due to mining, logging, and hydroelectric projects has increased. Of greater concern is the possibility that climate change already is impacting boreal wetland systems on a large scale. Temperature increases are expected to be greater nearer the poles, and higher temperatures are expected to cause more frequent disease and insect outbreaks and fires. Recent evidence indicates drying of wetlands in arctic and boreal regions of North America and changes in invertebrate community dynamics (Riordan 2005; Corcoran et al. 2007). Temperature increases could have dramatic effects on boreal permafrost and associated wetlands. Effects of changing conditions in the boreal forest on breeding ducks are unclear, but the potential changes are generating increased concern and attention from the management and conservation communities. In addition, there is a potential for projected sea level rises to adversely impact low lying nesting areas in arctic regions.

The continent’s capacity to support wintering ducks has been reduced dramatically by loss and degradation of wetlands. Losses are most severe in California’s Central Valley and the Mississippi River Alluvial Plain, where 90% and 80% of the original wetlands have been lost, respectively. Overall, the rate of loss of estuarine intertidal vegetated wetlands declined in the 1980s and 1990s relative to rates during 1950–1970. However, losses on the Gulf Coast continued at an alarming rate, primarily due to saltwater intrusion, destruction by hurricanes, and subsidence. Channeling and flood control on Gulf Coast rivers, especially the Mississippi River, result in most sediment being deposited off the continental shelf rather than along the coast where it can build wetlands. An estimated 25–30 square miles of coastal marsh are lost annually in Louisiana alone. Saltwater intrusion also is a problem, but less so on the southeastern Atlantic coast where most estuarine losses are due to development. On the Chesapeake and Delaware Bays, nutrient and sediment runoff, combined with the effects of hurricanes, have drastically reduced habitat quality by reducing the extent of submerged aquatic vegetation (SAV) beds where many duck species feed, especially canvasback and American wigeon. Despite restoration efforts, SAV beds in these areas, whose extent declined by more than half in the 1970s (Orth and Moore 1984), have shown little improvement. Under the NAWMP there are a number of JVs that focus on habitat for wintering ducks, including the Gulf Coast, Central Valley, Lower Mississippi Valley, Atlantic Coast, Pacific Coast and Playa Lakes JVs.

4.1.1.2 Populations and Status

Since 1955, aerial surveys have been conducted annually during the spring and summer to assess habitat conditions and estimate population sizes in important duck breeding areas. The traditional survey area of the WBPHS comprises parts of Alaska, Canada, and the north-central U.S., and includes approximately 1.3 million square miles (Figure 4.1). The eastern survey area includes portions of Ontario, Quebec, Labrador, Newfoundland, Nova Scotia, Prince Edward Island, New Brunswick, New York, and Maine, covering an area of approximately 0.7 million square miles. Portions of the eastern survey area have been flown since 1990, and estimates for most of the eastern survey area are comparable from 1998 to the present.

Surveys generally begin in early May and end in mid-June, and the goals are to estimate the species and numbers of ducks within the survey area. In prairie and parkland Canada and the north-central U.S., aerial waterfowl estimates are corrected annually for visibility bias by conducting ground counts covering similar areas. In the northern portions of the traditional survey area and the eastern survey area, duck estimates are adjusted using visibility correction factors derived from a comparison of airplane and helicopter counts. In the PPR of Canada and the U.S., certain types of ponds also are counted and the total number of ponds available to breeding ducks, or “May ponds,” are estimated (Smith 1995). The true continental duck population undoubtedly is higher than the estimate, because some ducks also nest outside surveyed areas. Details of survey methodology and history are available in Smith (1995).

The WBPHS is most reliable for widely distributed, early-nesting species such as mallards and northern pintails. The breeding-ground survey is less reliable for species of low abundance whose nesting range is more restricted or mainly outside surveyed areas. However, total duck and species-specific estimates are calculated along with measures of variance to evaluate the quality of the estimate.

In the traditional survey area, long-term trends indicate several up-and-down periods in total duck breeding populations (Figure 4.3), which typically follow wet and dry cycles in the prairie-pothole and parkland regions of the U.S. and Canada (Figure 4.2). In the mid- and late 1980s, May pond numbers and continental duck populations were at all-time lows due to drought. In 1994, good water conditions returned to this region, and abundances of most duck populations increased dramatically. Some of this increase may have been due to the propensity of ducks to nest in areas with good water conditions, which increases the probability that they settle within the surveyed areas. Good water conditions help improve duck production by increasing nesting and re-nesting efforts and duckling survival (Rotella and Ratti 1992; Guyn and Clark 1999; Krapu et al. 2000;

Pietz et al. 2003), and perhaps by reducing nest predation through increased availability of alternate prey (Ackerman 2002). The addition of grassland cover on a large scale through the CRP also lowered nest-predation rates via improved nesting habitat that ducks were able to exploit with the return of water to the PPR in the 1990s (Reynolds et al. 2001).

Although the annual distribution of ducks on their breeding grounds is influenced by habitat conditions, until recently the proportion of ducks breeding in Canada, the conterminous U.S., and Alaska remained relatively stable over time. Historically, in the traditional survey area, 65% of ducks bred in Canada, 23% in five north-central U.S. States, and 12% in Alaska. Since 1990, the proportion breeding in the U.S. has increased somewhat, likely due to improved wetland and upland conditions in the U.S., particularly through the addition of CRP. Canada is an especially important breeding area for many duck species. More than 85% of American black ducks breed in Canada. Canada and Alaska combined are the breeding area for most of the continent's diving ducks, such as canvasbacks, scaup, ring-necked ducks, and goldeneyes, as well as most mergansers and sea ducks. Wood ducks and mottled ducks are the only temperate North American duck species that breed predominantly in the U.S.

While many duck populations responded to the improved wetland conditions of the 1990s (Figure 4.4), a few continued to decline. Northern pintail nest in areas that are heavily impacted by agriculture, and their tendency to nest early in the season and utilize sparse cover, including cropland, make their nests vulnerable to predation and destruction by farm implements (Guyn and Clark 2000; Richkus 2002). In particular, the practice of leaving crop stubble standing the previous fall, while good for soil conservation, attracts Northern pintail to areas where their nest survival is poor (Richkus 2002). Northern pintails also are known for bypassing prairie breeding areas during dry years in favor of the more stable but less productive habitat of the boreal forest (Johnson and Grier 1988). During these "overflight" years, northern pintail reproduction is lower than in normal years (Scheaffer et al. 1999), and these birds are less likely to be detected by the WBPHS (Runge and Boomer 2005). Furthermore, the average latitude at which northern pintails settle is now approximately 2.4 degrees further north than the average prior to 1975, perhaps due to large-scale changes in habitat (U.S. Fish and Wildlife Service 2006). Recent management of northern pintail harvest (Runge and Boomer 2005) has accounted for this shift, with models in which pintail breeding populations and predicted reproduction are adjusted to account for the average latitude at which pintails settle in a given year. Due to continued concern about their status, restrictive daily bag limits on northern pintail has been the norm, even as regulations on many other duck species were liberalized when their populations rebounded (Runge and Boomer 2005).

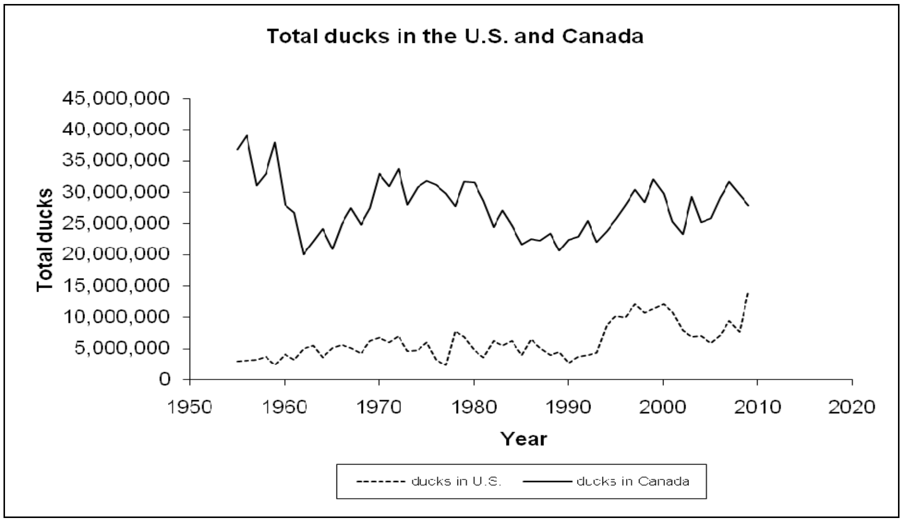

Figure 4.4. Total breeding ducks (includes mallard, gadwall, American wigeon, green-winged teal, blue-winged teal, northern shoveler, northern pintail, redhead, canvasback, greater and lesser scaup combined, ring-necked duck, common and Barrow's goldeneye combined, bufflehead and ruddy duck) in the Canadian and U.S. portions of the traditional survey area, 1961–2009, estimated from the Waterfowl Breeding Population and Habitat Survey. Canada estimates include Alaska.

The combined estimate of greater and lesser scaup abundance has been declining since the early 1980s, for reasons largely unknown. Hypotheses to explain this decline include reduced production or survival due to contaminants, lower nest survival, degradation of wintering or migrational habitats, and reduced productivity due to changes in the boreal forest (Austin et al. 2000). While harvest has not been implicated in the decline, the Service and State agencies currently are evaluating the contemporary harvest potential of these species and are reconsidering harvest strategies. Improved monitoring of scaup is a priority for management, as is continued research on possible reasons for their decline. Scoters and long-tailed ducks appear also to be declining throughout this region. However, green-winged teal and ring-necked duck are two boreal-nesting species with healthy, increasing populations.

During 1961–2003, a survey conducted in July over portions of the traditional WBPHS area provided an index of the number and average age and size of broods, the number of ponds available for brood-rearing, and the proportion of adults still attempting to breed. However, broods typically cannot be identified to species from the air, and there was no visibility correction factor (similar to the WBPHS) for this survey. Furthermore, detection probability can vary with brood age (younger broods are more secretive), species, time of day, and vegetative cover (Ringelman and Flake 1980; Pagano 2007). All these factors detract from the usefulness of uncorrected aerial brood counts as an index to production. Furthermore, a different production index (i.e., the ratio of young to adults in the pre-season population) can be calculated from harvest-survey and banding data, and typically is used for management purposes (Ver Steeg and Elden 2002). Pond counts in July likely provide a reasonable index to early-summer habitat conditions, because ponds are readily and accurately observed from the air, typically with a probability close to 1 (U.S. Fish and Wildlife Service, unpublished data). Due to budget constraints and concerns about the usefulness of brood-count data, the July survey was curtailed in 2004 and discontinued altogether in 2009. However, Service pilot-biologists responsible for several survey areas (southern Alberta, southern Saskatchewan, the Dakotas, and Montana) briefly flew representative portions of their survey areas to qualitatively assess habitat changes between May and July and potential impacts on duck production. Meanwhile, researchers and managers have been exploring other methods for estimating duck production, such as double-observer ground-based surveys (A. Royle, personal communication) and a variety of other ground-based methods (Pagono and Arnold 2009; M. Koneff, personal communication).

Each January, extensive mid-winter surveys of wintering ducks and geese are conducted in most States in the U.S. During mid-winter surveys, observers estimate the numbers of all wintering waterfowl, but the precision of the estimates is unknown and most counts are not based on a statistically-designed sampling framework. Exceptions are mid-winter surveys in most of Texas, and in coastal portions of Louisiana, where units that cover a portion of the area are surveyed, and counts are expanded to obtain a population estimate and associated variance. However, no mid-winter surveys are corrected for visibility. For many species, mid-winter counts are of limited utility as indices of population size, due to: (1) the lack of visibility corrections and statistically valid sampling frames, (2) the difficulties in surveying forested areas from the air, and (3) the very large area that is surveyed. Where available, trends estimated from the WBPHS survey are considered more reliable. For several species (e.g., brant and tundra swans) the mid-winter survey still provides the primary index to population status. In these cases, the mid-winter survey coverage has been established to coincide well with these species' winter ranges. However, mid-winter surveys do provide information about the distribution of wintering ducks and general habitat conditions for some species, as well as supplemental information for ducks that are not well-covered by breeding surveys. This information has proved useful in planning and implementing habitat conservation projects under the NAWMP.

American black ducks are difficult to survey on their breeding grounds due to the forested habitats in which they tend to nest, and biologists traditionally have used mid-winter counts as a long-term indicator of their population status. Mid-winter American black duck counts have declined by 17% over the past 10 years, and 26% over the past 20 years (Figure 4.5). Hierarchical modeling of Christmas Bird Count (CBC) data suggests that a higher proportion of American black ducks have begun wintering in Canada where they are not detected in the mid-winter surveys (Link et al. 2006), which raised renewed concerns about the utility of the mid-winter count as an index to population size for American black duck. Since 1990, the FWS and CWS have conducted breeding population surveys in eastern North America, targeted at the American black duck and other priority species. New estimation protocols have been developed to produce composite estimates of BPOP and trends for this region. Composite American black duck estimates for the eastern survey area indicate a stable population since 1990. Given concerns about the use of the mid-winter survey for this species, efforts are ongoing to develop a harvest strategy based on composite breeding-population estimates.

The wood duck, which is a particularly important species to hunters in the Atlantic and Mississippi Flyways, is even more difficult to survey than the American black duck, due to its secretive nature and preference for wooded habitats. Indices of wood duck range-wide population can be calculated from two data sets: the Breeding Bird Survey (BBS), and the CBC. The BBS is a roadside survey that primarily targets land birds; thus, wood duck are encountered infrequently (Sauer and Droege 1988). The CBC is conducted by observers whose skill level and effort may vary considerably from year to year. Through hierarchical modeling (Link and Sauer 2002; Link et al. 2006), however, these data can be adjusted for observer experience and effort to produce more reliable indices. When these indices are standardized, both surveys indicate a wood duck population that has increased approximately four-fold between 1966 and the present, but has leveled off in recent years. Intensive ground-based surveys in the northeastern U.S. also have been performed since 1993 and indicate stable wood duck populations during that shorter time frame (Raftovich and Padding 2007).

Insufficient population-monitoring data and a history of over-exploitation in the first half of the 20th century led to conservative wood duck harvest regulations in the last half of the century. However, in the 1990s and 2000s banding efforts have increased in much of the wood duck's primary range, largely due to implementation of a cooperative wood duck population-monitoring initiative that the Service and the Atlantic and Mississippi Flyway Councils developed in 1993 (Kelly 1997). Those efforts have provided reliable estimates of harvest rates and survival rates. Current efforts are focused on an assessment of harvest potential that utilizes population indices from the BBS and CBS indirectly, and relies heavily on harvest and survival-rate information derived from banding data (Garrettson 2007).

Mottled ducks are considered a species of concern throughout their range. In Florida, conservation efforts have focused largely on preventing hybridization with feral mallards, and the release of captive-reared mallards is illegal in that state. Florida has developed a point-transect survey that employs distance-sampling methods to estimate population size. In Florida, the population appears stable. Florida has a long-standing banding program for mottled ducks and is currently studying habitat use, survival, and movements of female mottled ducks with a radio telemetry project (Bielefeld 2007). Habitat loss due to development also is a concern, but mottled ducks appear adaptable, and frequently use storm water retention ponds and other artificial wetlands in urban areas (Bielefeld 2009).

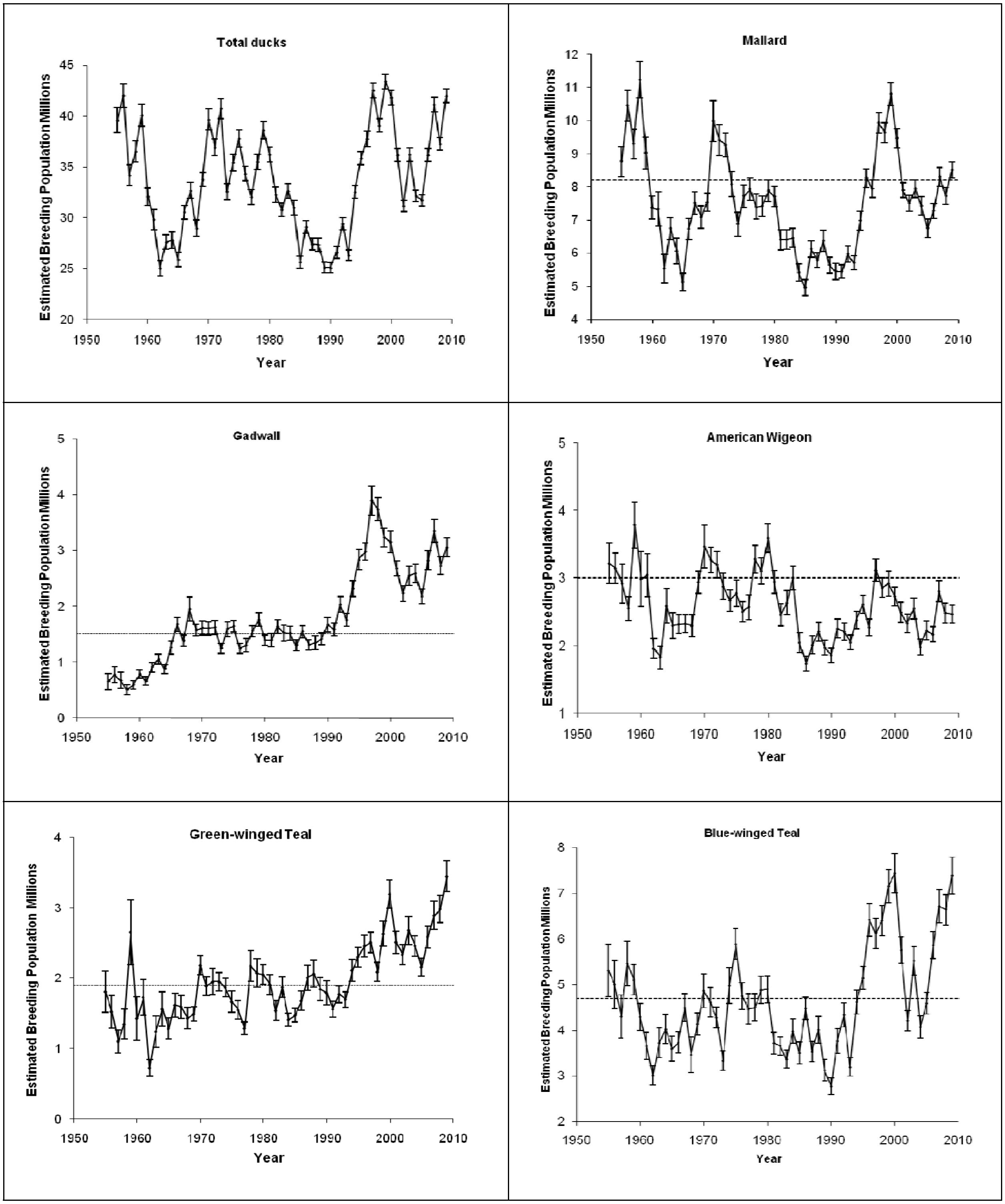

Figure 4.5. Duck breeding population estimates, 95% confidence intervals, and North American Waterfowl Management Plan population goals (dashed line) for selected species in the traditional survey area (strata 1–18, 20–50, 75–77) (*continued*).

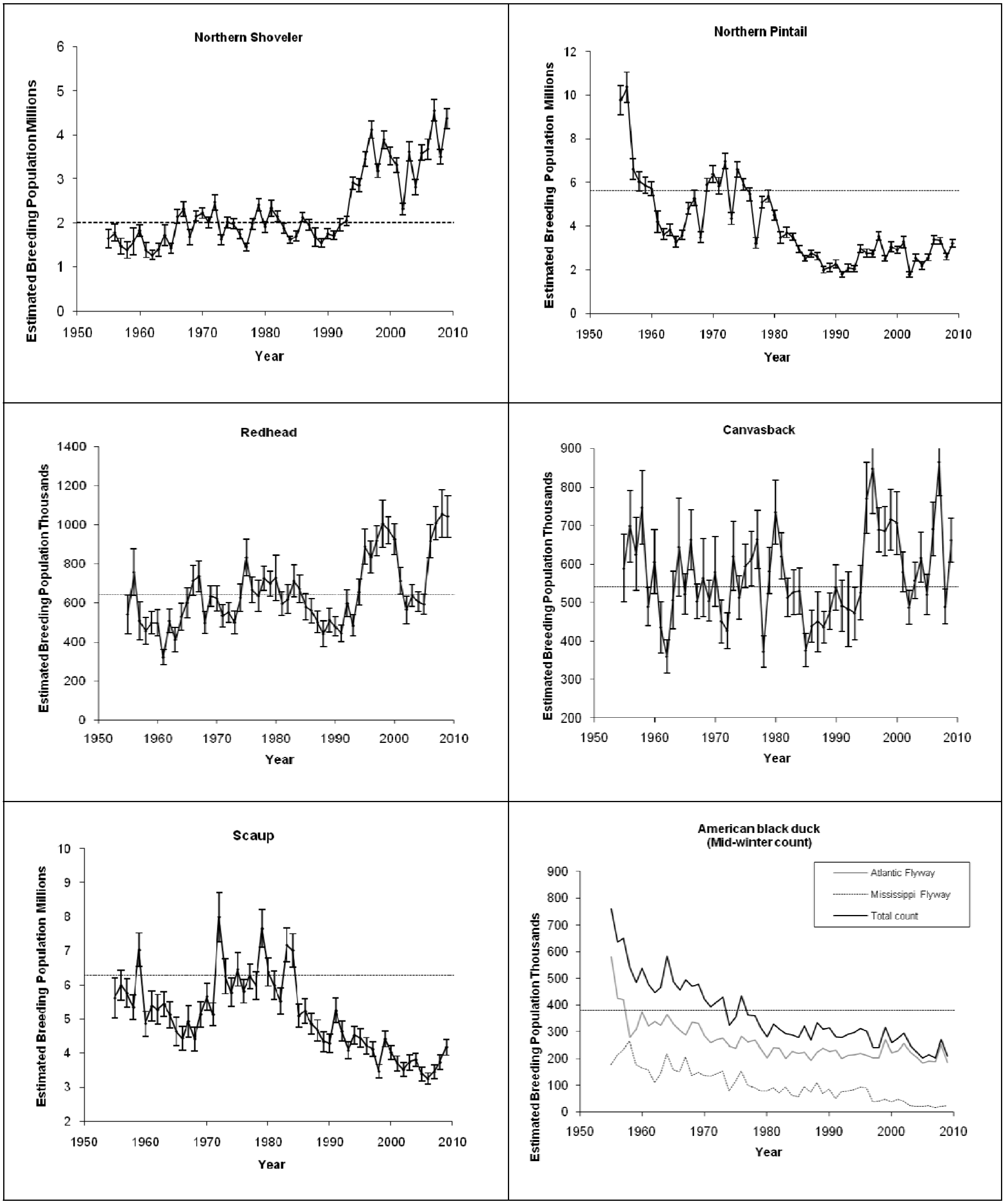

Figure 4.5. (*continued*) Duck breeding population estimates, 95% confidence intervals, and North American Waterfowl Management Plan population goals (dashed line) for selected species in the traditional survey area (strata 1–18, 20–50, 75–77).

On the western Gulf Coast, loss of coastal marsh habitat and degradation of remaining habitat due to salt water intrusion are the greatest concern. The Western Gulf Coast (WGC) population appears to have been declining over recent decades, but the magnitude of this decline is uncertain. BBS, CBC and mid-winter inventory data all suggest a decline of approximately 1% per year, while the Texas Coastal Refuges Survey (D. Haukos, unpublished data), and modeling efforts based on banding and harvest data (Johnson 2008) suggest a much steeper decline of approximately 22% per year. This discrepancy has led to cooperative efforts to develop a breeding mottled duck survey for the entire Western Gulf Coast that is corrected for visibility, and covers most of the WGC breeding mottled duck range.

Mottled ducks have been banded extensively and consistently in Louisiana since 1994 and in Texas since 1997. Most recent analyses (Johnson 2008; D. Haukos, personal communication) suggest that WGC band recovery and survival probabilities vary by age, sex, and banding year. Annual variation is likely due to hurricanes that have recently hit both the Texas and Louisiana coasts, and the timing of weather fronts that may bring other migrant species to the WGC that act to buffer mottled ducks against harvest (L. Reynolds, personal communication). A band reporting probability estimate for the WGC population (P. Garrettson, unpublished analyses) of 0.65 (0.52–0.78) lacks precision, but the point estimate is only slightly lower than the 0.72 that has been found in the U.S. for other species (Garrettson et al. unpublished data; Zimmerman et al. 2008). Annual estimates of productivity derived from adjusting harvest age ratios (K. Wilkins, unpublished data) also show significant year-to-year variation, and because female fall age-ratios tend to be higher than those of males, estimating the ratio of juveniles per adult female may be most appropriate approach (Johnson 2008; P Garrettson, unpublished analyses). Preliminary estimates of mottled duck harvest for the Florida and WGC populations in 2008 were 14,134 and 79,038 respectively (Raftovich et al. 2009).

Sea ducks are a diverse group for which the lack of monitoring data also is a concern. Limited data are available on the size and status of breeding populations of boreal and arctic-nesting long-tailed ducks, scoters, and eiders. Large portions of the breeding ranges of white-winged, surf, and black scoters are covered during the WBPHS. However, because scoters historically were recorded in the aggregate, inferences about individual species' status is not possible. Some data on wintering populations are available, but this information is insufficient to determine annual status. Moreover, scoters historically have not been distinguished to species during the mid-winter survey. CBC data likely are biased toward over-coverage of urban areas, and by increases in coverage in important areas through time. Available data does suggest that sustained, long-term declines have occurred in some species, notably, scoters, eiders, and long-tailed ducks (Bowman and Koneff, unpublished data; Caithamer et al. 2000). Currently, the eastern population of harlequin duck is listed as endangered in Canada, and spectacled eider and the

Alaskan breeding population of Steller's eider are listed as threatened in the U.S. (Sea Duck Joint Venture Management Board 2001). Mergansers are counted during the WBPHS, but species (i.e., hooded, common, red-breasted) cannot be determined from the air. A significant portion of the range for mergansers is covered in the eastern portion of the WBPHS and a combined merganser estimate is usually reported for this area. Overall, information about basic biology, delineation and estimation of breeding and wintering populations, and harvest, particularly subsistence harvest, of sea ducks lags far behind that of other duck species. In 1998, a Sea Duck Joint Venture under the NAWMP was established; surveys geared toward better assessment of sea duck populations, breeding success, and habitat associations are its major priorities.

4.1.1.3 Harvests

Waterfowl hunting is permitted in all States except Hawaii. From 1952 to 2001, the Service conducted the Mail Questionnaire Survey (MQS) to estimate waterfowl harvest and hunter activity. In 1964, the survey was expanded to include other migratory game birds (Martin 1979). The MQS was based on a sample of all migratory bird hunters who purchased Federal Migratory Bird Hunting and Conservation Stamps (Ducks Stamps). Only waterfowl hunters 16 years of age and older were required to buy a stamp. Therefore, migratory bird hunters who did not hunt waterfowl were excluded from the sample frame each year, and the Service could not accurately or precisely estimate harvest of webless migratory game birds.

This deficiency was recognized soon after the survey's inception (Tautin et al. 1989), and migratory game bird researchers and managers repeatedly called for establishing a new national survey with a sample frame that included all migratory game bird hunters (e.g., Owen et al. 1977, Tautin et al. 1989). Their recommendations resulted in several attempts to establish a Federal permit system, but none of those attempts were successful, including several bills introduced to the U.S. Congress (Tautin et al. 1989). The problem was addressed in 1992 when the national migratory bird Harvest Information Program (HIP) was established by the Service and State wildlife agencies (Elden et al. 2002). The HIP became fully operational in 1999 (Ver Steeg and Elden 2002).

The HIP is a cooperative, State-Federal program that requires all licensed migratory bird hunters to register annually with each State in which they hunt migratory game birds. Hunters who are exempt from State licensing requirements may also be exempt from the HIP registration requirement. Sheriff et al. (2002) reported that 41 States do not require certain groups of hunters to possess a State hunting license; 32 of those States extend the exemption to include the HIP requirement. The most common license exemptions are for junior hunters, senior hunters, and landowners hunting on their own property.

Under the HIP, every State wildlife agency is responsible for annually obtaining the name and address of each licensed migratory bird hunter in the State and forwarding that information to the Service. This provides the Service with a nearly complete sample frame for national migratory game bird harvest surveys that specifically target various types of hunters (e.g., waterfowl, dove, woodcock, etc.). The annual surveys are used to estimate the number of active U.S. hunters of the various types, how many days they hunt, and how many birds they harvest each year. All States in the continental U.S. have participated in this program since 1998, and the surveys have been conducted nationwide since 1999. Survey methods are described in annual reports (e.g., Padding et al. 2006).

Under the HIP, reliable estimates of harvest and hunter activity at national and regional scales can be obtained for all migratory bird species. This system has improved harvest estimates for waterfowl as well as for those of several species of webless migratory game birds. For instance, under MQS, it was not possible to generate separate estimates of waterfowl hunting days devoted to hunting ducks and geese. For three years (1999–2001), the MQS and the HIP were operated simultaneously and produced similar harvest estimates for waterfowl at both the national and flyway levels, which suggests that species-specific harvest estimates at these large scales are comparable between these two methods over time. Additional and ongoing improvements to harvest survey methodology include calculation of variance on harvest estimates and correction of a possible bias toward overestimation of waterfowl harvest (K. Richkus, personal communication).

Since 1961, the Service has conducted a Parts Collection Survey (PCS) to determine the duck or goose species composition of the waterfowl harvest. Each year, a sample of successful hunters (i.e., shot greater than one bird during the previous hunting season) are provided with envelopes and asked to send one duck wing or goose tail feathers from each harvested bird. These parts are examined by State and Federal biologists who determine the species, sex, and age of each part submitted. Summaries of these parts are then used in combination with estimates of total harvest from the HIP (or previously, MQS) surveys to estimate the species, age, and sex composition of the harvest each year. Details about the history and methodology of harvest surveys can be accessed electronically at the following web address: (www.fws.gov/migratorybirds/NewsPublicationsReports.html).

Data from harvest surveys generate measures of absolute harvest, but measures of harvest rate can be calculated from recoveries of bands if sufficient and representative numbers of birds are banded. If all hunters who harvest banded birds report them (i.e., 100% band-report probability), the harvest rate would simply be the proportion of banded birds that are recovered and reported (Brownie et al. 1985). If the band-reporting probability is not 100%, but is a known quantity (currently it averages approximately 73%), then the probability can be used to convert the raw band-recovery rate to a harvest rate. Harvest rates derived from banding data also can be used to calculate the relative vulnerability of the various age-sex classes to harvest, and thereby adjust harvest age ratios calculated from the PCS and HIP (previously MQS) surveys to produce a more accurate measure of the fall age ratio (young/adults) just prior to the hunting season. This age ratio is a reasonable surrogate for annual reproduction.

The annual harvest of ducks is a function of a number of factors, including the number of hunters, the average number of days spent afield, hunter success, duck abundance, harvest regulations, and weather (Tables 4.1 and 4.2). In general, the number of active hunters peaked during the early 1970s at approximately two million, fell to a low of one million in the late 1980s, and increased to approximately 1.4 million in 2000 (Table 4.1). Changes in hunter numbers must be considered when making inferences about the effect of hunting regulations on harvest. Duck Stamp sales and days afield follow similar patterns. However, annual Duck Stamp sales always are higher than numbers of active hunters due to the purchase of stamps by collectors and conservationists who do not hunt.

Estimates of total annual duck harvests (Table 4.3 and 4.4) have fluctuated over time, and tend to be high in years when duck populations are high and hunting regulations are liberal (e.g., the early 1970s and the late 1990s to the present), and low when the reverse is true (the early 1960s and late 1980s). This pattern is exacerbated by the drop in active hunters and days spent afield typically observed during years with restrictive hunting regulations and low duck populations. Harvest estimates include only birds killed and retrieved, and do not account for crippling loss, typically assumed to be approximately 20% (P. Padding, personal communication; see section 3.7 above) or illegal kill, which is difficult to estimate. The Atlantic Flyway usually accounts for 11–17% of the total U.S. duck harvest, the Mississippi Flyway 40–50%, and the Central Flyway 15–25% of the total. The Pacific Flyway’s share has dropped from 30–40% of the U.S. total in the 1960s and early 1970s to 15–25% currently. The total U.S. duck harvest estimate was 13.8 million in 2006, 14.6 million in 2007, and 13.7 million in 2008 (U.S. Fish and Wildlife Service 2007b; 2008; Raftovich et al. 2009).

Species-specific harvests can vary considerably according to their abundance, distribution, desirability as a game species, the timing of their migration, and regulatory restrictions. The mallard is the most abundant, most widespread, and most frequently harvested duck in North America. It accounts for about 20% of the ducks in surveyed areas of North America, but consistently comprises about 35% of the U.S. duck harvest (Table 4.4). Mallard harvest in the Pacific Flyway increased from about 32% of the flyway total prior to 1980, to 40% thereafter. The Mississippi Flyway typically accounts for more than half of the U.S. mallard harvest, followed by the Pacific Flyway (approximately 30%), Central Flyway (approximately 20%), and Atlantic Flyway (approximately 10%). The total U.S. mallard harvest estimate was 4.7 million in 2006, 4.9 million in 2007, and 4.6 million in 2008 (U.S. Fish and Wildlife Service 2007b; 2008; Raftovich et al. 2009).

Table 4.1. Duck Stamp sales, hunter activity, and harvest estimated using the Mail Questionnaire Survey, 1961–2000.

	Duck Stamp Sales					Active Hunters				
Hunting season	Atlantic Flyway	Mississippi Flyway	Central Flyway	Pacific Flyway[1]	Total[2]	Atlantic Flyway	Mississippi Flyway	Central Flyway	Pacific Flyway	Total
1961	232,578	527,145	271,865	294,178	1,344,236	174,070	426,752	199,340	232,012 3	1,032,174
1962	236,311	411,981	185,633	295,920	1,147,212	178,293	329,830	137,598	229,529	875,250
1963	270,382	571,667	262,470	325,127	1,448,191	195,976	460,233	198,456	256,983	1,111,648
1964	284,756	663,791	280,810	325,119	1,573,155	218,335	558,243	224,056	260,687	1,261,321
1965	301,088	636,470	260,027	343,056	1,558,197	240,279	546,871	207,799	287,055	1,282,004
1966	336,472	758,768	311,216	379,551	1,805,341	269,885	657,187	258,620	316,194	1,501,886
1967	360,937	813,797	360,157	381,364	1,934,697	287,894	704,788	303,143	326,036	1,621,861
1968	384,762	711,745	323,885	394,208	1,837,139	304,178	611,186	257,482	341,384	1,514,230
1969	438,372	810,588	373,751	428,020	2,072,108	360,879	698,925	313,685	365,202	1,738,691
1970	496,387	1,005,265	437,120	457,545	2,420,244	405,368	864,384	368,776	386,517	2,025,045
1971	501,289	1,003,218	454,635	438,146	2,445,977	406,627	847,547	372,936	367,005	1,994,114
1972	438,477	892,862	425,037	389,603	2,184,343	358,533	761,741	351,798	333,810	1,805,882
1973	434,851	826,911	412,320	387,156	2,094,414	357,800	700,025	338,217	330,952	1,726,993
1974	448,849	892,017	426,135	396,860	2,214,056	368,040	764,028	346,635	334,909	1,813,613
1975	441,838	916,734	430,618	400,864	2,237,126	357,410	792,045	358,638	344,576	1,852,668
1976	435,933	854,924	429,661	388,340	2,170,194	352,387	722,082	350,855	335,567	1,760,891
1977	434,558	872,064	423,871	383,195	2,196,774	351,929	743,204	342,447	323,349	1,760,929
1978	451,321	848,856	430,590	381,302	2,216,421	364,833	722,532	348,703	322,660	1,758,728
1979	416,574	808,051	414,970	368,850	2,090,155	346,614	699,369	339,013	315,394	1,700,390
1980	409,281	787,236	388,865	362,690	2,045,114	328,370	669,913	309,898	305,579	1,613,760
1981	407,906	724,334	339,358	332,455	1,907,120	324,682	621,401	272,270	277,047	1,495,400
1982	402,929	709,923	358,908	340,339	1,926,253	311,158	589,179	282,611	279,056	1,462,003
1983	390,896	686,016	338,735	338,724	1,867,998	304,071	594,231	276,408	283,643	1,458,352
1984	412,866	703,159	354,306	326,461	1,913,861	316,770	601,901	283,085	268,518	1,470,273
1985	382,422	651,194	329,010	300,512	1,780,636	284,585	547,905	259,413	245,760	1,337,663
1986	387,974	673,764	335,076	272,935	1,794,484	285,375	565,122	261,730	228,354	1,340,582
1987	385,660	623,596	302,909	241,684	1,663,470	282,151	531,802	239,981	202,226	1,256,160
1988	342,527	508,198	240,976	202,641	1,403,005	242,634	419,215	190,160	167,729	1,019,738
1989	331,345	534,007	246,745	201,698	1,415,882	232,520	451,541	198,253	168,956	1,051,270
1990	326,275	557,960	238,639	195,464	1,408,373	238,023	475,970	194,530	166,111	1,074,635
1991	316,656	550,688	232,309	185,402	1,423,374	240,307	477,187	189,287	157,381	1,064,162
1992	300,332	554,396	234,489	185,744	1,347,393	224,307	479,643	187,843	156,030	1,047,823
1993	292,601	570,538	248,347	210,695	1,402,569	220,490	495,325	204,517	178,256	1,098,588
1994	296,841	635,327	264,170	209,096	1,471,751	225,809	556,757	219,804	179,654	1,182,024
1995	271,439	684,671	295,506	225,981	1,539,623	204,976	596,039	242,140	198,284	1,241,439
1996	291,829	695,870	298,751	226,291	1,560,121	222,604	609,933	243,476	202,510	1,278,524
1997	305,697	752,280	338,937	238,325	1,697,590	240,467	668,994	282,316	220,127	1,411,904
1998	298,932	733,842	337,879	242,682	1,685,006	236,908	644,909	282,093	214,619	1,378,529
1999	298,611	746,682	334,842	258,918	1,665,670	230,523	648,534	274,357	212,225	1,365,639
2000	305,793	745,776	346,454	256,805	1,698,780	233,146	644,654	280,763	209,229	1,367,791

[1]Pacific Flyway includes Alaska. No data for Alaska from 1961 – 1964.

[2]Total includes Duck Stamps sold in Guam, Hawaii, Puerto Rico, the Virgin Islands, at National Wildlife Refuges, by the Duck Stamp Office, and the U.S. Postal Service Philatelic Unit.

(*continued*)

Table 4.1. (*continued*) Duck Stamp sales, hunter activity, and harvest estimated using the Mail Questionnaire Survey, 1961–2000.

	Waterfowl Hunter Days Afield					Waterfowl Harvest				
Hunting season	Atlantic Flyway	Mississippi Flyway	Central Flyway	Pacific Flyway[1]	Total[2]	Atlantic Flyway	Mississippi Flyway	Central Flyway	Pacific Flyway	Total
1961	1,104,130	2,585,904	1,240,599	1,589,395 [4]	6,520,028	737,800	1,746,600	788,200	2,065,900	5,338,500
1962	1,164,933	2,156,489	978,827	1,784,592	6,084,841	741,900	1,129,100	428,000	1,947,600	4,246,700
1963	1,254,025	3,134,524	1,418,953	2,058,627	7,866,129	904,900	2,505,200	1,012,300	2,832,000	7,254,400
1964	1,489,129	4,045,790	1,635,938	2,036,761	9,207,618	993,600	3,536,700	1,321,300	2,529,600	8,381,200
1965	1,535,147	4,151,823	1,483,136	2,126,654	9,296,760	1,021,300	3,618,000	1,218,500	2,914,100	8,771,900
1966	1,811,104	5,048,131	2,227,294	2,470,333	11,556,862	1,422,700	4,902,200	2,134,700	3,570,000	12,029,600
1967	1,906,587	5,314,031	2,419,454	2,660,699	12,300,771	1,344,600	4,769,400	2,239,900	4,438,000	12,792,000
1968	1,998,450	4,093,973	1,764,527	2,539,701	10,396,651	1,372,000	2,383,500	1,236,900	3,095,000	8,087,300
1969	2,613,939	5,382,105	2,610,032	3,146,830	13,752,906	1,802,300	4,492,600	2,596,600	4,108,000	12,999,600
1970	2,904,683	7,531,868	3,250,774	3,377,956	17,065,281	1,985,900	6,454,600	2,996,200	4,480,000	15,916,700
1971	2,945,763	7,172,705	3,354,231	3,168,265	16,640,964	1,724,200	5,381,100	2,794,800	4,048,900	13,949,100
1972	2,657,396	6,532,184	3,052,725	2,941,755	15,184,060	1,650,300	5,005,200	2,966,300	3,964,100	13,585,800
1973	2,658,950	5,907,579	2,916,781	3,018,151	14,501,461	1,547,200	4,592,400	2,446,500	3,305,700	11,891,800
1974	2,835,708	6,606,377	2,931,841	2,963,959	15,337,885	1,732,700	5,193,400	2,217,600	3,656,500	12,800,200
1975	2,854,849	7,178,649	3,195,445	3,148,120	16,377,063	1,858,100	6,603,100	2,934,400	4,091,200	15,486,800
1976	2,893,085	6,374,194	3,012,036	3,027,633	15,306,948	2,093,400	6,040,600	2,804,400	4,256,100	15,194,500
1977	2,744,893	6,677,686	2,919,165	2,907,811	15,249,555	1,881,800	5,955,900	2,439,500	3,192,800	13,470,000
1978	2,958,202	6,742,589	2,992,659	2,935,720	15,629,170	1,945,800	6,339,900	2,969,100	4,099,400	15,354,200
1979	2,855,079	6,875,562	2,856,165	2,771,584	15,358,390	1,849,400	6,382,500	2,707,100	3,475,500	14,414,400
1980	2,684,711	6,390,370	2,541,051	2,688,226	14,304,358	1,936,200	5,899,900	2,105,500	3,309,700	13,251,300
1981	2,671,279	6,017,724	2,237,545	2,415,290	13,341,838	1,904,200	5,475,600	2,040,400	2,773,900	12,194,200
1982	2,631,062	5,855,986	2,405,832	2,530,544	13,423,424	1,620,600	5,026,300	2,238,300	2,986,100	11,871,300
1983	2,405,447	5,539,880	2,124,113	2,298,442	12,367,882	1,692,300	5,926,300	2,146,700	3,157,600	12,922,900
1984	2,582,285	5,596,322	2,379,941	2,257,252	12,815,800	1,843,400	5,837,600	2,326,300	2,567,900	12,575,300
1985	2,125,082	4,771,127	2,042,412	1,935,742	10,874,363	1,421,300	4,245,500	1,519,500	2,357,600	9,544,000
1986	2,145,802	5,009,651	2,052,091	1,992,529	11,200,073	1,431,700	4,220,800	1,605,000	2,251,400	9,508,900
1987	2,126,272	4,623,310	1,952,941	1,780,400	10,482,923	1,410,200	3,842,600	1,747,100	2,202,700	9,202,500
1988	1,686,255	3,329,479	1,429,319	1,330,869	7,775,923	1,005,200	1,948,700	748,500	1,327,400	5,029,600
1989	1,593,165	3,694,806	1,605,732	1,418,918	8,312,622	1,158,600	2,616,600	918,600	1,544,700	6,238,500
1990	1,696,259	3,992,703	1,545,419	1,411,870	8,646,249	1,090,600	2,615,200	909,900	1,549,800	6,165,500
1991	1,800,300	4,221,336	1,505,464	1,371,578	8,898,679	1,191,400	2,858,400	753,300	1,434,200	6,237,300
1992	1,561,154	4,354,235	1,448,496	1,370,962	8,734,847	1,015,900	3,064,200	916,500	1,530,100	6,526,700
1993	1,563,980	4,368,115	1,763,527	1,640,344	9,335,966	1,120,200	3,093,800	1,020,200	1,768,200	7,002,500
1994	1,796,395	5,480,561	2,036,400	1,662,284	10,975,640	1,157,200	4,056,800	1,483,400	1,951,900	8,649,300
1995	1,678,299	6,244,553	2,234,947	2,094,708	12,252,507	1,737,900	6,576,700	2,033,700	2,611,500	12,959,800
1996	1,834,990	6,809,482	2,380,220	2,216,101	13,240,793	1,581,400	6,774,900	2,349,000	3,101,400	13,806,700
1997	2,193,347	7,764,633	2,683,635	2,322,561	14,964,176	1,884,700	7,815,800	2,935,300	3,267,300	15,903,000
1998	2,143,268	7,133,606	2,864,391	2,344,836	14,486,100	1,988,900	8,002,100	3,371,700	3,570,000	16,932,700
1999	2,125,814	7,585,171	2,607,993	2,130,118	14,449,096	2,021,200	8,358,200	2,823,300	2,763,500	15,966,200
2000	2,082,893	7,103,008	2,656,014	2,037,853	13,879,768	1,865,800	7,877,000	3,240,000	2,343,200	15,326,000

[1]Pacific Flyway includes Alaska. No data for Alaska from 1961 – 1964.

[2]Total includes Duck Stamps sold in Guam, Hawaii, Puerto Rico, the Virgin Islands, at National Wildlife Refuges, by the Duck Stamp Office, and the U.S. Postal Service Philatelic Unit.

Table 4.2. Hunter activity and harvest estimated using the Harvest Information Program, 2001–2008.

Duck Hunter Days					
Hunting Season	Atlantic Flyway	Mississippi Flyway	Central Flyway	Pacific Flyway[1]	Total
2001	1,275,500	4,364,800	1,544,300	1,186,100	8,370,700
2002	1,149,800	3,885,000	1,306,800	1,091,700	7,433,300
2003	1,106,900	4,033,400	1,182,200	1,118,500	7,441,000
2004[3]	980,000	3,857,300	1,327,000	1,203,500	7,367,800
2005	1,067,300	3,075,500	1,170,800	1,165,600	6,479,200
2006	1,046,200	3,364,300	1,077,700	1,300,200	6,788,400
2007	1,076,300	3,479,100	1,127,400	1,295,700	6,978,400
2008	1,001,300	3,410,000	946,100	1,329,000	6,686,400
Active Duck Hunters[2]					
Hunting Season	Atlantic Flyway	Mississippi Flyway	Central Flyway	Pacific Flyway	Total
2001	197,800	545,100	271,000	151,900	1,165,800
2002	182,400	517,900	225,500	147,100	1,072,900
2003	183,600	542,700	185,400	148,600	1,060,300
2004[3]	168,000	506,100	212,400	153,700	1,040,200
2005	184,500	449,700	205,300	148,900	988,400
2006	176,500	463,700	190,900	153,100	984,200
2007	175,600	474,400	193,400	152,300	995,700
2008	173,000	466,400	178,300	162900	980,500
Duck Harvest					
Hunting Season	Atlantic Flyway	Mississippi Flyway	Central Flyway	Pacific Flyway	Total
2001	1,662,800	6,726,400	3,279,200	2,400,500	14,068,900
2002	1,720,100	5,834,900	2,607,100	2,218,200	12,380,300
2003	1,518,600	6,759,100	2,495,500	2,524,300	13,297,500
2004[3]	1,491,400	5,505,500	2,655,700	2,676,500	12,329,100
2005	1,610,500	5,270,000	2,729,800	2,900,500	12,510,800
2006	1,622,500	6,257,200	2,453,200	3,475,300	13,808,200
2007	1,684,300	6,719,700	2,666,000	3,508,900	14,578,900
2008	1,744,700	6,522,900	2,086,700	3,368,900	13,723,200

[1]Pacific Flyway includes Alaska.
[2]Hunter number estimates at the flyway and national levels may be biased high because the HIP sample frames are State-specific; therefore hunters are counted twice if they hunt in more than one State.
[3]Estimates for 2004–2008 are preliminary.

Wood duck, gadwall, and green-winged teal harvests are similar in size and together account for about 30% of the total U.S. harvest. Wood duck is a very important harvested species in the Atlantic and Mississippi Flyways. In the Atlantic Flyway, wood ducks account for nearly as much of the total flyway harvest as do mallards, despite relatively conservative daily bag limits. Most of the U.S wood duck harvest (Table 4.4) occurs in the Mississippi (60%) and Atlantic (30%) Flyways. Wood ducks are more productive than mallards (Bellrose 1980) and recent work suggests that wood ducks could sustain additional harvest (Garrettson 2007). Green-winged teal remain well above their long-term averages in both the traditional and eastern survey areas. The Atlantic Flyway accounts for approximately 9% of the U.S. green-winged teal harvest, with the Mississippi and Pacific Flyways typically accounting for 30–40%, and the Central Flyway 20–25%.

Table 4.3. Ten-year average harvests of ducks in the U.S. by species or species-group and flyway, 1961–2008[1].

	1961 – 1970					1971 – 1980				
Species	**AF[2]**	**MF[3]**	**CF[4]**	**PF[5]**	**Total**	**AF**	**MF**	**CF**	**PF**	**Total**
Mallard	208,100	1,264,700	582,600	1,048,400	3,103,800	400,700	2,219,500	977,500	1,196,400	4,794,100
Domestic mallard	3,200	3,100	200	1,000	7,500	7,600	5,900	400	1,800	15,700
American black duck	253,900	88,000	1,100	0	343,000	268,600	90,600	600	0	359,800
Mallard x Black duck	7,900	4,900	100	0	12,900	10,500	5,700	100	0	16,300
Mottled duck	17,800	34,400	46,400	0	98,600	15,700	47,400	58,800	0	121,900
Gadwall	18,300	166,200	158,100	98,800	441,400	31,100	351,800	266,600	119,600	769,100
American wigeon	52,800	184,600	111,400	401,500	750,300	71,900	244,000	177,600	414,200	907,700
Green-winged teal	95,100	306,000	211,200	423,200	1,035,500	131,900	509,600	396,300	565,700	1,603,500
Blue-winged/cinnamon teal	30,600	284,600	102,300	66,700	484,200	71,300	520,200	193,400	84,100	869,000
Northern shoveler	9,400	72,800	63,000	203,600	348,800	13,900	109,200	98,300	211,600	433,000
Northern pintail	27,300	152,300	133,000	716,800	1,029,400	36,900	175,200	194,600	857,100	1,263,800
Wood duck	186,900	367,600	30,600	29,000	614,100	335,800	657,200	54,800	37,800	1,085,600
Redhead	9,000	50,700	44,700	24,600	129,000	7,400	47,500	46,000	35,700	136,600
Canvasback	20,000	28,100	15,900	22,600	86,600	8,700	24,300	11,800	33,200	78,000
Greater scaup	38,900	21,000	1,100	15,100	76,100	46,400	23,700	1,700	16,300	88,100
Lesser scaup	43,700	215,000	46,500	31,500	336,700	55,600	280,800	74,200	36,500	447,100
Ring-necked duck	79,400	207,500	27,100	19,900	333,900	112,300	268,800	49,500	28,500	459,100
Goldeneyes	19,300	23,400	3,500	25,600	71,800	21,800	33,900	6,100	25,400	87,200
Bufflehead	30,400	35,600	8,300	30,500	104,800	51,600	50,100	12,100	29,100	142,900
Ruddy duck	6,300	14,500	6,200	28,300	55,300	10,500	22,100	9,400	31,500	73,500
Long-tailed duck	5,900	1,200	100	300	7,500	12,500	1,400	0	600	14,500
Eiders	5,400	100	0	0	5,500	17,000	100	0	100	17,200
Scoters	36,300	4,000	300	4,100	44,700	49,100	5,600	400	4,100	59,200
Hooded merganser	16,700	19,200	2,200	1,800	39,900	19,400	32,400	3,400	2,800	58,000
Other mergansers	9,400	3,900	1,100	3,700	18,100	11,600	10,500	3,100	6,500	31,700
Other ducks	800	200	200	800	2,000	1,800	1,700	1,500	1,500	6,500

	1981 – 1990					1991 – 2000				
Species	**AF[2]**	**MF[3]**	**CF[4]**	**PF[5]**	**Total**	**AF**	**MF**	**CF**	**PF**	**Total**
Mallard	350,900	1,527,100	567,900	891,400	3,337,300	394,200	2,186,000	699,200	971,600	4,251,000
Domestic mallard	5,500	4,100	400	2,200	12,200	8,000	4,800	600	1,700	15,100
American black duck	151,300	44,300	300	0	195,900	110,900	41,900	100	0	152,900
Mallard x Black duck	8,700	3,700	100	0	12,500	8,400	4,600	100	0	13,100
Mottled duck	14,400	37,700	27,000	0	79,100	11,900	45,500	16,100	0	73,500
Gadwall	25,300	281,800	163,600	100,700	571,400	44,300	670,900	312,800	136,800	1,164,800
American wigeon	39,600	149,100	110,400	229,200	528,300	52,800	161,700	133,300	270,900	618,700
Green-winged teal	102,800	376,200	254,200	348,300	1,081,500	144,000	599,100	261,300	410,900	1,415,300
Blue-winged/cinnamon teal	53,200	410,600	116,700	50,100	630,600	67,700	514,200	163,500	45,100	790,500
Northern shoveler	9,200	75,300	55,900	138,800	279,200	16,500	161,700	88,200	163,500	429,900
Northern pintail	20,900	113,300	101,600	304,500	540,300	22,000	114,100	94,500	210,000	440,600
Wood duck	322,600	608,900	55,300	24,800	1,011,600	325,800	687,900	85,500	40,000	1,139,200
Redhead	4,500	34,900	34,600	21,900	95,900	5,300	51,800	63,400	20,600	141,100
Canvasback	4,400	11,300	5,500	19,000	40,200	8,000	32,200	14,500	18,100	72,800
Greater scaup	26,700	16,200	1,600	9,900	54,400	10,000	14,400	3,900	10,800	39,100
Lesser scaup	44,300	188,100	55,700	27,100	315,200	32,700	185,300	58,400	25,200	301,600
Ring-necked duck	99,800	187,100	42,200	28,800	357,900	120,600	228,100	59,100	38,800	446,600
Goldeneyes	16,900	19,900	4,700	21,700	63,200	12,800	21,500	6,400	27,200	67,900
Bufflehead	41,300	36,400	9,200	26,300	113,200	46,000	60,700	12,800	24,100	143,600
Ruddy duck	5,700	12,300	4,200	11,800	34,000	10,400	12,700	4,900	7,700	35,700
Long-tailed duck	14,900	500	100	400	15,900	13,300	900	0	400	14,600
Eiders	23,200	0	0	200	23,400	26,400	0	0	0	26,400
Scoters	37,300	3,600	200	4,800	45,900	21,900	2,600	300	1,800	26,600
Hooded merganser	19,500	24,800	3,500	2,600	50,400	25,400	36,600	6,300	2,700	71,000
Other mergansers	13,500	7,500	2,600	5,400	29,000	16,100	7,300	1,800	4,300	29,500
Other ducks	1,400	700	2,400	2,100	6,600	1,200	1,100	5,500	1,800	9,600

[1]Harvests for 1961–2000 estimated with Mail Questionnaire Survey. Harvests for 2001–2008 estimated with Harvest Information Program.

[2]AF = Atlantic Flyway. [3]MF = Mississippi Flyway. [4]CF = Central Flyway. [5]PF = Pacific Flyway, including Alaska.

(*continued*)

Table 4.3. (*continued*) Ten-year average harvests of ducks in the U.S. by species or species-group and flyway, 1961–2008[1].

Species	2001 – 2008 AF[2]	MF[3]	CF[4]	PF[5]	Total
Mallard	454,784	2,373,236	898,255	1,066,709	4,792,984
Domestic mallard	10,354	5,709	1,131	1,880	19,074
American black duck	95,881	36,124	127	0	132,133
Mallard x Black duck	9,990	4,850	185	28	15,053
Mottled duck	13,270	40,121	11,570	0	64,960
Gadwall	34,899	775,101	438,285	177,296	1,425,581
American wigeon	30,596	147,752	186,041	385,177	749,565
Green-winged teal	142,626	642,454	315,218	489,457	1,589,756
Blue-winged/cinnamon teal	70,314	500,752	268,538	59,676	899,280
Northern shoveler	14,550	211,553	107,821	221,566	555,490
Northern pintail	18,040	120,831	77,675	196,635	413,182
Wood duck	339,605	673,586	74,528	49,147	1,136,866
Redhead	5,783	48,481	60,565	18,965	133,795
Canvasback	3,601	21,111	12,335	15,166	52,214
Greater scaup	14,111	21,475	2,660	18,080	56,326
Lesser scaup	61,903	125,225	55,779	37,260	280,168
Ring-necked duck	109,968	252,538	73,662	50,776	486,945
Goldeneyes	13,370	27,125	7,375	33,840	81,710
Bufflehead	61,114	69,908	13,308	36,400	180,729
Ruddy duck	7,569	8,950	2,947	5,570	25,036
Long-tailed duck	20,236	4,013	52	488	24,789
Eiders	21,700	0	0	404	22,104
Scoters	42,065	3,402	226	6,316	52,008
Hooded merganser	32,809	43,275	7,875	4,416	88,375
Other mergansers	18,760	7,467	2,014	6,832	35,072
Other ducks	2,998	4,801	9,071	3,571	20,441

[1]Harvest estimates for 1961–2000 based on Duck Stamp sales sampling frame. Estimates for 2001–2008 based on Harvest Information Program sampling frame.
[2]AF = Atlantic Flyway.
[3]MF = Mississippi Flyway.
[4]CF = Central Flyway.
[5]PF = Pacific Flyway, including Alaska.

Northern pintail has been a species of concern for the past 25 years and has been under restrictive harvest regulations instituted in response to their decline. The northern pintail proportion of the Nation's total duck harvest dropped from 10–11% prior to 1980 to 4% currently. The Pacific Flyway accounts for the largest portion of the U.S. northern pintail harvest, though this has dropped from 70% in the 1960s and 1970s to 48% currently. Harvest of American black duck also has dropped due to population declines and restrictive seasons. American black duck is an eastern species; the Atlantic Flyway typically accounts for 75%, and the Mississippi Flyway 25% of the U.S. black duck harvest.

Table 4.4. Ten-year percentage of duck harvest in the U.S. by species or species-group and flyway, 1961–2008.

	1961 – 1970				**1971 – 1980**				**1981 – 1990**			
Species	**AF**[1]	**MF**[2]	**CF**[3]	**PF**[4]	**AF**	**MF**	**CF**	**PF**	**AF**	**MF**	**CF**	**PF**
Ducks												
Mallard	7%	41%	19%	34%	8%	46%	20%	25%	11%	46%	17%	27%
Domestic mallard	43%	41%	3%	13%	48%	38%	3%	11%	45%	34%	3%	18%
American black duck	74%	26%	0%	0%	75%	25%	0%	0%	77%	23%	0%	0%
Mallard x Black duck	61%	38%	1%	0%	64%	35%	1%	0%	70%	30%	1%	0%
Mottled duck	18%	35%	47%	0%	13%	39%	48%	0%	18%	48%	34%	0%
Gadwall	4%	38%	36%	22%	4%	46%	35%	16%	4%	49%	29%	18%
American wigeon	7%	25%	15%	54%	8%	27%	20%	46%	7%	28%	21%	43%
Green-winged teal	9%	30%	20%	41%	8%	32%	25%	35%	10%	35%	24%	32%
Blue-winged/Cinnamon teal	6%	59%	21%	14%	8%	60%	22%	10%	8%	65%	19%	8%
Northern shoveler	3%	21%	18%	58%	3%	25%	23%	49%	3%	27%	20%	50%
Northern pintail	3%	15%	13%	70%	3%	14%	15%	68%	4%	21%	19%	56%
Wood duck	30%	60%	5%	5%	31%	61%	5%	3%	32%	60%	5%	2%
Redhead	7%	39%	35%	19%	5%	35%	34%	26%	5%	36%	36%	23%
Canvasback	23%	32%	18%	26%	11%	31%	15%	43%	11%	28%	14%	47%
Greater scaup	51%	28%	1%	20%	53%	27%	2%	19%	49%	30%	3%	18%
Lesser scaup	13%	64%	14%	9%	12%	63%	17%	8%	14%	60%	18%	9%
Ring-necked duck	24%	62%	8%	6%	24%	59%	11%	6%	28%	52%	12%	8%
Goldeneyes	27%	33%	5%	36%	25%	39%	7%	29%	27%	31%	7%	34%
Bufflehead	29%	34%	8%	29%	36%	35%	8%	20%	36%	32%	8%	23%
Ruddy duck	11%	26%	11%	51%	14%	30%	13%	43%	17%	36%	12%	35%
Long-tailed duck	79%	16%	1%	4%	86%	10%	0%	4%	94%	3%	1%	3%
Eiders	98%	2%	0%	0%	99%	1%	0%	1%	99%	0%	0%	1%
Scoters	81%	9%	1%	9%	83%	9%	1%	7%	81%	8%	0%	10%
Hooded merganser	42%	48%	6%	5%	33%	56%	6%	5%	39%	49%	7%	5%
Other mergansers	52%	22%	6%	20%	37%	33%	10%	21%	47%	26%	9%	19%
Other ducks	40%	10%	10%	40%	28%	26%	23%	23%	21%	11%	36%	32%

	1991 – 2000				**2001 – 2008**			
Species	**AF**[1]	**MF**[2]	**CF**	**PF**	**AF**	**MF**	**CF**	**PF**
Ducks								
Mallard	9%	51%	16%	23%	9%	50%	19%	22%
Domestic mallard	53%	32%	4%	11%	54%	30%	6%	10%
American black duck	73%	27%	0%	0%	73%	27%	0%	0%
Mallard x Black duck	64%	35%	1%	0%	66%	32%	1%	0%
Mottled duck	16%	62%	22%	0%	20%	62%	18%	0%
Gadwall	4%	58%	27%	12%	2%	54%	31%	12%
American wigeon	9%	26%	22%	44%	4%	20%	25%	51%
Green-winged teal	10%	42%	18%	29%	9%	40%	20%	31%
Blue-winged/Cinnamon teal	9%	65%	21%	6%	8%	56%	30%	7%
Northern shoveler	4%	38%	21%	38%	3%	38%	19%	40%
Northern pintail	5%	26%	21%	48%	4%	29%	19%	48%
Wood duck	29%	60%	8%	4%	30%	59%	7%	4%
Redhead	4%	37%	45%	15%	4%	36%	45%	14%
Canvasback	11%	44%	20%	25%	7%	40%	24%	29%
Greater scaup	26%	37%	10%	28%	25%	38%	5%	32%
Lesser scaup	11%	61%	19%	8%	22%	45%	20%	13%
Ring-necked duck	27%	51%	13%	9%	23%	52%	15%	10%
Goldeneyes	19%	32%	9%	40%	16%	33%	9%	41%
Bufflehead	32%	42%	9%	17%	34%	39%	7%	20%
Ruddy duck	29%	36%	14%	22%	30%	36%	12%	22%
Long-tailed duck	91%	6%	0%	3%	82%	16%	0%	2%
Eiders	100%	0%	0%	0%	98%	0%	0%	2%
Scoters	82%	10%	1%	7%	81%	7%	0%	12%
Hooded merganser	36%	52%	9%	4%	37%	49%	9%	5%
Other mergansers	55%	25%	6%	15%	53%	21%	6%	19%
Other ducks	13%	11%	57%	19%	15%	23%	44%	17%

[1]AF = Atlantic Flyway.

[2]MF = Mississippi Flyway.

[3]CF = Central Flyway.

[4]PF = Pacific Flyway, including Alaska.

Diving ducks generally are subject to restrictive regulations, and comprise a relatively small portion of the total duck harvest. Scaup harvest regulations have become more restrictive in the 2000s due to continued population declines. Scaup are not separated by species in setting regulations, but greater and lesser scaup have different geographic distributions and can be distinguished in the PCS. The Mississippi Flyway accounts for approximately 38% of the harvest of greater scaup and 45% of the harvest of lesser scaup. Sea duck harvest traditionally has comprised less than 2% of the total annual duck harvest, but is relatively important in some States in the Atlantic Flyway. Distributional changes in harvest also have occurred within flyways, with southern States taking an increasing proportion of flyway totals, especially in the Mississippi Flyway. This trend increased with the advent of 60-day seasons and the extension of the hunting-season framework in 2004.

The harvest estimate for mergansers has been approximately 123,000 birds per year in recent years (Table 4.3), with approximately 72% of this harvest consisting of hooded mergansers. Almost 80% of the harvest of mergansers in the U.S. occurs in the Atlantic and Mississippi Flyways (Table 4.4). Special regulations on sea ducks were permitted for many years, but have been curtailed due to concerns about their status.

Most of the non-U.S. harvest of ducks occurs in Canada, where most of the ducks harvested in the U.S. are produced. Canada's most recent annual duck harvests of 1.2 million during both 2007 and 2008 were less than 10% of the size of the U.S. duck harvests of 14.6 and 13.7 million during the same years. Mallards are the most important duck in the Canadian harvest, accounting for ~45% of the Canadian duck harvest. Canada accounts for approximately 8% of the total North American duck harvest. American black duck is another important species in the Canadian harvest, especially in Quebec, Ontario, and the Maritime Provinces. Canadian harvest of American black duck was estimated at 80,000 in 2005, 100,000 in 2006, and 104,000 in 2007 and in 2008 (Gendron and Collins 2007; Raftovich et al. 2009). Canadian hunters account for approximately half of the American black duck harvest.

Blue-winged teal are early migrants that winter in Mexico, Central America and the Caribbean. Although blue-winged teal comprised 17.6% of the total duck population in the traditional survey area in 2008, they typically account for only 4–6% of the U.S. total duck harvest, most of which occurs in early special teal seasons. This is because most blue-winged teal winter outside of the conterminous U.S. and are not available for hunting during a large portion of the hunting season.

4.1.2 Geese

4.1.2.1 Breeding Habitats

North American geese are an abundant and diverse group including six species and 34 recognized populations. These geese nest from the arctic islands of northern Canada south to Texas, and from Alaska's Aleutian Islands east to Newfoundland.

Most North American goose species nest and molt their flight feathers each year in low-lying wetland areas distributed across the vast arctic and subarctic regions of North America (Figure 4.6). Nesting and molting areas often are associated with coastal areas underlain by marine sediments. Wetland areas frequented by geese provide abundant and nutritious vegetative growth, which is a relative rarity in "polar desert" environments. Because geese are herbivores, vegetated wetlands are essential for the development of goslings and the post-breeding nutrient replenishment and feather replacement of adult geese.

Weather is an important component of arctic/subarctic habitat suitability for geese. Nesting seasons at northern latitudes are harsh and short. In many areas, the average period between the disappearance of snow from nesting sites in June/July and the return of freezing temperatures in September is only slightly longer than the interval between initiation of egg-laying and the fledging of goslings. Delays in spring snowmelt generally reduce the proportion of geese that nest, clutch sizes, and nest success in that year and contribute to poor gosling production. Conversely, early snowmelt benefits reproductive success.

The arctic/subarctic nesting grounds were once thought to be relatively safe from both natural and anthropogenic impacts, but now are subject to increasing risk from climate change, human exploitation of mineral resources, and the impacts of geese themselves.

Figure 4.6. Important goose nesting areas in arctic and subarctic North America.

The arctic has experienced the greatest regional warming on Earth in recent decades (Arctic Climate Impact Assessment 2005). Greenhouse gases (e.g., carbon dioxide, methane) trap solar radiation and contribute to temperature increases. Rising temperatures in polar areas lead to reduced snow cover and decreased albedo (i.e., reflectance; Euskirchen et al. 2009), allowing a disproportionally larger change in heat absorption than at lower latitudes. Similarly, reduced ice cover in the Arctic Ocean reduces albedo and functions as a positive feedback that accelerates warming. These factors contribute to increasing snow-free periods in the Arctic (Arctic Climate Impact Assessment 2005). Longer growing seasons may result in increased growth of goose forage and allow a northward expansion in the breeding ranges of geese. However, increased growth of tundra plants also may correspond to reductions in forage quality, the magnitude of which depends on hydrological changes.

Climate change factors also have been implicated in the disappearance of tundra wetlands, partially through cumulative impacts on the extent and depth of permafrost. In the long term, the extent of shrub cover (e.g., *Betula nana, Salix* spp.) is expected to expand into tundra habitats (Sturm et al. 2005). Along coastal areas in the Arctic, storm surges and erosion are increasing (driven by loss of sea ice), which is accelerating the introduction of saltwater into freshwater plant communities important to geese and other arctic fauna.

Furthermore, longer snow-free periods, recent reductions in the extent of summer sea-ice coverage, and global socioeconomic forces have promoted renewed interest in oil and gas development, precious-mineral extraction, hydroelectric power development, commercial fishing, and tourism activities across these northern areas. Risks to coastal wetland systems, permafrost integrity, and disturbance-free goose reproductive seasons are increasing due to human activity.

Thus far, a warming arctic generally has promoted improved goose production and contributed, along with other factors discussed below, to increased goose abundance. Many populations have increased exponentially, some to levels at which they negatively affect habitats on the nesting (e.g., Hudson Bay Lowland salt marshes) and migration/wintering grounds (e.g., St. Lawrence bulrush marshes) (Batt 1997, 1998; Moser 2001; U.S. Department of the Interior 2005; U.S. Department of the Interior 2007a).

Large numbers of geese exert substantial pressures on vegetation through grazing and grubbing on above- and below-ground plant parts during migration, nesting, and brood-rearing periods. Abraham and Jefferies (1997) described a negative feedback loop between snow/Ross' geese and salt-marsh graminoid habitats, whereby foraging activity reduces the insulating effect of vegetative cover, increases solar warming of soils, increases evaporation, and raises surface soil salinity due to the transport of subsurface minerals. Resultant hyper-saline soils support little vegetation useful to geese and reduce habitat suitability for geese and other fauna.

Increased abundance of Central and Mississippi Flyway snow and Ross' geese and their foraging activity has had negative impacts at all major nesting colonies in the arctic (Abraham and Jefferies 1997). Additionally, the intensive grubbing by these geese during spring migrations also has degraded areas used for nesting by other geese and fauna (Abraham and Jefferies 1997; Nack and Andersen 2006; U.S. Department of the Interior 2007a).

Rapidly expanding populations of temperate-nesting Canada geese (see below) also have impacts on northern habitats. Increasingly large numbers of temperate-nesting geese fly north during summer to molt their feathers. There, they compete with the locally nesting geese for food resources, and increase foraging pressure on habitats that are often already overgrazed (Abraham et al. 1999).

Although climate warming trends in arctic areas appear to have benefited goose populations in the short-term, the long-term effects could be devastating to the nesting grounds of geese. Arctic warming may increase frequency of coastal storm surges, raise sea levels, and inundate primary coastal goose nesting areas. These effects would be most apparent on brant and emperor goose populations. Further inland, other species which favor nesting on islands or near ponds would be impacted by permafrost depletion and the drying of tundra pools.

Most of the North American geese that nest south of the Arctic and subarctic belong to the two largest subspecies of Canada geese (giant Canada goose and western Canada goose). These large birds nest within the temperate biomes of Canada and the U.S. Habitats of these "temperate-nesting" Canada geese, including "resident geese," which nest or reside predominantly in the U.S. (U.S. Department of the Interior 2005), are subjected to many of the same pressures as are duck habitats (i.e., wetland drainage and land-use conversion). Unlike most duck species, however, these geese are very well adapted to terrestrial life, are complete herbivores, and do not require concealment when nesting; therefore, their wetland/nesting habitat requirements are less stringent than those of ducks. In fact, these geese will use a great variety of habitats for nesting, including prairies, forests, rivers, lakes, reservoirs, natural or artificial ponds, and urban areas.

Primary threats to the habitats of temperate-nesting geese include wetland destruction and drought. River-level increases during goose nesting seasons, resulting from natural flooding or manipulations of man-made water-control structures, have the potential to destroy many island or shoreline nests. Shoreline development, increased urbanization, human disturbance, and increasing populations of predators (e.g., coyotes, dogs, crows, gulls) also may contribute to reduced habitat suitability and goose productivity. However, temperate-nesting Canada geese readily utilize habitats altered by humans, and high productivity is likely to continue. Most populations of temperate nesting Canada geese are well above population objective levels.

Migration and Wintering Habitats

Following their often spectacular fall migrations from the nesting grounds, geese still can be found in much of southern Canada, every State of the U.S., and in areas of Mexico. Consistent with their wide distribution, geese use many habitats throughout their annual cycles.

In general, migration and wintering habitat for most geese is abundant. Goose habitat increased greatly during the last half-century through the conversion of forests and grasslands to agriculture. Geese have adapted quickly to the increased abundance of new food resources (e.g., forage crops and waste grain). These abundant and energy-rich foods have provided migratory geese a "nutrient subsidy" beyond that provided by their traditional natural foods. These readily available resources help fuel the energy requirements of migration and nesting activities and are another reason for the rapid growth of many North American goose populations.

Currently, neither food abundance nor roosting/loafing water bodies appear to be limiting goose populations in the continent's interior. However, continued reduction in the abundance and distribution of quality wetlands has promoted extremely high concentrations of waterfowl in some areas. The current trend toward increased harvest efficiency of farm machinery, conversion of grain crops to other commodities, and continued increases in goose abundance could result in reduced food availability for geese, at least regionally. For example, large concentrations of waterfowl, sandhill cranes, and other birds stage during spring in Nebraska's Rainwater Basin (RWB). Estimated waste grain abundance in this important spring staging area was reduced 24–47% between 1978 and 1997–1998 (Krapu et al. 2004). For some geese and ducks, the rate of body-mass increase during the spring migration in the RWB appeared to be reduced during the 2000s as compared to that of the 1970s (R. R. Cox, Jr., personal communication). A reduction of spring foraging opportunity may be related to a long-term decline in the productivity of several mid-continent goose populations (Kruse et al. 2002).

Limited numbers of wetlands in the RWB have led to very high roosting densities of waterfowl on many wetlands. Such high densities are conducive to disease transmission and acute mortality events. In recent decades, these concentrations included large numbers of snow and Ross' geese, known carriers of the bacterium that causes avian cholera. Significant avian cholera mortality events occurred historically in the RWB and have affected many species of geese, ducks, and other waterbirds (Blanchong et al. 2006). Crowded conditions have led to similar disease outbreaks elsewhere (e.g., California, Texas).

In contrast to the midcontinent region, migration and wintering habitats along North America's coasts may be vulnerable to oil fouling from shipping traffic, development, dredging, and water-quality degradation. In some coastal areas, subsidence, pollution, and development have resulted in substantial loss of wintering habitat (Tiner 1984). Eelgrass, a submerged tidal aquatic plant and a primary food of brant and emperor geese, is subject to large scale die-offs and reduced productivity due to these impacts (Ward et al. 2005).

Wintering grounds also could be impacted by global warming. The playas in the High Plains of the western Great Plains (with the greatest densities on the Southern High Plains of northwest Texas and eastern New Mexico) provide wintering habitat for several goose species, but do so only when rainfall is adequate to flood them. Global warming impacts on the timing, intensity, and amount of precipitation at various scales are uncertain (Seavy et al. 2008), but diminished rainfall or changes in timing of precipitation could degrade the wintering grounds of most continental goose and duck populations.

Deterioration of water quality (turbidity, toxicity) from agricultural or municipal runoff also could impact food availability or overall health of goose populations. Some chemicals (e.g., diazinon) have caused direct mortality of geese, and contaminants have been reported from goose tissues (Zinkl et al. 1978; Stone and Knoch 1982; Anderson et al. 1984).

Overabundant geese also can degrade habitats on their staging and wintering areas. Snow goose foraging along the east and west coasts have reduced stem density and productivity of bulrush (*Scirpus spp*.) marshes (Giroux et al. 1998). Regionally abundant or overabundant geese have caused socioeconomic conflicts when they feed on growing or sprouting grain, forage, vegetable, and seed crops. Goose use of these habitats has angered producers and has required abatement measures by Federal agencies (e.g., Animal and Plant Health Inspection Service), State and Provincial resource agencies, and in rare cases, have required financial depredation awards to affected agricultural producers.

4.1.2.2 Populations and Status

Goose species in North America generally are abundant and at healthy levels. Although the numbers derived from mid-winter surveys are considered underestimates of goose abundance (i.e., not all areas are surveyed and large flocks of waterfowl are generally underestimated), they offer reasonable indices of change in regional goose abundance (Moser and Caswell 2004; Figure 4.7). Light geese (i.e., lesser snow and Ross'), Canada, and white-fronted geese have increased at annual rates of 2.7%, 2.5%, and 3.0%, respectively during 1955-2009, while brant populations have shown no trend since 1960 (P = 0.395; Figure 4.7). Likely, there are more Canada and snow geese now than at any previous point in time (Rusch et al. 1995; Ankney 1996; U.S. Department of the Interior 2007a). Ross' geese and snow geese are too similar in appearance to be separated during aerial winter surveys, but periodic photographic surveys on the major breeding colonies in the central Canadian arctic indicated that Ross' geese increased at a 9% annual rate during 1976-2006. Annual nesting surveys at one of the largest colonies in the central Canadian arctic indicated a growth rate of 8% per year 1993–2008 (R. T. Alisauskas, Canadian Wildlife Service, personal communication). Ross' geese are expanding both numerically and geographically and likely also are more abundant than ever before (Kelley et al. 2001). North American emperor geese breed in Alaska and Russia. Occasional surveys indicated emperor goose abundance declined in the late 1970s and early 1980s. Since 1981, emperor geese have been surveyed in spring annually, but these surveys have indicated no trend (*P* = 0.932). Current spring indices of emperor geese fluctuate around a level somewhat lower than that of the early 1980s.

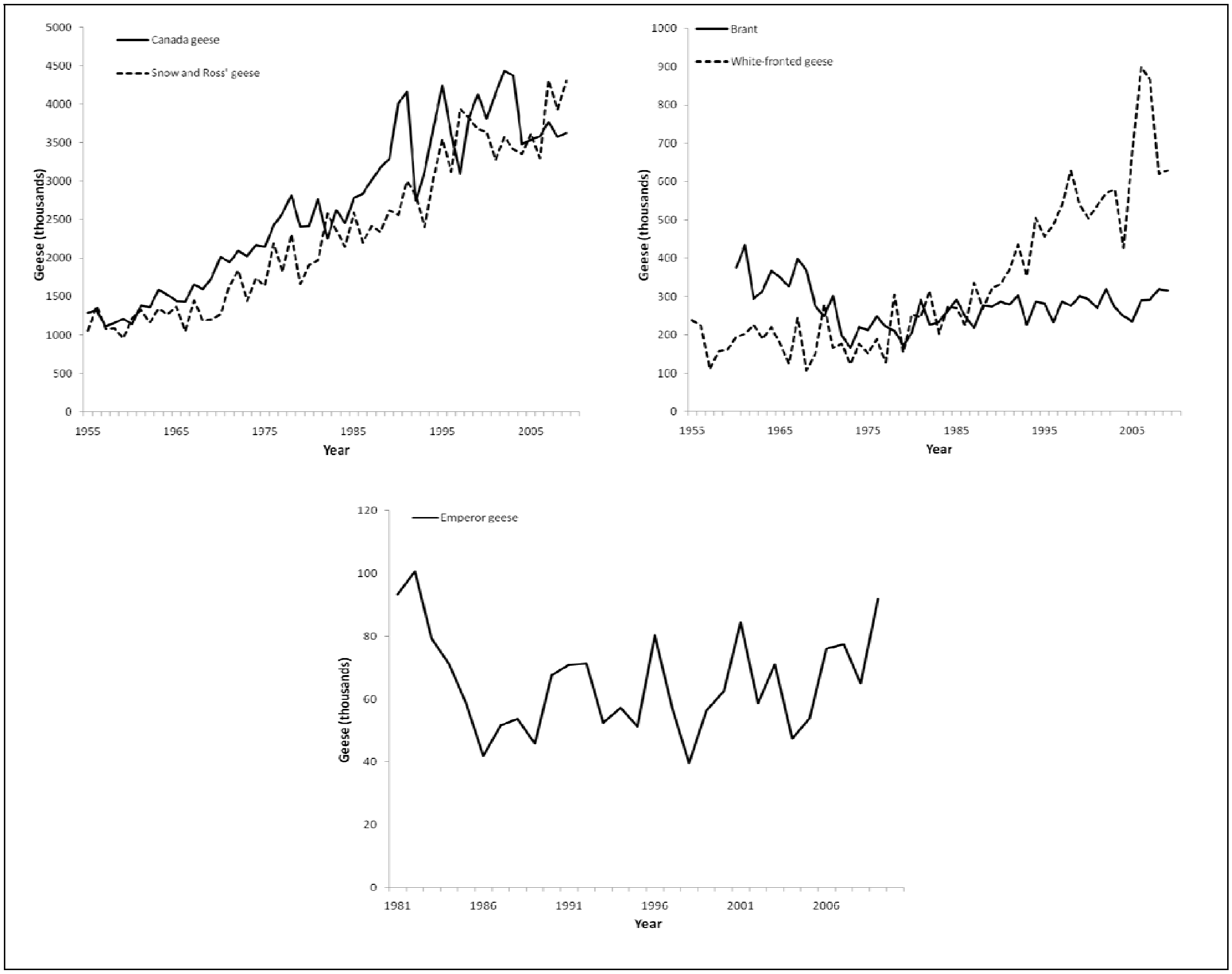

Figure 4.7. Abundance indices of (a) Canada and snow/Ross' geese from winter surveys, (b) brant and white-fronted geese from winter surveys, and (c) emperor geese from spring staging surveys conducted annually in North America.

In general, geese are more philopatric to breeding and wintering areas than are ducks. This philopatry has promoted management of geese at a finer geographic scale. Managers from North American natural resource agencies cooperatively have defined 34 "populations" of geese (Table 4.5), based on similar geographic distributions and demographics.

Table 4.5. Status, trends, and objectives for North American goose populations.

Species and Population	Trend 2000–2009[1]	Mean Population Size 2007–2009	Population Objective[2]	Population Index[2]
Canada goose				
Atlantic Flyway Resident	Stable	1,053,000	≤650,000	BGG
Mississippi Flyway Giant	Increasing	1,887,600	1,000,000	BGG
Western Prairie[3]	Stable	581,200	285,000	WGG
Great Plains[3]	Stable	581,200	285,000	WGG
Hi-line	Stable	224,300	80,000	WGG
Rocky Mountain	Stable	165,800	117,000	BGG
Pacific	Stable	169,200	Regional goals	BGG
North Atlantic	Unknown		TBD	
Atlantic	Increasing	180,500	225,000	NPR
Southern James Bay	Stable	75,500	100,000	BGG
Mississippi Valley	Stable	315,800	375,000	NG
Eastern Prairie	Increasing	161,200	75,000	NG
Vancouver	Unknown		TBD	BGG
Dusky	Stable	8,700	10,000-20,000	BGG
Lesser	Unknown		TBD	BGG
Tall Grass Prairie	Stable	464,300	250,000	WGG
Short Grass Prairie	Stable	207,700	150,000	WGG
Taverner's	Unknown		TBD	
Cackling	Stable	175,800	250,000	BGG
Aleutian	Increasing	100,100	40,000	WGG
Snow goose				
Greater Snow Goose	Increasing	1,131,300	500,000–750,000	SGG
Mid-continent	Stable	2,708,500	1,000,000–1,500,000	WGG
Western Central Flyway	Increasing	214,500	110,000	WGG
Western Arctic	Increasing	579,800	200,000	NG
Wrangel Island	Increasing	140,800	120,000	BGG
Ross' goose	Increasing	1,205,800	100,000	NG
Greater white-fronted goose				
Mid-continent	Stable	755,800	600,000	SSG
Pacific Flyway	Increasing	589,500	300,000	BGG/FSG
Tule White-fronted Goose	Stable		10,000	WGG
Brant				
Atlantic Brant	Stable	154,500	124,000	WGG
Eastern High Arctic Brant	Stable		TBD	
Western High Arctic Brant	Stable	10,500	12,000	WGG
Pacific Brant	Stable	140,700	150,000	WGG
Emperor goose	Stable	78,100	150,000	SSG

[1]U.S. Fish and Wildlife Service 2009.
[2]Population objective units: BGG = breeding ground geese, NG = nesting geese, NPR = nesting pairs, WGG = wintering ground geese, SSG = spring staging geese, FSG = fall staging geese, BGG/FSG = estimated fall population based on numbers of breeding ground geese counted.
[3]These two populations are managed and surveyed jointly.

Originally, goose populations were defined largely by their affiliation with certain wintering grounds. However, during the last 25 years, the abundance of many goose populations increased (especially temperate-nesting Canada geese and light geese), wintering areas began to change, monitoring efforts were expanded (e.g., use of neck collars), and research indicated that several different breeding populations often commingled on shared wintering grounds. This commingling made winter surveys less reliable for tracking distinct populations of similar-appearing geese (e.g., subspecies of Canada geese). Currently, most goose populations are defined by their affiliation to breeding areas. Unless populations are readily identifiable and reliably tracked elsewhere (i.e., brant, emperor geese), managers strive to monitor populations on breeding areas, where populations are most geographically isolated during the annual cycle. As of 2009, 13 of 20 Canada goose populations, three of six snow and Ross' goose populations, and one of three white-fronted goose populations are monitored on their breeding grounds. Breeding-ground surveys are conducted for additional goose populations but are not yet annually available (e.g., snow and Ross' goose photoinventory surveys). Annual surveys are being developed for additional populations.

Current cooperative management plans have established population objectives for 29 goose populations (Table 4.5). Currently, the three-year averages of eight of these populations are below their respective objective level, as measured by monitoring programs identified in management plans. During the most recent ten-year period (2000–2009), 10 populations increased ($P < 0.05$), zero populations showed statistical declines, and the remainder showed no trends ($P > 0.05$) (Table 4.5; U.S. Fish and Wildlife Service 2009). During the past five years, however, dusky Canada geese have been declining steadily, and in 2009 further harvest restrictions were implemented in response to this decline.

Several populations of snow and Ross' geese have been identified as contributors to wetland degradation and destruction on their nesting, staging, and wintering areas (see above), and that greatly exceed population objectives (U.S. Department of the Interior 2007a). Additionally, several populations of Canada geese greatly exceed population objectives and human tolerance for their hazards to public health and safety, crop depredations, and fouling of aquatic habitats and beaches (U.S. Department of the Interior 2005). For more information about these populations and actions taken to reduce these concerns, see documents published by the U.S. Department of the Interior (2005; 2007a).

Changing agricultural practices, perhaps aided by a warming climate, have contributed to a northward shift in the wintering grounds of many northern-nesting goose populations over the last 50 years (Krohn and Bizeau 1988; Hestbeck et al. 1991; Williams et al. 2008). Despite the lower numbers of northern-nesting geese wintering in the southern U.S., many of these areas have experienced increases in the number of temperate-nesting (resident) geese.

Despite the generally healthy status of most goose populations, several have undergone particularly notable changes in the recent past, and the following populations are still of concern to managers.

Giant Canada Geese

By the mid-1900s, many naturalists suspected that the giant Canada goose was extinct (Hanson 1965). The giant Canada goose was the largest of 11 commonly-recognized subspecies and was endemic to the central plains of the U.S. and Canada. In 1962, the subspecies was rediscovered in Minnesota (Hanson 1965). The rediscovery spurred many goose restoration and translocation efforts. Today, the giant Canada goose is very abundant, both within and outside its original geographic range. In many locations, large abundances have resulted in frequent negative human/goose interactions

Aleutian Canada geese

The Aleutian Canada goose was listed as an endangered species in 1967 and a recovery program began in 1974. The population numbered approximately 800 birds in 1974 but increased steadily to the present (Pacific Flyway Council 1999). The population was de-listed in 2001. The preliminary population estimate during the winter of 2008–2009 was 79,500 (± 26,100), 29% lower than the 2008 estimate (P=0.034). Population indices have increased an average of 10% per year during the last 10 years ($P < 0.05$; U.S. Fish and Wildlife Service 2009).

Dusky Canada Geese

The breeding habitat of the dusky Canada goose population near the Copper River Delta was elevated during the Alaskan earthquake of 1964 (Pacific Flyway Council 2008). This localized nesting population was never abundant and it declined as habitats and predators responded to that uplift. Dusky Canada geese, with the assistance of intensive management, remained at a fairly stable, but low, level until recently. The 2009 spring population estimate was 6,700, approximately 26% lower than 2008 counts, and the lowest on record for this population since 1986 (U.S. Fish and Wildlife Service 2009).

Atlantic Population (AP) Canada Geese

This population of Canada geese suffered a sharp decline in the 1990s, masked by increasing numbers of resident geese, that led to a hunting season closure in 1995 (Atlantic Flyway Council 2008). Within a few years after the closure, the population had recovered well and hunting was resumed in 1999. The population is now near an all-time high.

4.1.2.3 Harvest

Goose hunting frameworks are promulgated by the Service after assessing population status and consulting with Flyway Councils, which include representation by State, Provincial and Federal wildlife agencies, Native American groups, and NGOs. Goose harvests are monitored by the same harvest surveys as are duck harvests (i.e., MQS [prior to 1999], HIP, and Waterfowl Parts Surveys).

Commensurate with long-term increases in the abundance of most North American goose species, goose harvest opportunity has increased dramatically in the U.S. Goose hunting now occurs in all States (except Hawaii) and, in general, regulations are more liberal now than any time since 1918. In 1977, the first special Canada goose season was held in Michigan to harvest resident Canada geese (Mississippi Flyway Council 1996). Since 1977, the use of special regulations has increased in all flyways to help reduce growth rates of resident Canada geese. Special conservation measures (i.e., conservation orders, special Canada goose permits) also have been implemented in the U.S. and Canada to increase the take of overabundant snow, Ross', and/or resident Canada geese (64 FR 32766-32776 [June 17, 1999]; U.S. Department of the Interior 2005, 2007a).

Estimated continental goose harvests increased moderately from 1962 through the mid-1970s, remained fairly stable until the early 1990s, and then increased rapidly to the early 2000s (Figure 4.8). The period of slower growth largely was due to reductions in waterfowl hunter days-afield during the more restrictive duck hunting regulations and drought of the 1980s, as well as reductions in important goose stocks in the Pacific and Atlantic Flyways. Average annual total harvest of native goose species in the U.S. during the 2001–2008 seasons exceeded 3.5 million birds (Figure 4.9).

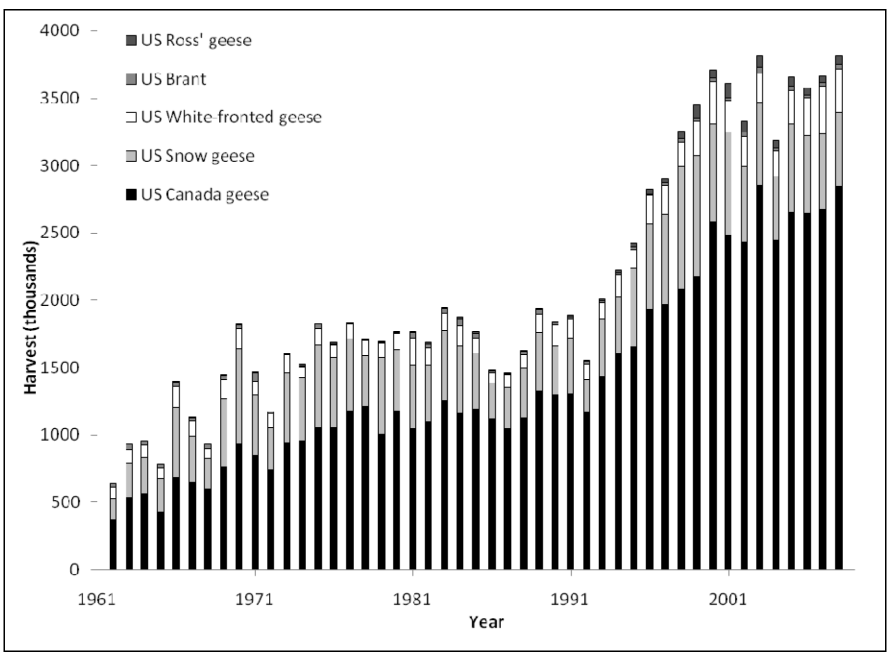

Figure 4.8. Cumulative estimated harvest of geese in the U.S. (regular and special seasons) by species, 1962–2008 (the species of harvested geese were not determined in 1961). Estimates do not include take of light geese under the conservation order.

From 1962 through 2008, the Canada goose harvest in the U.S. increased an average of 3.6% per year. The rate of increase has ranged from 1.4% (Pacific Flyway) to 5.0% (Mississippi Flyway) per year in all flyways. During 2001–2008, Canada geese represented an average of 73% of all harvested geese, and were the second most frequently harvested species of waterfowl in the U.S., exceeded only by the mallard (FWS Harvest Survey Section data).

Regular-season snow goose harvest increased an average of 1.5% each year during the period of 1962 to 2008. However, since 1999, when conservation order management actions were implemented, the regular season harvest of snow goose has declined slightly. This result was not surprising because many States replaced regular season snow goose hunting opportunities with the more liberal conservation orders.

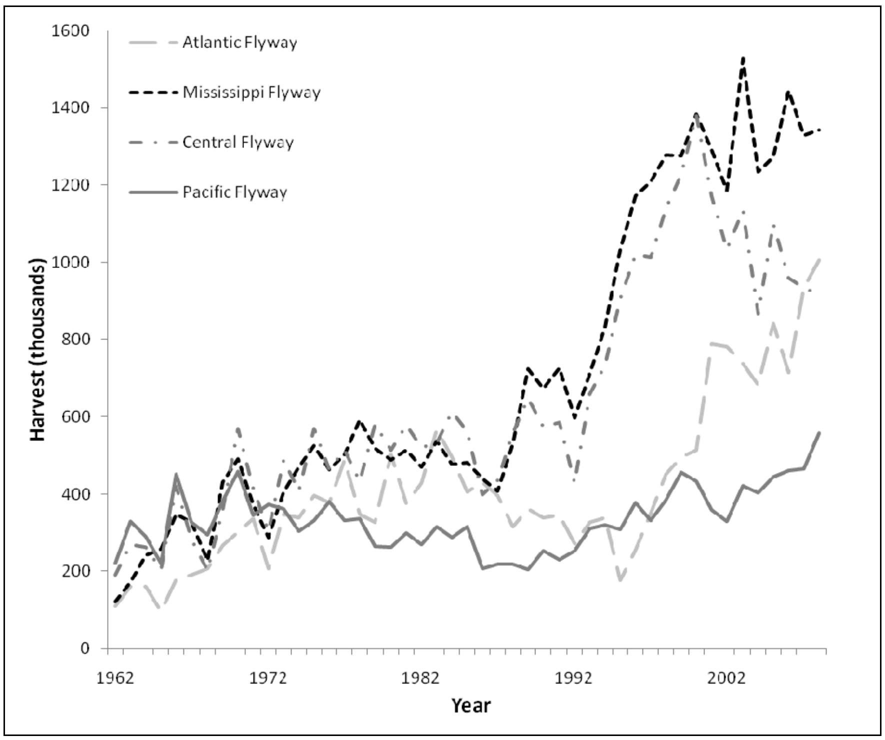

Figure 4.9. Estimated total harvest of geese in the U.S. (regular and special seasons) by flyway, 1961–2008. Estimates do not include take of light geese under the conservation order.

On a flyway basis, annual regular-season snow goose harvests during 1962–2008 increased approximately 1.7% and 1.8% per year in the Central and Mississippi Flyways, respectively, but decreased 1.1% per year in the Pacific Flyway. In the Atlantic Flyway, greater snow goose harvest increased an average of 3.7% per year since the greater snow goose season was opened in 1975. During 2001–2008, snow geese represented an average of 16.6% of the total U.S. goose harvest (regular seasons only) and were the 8th most prevalent waterfowl species in the bag.

The eastward extension of Ross' goose wintering range is illustrated by their appearance in flyway-specific harvest survey data. Ross' geese were first detected in the FWS harvest survey in the Pacific Flyway in 1966, in the Central Flyway in 1974, in the Mississippi Flyway in 1982, and in the Atlantic Flyway in 1996. The harvest of Ross' geese in the U.S. has increased an average of 13.5% per year from 1966 to 2008. Ross' goose harvest has increased 8.0%, 18.5%, and 27.2% per year in the Pacific, Central, and Mississippi Flyways, respectively, since they were first detected (FWS Harvest Survey Section data). Ross' goose harvest in the Atlantic Flyway is sporadic.

White-fronted goose harvest in the U.S. increased an average of 2.3% per year during 1962–2008 (FWS Harvest Survey Section data). The harvest of Mid-continent Population white-fronted geese increased steadily during 1962–2008 in the Central (3.0% per year) and Mississippi Flyways (5.7% per year). In the Pacific Flyway, harvest declined in the 1970s and 1980s, reflecting reductions in Pacific Population white-fronted geese. Although the Pacific Flyway harvest has declined over the long term (-1.1% per year), harvest since 1988 has risen consistently, commensurate with population growth. White-fronted geese rarely are harvested in the Atlantic Flyway.

The U.S. harvest of brant has shown no statistically significant trend during 1962–2008. However, harvest declined 2.2% per year in the Pacific Flyway and increased 4.1% in the Atlantic Flyway over that period (the brant season in the Atlantic Flyway was closed for eight of nine years during 1972–1980; FWS Harvest Survey Section data).

The only harvest of emperor geese in the U.S. occurs in Alaska. However, hunting outside of subsistence harvests for emperor geese has been closed since 1986, and subsistence hunting has been closed since 1987 following population declines and adoption of the Yukon-Kuskokwim (Y-K) Delta Management Plan. The fall-winter harvest had averaged ~1,850 geese per year during 1970–1985 (data from Alaska and Federal surveys; Pacific Flyway Council 2006).

Long-term increases in total goose harvests have been experienced by all four flyways, but increases since 1990 have been most pronounced in the Mississippi, Atlantic, and Central Flyways (Figure 4.9). Prolonged periods of reduced harvests were experienced by the Pacific and Atlantic Flyways, due primarily to restricted hunting opportunity designed to allow depressed populations the opportunity to rebound. In the Pacific Flyway, harvest restrictions were imposed to reduce mortality of dusky and cackling Canada geese, Pacific Population white-fronted geese, and brant in the mid-1980s. In the Atlantic Flyway, hunting seasons were closed on the AP of Canada geese for four years, after a sharp decline in the breeding population was detected. In both flyways, populations of concern subsequently increased and harvest restrictions were relaxed. Periodically, substantial harvest restrictions have been imposed in all flyways in response to reduced population abundance or productivity.

Significant harvest of geese also occurs in Canada, averaging 979,000 birds per year during 2001–2008, or about 21.4% of the U.S. and Canadian combined harvest (http://www.cws-scf.ec.gc.ca/harvest/). In each year during 2001–2008, Canada goose was the most prevalent goose species in the Canadian harvest.

Goose harvest in Mexico is not estimated annually. During a study from 1987 to 1993, an annual goose harvest of ~5,800 geese (53% of which were brant) was estimated in Mexico (Kramer et al. 1995).

4.1.3 Swans

Three native species of swan occur in the U.S.: the tundra swan, trumpeter swan, and whooper swan. Except as vagrants, whooper swans occur in the U.S. only during winter, mainly in the western Aleutian Islands. Whooper swans are not addressed in SEIS 2010 because of their very limited distribution in a remote area where they are not subjected to hunting. In addition to the three species that occur naturally in North America, the mute swan, which is native to Eurasia, exists in several feral populations that have become established along the east coast, from Chesapeake Bay to the northeastern U.S., around the Great Lakes region, and in the Pacific Northwest (Ciaranca et al. 1997). Because mute swans are a non-native species, they are not included in the MBTA (as amended by the Migratory Bird Treaty Reform Act of 2004); therefore, information about this species is not included in this document.

4.1.3.1 Habitat

Tundra swans breed across northern North America, from Alaska in the west to northern Quebec and Baffin Island in the east (Bellrose 1980). The breeding range of trumpeter swans is limited to boreal and taiga regions of Alaska southwards to the lower Yukon Territory and a portion of Alberta, and the Tri-State Area in the U.S. (Bellrose 1980). Additionally, through restoration efforts, a small but increasing number of trumpeter swans breed in the conterminous U.S., primarily in Minnesota, Michigan, Wisconsin, Iowa, Nebraska, Montana, Wyoming, and Idaho (Moser 2006, unpublished report). Tundra and trumpeter swans nest around freshwater ponds, lakes, marshes, and occasionally rivers. Tundra swans most often are found in tundra habitats along coasts, while trumpeter swans usually are found farther inland in forested habitats (Wilk 1993). These breeding habitats have been relatively stable, but loss of habitat from climate change, and natural-resource extraction poses increasing risks, especially along coastal areas and on the North Slope of Alaska.

Our knowledge of important migratory stop-over locations for tundra and trumpeter swans is incomplete. However, the most important habitats are large river deltas or lakes in the northern boreal forest and prairie-pothole Bird Conservation Regions, such as the Athabasca Delta, Saskatchewan River, Malheur Lake, Klamath Valley, the PPR of the Dakotas and Minnesota, Upper Mississippi River, and the

Great Lakes Region (Ely et al. 1997; Wilkins 2007). The quality and quantity of migration habitats seem to be sufficient to meet the needs of migrating swans. One problem site is the Coeur D'Alene River Valley in Idaho. In this area, hundreds of tundra swans have been poisoned by mine tailings (Beyer et al. 1998). Clean-up of the region is ongoing.

Wintering habitat for tundra and trumpeter swans has been more impacted by human development and land use changes than breeding or migration habitat. In addition, for some populations of trumpeter swans, wintering habitat is limited due to the loss of some migratory traditions. Most tundra swans winter along the two coasts of the U.S., and these regions have been impacted heavily by human development, especially the Chesapeake Bay in Maryland and Pamlico Sound Region of North Carolina, and the Sacramento River Valley and Central Valley in California. Each year since 1999, several hundred tundra and trumpeter swans wintering in northwestern Washington/southeastern British Columbia have died of lead poisoning from spent lead shot. Research is ongoing to identify the source of this lead and minimize the problem (Smith 2006, unpublished report). However, the quality and quantity of wintering habitats seem to be sufficient to support current swan population levels. Swans are able to adapt to some changing habitat conditions, as shown by the field-feeding behavior adopted by tundra swans in the Atlantic and Pacific Flyways, and trumpeter swans in Idaho.

4.1.3.2 Populations and Status

Tundra swan

Tundra swans are delineated into two populations, based on their largely separate breeding and wintering distributions. The Western Population nests along the coastal lowlands of western Alaska, particularly between the Kotzebue Sound and Bristol Bay, with the largest concentrations being found in the Y-K Delta River region. These tundra swans winter primarily in California, Utah, and the Pacific Northwest. The Eastern Population nests from northern Alaska to northern Quebec and Baffin Island. These birds winter in coastal areas, primarily from Maryland to North Carolina (U.S. Fish and Wildlife Service 2007c, unpublished report). Both populations have increased from historical numbers but currently are relatively stable at around 100,000 birds each (Table 4.6).

Trumpeter swan

The trumpeter swan was nearly extirpated from North America by the early 1900s, and some long-distance migratory movements have been eliminated. The causes of this population decline included over-hunting in the 1800s and early 1900s, largely by commercial hunters, and habitat loss. Numerous relocation projects are underway to establish nesting flocks across Canada and the U.S.

Table 4.6. Tundra swan population data[1].

	Eastern Population		Western Population	
Year	Population count	% young observed on the wintering ground	Population count	% young observed on the wintering ground
1956	38,699		46,282	
1957	40,224		42,970	
1958	28,181		49,946	
1959	27,717		39,600	
1960	41,100		35,508	
1961	62,500		40,828	
1962	39,400		32,356	
1963	61,400		46,350	32
1964	62,100		40,545	31
1965	54,000		42,649	44
1966	57,800		34,804	38
1967	72,000		48,946	49
1968	45,600		35,630	43
1969	62,200		74,879	46
1970	55,000		31,000	22
1971	58,200		98,856	29
1972	62,800		82,847	27
1973	56,517		33,917	42
1974	63,827		69,768	22
1975	66,083		54,872	20
1976	67,728	7	51,350	29
1977	76,238	20	47,269	24
1978	70,244	29	45,597	25
1979	76,826	9	53,523	34
1980*	60,057	11	65,209	34
1981	92,965	30	83,553	32
1982	73,182	12	91,314	29
1983	87,514	20	67,302	38
1984	81,360	20	61,873	36
1985	96,934	24	48,798	35
1986	90,941	9	66,157	46
1987	95,754	10	52,798	43
1988	78,685	15	59,193	42
1989	91,300	15	78,658	40
1990	90,619	10	40,052	38
1991	98,198	12	47,618	34
1992	113,044	4	63,737	27
1993	78,190	15	62,202	26
1994	84,772	19	79,406	21
1995	85,142	8	52,942	31
1996	79,527	10	98,064	26
1997	92,380	8	122,521	18
1998	100,558	16	70,048	13
1999	110,955	10	119,777	14
2000	115,343	10	89,622	8
2001	98,444	10	87,327	8
2002	114,672	8	58,675	18
2003	111,726	5	102,736	22
2004[2]	110,806	16	82,950[2]	26
2005	72,457	10	92,074	25
2006	81,269	23	106,868	9
2007	114,418	12	109,647	11
2008	96,249	17	89,743	9
2009	100,192		105,200	

[1]Sources: Trost et al. 2007, unpublished report; Padding and Klimstra 2008; 2009, unpublished report; U.S. Fish and Wildlife Service 2007b.
[2]Survey incomplete in 2004.
*———— 1980-2009 totals include counts from the Atlantic and Mississippi Flyways. Pre-1980 totals include counts from the Atlantic Flyway only.

The North American trumpeter swan has been segregated into three populations for management purposes: (1) the Rocky Mountain (RMP), which consists of a migratory flock from interior Canada and a largely sedentary flock from the Tri-state Area (portions of Montana, Idaho, and Wyoming), which winter sympatrically, primarily in the Tri-state Area, as well as restoration flocks elsewhere in the Tri-state Area, Oregon and Nevada; (2) the Pacific Coast (PCP), which breeds mainly in Alaska and winters along the northern Pacific Coast; and (3) the Interior (IP), which is an amalgamation of independent restoration efforts in South Dakota, Nebraska, Minnesota, Michigan, Wisconsin, Iowa, Ontario, Ohio, and New York.

Abundance estimates for populations and flocks of trumpeter swan result from a number of surveys throughout North America. The population index relied upon most by managers is the coordinated summer survey, which was first instituted in 1968 and has been conducted at five-year intervals since 1975 (Moser 2006, unpublished report). The most recent summer survey was carried out in 2005. Based on eight continental surveys over the 1968-2005 period, trumpeter swans have increased approximately six percent per year and have reached 34,803 birds as of the late-summer of 2005 (Moser 2006, unpublished report). This total represents an increase of approximately 935% between the 1968 survey and the most recent survey in 2005. More than 1,000 additional trumpeter swans are now in captivity and are being held by aviculturists and zoos. Since these surveys were instituted, the annual growth rates for the RMP, PCP, and IP have been 5.4%, 5.8%, and 11.7%, respectively (Moser 2006, unpublished report). Of the 34,803 trumpeter swans counted in the 2005 survey, 5,228 were from the RMP, 24,928 were from the PCP, and 4,647 were from the IP (Moser 2006, unpublished report).

Although management actions for trumpeter swans conducted by some states are under the purview of their nongame bird programs, the trumpeter swan is a migratory game bird under Federal regulations. Further, despite some contentions to the contrary, trumpeter swans are not and never have been classified as being either "threatened" or "endangered" under the ESA. In the 1960s, the trumpeter swan was listed under the Service's "Red Book" based on knowledge of its population status at that time. The Red Book is an international compilation of globally threatened or endangered species prepared under the auspices of the International Union for the Conservation of Nature. The Service was petitioned in 1989 and 2000 to list portions of the trumpeter swan population as threatened or endangered, but neither of these petitions resulted in listing (55 FR 17646 [April 16, 1990] and 68 FR 4221 [January 28, 2003]).

4.1.3.3 Harvest

Tundra swan

Tundra swans have been subjected to a limited harvest since 1962. All swan-hunting seasons are regulated and monitored by Federal and State wildlife agencies in accordance with Tundra Swan Hunt Plans (Trost et al. 1999; Pacific Flyway Council 2001, unpublished report; *Ad hoc* Eastern Population Tundra Swan Committee 2007, unpublished report). As specified in the Plans, hunting seasons are limited to specific areas, time periods, and numbers of hunters. Limits are placed on the number of swans that can be harvested in each flyway and within each swan population. Hunters must get a permit for each swan, and are required to report whether a swan was harvested. In addition, hunters in Utah and Nevada must have their swans examined by State biologists to identify the species of swan (i.e., tundra or trumpeter, see below). In recent years, approximately 4,400 tundra swans have been harvested annually in the U.S. (Table 4.7). Subsistence hunting of tundra swans and eggs occurs in Alaska, but the harvest is small (approximately equal to the fall-winter harvest; U.S. Fish and Wildlife Service 2003a, unpublished report; U.S. Fish and Wildlife Service 2003b, unpublished report; Wentworth 2004; Collins and Trost 2009).

Trumpeter swan

Prior to 1995, trumpeter swans had not been hunted since Federal protection was authorized in 1918. Furthermore, there is no hunting season promulgated specifically for trumpeter swans. Trumpeter swans are, however, occasionally harvested by tundra swan hunters because the two species are difficult to distinguish in the field. To minimize incidental take, areas open to tundra swan hunting in Utah and Montana (where most swans are harvested) are limited to regions with small numbers of trumpeter swans. Additionally, swan seasons in Utah, Nevada, and Montana are now shortened to end earlier in the winter before most trumpeters arrive. Furthermore, swan identification training is now provided to all hunters in Montana, Utah, and Nevada. Provisions for limited take (quotas) of trumpeter swans have been set to protect tundra swan hunters from criminal liability if they accidentally shoot a trumpeter swan. The take limits are 10 birds in Utah and five in Nevada, and are designed not to have a biological impact on the RMP (Trost et al. 2003). Biologists in these States monitor the swan harvest to detect take of trumpeter swans. On average, 75–89% of tundra swans harvested in Utah, Nevada, and Montana were examined during 1994–2007 (Trost and Sanders 2008). If the limit is reached in a State, all swan hunting is closed in that State for the remainder of the swan hunting season. The general swan season has been effective in reducing the liability to hunters while preventing increased harvest of trumpeter swans in these States.

Table 4.7. Tundra swan harvest data[1].

	Eastern Population				Western Population				
Year	# of harvest permits issued	# of active hunters	Retrieved harvest	% young in harvest	# of harvest permits issued	# of active hunters	Retrieved harvest	% young in harvest	# trumpeter swans in harvest
1962					1,000		320	<1	
1963					1,000		392	<1	
1964					1,000	940	335	<1	
1965					995	915	336	<1	
1966					1,000	950	491	<1	
1967					1,000	910	246	<1	
1968					1,000	930	520	<1	
1969					3,000	2,225	1,377	2	
1970					3,500	2,475	1,199	11	
1971					3,495	2,806	1,109	4	
1972					3,500	2,765	1,028	6	
1973					3,500	2,780	1,191	6	
1974					3,500	2,935	1,377	10	
1975					3,500	2,915	1,383	8	
1976					3,500	2,940	1,109	8	
1977					3,488	2,644	1,575	5	
1978					3,500	2,870	1,152	6	
1979					3,500	2,930	1,293	8	
1980					3,500	2,895	1,156	8	
1981					3,500	3,000	1,619	6	
1982					3,500	2,940	1,244	4	
1983	109	70	34	29	3,650	3,077	1,168	8	
1984	1,108	925	335	2	3,650	2,949	1,194	6	
1985	6,120	5,140	2,542	<1	3,645	2,732	673	8	
1986	6,170	4,939	2,343	1	3,608	2,825	947	8	
1987	6,139	5,120	2,828	<1	3,593	2,723	600	11	
1988	7,094	5,609	2,821	1	3,372	2,496	855	8	
1989	7,211	5,945	2,813	2	3,454	2,668	1,094	10	
1990	8,262	6,780	3,855	2	3,378	2,698	1,232	7	
1991	9,804	7,883	4,345	3	3,342	2,369	923	5	
1992	10,280	8,330	4,480	2	3,189	2,369	717	7	
1993	10,112	8,208	4,178	4	3,375	2,623	699	13	
1994	10,332	8,300	5,179	4	3,422	2,785	1,222	9	1
1995	10,391	7,984	4,083	2	3,843	2,917	659	4	6
1996	9,207	6,857	3,329	3	3,818	3,218	1,368	3	11
1997	9,041	7,200	3,916	3	3,832	3,240	1,193	4	4
1998	9,245	6,961	3,543	3	3,934	3,361	1,654	2	4
1999	8,895	6,928	3,601	3	3,995	3,311	1,388	6	7
2000	8,884	6,992	3,711	1	3,221	2,400	957	7	4
2001	8,981	7,120	3,457	3	3,063	2,291	713	5	0
2002	9,053	7,179	3,472	2	3,014	2,296	743	6	5
2003	9,225	6,999	2,861	2	3,013	2,342	1,034	6	5
2004	8,940	6,857	2,862	2	3,005	2,312	999	8	8
2005	8,959	7,201	3,633	2	3,043	2,351	1,204	9	15
2006	8,951	7,170	3,292	3	3,267	2,624	1,209	5	10
2007	9,187	7,220	3,366	29	3,312	2,771	1,367	<1	8
2008	9,065	7,351	3,903	10	3,217	2,623	1,054	12	1

[1]Sources: Bidrowski and Costanzo 2007, unpublished report; Hansen 2007, unpublished report; Johnson 2007, unpublished report; K. Kruse, U.S. Fish and Wildlife Service, unpublished data; Trost et al. 2007, unpublished report; Vaa 2007, unpublished report; Padding and Klimstra 2008; 2009, unpublished report; J. Fuller, NC Wildlife Resources Commission, unpublished data; T. Aldrich, Utah Division of Wildlife Resources, unpublished data.

4.1.4 Sandhill Cranes

Sandhill cranes and their biology were described in Sanderson (1977), Lewis (1987), and most recently in Tacha et al. (1994). In North America, this species is classified into six subspecies. The

Cuban, Florida, and Mississippi sandhill cranes are non-migratory subspecies and are not hunted. The other three subspecies, the lesser, Canadian, and greater sandhill cranes, are migratory and are hunted in portions of their range. Although the Canadian sandhill crane was identified by Walkinshaw (1965), recent genetic investigations question the existence of this subspecies (Rhymer et al. 2001; Petersen et al. 2003; Jones et al. 2005).

The migratory subspecies are grouped into six management populations: the Mid-continent, Eastern, Rocky Mountain, Lower Colorado River Valley, Central Valley, and Pacific Coast populations. Cooperative Flyway Management Plans, which include harvest strategies, have been developed for the Mid-continent (MCP), Rocky Mountain (RMP) and Lower Colorado River Valley (LCRVP) populations (Pacific Flyway Council 1995; Central, Mississippi and Pacific Flyway Councils 2006; Pacific Flyway Council and Central Flyway Council 2007). The Eastern and Central Valley populations of greater sandhill cranes and the Pacific Coast population of lesser sandhill cranes are not hunted, although there is some incidental take of the Pacific Coast population in Alaska during MCP hunts. Further, although not hunted currently, the Mississippi Flyway is leading the development of a management plan that would allow harvest of this population.

4.1.4.1 Habitat

<u>Mid-continent Population</u>

The MCP is the most abundant sandhill crane population in North America and has a vast breeding range that extends from northwestern Minnesota northeastward into western Quebec, and then northwest through Arctic Canada, Alaska, and into eastern Siberia. Breeding habitat in Alaska and in tundra areas of northern Canada consists of wet marsh or sedge meadow areas. Broods spend most of their time in tall vegetation along slough banks, heath tundra, and short-grass meadows (Tacha et al. 1994). Cranes in central Alberta are known to nest in open, sedge marsh adjacent to wooded areas (Carlisle 1982).

Fall-staging MCP cranes in southeastern Saskatchewan roost in shallow, open wetlands and feed in small grain fields. In eastern North Dakota such birds roost in shallow lakes and marshes, loaf in hay fields and pastures, and feed in harvested grain fields (Melvin and Temple 1983). In western North Dakota, fall-staging birds roost within vast areas of shallow saline water with a soft substrate, far from shoreline (Soine 1982). In western Texas, cranes roost on <20 saline pluvial lakes and prefer those that have at least one freshwater spring (Iverson et al. 1985). Spring migrants staging in the North Platte River Valley prefer habitat complexes that include a river or shallow wetland roost site, an interspersion of 30-70% corn stubble, 5-40% pasture, ≥ 13% alfalfa and at least one wetland within 4 km of the roost site (Iverson et al. 1987). In the spring in southeastern Saskatchewan and central Alaska cranes roost in shallow wetlands and use wheat stubble and barley fields as food sources.

The MCP wintering range includes western Oklahoma, New Mexico, southeastern Arizona, Texas, and Mexico (Figure 4.10). Wintering cranes along the Gulf Coast of Texas, New Mexico and southeastern Arizona roost in shallow, open-water marshes or playas and spend their days in coastal prairie, scrub oak brushland, freshwater marshes, grasslands and/or crop stubble fields and pastures (Tacha et al. 1994).

Rocky Mountain Population

The RMP is comprised exclusively of greater sandhill cranes that breed in isolated, well-watered river valleys, marshes, and meadows of the U.S. portions of the Central and Pacific Flyways (Drewien and Bizeau 1974). Nests are usually along the marsh edge in wet, meadow-shallow marsh zones. The highest nesting concentrations are located in western Montana and Wyoming, eastern Idaho, northern Utah, and northwestern Colorado (Figure 4.10). The RMP migrates through the San Luis Valley in Colorado and winters primarily in the Rio Grande Valley in New Mexico, with smaller numbers wintering in southwestern New Mexico, southeastern Arizona, and at several locations in the Northern Highlands of Mexico (Drewien et al. 1996). In their staging and wintering areas, RMP cranes feed in grain fields and are often found on livestock farms, hay pastures, and on refuges (Tacha et al. 1994).

Figure 4.10. Approximate breeding ranges of Mid-continent, Rocky Mountain and Lower Colorado River Valley populations of sandhill cranes.

Lower Colorado River Valley Population (LCRVP)

The LCRVP is comprised exclusively of greater sandhill cranes that breed primarily in northeastern Nevada, with smaller numbers in adjacent parts of Idaho, Oregon, and Utah (Figure 4.10), and winter in the Colorado River Valley of Arizona and the Imperial Valley of California. Their breeding, staging and wintering habitats are the same as those used by RMP cranes (Tacha et al. 1994).

4.1.4.2 Populations and Status

Mid-continent Population

In March 1982, the last extensive survey involving high-altitude vertical photography of major spring-migration staging concentrations of the MCP was conducted, and at least 510,000 sandhill cranes were counted. Beginning in 1982, an intensive photo-corrected, ocular-transect survey of Nebraska's Central Platte River Valley (CPRV) and ocular assessments from other spring staging areas have been used to monitor the annual status and trends for this population (Benning and Johnson 1987). Use of the count in the development of annual harvest recommendations relies on the premise that >90% of the MCP are in the surveyed area at the time of the annual survey. Annual variability in weather patterns can reduce the percentage below 90% in some years, such as in the spring of 2008, when fair weather prompts birds to migrate to the Dakotas by the time of the survey. The annual photo-corrected estimates and 95% confidence intervals for the CPRV portion of the survey indicate a relatively stable (P = 0.67) population since 1982 (Figure 4.11).

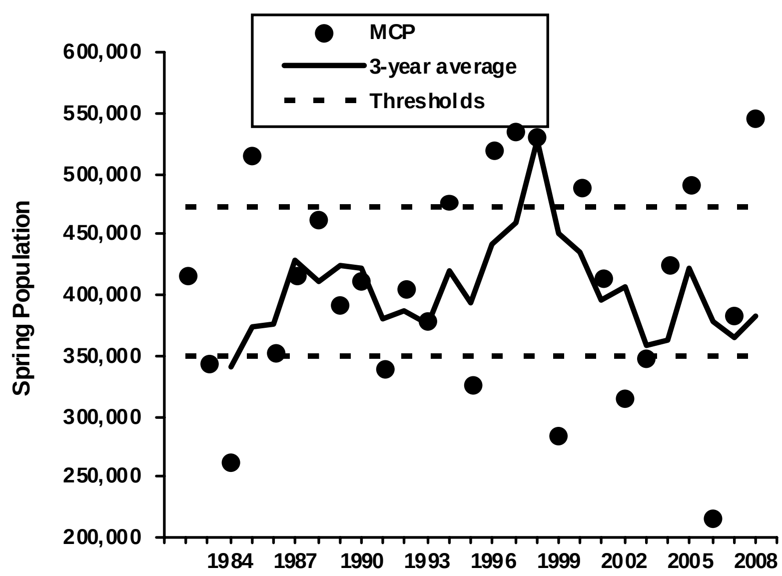

Figure 4.11. Annual and three-year average photo-corrected, ocular-transect spring population indices and population objective thresholds for the Mid-continent population of sandhill cranes.

Rocky Mountain Population

During 1984–96, the RMP was monitored in the San Luis Valley, Colorado, their primary fall and spring staging area. However, MCP cranes also began to use this area, which confounded estimates of RMP abundance. In 1996, a fall pre-migration (September) survey replaced the spring count as the primary tool for monitoring population change (Drewien et al. 2005). The RMP Cooperative Flyway Management Plan (Pacific Flyway Council and Central Flyway Council 2007) established a population objective and surveys to monitor recruitment and harvest levels that are designed to maintain a population of 17,000–21,000 birds. Currently, the three-year average population is increasing but remains within objective levels (Fig 4.12).

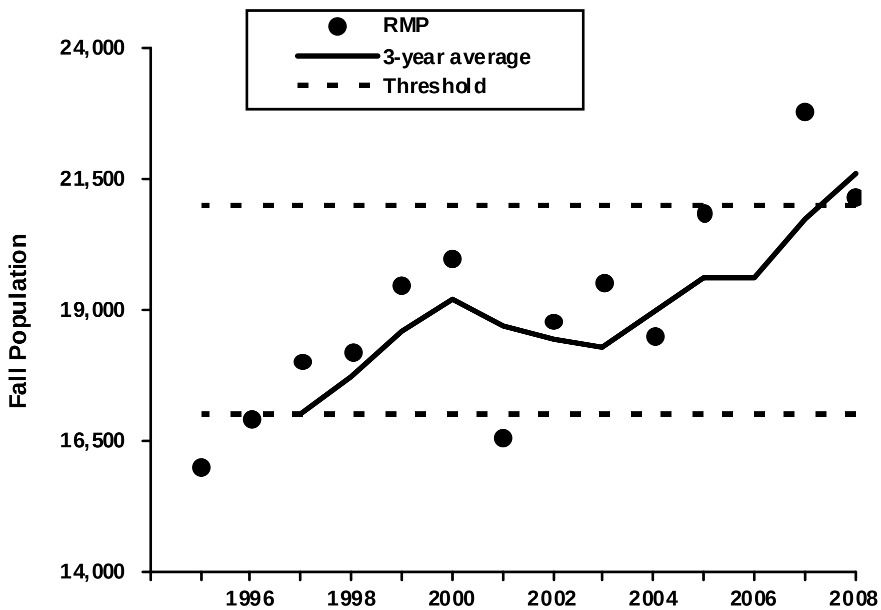

Figure 4.12. Annual and three-year average aerial-cruise fall population indices and population-objective thresholds for the Rocky Mountain population of sandhill cranes.

Lower Colorado River Valley Population

The LCRVP is the smallest of the migratory populations. The range of this population is believed to overlap ranges with the RMP and Central Valley population (CVP). Beginning in 1998, a coordinated winter count has been conducted at the four major wintering areas: Cibola NWR, the Colorado River Indian Tribes wetland areas, Sonny Bono Salton Sea NWR, and the Gila River. Collectively, these counts are believed to contain in excess of 90% of the total number of cranes in this population. Based on these winter counts, the population has been increasing at an annual rate of about 3% (Figure 4.13).

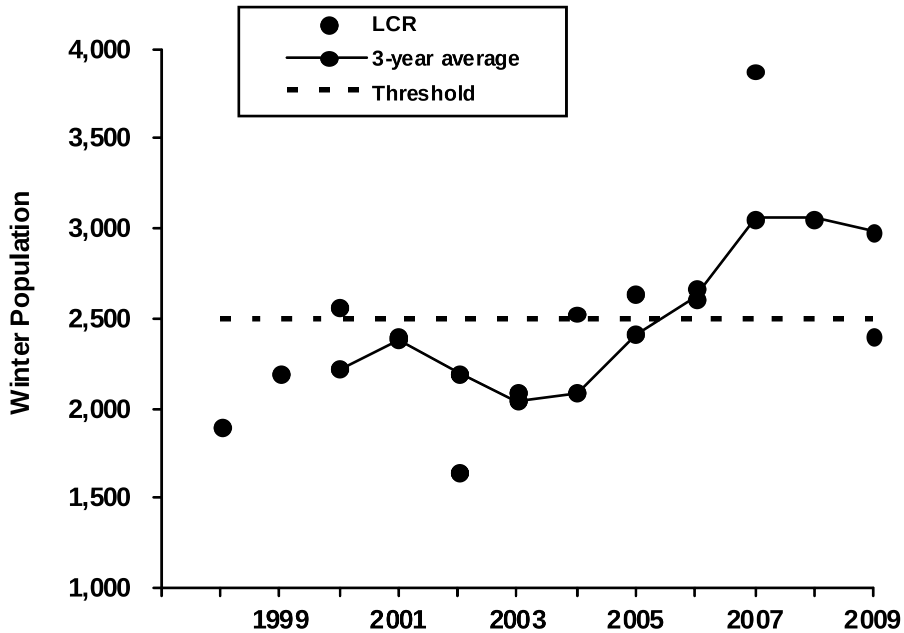

Figure 4.13. Annual and three-year average aerial-cruise winter population indices and lower threshold for the Lower Colorado River Valley Population of sandhill cranes.

4.1.4.3 Harvest

<u>Mid-continent Population</u>

No hunting of MCP cranes was allowed in the U.S. between 1916 and 1960. In the Central Flyway, areas open to hunting were gradually expanded during 1961–74, but since that time have remained relatively stable. Operational hunting seasons are now held annually in portions of Colorado, Kansas, Montana, New Mexico, North Dakota, Oklahoma, South Dakota, Texas, and Wyoming. Nebraska is the only Central Flyway State that currently does not have a sandhill crane hunting season.

The MCP Cooperative Flyway Management Plan established regulatory thresholds for changing harvest regulations that are based on an objective of maintaining sandhill crane numbers at 1982–2005 levels (i.e., spring index of 349,000–472,000 [411,000 ± 15%]). Sandhill crane hunters are required to obtain either a Federal crane hunting permit or register under the HIP to hunt MCP cranes in the U.S. The permits or HIP registration records provide the sampling frame to conduct annual harvest surveys. In Canada, the harvest survey is based on the sales of Federal Migratory Bird Hunting Permits, which are required for all crane hunters. MCP harvest areas have remained relatively constant from year to year. The levels of harvest, however, vary with respect to many factors, including changes in hunting pressure, land-use, and environmental factors. Most shifts in annual harvests occur locally, but large-scale changes in harvest distributions also have occurred.

Since 1975, an average of 7,185 hunters annually participated in sandhill crane hunting in the Central Flyway. The number of hunters in Texas (62%) and North Dakota (27%) comprised 89% of all sandhill crane hunters in the Central Flyway in 2008. Federal frameworks allowed daily bag/possession limits of 3/6, which most States selected (only portions of North Dakota and Texas had lower bag and possession limits). The number of days afield averaged 3.7 days per hunter and the seasonal bag per hunter was approximately 2.2 birds. Cranes from the MCP also are harvested in the RMP hunt areas in Arizona, New Mexico, Alaska, Canada, and Mexico. The estimate for the 2008-2009 harvest in Canada (Manitoba and Saskatchewan) was 9,439. The estimated harvest for Alaska and the RMP hunt areas in Arizona and New Mexico combined was 1,716 birds for 2008-09. For Alaska, sandhill crane harvest in zones 1–6 is believed to be mostly MCP cranes and zones 7–12 are sandhill cranes from the Pacific Population of lesser sandhill cranes. Some intermingling of MCP cranes with RMP cranes in portions of New Mexico and Arizona also occurs. Bag checks, however, allow estimates of specific harvests for each population. There are no annual harvest surveys in Mexico, but annual MCP harvests probably are <10% of the retrieved harvest in the U.S. and Canada (Kramer et al. 1995). The 1975–2008 average annual estimate of retrieved and unretrieved kill of MCP cranes by hunters was 27,274 (Table 4.8, plus average unretrieved harvest (3,632) and average retrieved harvest from Mexico (2,149)).

Rocky Mountain Population

The RMP was not hunted in the U.S. from 1916 until 1981, at which time Arizona initiated the first hunting season. Since 1982, hunting programs have been guided by a Cooperative Flyway Management Plan, including a harvest strategy that has been periodically updated. The Plan contains a formula for calculating allowable annual harvests to achieve population objectives. All sandhill crane hunters in the range of the RMP must obtain a State permit to hunt cranes, which provides the sampling frame for independent State harvest estimates and allows for assignment of harvest quotas by State. During 1981–2008, the average annual harvest was 491 birds, including 242 in New Mexico, 172 in Idaho, 128 in Wyoming, 59 in Montana, 55 in Utah, and 33 in Arizona (Table 4.8).

Lower Colorado River Valley Population

The LCRVP has not been hunted since the MBTA was passed in 1918. In 2007, the Service completed an EA entitled, “Proposed hunting regulations for the Lower Colorado River Valley Population of Greater Sandhill Cranes in the Pacific Flyway” (U.S. Department of the Interior 2007b). In 2008, the Service determined that a small harvest from this population could be allowed in years when the three-year average of winter counts exceeded 2,500 (Pacific Flyway Council 1995). To date, no seasons have been offered and no harvest has occurred.

Table 4.8. Estimated retrieved harvests of Mid-continent and Rocky Mountain populations of sandhill cranes, 1975–2008 (Kruse et al. 2009).

Year	Canada	Central Flyway[1]	Pacific Flyway[2]	MCP Total	RMP	Total
1975	5,906	9,497	1,094	16,497		16,497
1976	1,636	7,393	637	9,666		9,666
1977	367	12,151	471	12,989		12,989
1978	877	10,146	239	11,262		11,262
1979	3,799	10,379	517	14,695		14,695
1980	5,589	10,152	809	16,550		16,550
1981	2,966	10,134	403	13,503	20	13,523
1982	2,834	7,916	1,222	11,972	152	12,124
1983	3,088	12,959	1,557	17,604	189	17,793
1984	3,703	11,271	2,009	16,983	134	17,117
1985	5,139	12,776	1,245	19,160	178	19,338
1986	6,114	12,487	831	19,432	218	19,650
1987	5,144	12,770	1,281	19,195	250	19,445
1988	6,948	12,772	1,540	21,260	478	21,738
1989	4,975	13,639	809	19,423	713	20,136
1990	4,835	18,041	1,291	24,167	181	24,348
1991	5,318	13,079	1,084	19,481	240	19,721
1992	5,939	12,433	833	19,205	396	19,601
1993	2,915	18,005	492	21,412	546	21,958
1994	3,830	16,201	887	20,918	667	21,585
1995	5,827	20,628	1,047	27,502	448	27,950
1996	4,312	17,111	1,397	22,820	448	23,268
1997	5,900	19,766	1,086	26,752	446	27,198
1998	9,526	19,831	1,211	30,568	538	31,106
1999	8,400	16,969	193	25,562	658	26,220
2000	9,450	15,504	1,251	26,205	810	27,015
2001	8,786	15,000	1,201	24,987	898	25,885
2002	7,947	13,087	1,139	22,173	639	22,812
2003	9,585	18,335	647	28,567	528	29,095
2004	11,037	14,546	797	26,380	594	26,974
2005	9,876	18,263	786	28,925	702	29,627
2006	10,417	17,631	759	28,807	907	29,714
2007	11,786	18,610	1,195	31,591	820	32,411
2008	9,861	22,989	1,716	34,566	946	35,512

[1]Central Flyway States include ND, MT, SD, WY, KS, CO, OK, NM, & TX.
[2]Pacific Flyway States include AZ, NM, and AK.

4.1.5 Doves

Three species of doves are designated as game birds and are hunted in the conterminous U.S.: the mourning dove, white-winged dove, and white-tipped dove. The mourning and white-winged doves are the most widely distributed and the more important game species as measured by hunter harvest.

4.1.5.1 Habitat

Mourning dove

Mourning doves breed from the southern portions of Canada throughout the U.S. into Mexico, Bermuda, the Bahamas and Greater Antilles, and scattered locations in Central America. While mourning doves also winter throughout much of the breeding range, the majority winter in the southern U.S., Mexico, and Central America (Figure 4.14; Aldrich 1993; Otis et al. 2008).

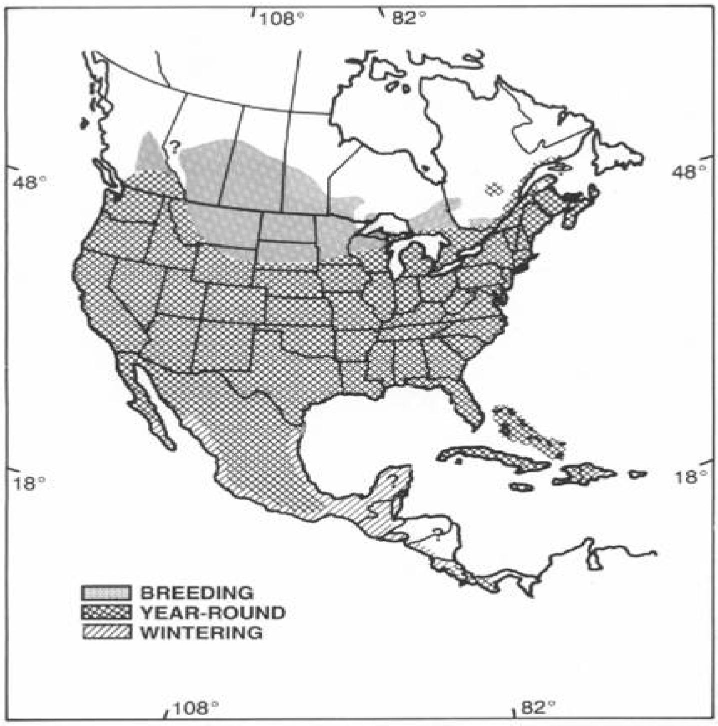

Figure 4.14. Breeding and wintering ranges of the mourning dove (adapted from Otis et al. 2008).

The mourning dove is one of the most generally adapted and widely distributed birds in North America (Peterjohn et al. 1994). Dove habitat is difficult to quantify or otherwise evaluate because the species nests in virtually all ecological types, except thick forests, marshes, and alpine areas. They generally select more open woodlands and edges between forest and prairie communities for nesting (Tomlinson et al. 1994). Most nests are located in trees, but ground nesting can be important, particularly in Great-Plains and Great-Basin States (Sayre and Silvy 1993). Even though habitat generally is abundant and widespread, managers are concerned about changes in habitat availability over time, such as the elimination of shelterbelts (Dunks et al. 1982) and changing agricultural practices in parts of the western U.S. (Tomlinson et al. 1988).

White-winged dove

White-winged doves range from the southernmost U.S. and Mexico (where the birds are partially migratory; Figure 4.15) to Central America and much of the West Indies. In the U.S. specifically, white-winged doves occurred historically only in the southern regions of Texas, New Mexico, Arizona and California (Schwertner et al. 2002). Prior to the 1980s, white-winged doves were most abundant and had the highest density in the Lower Rio Grande Valley (LRGV) of Texas (Schwertner et al. 2002). Deadly periodic freezes, most recently in 1983 and 1989, combined with an extended drought during 1987–90, decimated the citrus orchards and the native brush, both of which are important for nesting. As the white-winged dove population declined in this area during the 1980s, populations increased substantially in south-central Texas, particularly near San Antonio. Since that time, white-winged doves have expanded their range northward. It is unknown whether this range expansion and increase in numbers outside the LRGV resulted from displacement of LRGV birds (George et al. 1994).

The expansion of white-winged doves northward and eastward from Texas has led to sightings in most of the Great Plains and Midwestern States and as far north as Ontario. Since the 1980s, nesting has been documented along the entire U.S. Gulf Coast and throughout most of Florida (G. Waggerman, personal communication; Schwertner et al. 2007, unpublished report). Additionally, white-winged doves are believed to be expanding northward along both Pacific and Atlantic Coasts.

In the U.S., only Texas winters significant numbers of white-winged doves (Schwertner et al. 2002). White-winged doves breed from southern Nevada through Mexico and can winter as far south as Costa Rica and Panama (Figure 4.15; Howell and Webb 1995; George et al. 2000; Schwertner et al. 2002). Typical white-winged dove breeding habitat in the southwestern U.S. and northern Mexico includes dense thorny native brush, cacti-palo verde deserts, oak-juniper forests, salt-cedar or tamarisk and other riparian woodlands, citrus orchards, and residential shade trees. White-winged doves often are colonial nesters in good habitat, but in more marginal habitat they nest only as scattered pairs (George et al. 1994). In Texas, residential shade and ornamental trees, bird feeders, and bird baths enhance components of white-winged dove natural breeding habitat (Small et al. 1989; George 1991; West 1993; West et al. 1993). These urban birds heavily use, but are not dependent upon, residential food sources such as bird feeders. White-winged doves nesting in San Antonio make daily feeding flights to surrounding farmland (George et al. 1994). The northern expansion of white-winged doves has been associated primarily with urban areas. The expansion and post-breeding-season dispersal may be associated with moderate climates coupled with anthropogenic food sources (Schwertner et al. 2007, unpublished report).

Figure 4.15. The principal breeding, wintering, and resident area of migratory white-winged dove populations in North America, from George et al. (1994). Since George et al. (1994), white-winged doves have expanded their range into north-central New Mexico and southern Colorado. These new range expansions most likely are Mexican highland birds. The Eastern Population has expanded northward throughout most of the central United States.

White-tipped dove

The white-tipped dove is a neotropical species that, in the U.S., is found only in south Texas. The white-tipped dove's range extends through western and eastern Mexico into Central and South America (Waggerman et al. 1994; Hogan 1999). In Texas, as throughout its range, the primary habitat is thickets of native brush (Waggerman et al. 1994). With the clearing of approximately 95% of the native vegetation in the LRGV of Texas since the early 1900s, white-tipped doves have become a common nesting species in citrus groves and suburban areas (Boydstun and DeYoung 1985; Waggerman et al. 1994; Hogan 1999).

4.1.5.2 Populations and Status

Mourning dove

The mourning dove is one of the most abundant birds in North America, ranking ninth in 2006 among the hundreds of species monitored annually by the BBS (Sauer et al. 2008). The total population size is not known precisely, but recently was estimated at about 350 million birds in the fall (Otis et al. 2008). The population dynamics of this species is characterized by low survival and high recruitment rates. Populations are monitored annually with the Mourning Dove Call-count Survey (CCS; Dolton et al. 2007). Counts of calling doves, along with a separate count of doves seen, are made along randomly selected routes located throughout the dove's U.S. breeding range.

Population indices are calculated for three mourning dove management units, the Western, Central and Eastern Management Units, that contain populations that are largely independent of each other. Annual and long-term trends are determined for each unit. Annual indices and trends during 1966–2009 are shown in Figure 4.16 for each of the management units. For doves heard over the 44-year period, all three units exhibited significant declines (Figure 4.16). Over the most recent ten-year interval, no significant trend was indicated for doves heard in either the Western or Eastern Units, while the Central Unit showed a significant decline. For doves seen over 44 years, no trend was found in the Eastern or Central Units, while a significant decline was indicated for the Western Unit (Figure 4.16). No trend in doves seen was found in any of the three management units over the most recent 10 years (Dolton et al. 2007; Sanders 2009).

In 2003, a Mourning Dove National Strategic Harvest Management Plan was approved by all four Flyway Councils and published by the Service (National Mourning Dove Planning Committee 2003). The goal of this plan is to develop and continuously improve an objective framework for making informed harvest-management decisions based on demographic models that predict effects of harvest-management actions and environmental conditions on population abundance. To reach that goal, a nationwide mourning dove banding program has been initiated, with over 30 States participating in 2008, to provide information on survival and harvest rates. Also, a Wing-collection Survey (WCS) has been initiated to obtain information about recruitment rates. However, because several years of data gathered from these new monitoring programs are needed to populate a demographic model, interim harvest strategies have been developed for each management unit, approved by the Flyway Councils, and accepted by the Service in 2008.

White-winged dove

Two States having high white-winged dove populations are Arizona and Texas. California, New Mexico, and Florida have much smaller populations and do not conduct population surveys. Arizona conducts a spring survey of doves heard, similar to the Mourning Dove CCS (George et al. 1994). In recent years, indices were significantly lower than the peak of 52.3 average birds heard/route in 1968. Drought and a lack of cereal grains at call-count locations are suspected of playing a role in the reduction. As of 2007, Arizona was experiencing the most severe drought in recorded history (Rabe 2007, unpublished report). A simple linear regression for the ten-year period of white-winged dove call-counts in Arizona (1998–2007) shows a statistically-significant declining trend. That trend appears to have leveled off in recent years, and the counts from 2006 to 2009 have ranged between 24.7 and 27.9 birds heard/route.

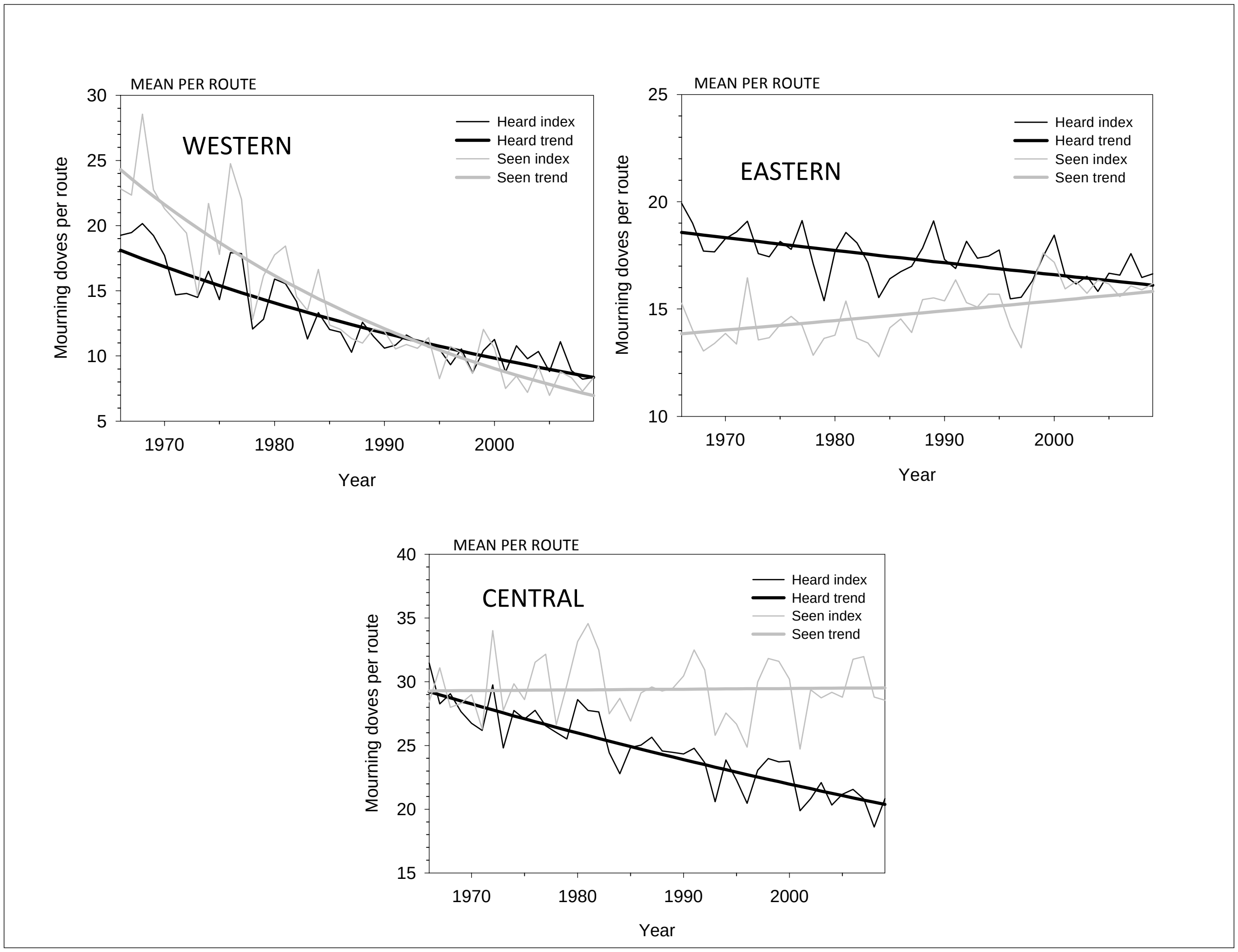

Figure 4.16. Population indices and trends of breeding mourning doves in the Western, Eastern, and Central Management Units, 1966–2009. Heavy solid line = doves heard; light solid line = doves seen. Heavy and light dashed lines = predicted trends.

In Texas, a more subjective survey technique was used for many years, due to the clumped distribution of colonial-nesting white-winged doves. Call-counts were made at specific locations rather than running routes. Indices were expressed as breeding pairs/ha (George et al. 1994). Efforts continue to improve survey techniques (e.g., distance sampling) for white-winged doves in Texas.

White-winged dove populations have changed dramatically in Texas since the early 1900s. They reached a peak in 1923 when 4 to 12 million white-winged doves were estimated as nesting in the LRGV of Texas (Saunders 1940; Marsh and Saunders 1942). In 2007, the statewide population was estimated to be between eight and 10 million white-winged doves. In San Antonio alone, the population is estimated to be between 1–1.5 million birds (J. Roberson, personal communication).

<u>White-tipped dove</u>

Until the early 1970s, white-tipped doves were found only in the dense riparian brush along the Rio Grande in the LRGV. At that time, a gradual movement of birds into native brush-lands and nearby citrus orchards north of the river began. CCSs indicated that dove abundance in South Texas was relatively stable between 1983 and 1993 (Waggerman et al. 1994). Since 1994, however, there has been a noticeable decrease in numbers of birds heard, suggesting a possible change in abundance or a change in distribution in response to drought conditions in South Texas (Schwertner et al. 2007, unpublished report).

4.1.5.3 Harvest

<u>Mourning dove</u>

In 2007, 39 of the 48 conterminous States permitted mourning dove hunting (Figure 4.17). Mourning dove harvest estimates from State surveys showed that, in general, harvest has declined since the 1960s (Sadler 1993; Tomlinson et al. 1994). Since the HIP was established in 1999, mourning dove harvest has ranged from a high of 26 million in 2000 to a low of about 18 million in 2003 (Richkus et al. 2005; Padding et al. 2006; Moore et al. 2007; Richkus et al. 2007). The estimate for 2008 was 17.4 million (Table 4.9).

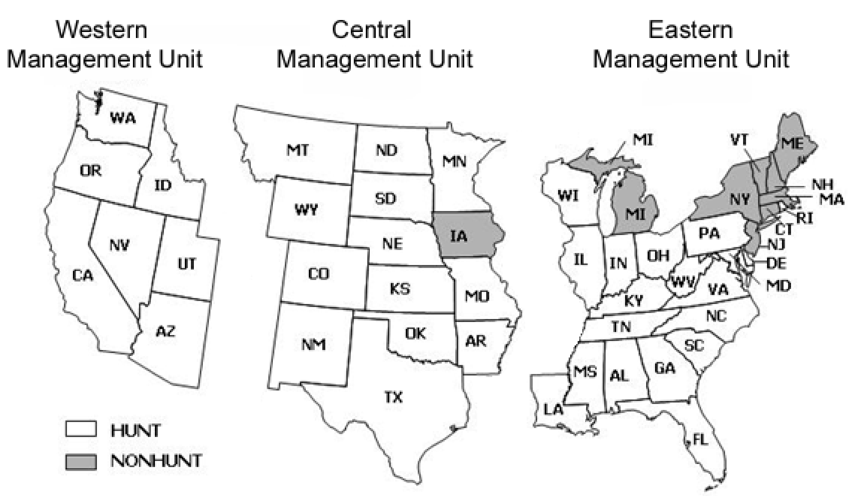

Figure 4.17. Mourning Dove Management Units with 2008 hunting and non-hunting States.

Table 4.9. Preliminary Harvest Information Program estimates of mourning dove harvest and hunter activity during the 2007 & 2008 hunting seasons (Richkus et al. 2008; Raftovich et al. 2009)[1].

State and Mgmt Unit	Mourning Dove Harvest		Active Hunters[2]		Mourning Dove Days Afield		Seasonal Harvest Per Hunter	
	2007	2008	2007	2008	2007	2008	2007	2008
AL	829,300 ± 11%	877,400 ± 15%	48,500 ± 8%	42,300 ± 9%	127,500 ± 12%	113,500 ± 12%	17.1 ± 14%	20.7 ± 17%
DE	50,900 ± 22%	33,800 ± 35%	2,600 ± 20%	2,000 ± 29%	8,100 ± 20%	5,700 ± 34%	19.4 ± 30%	16.7 ± 45%
FL	372,600 ± 24%	516,500 ± 24%	21,600 ± 18%	20,300 ± 16%	66,000 ± 24%	94,800 ± 23%	17.3 ± 29%	25.4 ± 29%
GA	1,107,500 ± 32%	718,700 ± 22%	37,900 ± 16%	36,100 ± 15%	145,600 ± 26%	102,300 ± 19%	29.2 ± 36%	19.9 ± 27%
IL	912,300 ± 16%	683,100 ± 21%	41,400 ± 10%	31,600 ± 12%	137,200 ± 15%	97,000 ± 18%	22.0 ± 19%	21.6 ± 24%
IN	258,400 ± 17%	255,700 ± 16%	15,000 ± 26%	14,300 ± 17%	46,000 ± 23%	38,500 ± 17%	17.2 ± 31%	17.9 ± 23%
KY	278,100 ± 41%	369,400 ± 18%	10,600 ± 38%	18,700 ± 21%	34,100 ± 48%	43,700 ± 17%	26.2 ± 56%	19.8 ± 28%
LA	412,900 ± 29%	188,200 ± 38%	24,600 ± 23%	17,200 ± 26%	63,700 ± 25%	38,400 ± 31%	16.8 ± 37%	11.0 ± 46%
MD	212,900 ± 26%	151,800 ± 26%	11,800 ± 20%	9,300 ± 19%	36,600 ± 24%	28,400 ± 25%	18.0 ± 33%	16.3 ± 32%
MS	612,000 ± 21%	452,400 ± 20%	30,100 ± 12%	17,300 ± 11%	82,000 ± 18%	53,800 ± 18%	20.4 ± 24%	26.1 ± 23%
NC	854,000 ± 24%	757,900 ± 18%	50,900 ± 16%	43,800 ± 15%	144,800 ± 22%	112,900 ± 18%	16.8 ± 29%	17.3 ± 24%
OH	307,700 ± 35%	205,900 ± 28%	17,500 ± 21%	13,500 ± 21%	60,600 ± 33%	61,600 ± 32%	17.6 ± 40%	15.3 ± 35%
PA	509,100 ± 27%	340,900 ± 19%	37,500 ± 17%	30,700 ± 19%	159,000 ± 20%	129,900 ± 24%	13.6 ± 32%	11.1 ± 26%
RI	2,000 ± 55%	4,400 ± 108%	300 ± 66%	300 ± 61%	1,100 ± 71%	2,000 ± 78%	8.0 ± 86%	13.4±124%
SC	865,900 ± 18%	844,500 ± 17%	43,400 ± 12%	39,900 ± 12%	139,400 ± 16%	140,900 ± 19%	20.0 ± 21%	21.2 ± 21%
TN	682,700 ± 32%	798,200 ± 38%	33,000 ± 19%	37,500 ± 16%	85,500 ± 24%	103,000 ± 30%	20.7 ± 37%	21.3 ± 41%
VA	418,100 ± 21%	333,600 ± 27%	26,500 ± 11%	17,300 ± 20%	78,600 ± 18%	59,000 ± 23%	15.8 ± 24%	19.3 ± 33%
WV	20,200 ± 32%	16,900 ± 29%	1,800 ± 16%	1,400 ± 20%	4,300 ± 29%	3,700 ± 28%	11.0 ± 36%	12.0 ± 35%
WI	202,000 ± 38%	122,300 ± 37%	13,600 ± 24%	10,500 ± 26%	61,600 ± 29%	40,600 ± 31%	14.9 ± 45%	11.6 ± 45%
Eastern Unit Total	8,908,400 ± 7%	7,671,800 ± 6%	468,600	404,000	1,481,700 ± 6%	1,269,462 ± 6%		
AR	791,700 ± 24%	422,000 ± 23%	37,000 ± 16%	23,300 ± 18%	115,900 ± 23%	76,600 ± 33%	21.4 ± 29%	18.1 ± 29%
CO	315,000 ± 14%	288,400 ± 19%	21,800 ± 11%	23,200 ± 12%	57,800 ± 14%	60,400 ± 18%	14.5 ± 17%	12.4 ± 23%
KS	725,100 ± 13%	443,700 ± 15%	36,300 ± 8%	26,800 ± 11%	119,100 ± 11%	78,500 ± 15%	20.0 ± 16%	16.6 ± 19%
MN	67,400 ± 52%	83,500 ± 48%	7,700 ± 35%	11,300 ± 28%	27,600 ± 49%	34,900 ± 42%	8.7 ± 62%	7.4 ± 55%
MO	603,300 ± 15%	467,800 ± 16%	42,600 ± 8%	34,300 ± 9%	124,400 ± 13%	93,400 ± 14%	14.2 ± 17%	13.7 ± 19%
MT	20,900 ± 43%	18,400 ± 51%	1,700 ± 31%	2,100 ± 45%	4,000 ± 34%	3,700 ± 44%	12.3 ± 53%	8.8 ± 68%
NE	319,600 ± 18%	238,600 ± 49%	17,000 ± 12%	13,600 ± 33%	55,300 ± 16%	48,800 ± 52%	18.8 ± 22%	17.6 ± 59%
NM	198,700 ± 25%	138,100 ± 30%	8,600 ± 18%	6,300 ± 18%	40,100 ± 33%	26,200 ± 29%	23.1 ± 31%	22.0 ± 35%
ND	48,700 ± 27%	26,400 ± 31%	3,200 ± 27%	2,700 ± 30%	9,900 ± 26%	9,200 ± 44%	15.4 ± 38%	9.6 ± 43%
OK	480,000 ± 24%	361,200 ± 18%	24,600 ± 14%	19,300 ± 12%	73,100 ± 19%	57,800 ± 17%	19.5 ± 27%	18.7 ± 22%
SD	104,000 ± 30%	152,100 ± 30%	6,000 ± 20%	7,300 ± 18%	18,200 ± 25%	27,500 ± 34%	17.2 ± 36%	20.9 ± 35%
TX	5,463,300 ± 14%	4,849,600 ± 14%	275,200 ±10%	271,300 ±10%	1,149,600 ± 13%	974,100 ± 13%	19.9 ± 17%	17.9 ± 18%
WY	42,600 ± 27%	30,100 ± 36%	4,000 ± 20%	2,500 ± 25%	8,800 ± 24%	5,900 ± 33%	10.6 ± 33%	11.9 ± 44%
Central Unit Total	9,180,200 ± 9%	7,520,000 ± 10%	485,800	443,900	1,803,800 ± 9%	1,497,000 ± 9%		

[1]Variance estimates presented as 95% confidence interval as percent of the point estimate.

[2]Hunter number estimates at the management unit and national levels may be biased high, because the HIP sample frames are State-specific; therefore, hunters are counted more than once if they hunt in >1 State.

Variance inestimable. Note - totals are sums that have been added and then rounded. (*continued*)

Table 4.9. (*continued*) Preliminary Harvest Information Program estimates of mourning dove harvest and hunter activity during the 2007 & 2008 hunting seasons (Richkus et al. 2008; Raftovich et al. 2009)[1].

State and Mgmt Unit	Mourning Dove Harvest		Active Hunters[2]		Mourning Dove Days Afield		Seasonal Harvest Per Hunter	
	2007	2008	2007	2008	2007	2008	2007	2008
AZ	792,800 ± 11%	726,600 ± 12%	39,500 ± 8%	34,000 ± 10	125,500 ± 10%	118,000 ± 13%	20.0 ± 14%	21.4 ± 16%
CA	1,162,100 ± 11%	1,113,700 ± 12%	63,800 ± 6%	72,700 ± 7%	201,100 ± 10%	207,200 ± 10%	18.2 ± 12%	15.3 ± 14%
ID	192,300 ± 35%	127,400 ± 24%	22,800 ± 21%	11,800 ± 19%	68,500 ± 36%	33,600 ± 25%	8.4 ± 41%	10.8 ± 30%
NV	38,500 ± 43%	45,000 ± 25%	2,800 ± 26%	4,900 ± 15%	9,600 ± 42%	12,200 ± 26%	13.8 ± 50%	9.1 ± 29%
OR	96,900 ± 55%	45,500 ± 35%	6,800 ± 49%	5,800 ± 22%	27,600 ± 60%	14,600 ± 28%	14.2 ± 74%	7.9 ± 42%
UT	90,000 ± 20%	74,100 ± 38%	14,200 ± 12%	9,600 ± 28%	36,400 ± 24%	22,100 ± 33%	6.4 ± 23%	7.7 ± 48%
WA	88,900 ± 19%	78,500 ± 31%	7,400 ± 18%	7,300 ± 23%	18,500 ± 21%	18,500 ± 31%	11.9 ± 26%	10.8 ± 38%
Western Unit Total	2,461,500 ± 7%	2,210,700 ± 8%	157,400	146,100	487,200 ± 8%	426,200 ± 7%		
U.S. Total	20,550,000 ± 5%	17,402,400 ± 5%	1,111,800	994,100	3,772,700 ± 5%	3,192,662 ± 5%		

[1]Variance estimates presented as 95% confidence interval as percent of the point estimate.

[2]Hunter number estimates at the management unit and national levels may be biased high, because the HIP sample frames are State-specific; therefore, hunters are counted more than once if they hunt in >1 State.

Variance inestimable. Note - totals are sums that have been added and then rounded.

White-winged dove

White-winged dove harvest estimates for 2007 and 2008, derived from the HIP, are presented in Table 4.10. Totals are shown by State and mourning dove management unit. The average harvest for all States sampled for the two years was 1,743,100 birds. Texas averaged 1,418,500 white-winged doves while Arizona averaged 111,450. In Texas, the distribution of harvest has shifted significantly from the 1960s when white-winged doves were found essentially only in the LRGV. State surveys showed the harvest declined in the LRGV from >200,000 birds to 34,000 by the early 1990s. Harvest in the Special White-winged Dove Hunting Area also declined from almost 500,000 in 1976 to 48,000 in 1992 (George et al. 1994). Arizona surveys indicated that harvest declined from a high of 740,000 in 1968 to about 100,000 in the early 1990s. Much of the reduction was due to a population decline and a commensurate restriction in bag limits (George et al. 1994). Notably, the HIP surveys are not directly comparable to the earlier State surveys.

White-tipped dove

The estimated white-tipped dove harvest in South Texas between 1986 and 1992 ranged from 1,200–3,900 (Waggerman et al. 1994). Harvest is limited, because only two white-tipped doves are allowed in the daily bag limit.

Table 4.10. Preliminary Harvest Information Program estimates of white-winged dove harvest and hunter activity during the 2007 & 2008 hunting seasons (Richkus et al. 2008; Raftovich et al. 2009)[1].

State and Mgmt Unit	White-winged Dove Harvest		Active Hunters[2]		White-winged Dove Days Afield		Seasonal Harvest Per Hunter	
	2007	2008	2007	2008	2007	2008	2007	2008
AL	10,100 ± 75%	8,500 ± 58	2,900 ± 43%	2,700 ± 42%	9,900 ± 70%	6,400 ± 51	3.5 ± 86%	3.1 ± 71%
FL	29,100 ± 44%	46,000 ± 48%	4,100 ± 42%	4,200 ± 36%	15,900 ± 63%	19,600 ± 45%	7.1 ± 61%	10.8 ± 60%
KY	200 ± 196%	1,600 ± 98%	300 ± 146%	700 ± 85%	800 ± 153%	1,000 ± 93%	0.7 ± 244%	2.4 ± 130%
LA	11,800 ± 81%	1,800 ± 99%	2,700 ± 75%	1,600 ± 89%	9,900 ± 79%	3,200 ± 109%	4.4 ± 110%	1.1 ± 133%
MS	2,100 ± 111%	2,200 ± 81%	1,900 ± 74%	700 ± 73%	3,600 ± 82%	2,100 ± 79%	1.1 ± 134%	3.0 ± 109%
Eastern Unit Total	53,400 ± 33%	60,000 ± 38%	9,000	10,000	40,000 ± 37%	32,200 ± 31%		
CO	3,300 ± 86%	4,800 ± 47%	2,300 ± 40%	3,300 ± 38%	19,700 ± 114%	9,100 ± 46%	1.4 ± 95%	1.5 ± 60%
KS	8,800 ± 66%	1,300 ± 88%	1,800 ± 55%	1,300 ± 76%	6,200 ± 53%	3,400 ± 71%	4.9 ± 86%	1.0 ± 116%
MO	2,200 ± 106%	2,700 ± 93%	1,600 ± 61%	1,900 ± 56%	4,100 ± 61%	4,300 ± 61%	1.4 ± 123%	1.4 ± 109%
NE	900 ± 101%	200 ± 139%	200 ± 64%	100 ± 139%	1,000 ± 70%	300 ± 139%	3.6 ± 119%	2.0 ± 196%
NM	64,000 ± 39%	49,100 ± 44%	5,000 ± 27%	3,200 ± 29%	26,400 ± 49%	13,700 ± 35%	12.7 ± 48%	15.5 ± 53%
OK	17,100 ± 106%	5,200 ± 74%	2,900 ± 55%	2,100 ± 46%	11,200 ± 71%	8,500 ± 72%	5.9 ± 119%	2.5 ± 87%
TX	1,522,100 ± 21%	1,314,900 ± 19%	133,200 ± 16%	134,900 ± 16%	519,500 ± 18%	468,200 ± 18%	11.4 ± 26%	9.7 ± 25%
Central Unit Total	1,618,400 ± 20%	1,378,200 ± 18%	147,100	146,800	588,000 ± 17%	507,500 ± 16%		
AZ	127,600 ± 25%	95,300 ± 25%	23,200 ± 14%	19,800 ± 16%	68,700 ± 14%	82,400 ± 59%	5.5 ± 28%	4.8 ± 30%
CA	67,900 ± 40%	83,300 ± 33%	10,000 ± 20%	15,100 ± 21%	30,400 ± 26%	40,000 ± 25%	6.8 ± 45%	5.5 ± 39%
NV	0	<50 ± 106%	100 ± 73%	400 ± 98%	200 ± 86%	500 ± 85%	0	
UT	800 ± 148%	1,200 ± 110%	1,400 ± 52%	600 ± 129%	2,900 ± 57%	1,600 ± 111%	0.6 ± 157%	2.1 ± 169%
Western Unit Total	196,300 ± 21%	179,900 ± 20%	34,700	36,000	102,100 ± 12%	124,500 ± 40%		
U.S. Total	1,868,100 ± 17%	1,618,100 ± 16%	190,900	192,700	730,200 ± 14%	664,100 ± 15%		

[1]Variance estimates presented as 95% confidence interval as percent of the point estimate.

[2]Hunter number estimates at the management unit and national levels may be biased high, because the HIP sample frames are State-specific; therefore, hunters are counted more than once if they hunt in >1 State.

Variance inestimable. Note - totals are sums that have been added and then rounded.

4.1.6 Pigeons

The band-tailed pigeon is the only extant native species of pigeon in northern temperate North America. Most pigeons are otherwise mostly tropical in distribution. Comprehensive material on the life history of the band-tailed pigeon may be found in Keppie and Braun (2000), Braun (1994), Jarvis and Passmore (1992), and Neff (1947). Management of band-tailed pigeon demographics and harvest is cooperative among States and the Service, and is detailed in population-specific (i.e., Four-corners and

Pacific Coast populations) management plans (Pacific Flyway Study Committee 1994; Pacific Flyway Study Committee and Central Flyway Webless Migratory Game Bird Technical Committee 2001).

4.1.6.1 Habitat

Two subspecies of band-tailed pigeon occur north of Mexico, each in a disjunct geographic distribution in western North America; the Pacific Coast and U.S. interior regions. The coastal race breeds from extreme southeastern Alaska and western British Columbia south into Washington, Oregon, California, and extreme western Nevada, primarily west of the Cascade and Sierra Nevada ranges, into Baja California (Braun 1994). These birds winter from central California to northern Baja California. Some birds in Mexico and southern California, and the few birds wintering north of southern California, may represent non-migratory population segments. The interior race breeds from northern Colorado and east-central Utah south through Arizona, New Mexico, extreme western Texas into the Sierra Madre Occidental of Mexico. The interior band-tailed pigeon winters from northern Mexico south to at least as far as Michoacan. Some interchange occurs between races (Schroeder and Braun 1993).

Band-tailed pigeons primarily inhabit coniferous forests. These birds are highly mobile and individuals are capable of traveling long distances (up to about 32 miles) daily to feed and drink (Leonard 1998). Early migrants are readily attracted to grain fields and fruit orchards below the forested hills where they nest, particularly before natural foods, which are preferred, become available (Braun 1994). Adults, especially in summer and in the Pacific Coast region, frequently visit natural springs and water bodies high in mineral salts where they drink and peck at the soil, with long bouts of roosting in nearby trees (Jarvis and Passmore 1992; Sanders and Jarvis 2000). Band-tailed pigeons in the Pacific Coast Range nest primarily in conifers and occasionally in hardwoods and shrubs, within closed-canopy conifer or mixed hardwood and conifer forest stands (Leonard 1998). Birds in the Interior Range nest primarily in lodgepole pine and live oak (Keppie and Braun 2000). Nests are loosely constructed twig platforms. Placement is highly variable, ranging 6–120 ft above ground, but generally is near the bole and in dense foliage (Leonard 1998). Adults are presumably monogamous, and most clutches have one egg (Keppie and Braun 2000). Some nesting pairs may complete up to three nesting cycles a year in mild climates offering long nesting seasons. Both parents incubate the egg and brood the squab. Nestlings are fed curdlike crop milk formed from the inside lining of the crop of both adults (Braun 1994; Keppie and Braun 2000).

4.1.6.2 Populations and Status

The demographics of band-tailed pigeon populations largely are unknown because their habits and habitat make it impractical to locate and observe or trap an adequate sample of birds. However, in the early 1970s the total population size was approximated at 2.9–7.1 million birds in the Pacific Coast region and <250,000 birds in the Interior region (estimated from harvest reports and band-recovery rates, Braun 1994), which demonstrates the likely sizes and disparity between the two populations.

Indices of abundance for the Pacific Coast Population (PCP) are obtained from visual counts of band-tailed pigeons at selected mineral sites (N=57) throughout the populations' range (12 in California, 27 in Oregon, 14 in Washington, and 4 in British Columbia) during July from one-half hour before sunrise to noon (Casazza et al. 2000, unpublished report). The range-wide Mineral Site Survey (MSS) is coordinated among State and Provincial wildlife agencies in California, Oregon, Washington, British Columbia, and the Service. The survey was developed and initiated on an experimental basis in 2001 (Casazza et al. 2003), and became operational in 2004. Past monitoring efforts for this population relied on different techniques in Oregon (visual counts at mineral sites in August) and Washington (audio counts along transects in June), but estimates are unreliable (Casazza et al. 2000, unpublished report). No monitoring program existed in California or British Columbia. Estimates from the current survey suggest that annual counts of Pacific Coast band-tailed pigeons per mineral site increased since the survey was experimentally implemented in 2001 by 3.4% ± 1.6 (mean ± SE, $P = 0.04$) (Table 4.11). There is no evidence that these counts changed over the last five years. Unfortunately, a similar survey to index abundance of Interior band-tailed pigeons is not possible because use of mineral sites is primarily limited to the Pacific Coast region (Sanders and Jarvis 2000).

Definitive information on the Interior Population (IP) of band-tailed pigeons is lacking, but their status is believed to be satisfactory. A review of the earliest available information suggests that during 1928–1946 these birds were not known to be abundant, did not increase or decrease in numbers, nor did they occur in high densities except possibly at preferred feeding areas (Merovka 1944; Neff and Culbreath 1947; Kinghorn and Neff 1948; Neff 1951, 1952; Branch of Game Management 1954, 1955, 1956, 1957). Abundance may have decreased during 1946–1956 (based on the same review). Interior band-tailed pigeons may have been especially abundant (estimated at <250,000 birds) during 1967–1972, the period when the population was intensively studied and 25,730 pigeons were banded, because of increased availability of food associated with grain crops. Subsequent visits to those sites in 1993 found band-tailed pigeons at only 41% (17 of 42) of the sites and most of the sites had been converted to other land-uses (Szymczak and Funk 1993).

Band-tailed pigeons are encountered on some BBSs in British Columbia and in all of the States of both the PCP and IP (Sauer et al. 2008). Results from the BBS (Table 4.11) provide little evidence that annual counts of Interior and Pacific Coast band-tailed pigeons seen and heard per route have changed since survey implementation in 1966 or over the last five years. Caution should be used in interpreting results, particularly for the Interior region, because sample sizes (routes) and pigeon counts per route are low, variances are high, and coverage of habitat by the BBS routes is poor.

Table 4.11. Indices to abundance and annual population trends of band-tailed pigeons determined from the Mineral Site Survey (MSS) in the Pacific Coast region and the Breeding Bird Survey (BBS) in both the Pacific Coast and Interior regions.

		Trend				
	Relative	Mean	95% CI			
Survey and Region	**Abundance[1]**	**(%)**	**Lower**	**Upper**	***P*-value**	**N[2]**
MSS (2001–2008)						
Pacific Coast	180.8	3.4	0.3	6.7	0.04	55
British Columbia	118.2	8.2	1.1	19.5	0.13	4
California	64.6	4.2	-8.0	14.1	0.46	12
Oregon	243.9	4.5	0.7	10.1	0.06	25
Washington	183.3	1.0	-4.1	5.5	0.68	14
BBS (1966–2008)						
Pacific Coast	2.6	-0.7	-2.6	1.2	0.46	198
British Columbia	1.6	-2.1	-7.6	3.3	0.45	28
California	2.2	-0.1	-2.8	2.6	0.95	108
Oregon	4.1	-0.4	-2.3	1.5	0.67	33
Washington	4.0	-0.6	-1.6	2.9	0.60	29
Interior[3]	0.6	-2.9	-7.2	1.4	0.20	34
Arizona	0.8	-1.3	-15.6	13.0	0.86	12
Colorado	0.1	10.2	-2.3	22.6	0.14	12
New Mexico	1.0	-8.6	-11.8	-5.4	<0.01	9
BBS (2004–2008)						
Pacific Coast		4.9	-3.6	13.5	0.26	95
British Columbia		3.2	-59.2	65.6	0.92	7
California		1.9	-4.2	7.9	0.55	53
Oregon		-0.7	-21.6	20.2	0.95	19
Washington		21.1	-6.7	48.9	0.16	16
Interior[4]		11.3	1.9	20.6	0.07	10
Arizona		9.6	-30.7	49.8	0.67	4
New Mexico		30.3	12.2	48.5	0.05	6

[1]Mean number of individuals recorded per mineral site for the MSS and mean number of individuals counted per route for BBS.
[2]Number of mineral sites for MSS and number of routes for BBS.
[3]Too few band-tailed pigeons counted on routes to produce estimates for Utah.
[4]Too few band-tailed pigeons counted on routes to produce estimates for Utah and Colorado.

4.1.6.3 Harvest

Federal regulations permitted hunting of band-tailed pigeons in all or parts of their range since 1932, following a period of complete protection from 1913 to 1931 (Neff 1947). The season was again closed in the Interior region during 1951–1967 due to suspected population size declines. Colorado and Utah were closed from 1932 through 1969, with the exception that Colorado had a season in 1944 and 1945. Hunting seasons currently are offered in Washington, Oregon, California, and Nevada (PCP), and in Utah, Colorado, Arizona, and New Mexico (IP). Seasons generally are not more than 30 days, with a daily bag limit of not more than five birds. Current seasons are between September 15 and January 1 in the Pacific Coast region, and between September 1 and November 30 in the Interior region.

The HIP provides annual estimates of harvest since 1999, one year after full implementation of the program in 1998. Preliminary harvest, active hunters, and days afield during 2008 averaged 30,200 birds, 11,300 hunters, and 31,300 days afield in the Pacific Coast region; and 4,700 birds, 4,600 hunters, and 12,200 days afield in the Interior region (Sanders 2008). Distribution of harvest for the PCP is approximately 7.0% in Washington, 1.7% in Oregon, and 91.3% in California. Harvest distribution for the IP is approximately 53.2% in Colorado, 34.0% in Arizona and 12.8% in New Mexico. Estimates for Utah in 2008 are not available.

Prior to the HIP, State wildlife agencies, in whole or in part, obtained annual estimates of band-tailed pigeon hunter participation and harvest since 1957 in the Pacific Coast region and since 1968 in the Interior region. State estimates were obtained specifically from a sample of hunters with a State-issued permit required to hunt band-tailed pigeons or a general survey of small-game license buyers. In the Pacific Coast region during 1957–1988 (the period when State estimates are generally considered to be comparable), harvest increased from 423,000 birds in 1957 to 550,000 birds in 1968 and then decreased to a low of 70,000 birds in 1988, a decline of 20,000 birds per year ($P < 0.01$, R^2=0.65) during 1968–1988 (Pacific Flyway Study Committee 1994). State agencies in Washington, Oregon, and California responded with increasingly restrictive hunting regulations beginning in 1975, but primarily during 1987–1992. Washington closed their season during 1991–2003 and the Nevada season has been closed since 1992. In the Interior region during 1970–1996 (the period when State estimates are generally considered to be comparable), harvest increased from about 5,000 birds in 1970 to about 6,000 birds in 1975 and then decreased to a low of 789 birds in 1996, a decline of 220 birds per year ($P < 0.01$, R^2=0.97) during 1975–1996 (Pacific Flyway Study Committee and Central Flyway Webless Migratory Game Bird Technical Committee 2001). Hunting regulations have remained largely unchanged in the Interior region since 1974.

4.1.7 American Woodcock

The American woodcock is found throughout the deciduous forest region of eastern North America and is a popular game bird in the U.S. The principal breeding range is located in the north-central and northeastern part of the U.S. and southeastern Canada, with limited breeding in the southeastern U.S. (Figure 4.18). The winter range is primarily in the southeastern U.S. extending west to eastern Texas and Oklahoma. American woodcock are managed on the basis of two management regions (Eastern and Central) as recommended by Owen et al. (1977; Figure 4.18). This configuration was biologically justified through the analysis of band-recovery data (Martin et al. 1969; Krohn et al. 1974).

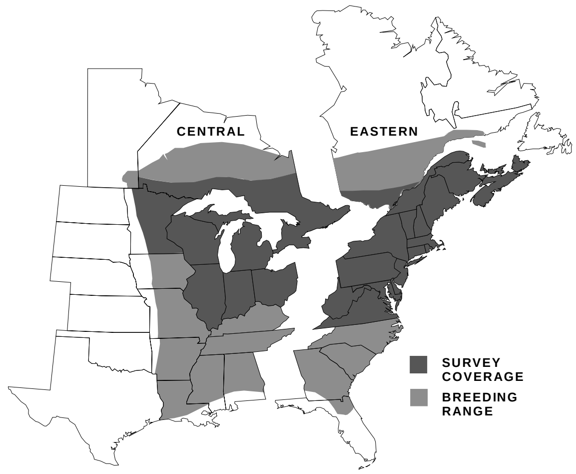

Figure 4.18. American woodcock Management Regions, breeding range, and Singing-ground Survey coverage.

4.1.7.1 Habitat

Detailed information about woodcock breeding and wintering habitat requirements was provided by Straw et al. (1994). In general, preferred breeding habitat consists of young, second-growth hardwood forests with associated openings (i.e., old fields, clear-cuts, natural openings, and pastures). Locations containing stands of hawthorn (*Crataegus* spp.), alder (*Alnus* spp.), aspen (*Populus* spp.) and dogwood (*Cornus* spp.) usually are good indicators of American woodcock habitat. Winter habitat primarily is bottomland hardwood forests with associated nocturnal roosting fields. American woodcock also will use pinelands when suitable soil moisture is present.

The loss of early-succession forest habitat in the breeding range is believed to be the largest threat facing American woodcock populations (Kelley et al. 2008). A large amount of breeding habitat has been lost throughout the species' breeding range from natural forest succession. This is especially true in the northeastern U.S. where habitat on previously abandoned farms has matured past a stage suitable for American woodcock (U.S. Department of the Interior 1988). Straw et al. (1994) also reported that "rates of forest regeneration through timber harvesting have not kept pace with habitat losses due to succession."

4.1.7.2 Populations and Status

The population status of American woodcock is monitored primarily by the annual Singing-ground Survey (SGS), which has been conducted throughout the northern part of the species' breeding range annually since 1968 (Figure 4.18). The SGS consists of approximately 1,500 transects of 3.6 mile (5.4 km) routes, containing 10 listening points per route. Cooper et al. (2008) and Sauer et al. (2008) provide specific details on SGS methodologies and analysis. Analysis of SGS data shows long-term (1968–2009) declining population trends for both the Eastern and Central Management Regions (Cooper and Parker 2009; Figure 4.19). The long-term trends for the Eastern Region (N = 638) and Central Region (N = 639) both show declines of 1.1% per year (Cooper and Parker 2009). State-specific trends and short-term trends can be reviewed by consulting Cooper et al. (2008). An American Woodcock Conservation Plan recently was developed in response to declining populations. The objectives of the Plan are to halt American woodcock population declines by 2012 and achieve positive population growth by 2022, as measured by the SGS (Kelley et al. 2008).

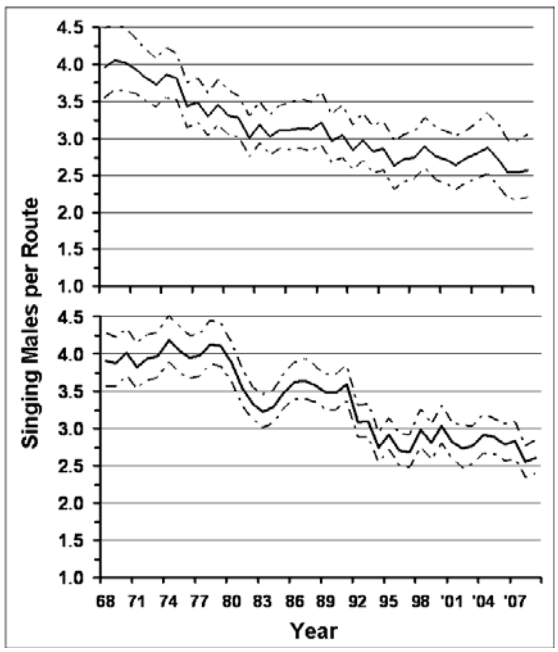

Figure 4.19. Annual indices of the number of American woodcock heard on the Singing-ground Survey, 1968–2009 (from Cooper and Parker 2009).

The WCS provides an index of annual recruitment of young into the population. The index is reported as the number of young per adult female, and regional indices are derived by weighting the relative contribution of each State to the cumulative number of adult female and immature wings received (Cooper and Parker 2009). The 2008 recruitment index in the U.S. portion of the Eastern Region was 7.6% higher than the long-term (1963-2007) regional average (Cooper and Parker 2009; Figure 4.20). In the Central Region, the 2008 recruitment index was 1.1% lower than the long-term regional average (Cooper and Parker 2009; Figure 4.20).

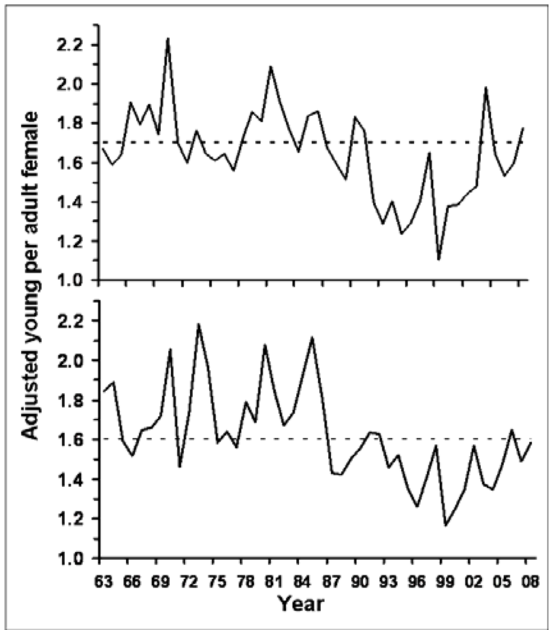

Figure 4.20. Weighted annual indices of American woodcock recruitment in the U.S., 1963–2008. The dashed line is the 1963–2007 average (from Cooper and Parker 2009).

4.1.7.3 Harvest

American woodcock are hunted in 20 States in the Central Management Region and 17 States in the Eastern Management Region. In response to population declines, hunting-season frameworks have become more restrictive through time in both the Eastern and Central Regions (Table 4.12).

Annual estimates of hunter numbers and American woodcock harvest prior to 1999 were based on an incomplete sample frame derived from Duck Stamp purchasers. The main source of information prior to 1999 was the Service's WHS, which estimated American woodcock harvest and participation from individuals who purchased a Duck Stamp (not required for hunting woodcock). Data from the WHS indicated that American woodcock harvest increased during the 1950s through the early 1970s and peaked in the mid-1970s (U.S. Department of the Interior 1988). Harvest increased primarily from increased hunter participation, rather than increased success. After the peak in the mid-1970s, harvest declined through the 1980s, primarily due to lower hunter success (U.S. Department of the Interior 1988).

In 1999, the Service and State wildlife agencies implemented the HIP. The HIP was developed to provide more reliable annual estimates of hunter activity and harvest for all migratory game birds (Elden et al. 2002). Since the start of the HIP, U.S. American woodcock harvest has averaged 91,216 birds per year in the Eastern Region and 237,337 birds in the Central Region (Figure 4.21). Overall, harvest has declined in the Eastern Region from a high of 129,400 in 1999 to 104,700 in 2008 (Figure 4.21). In the Central Region, harvest declined during the first four years of the HIP estimates, stabilized around

225,000 birds/year for several years, and then dropped to only 174,300 birds/year in 2008 (Figure 4.21). U.S. hunter effort in the Eastern Region declined from over 222,000 days in 1999 to under 170,000 days in 2008, while days afield declined from over 500,000 days in 1999 to under 370,000 in 2008 in the Central Region (Figure 4.22). Regional estimates of hunter numbers and hunter success cannot be obtained due to the occurrence of individual hunters registering for the HIP in more than one State (Cooper et al. 2008).

Table 4.12. History of Federal framework dates, season lengths, and daily bag limits for hunting American woodcock in the U.S. portion of the Eastern and Central Regions, 1918–2008 (Cooper and Parker 2009).

Eastern Region				Central Region			
Year(s)	Outside dates	Season length	Daily bag limit	Year(s)	Outside dates	Season length	Daily bag limit
1918–26	Oct 1 – Dec 31	60	6	1918–26	Oct 1– Dec 31	60	6
1927	Oct 1 – Dec 31	60	4	1927	Oct 1– Dec 31	60	4
1928–39	Oct 1 – Dec 31	30	4	1928–39	Oct 1– Dec 31	30	4
1940–47	Oct 1 – Jan 6	15	4	1940–47	Oct 1 – Jan 6	15	4
1948–52	Oct 1 – Jan 20	30	4	1948–52	Oct 1 – Jan 20	30	4
1953	Oct 1 – Jan 20	40	4	1953	Oct 1 – Jan 20	40	4
1954	Oct 1 – Jan 10	40	4	1954	Oct 1 – Jan 10	40	4
1955–57	Oct 1 – Jan 20	40	4	1955–57	Oct 1 – Jan 20	40	4
1958–60	Oct 1 – Jan 15	40	4	1958–60	Oct 1 – Jan 15	40	4
1961–62	Sep 1 – Jan 15	40	4	1961–62	Sep 1 – Jan 15	40	4
1963–64	Sep 1 – Jan 15	50	5	1963–64	Sep 1 – Jan 15	50	5
1965–66	Sep 1 – Jan 30	50	5	1965–66	Sep 1 – Jan 30	50	5
1967–69	Sep 1 – Jan 31	65	5	1967–69	Sep 1 – Jan 31	65	5
1970–71	Sep 1 – Feb 15	65	5	1970–71	Sep 1 – Feb 15	65	5
1972–81	Sep 1 – Feb 28	65	5	1972–90	Sep 1 – Feb 28	65	5
1982	Oct 5 – Feb 28	65	5	1991–96	Sep 1 – Jan 31	65	5
1983–84	Oct 1 – Feb 28	65	5	1997	Sep 20 – Jan 31	45	3
1985–96	Oct 1 – Jan 31	45	3	1998	*Sep 19 – Jan 31	45	3
1997–01	Oct 6 – Jan 31	30	3	1999	*Sep 25 – Jan 31	45	3
2002–08	Oct 1 – Jan 31	30	3	2000	*Sep 23 – Jan 31	45	3
				2001	*Sep 22 – Jan 31	45	3
				2002	*Sep 21 – Jan 31	45	3
				2003	*Sep 20 – Jan 31	45	3
				2004	*Sep 25 – Jan 31	45	3
				2005	*Sep 24 – Jan 31	45	3
				2006	*Sep 23 – Jan 31	45	3
				2007	*Sep 22 – Jan 31	45	3
				2008	*Sep 20 – Jan 31	45	3

*Saturday nearest September 22

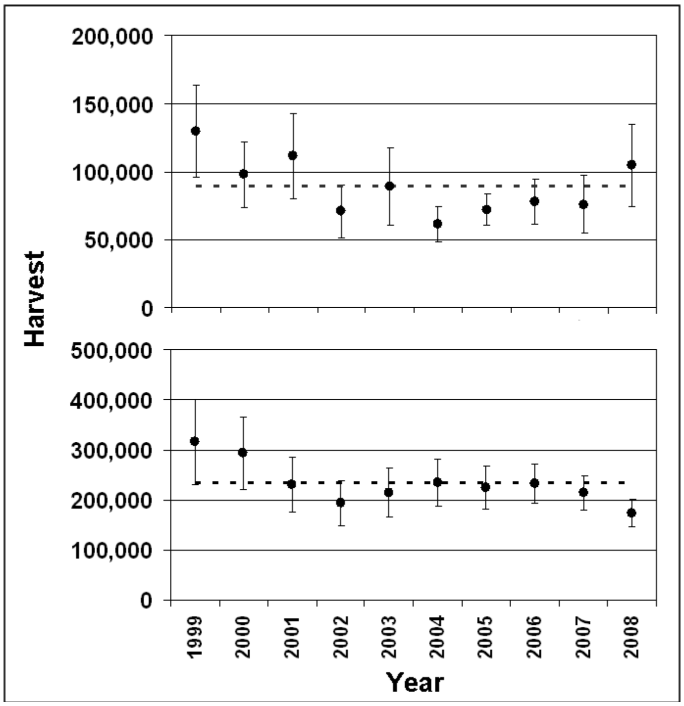

Figure 4.21. American woodcock annual harvest estimates and 95% confidence intervals for the Eastern and Central Management Regions as estimated from the HIP, 1999–2008 (estimates for 2003–2008 are preliminary). The horizontal dashed line represents the 1999–2008 average.

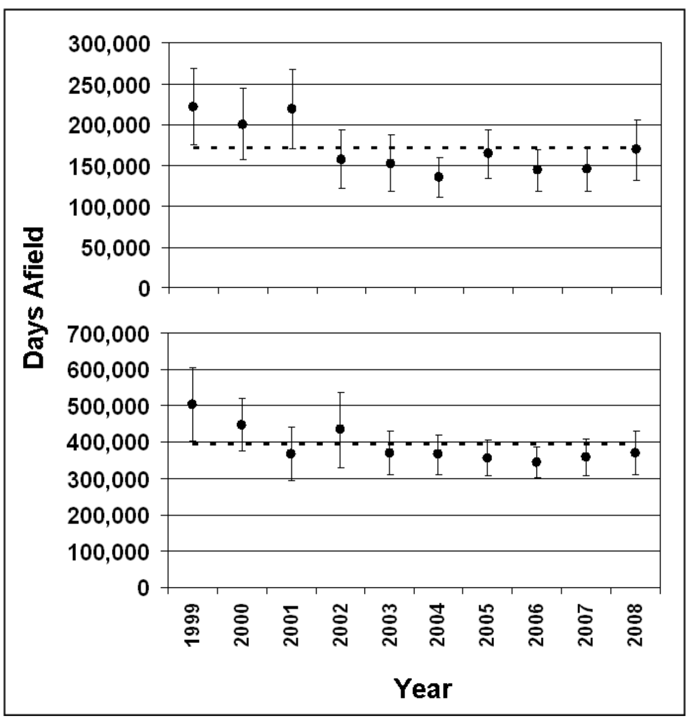

Figure 4.22. Annual estimates of days afield by American woodcock hunters and 95% confidence intervals for the Eastern and Central Management Regions as estimated from the HIP, 1999–2008 (estimates for 2003–2008 are preliminary). The horizontal dashed line represents the 1999–2008 average.

4.1.8 Coots, Moorhens and Gallinules

4.1.8.1 Habitat

American coot

The density of breeding American coots is highest in the Canadian Prairie Provinces, North and South Dakota, and Oregon; the western U.S. has lower densities, and very few birds are observed in eastern North America (Alisauskas and Arnold 1994). During the breeding season, American coots nest in stands of emergent aquatic vegetation in a wide variety of freshwater wetlands, including lakes, ponds, canals, sewage ponds, and slow-moving rivers (Brisbin and Mowbray 2002). While seasonal wetlands may be used during years of high water, breeding may be restricted to permanent wetlands during severe drought (Alisauskas and Arnold 1994). During migration and winter, coots use a wide variety of wetland and deep-water habitats similar to those used in the breeding season, but may be found in coastal and estuarine habitats, brackish impoundments, and other man-made wetlands as well (Alisauskas and Arnold 1994).

Common moorhen

Common moorhens are concentrated in the eastern and southwestern U.S., Mexico, Central America, Bermuda, the West Indies, and the Galapagos (Greij 1994). Moorhens often nest in wetlands with dense stands of emergent vegetation and openings that create a nearly equal interspersion of cover and open water (Greij 1994). In the northern portions of the breeding range in the U.S., moorhens nest primarily in permanently flooded, non-tidal, deep marshes, and slightly brackish or freshwater tidal marshes (Bannor and Kiviat 2002). In the southeast and western U.S., moorhens breed in a wide variety of marshes, ponds, lakes, canals, borrow pits, rice fields, and rivers (Bannor and Kiviat 2002). The non-breeding range in the U.S. includes southern and southwestern States, where the species is found in a variety of marshes, swamps, canals, ponds, and lakes (Bannor and Kiviat 2002).

Purple gallinule

The breeding range of purple gallinules in North America includes several states, but highest breeding densities occur near the Gulf and lower Atlantic coasts of Florida, Georgia, Louisiana, South Carolina, and Texas (Helm 1994). Purple gallinules breed primarily in wetlands that range from freshwater to intermediate salinity (<5 ppt; Helm 1994). Preferred nesting habitat includes deep-water (0.25–1.0 m) marshes, lakes, and impoundments, stable water levels, and dense stands of floating, emergent, and submergent vegetation (Helm 1994). Gallinules may require habitat structure that includes places to walk and feed over water, invertebrate and vegetable (e.g., flowers) food resources, some tall vegetation cover for nesting, and some open water (West and Hess 2002). In the southern U.S., rice fields also are an important nesting habitat and offer a dependable source of food, water, and cover for gallinules (Helm 1994; West and Hess 2002). Migration and winter habitats generally are similar to breeding habitats.

4.1.8.2 Populations and Status

American coot

Quantitative data on the status of American coots is provided by the WBPHS. Most coots occur in the southern Prairie Provinces of Canada, especially Saskatchewan, and in eastern North and South Dakota and southern Oregon (Alisauskas and Arnold 1994; Brisban and Mowbray 2002). American coot numbers fluctuate widely in response to water levels, and changes in abundance can be dramatic. Populations decline during drought years, but are able to quickly increase when conditions on the breeding grounds improve. During the 1986–2009 period, annual estimates of coot abundance ranged from 1.0 to 4.9 million (Figure 4.23). Coot numbers declined in response to drought conditions in the prairies during the late 1980s and early 1990s, but they rebounded during the mid-1990s, peaking in 1997 at nearly five million birds.

Figure 4.23. Estimated American coot abundance, 1986–2009 (Waterfowl Breeding Population and Habitat Survey).

Common moorhen and purple gallinule

Few quantitative population data are available for common moorhens and purple gallinules. These two species are not counted during the WBPHS. Moorhens are not well-monitored by the BBS because of their secretive nature and because they typically occur in relatively low densities (i.e., less than one bird per route). Nevertheless, the BBS provides an index of population trend. BBS data for 1966–2006 showed a non-significant decrease of -0.6% per year (P = 0.63; 95% CI [-2.9, 1.8]) for the U.S. and Canada (Sauer et al. 2008). BBS data thus indicate that common moorhen populations have been stable during this time period. The BBS does not provide any useful information about population trends of purple gallinules because the species is rarely encountered on BBS routes (< 0.1 birds per route).

4.1.8.3 Harvest

American coot

Annual retrieved kill of American coots in the U.S. during the 1987–2008 period averaged 281,809, and the annual number of hunters averaged 38,922 (Table 4.13). Note that the estimates for American coots harvested and hunters between 1987 and 1998 are based on a survey of people that purchased Federal Duck Stamps. Because individuals that hunt American coots exclusively are not required to purchase these Stamps, the estimates for the years 1987–1998 in Table 4.13 are not based on a complete sample frame and should be interpreted with caution. The estimated harvest and number of hunters during 1999–2008 are based on the HIP, which provides a complete sample frame. The 2008 harvest in Louisiana alone was 171,500 birds. Other States with relatively large harvest in 2008(annual average > 10,000) included California, Minnesota, Wisconsin, Texas, and Florida. During the 1987–2007 period, 50% of the total U.S. harvest occurred in the Mississippi Flyway, 29% in the Central Flyway, 10% in the Pacific Flyway, and 11% in the Atlantic Flyway. The geographic pattern of harvest likely reflects abundance of American coots during migration and winter, and variation in the regional traditions for harvesting coots (Alisauskas and Arnold 1994). Alisauskas and Arnold (1994) noted a shift in the regional harvest from the Atlantic and Pacific Flyways toward a greater proportion in the Mississippi. This trend apparently has continued in recent years (Table 4.13).

Common moorhen and purple gallinule

Common moorhens and purple gallinules are not distinguished in the WHS or in the HIP and, as such, are treated collectively here (hereafter gallinule). Annual retrieved kill of gallinule in the U.S. during the 1987–2008 period was 32,960, and the annual number of hunters was 4,289 (Table 4.14). Gallinule harvest in the U.S. during this time period ranged from 6,500 (2007) to 99,334 (1995).

Table 4.13. Harvest and hunter activity for American coots, 1987–2008. Estimates for 1987–1998 are estimated from waterfowl hunters (Federal Duck Stamp purchasers); estimates for 1999–2008 are based on the Harvest Information Program (estimates for 2003–2008 are preliminary).

	Atlantic Flyway		Mississippi Flyway		Central Flyway		Pacific Flyway		U.S. Total	
	Harvest	Hunters	Harvest	Hunters	Harvest	Hunters	Harvest	Hunters	Harvest	Hunters
1987	62,527	11,793	35,350	9,693	294,925	38,027	37,204	7,597	430,402	67,227
1988	49,597	9,411	27,800	6,490	217,861	26,436	37,734	7,805	333,461	50,219
1989	23,553	5,009	9,027	2,320	78,659	11,584	16,805	3,470	128,212	22,475
1990	22,900	5,163	15,236	4,760	116,541	15,370	17,640	3,887	173,070	29,310
1991	21,909	5,298	11,748	2,928	124,517	15,893	12,495	4,212	170,814	28,368
1992	30,092	5,388	9,627	3,369	122,537	17,269	19,371	4,953	181,829	31,008
1993	47,362	5,514	18,669	3,190	108,249	19,065	21,772	5,281	196,110	33,088
1994	23,331	5,919	11,126	4,160	117,290	13,910	15,678	4,221	167,425	28,209
1995	44,651	7,711	31,053	5,876	289,117	30,201	36,485	5,761	401,354	49,585
1996	57,805	9,347	22,932	6,161	398,739	32,415	56,077	7,622	535,905	55,693
1997	65,327	10,086	42,087	8,125	476,328	37,639	40,562	7,960	624,363	63,878
1998	56,481	11,751	51,474	9,980	493,235	38,085	70,927	10,809	672,116	70,624
1999	21,942	7,652	147,274	17,143	28,947	7,561	37,846	7,612	236,009	39,968
2000	13,656	4,052	229,998	20,601	37,407	7,824	53,958	6,730	335,019	39,208
2001	12,395	8,963	214,431	17,790	2,974	8,069	54,640	7,459	284,440	42,281
2002	6,689	2,674	178,959	13,602	3,520	1,169	16,204	6,347	205,372	23,792
2003	12,824	4,428	54,752	11,184	6,420	2,974	14,020	2,814	88,016	21,400
2004	13,061	4,497	125,558	14,807	19,925	2,622	22,718	5,544	181,262	27,470
2005	32,642	5,266	110,601	12,514	15,389	5,496	22,707	5,013	181,338	28,289
2006	37,778	7,800	115,142	19,194	6,903	2,300	39,256	10,209	199,080	39,400
2007	16,700	4,500	115,300	14,400	23,800	8,600	42,500	6,200	198,300	33,700
2008	21,300	5,300	207,900	17,200	9,900	3,100	36,700	5,600	275,900	31,100

Table 4.14. Harvest and hunter activity for moorhens and gallinules (combined). Estimates of harvest (total retrieved kill) and hunters for 1987–1998 are based on information provided by waterfowl hunters (Duck Stamp purchasers). Estimates for 1999–2008 are based on the Harvest Information Program (estimates for 2003–2008 are preliminary).

	Atlantic Flyway		Mississippi Flyway		Central Flyway		Pacific Flyway		U.S. Total	
	Harvest	Hunters	Harvest	Hunters	Harvest	Hunters	Harvest	Hunters	Harvest	Hunters
1987	5,412	875	36,787	2,947	1,778	380	532	246	44,508	4,448
1988	7,090	1,018	27,501	2,581	321	135	176	95	35,088	3,828
1989	2,529	458	15,278	1,427	500	152	23	118	18,330	2,155
1990	4,011	721	31,328	2,196	3,338	288	82	41	38,759	3,247
1991	2,208	392	37,079	2,998	1,175	104	252	48	40,714	3,542
1992	63	169	45,050	3,024	1,485	131	847	136	47,445	3,460
1993	3,167	621	32,924	3,796	90	45	1,017	83	37,197	4,545
1994	4,029	420	25,978	2,419	0	0	73	53	30,080	2,892
1995	568	383	97,526	4,651	853	388	386	83	99,334	5,505
1996	4,376	540	53,499	4,092	0	125	0	75	57,875	4,832
1997	1,960	512	36,525	3,793	38	143	1,120	174	39,643	4,622
1998	1,192	428	30,649	2,209	236	214	1,126	169	33,204	3,020
1999	1,434	1,060	29,320	2,350	743	130	1,136	344	32,633	3,884
2000	137	201	18,230	3,447	0	123	2,517	229	20,884	4,001
2001	3,642	4,582	6,992	1,153	5	1,003	552	944	11,190	7,682
2002	5,178	1,302	7,487	1,362	370	185	648	348	13,682	3,197
2003	820	421	27,852	964	5	5	0	267	28,676	1,657
2004	78	78	31,429	4,309	701	50	1,723	1,723	33,930	6,159
2005	2,642	1,558	25,748	5,352	21	11	2,173	1,053	30,584	7,973
2006	1,838	1,794	11,821	2,889	0	0	0	460	13,660	5,143
2007	200	<50	300	200	<50	<50	4,000	1,200	4,500	2,000
2008	3,000	<50	3,500	2,200	100	<50	6,700	700	13,200	3,700

4.1.9 Wilson's Snipe

4.1.9.1 Habitat

Wilson's snipe breed in sedge bogs, fens, willow and alder swamps, and pond and river edges throughout most of Canada and Alaska, and south into the northern conterminous U.S. (Arnold 1994; Mueller 1999). Winter habitat includes marshes, swamps, wet meadows, wet pastures, and wet fallow fields throughout most of the conterminous U.S. (Arnold 1994). Rice fields and fallow sugar cane are used extensively by snipe in the southern U.S. (Mueller 1999). Loss of wetlands in the southern part of the breeding range has led to the loss of some breeding habitat. However, a net loss or gain in habitat is unclear because conversion of wetlands to wet pastures, rice fields, or other fallow fields may have created some suitable habitat (Mueller 1999).

4.1.9.2 Populations and Status

Total population size of Wilson's snipe in North America is believed to be approximately 2,000,000 (Brown et al. 2001). Wilson's snipe is considered a species of moderate conservation concern due to a negative population trend (U.S. Shorebird Conservation Plan 2004, unpublished report). Data from the BBS (Sauer et al. 2008) provide an index to changes in abundance of snipe on the breeding grounds and indicate a nonsignificant slight decline from 1966 to 2007 (%/year = -0.40, $P = 0.19$, detected on 1,244 routes). The CBC (National Audubon Society 2002), which provides an index to change in winter abundance, suggests a decline in population from 1960 to 2006 (change/year = -2.8%, Wilson's snipe counted per survey party hour).

4.1.9.3 Harvest

In the U.S., Federal regulations for 2007–2008 provided an open hunting season for Wilson's snipe in 49 States, plus Puerto Rico (U.S. Fish and Wildlife Service 2007d). Individual State hunting seasons generally last 3.5 months, with the earliest seasons opening the first week of September and the latest seasons closing the last day of February. The daily bag limit for nearly all States is eight (three States have lower bag limits). The daily bag limit in Canada for the 2007–2008 hunting season was 10, and the season was 61–114 days, depending on Province and zone.

From the 1964 through 2001 hunting seasons, harvest surveys for Wilson's snipe (and rails; see below) in the U.S. were limited to hunters who purchased a Federal Duck Stamp. Thus, hunter numbers and harvest estimates from 1964 to 2001 represent hunting and harvest of snipe by duck hunters and may reflect trends in duck hunters, trends in duck hunters who hunted Wilson's snipe, and/or trends in snipe harvest by duck hunters. The HIP, 1999 to present, uses a more appropriate sampling frame for all migratory game birds and provides improved harvest estimates for snipe. The number of snipe hunters among duck hunters and total snipe harvest by duck hunters in the U.S. appear to have peaked in the mid-1970s (Figure 4.24, Table 4.15). Based on the HIP estimates, snipe harvest has remained relatively constant since 2000 (Figure 4.24), whereas the number of snipe hunters has declined since 2004 (Table 4.15). In the three years of MQS and HIP survey overlap (1999–2001), snipe harvest estimates from the Federal Duck Stamp Survey did not appear correlated to those from the HIP Survey (Figure 4.24). From 1999 through 2008, the average annual number of snipe hunters in the Mississippi Flyway ($\bar{x}$ =11,970) was about twice that of the Atlantic ($\bar{x}$ =7,220), Central ($\bar{x}$ =5,140) and Pacific ($\bar{x}$ = 5,230) Flyways; whereas the average annual number of snipe harvested in the Mississippi ($\bar{x}$ =43,590) and Atlantic ($\bar{x}$ =33,050) Flyways was two to three times greater than in the Central ($\bar{x}$ =13,440) and Pacific ($\bar{x}$ =17,490) Flyways. The estimated harvest of snipe in Canada in 2006, 2007, and 2008 was 5,968, 8,817, and 12,140, respectively.

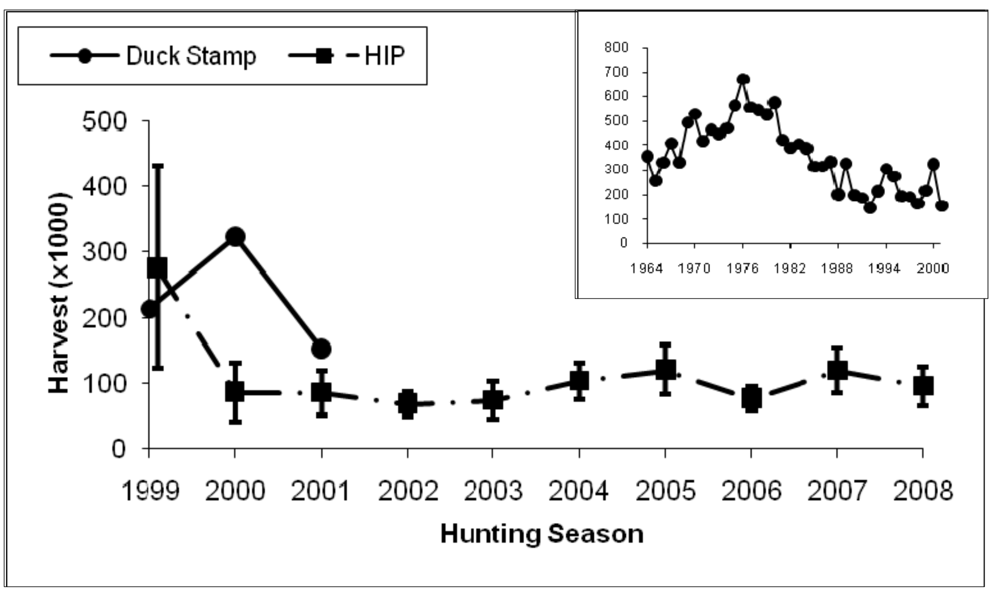

Figure 4.24. Annual Wilson's snipe harvest in the U.S. from the 1964–2008 hunting seasons. Federal Duck Stamp Survey estimates (inset, 1964–2000) were based on a mail-in survey of duck hunters. Harvest Information Program (HIP) survey estimates (1999–2008; ±95% confidence intervals) were based on a survey of all migratory bird hunters. Federal Duck Stamp and HIP estimates were made concurrently for the 1999 through 2001 hunting seasons.

Table 4.15. Annual Wilson's snipe harvest and number of snipe hunters in the U.S. from the 1964–2008 hunting seasons. Federal Duck Stamp Survey estimates were based on a mail-in survey of duck hunters. Harvest Information Program (HIP) survey estimates were based on a survey of all migratory bird hunters. Federal Duck Stamp and HIP estimates were made concurrently for the 1999 through 2001 hunting seasons.

Hunting	Duck Stamp Survey		HIP Survey	
Season	Hunters	Harvest	Hunters	Harvest
1964	56,100	355,300	—	—
1965	47,500	254,200	—	—
1966	58,600	329,300	—	—
1967	65,200	407,500	—	—
1968	59,400	330,100	—	—
1969	85,300	493,500	—	—
1970	94,600	529,100	—	—
1971	79,300	417,300	—	—
1972	85,300	466,100	—	—
1973	79,300	447,500	—	—
1974	85,500	471,700	—	—
1975	99,200	564,000	—	—
1976	106,300	670,500	—	—
1977	89,600	557,300	—	—
1978	87,800	545,300	—	—
1979	84,100	527,300	—	—
1980	85,400	576,300	—	—
1981	63,700	420,900	—	—
1982	56,300	387,500	—	—
1983	57,700	406,500	—	—
1984	57,100	386,500	—	—
1985	48,100	313,500	—	—
1986	47,700	312,200	—	—
1987	48,600	332,700	—	—
1988	34,600	200,000	—	—
1989	44,400	325,400	—	—
1990	37,200	198,200	—	—
1991	30,500	185,000	—	—
1992	28,000	145,100	—	—
1993	29,700	212,500	—	—
1994	27,100	303,100	—	—
1995	31,200	272,000	—	—
1996	28,600	190,500	—	—
1997	28,300	189,200	—	—
1998	28,700	160,800	—	—
1999	32,900	214,000	40,200	276,500
2000	34,900	323,900	29,200	86,400
2001	25,100	153,100	28,600	85,500
2002	—	—	24,900	68,200
2003	—	—	29,800	73,800
2004	—	—	34,500	103,300
2005	—	—	27,900	120,700
2006	—	—	19,900	76,700
2007	—	—	29,800	119,400
2008	—	—	27,400	95,500

4.1.10 Rails

4.1.10.1 Habitat

Four rail species, Virginia rail, sora rail, king rail, and clapper rail are hunted in the U.S. Breeding distribution for rail species in North America is described by Conway and Eddleman (1994), Melvin and

Gibbs (1994), Reid et al. (1994), and Eddleman and Conway (1994). Virginia, sora, and king rails breed mostly in freshwater wetlands with emergent vegetation and bulrush, with some interspersion of openings as mudflats and/or shallow water. Winter habitat is thought to be similar to breeding habitat for these species. Clapper rails breed and winter in coastal salt marshes dominated by cordgrass, pickleweed, or mangroves. Some habitat types that are important for rails, such as salt-marsh and freshwater emergent marsh, may have declined from 1998-2004 (Dahl 2006).

4.1.10.2 Populations and Status

There are no reliable abundance estimates for any rail species. The king rail is classified as a "bird of management concern" by the Service, and is a federally-endangered species in Canada. The BBS was not designed to index rail abundance. Range-wide, only the sora rail was detected on more than 150 BBS routes and had abundance approaching 1.0 bird per route. BBS data suggested sora abundance was stable from 1996 to 2007 (P = 0.84), and near stationary from 1980 to 2006 (P = 0.48). Distribution of clapper rails in some States appears largely unchanged during the past century, although overall numbers probably have declined because of habitat loss.

4.1.10.3 Harvest

In the U.S., Federal regulations for 2007–2008 provided open hunting seasons for sora in 36 states, Virginia rails in 35 states, clapper rails in 14 states, and king rails in 13 states (U.S. Fish and Wildlife Service 2007d). Individual State hunting seasons last from two to two and a half months. The earliest State hunting seasons begin the first week of September and the latest seasons close in late December. In Canada, the only province with an open rail season is Ontario.

Harvest information for rails in the U.S. from 1964 to present was collected the same way as for Wilson's snipe (see section 4.1.9.3). Federal Duck Stamp surveys provide information about rail harvest from 1964 through 2001 and HIP surveys from 1999 through 2008. From 1999 to present, harvest estimates of individual rail species were estimated from the HIP survey. HIP estimates indicate no clear trend in the number of rail hunters or rail harvest in the U.S. from 1999 through 2008 (Table 4.16). During this period, the average annual number of rail hunters in the Mississippi Flyway ($\bar{x}$ = 4,640) was about twice that of the Atlantic ($\bar{x}$ = 2,710) and Central ($\bar{x}$ = 2,420) Flyways; whereas the average annual number of rails harvested in the Mississippi ($\bar{x}$ =14,500) and Atlantic ($\bar{x}$ =16,100) Flyways was much greater than that in the Central Flyway ($\bar{x}$ =2,600). Since 1989, 100 to 4,300 rails have been harvested annually in Canada. Overall, hunting pressure generally is presumed to be highest on the wintering grounds.

Table 4.16. Annual rail harvest and number of rail hunters in the U.S. from the 1964–2008 hunting seasons. Federal Duck Stamp Survey estimates were based on a mail-in survey of duck hunters. Harvest Information Program (HIP) survey estimates were based on a survey of all migratory bird hunters. Species composition estimates from 1999 to 2008 were derived from HIP information and five-year running averages of species composition estimates from the Migratory Bird Wing Collection Survey.

Hunting Season	**Duck Stamp Survey**				**HIP Survey**				
	Sora		Other Rails			Harvest			
	Hunters	Harvest	Hunters	Harvest	Hunters	Sora	Clapper	King	Virginia
1964	5,900	37,700	8,000	41,300	—	—	—	—	—
1965	5,000	26,600	5,900	24,200	—	—	—	—	—
1966	5,000	30,400	6,700	50,600	—	—	—	—	—
1967	5,600	29,700	10,800	94,300	—	—	—	—	—
1968	3,800	13,400	10,400	67,400	—	—	—	—	—
1969	6,500	29,500	20,000	130,000	—	—	—	—	—
1970	8,100	27,100	21,400	175,200	—	—	—	—	—
1971	5,500	31,200	15,000	118,300	—	—	—	—	—
1972	7,400	47,200	19,900	147,100	—	—	—	—	—
1973	6,900	37,100	18,000	148,100	—	—	—	—	—
1974	7,300	30,400	16,400	108,300	—	—	—	—	—
1975	8,800	44,900	18,900	160,400	—	—	—	—	—
1976	9,200	39,100	19,800	165,600	—	—	—	—	—
1977	6,600	26,100	15,400	95,400	—	—	—	—	—
1978	7,000	32,300	15,800	97,400	—	—	—	—	—
1979	6,500	26,300	13,300	98,800	—	—	—	—	—
1980	6,300	29,400	12,500	99,000	—	—	—	—	—
1981	4,600	20,500	12,200	130,400	—	—	—	—	—
1982	4,700	30,100	10,000	69,600	—	—	—	—	—
1983	4,700	25,000	9,400	63,300	—	—	—	—	—
1984	4,800	27,200	10,900	85,900	—	—	—	—	—
1985	4,100	20,000	9,100	73,100	—	—	—	—	—
1986	4,300	25,600	8,100	78,900	—	—	—	—	—
1987	3,500	18,000	8,100	52,000	—	—	—	—	—
1988	2,400	12,800	4,000	29,600	—	—	—	—	—
1989	2,900	16,600	5,300	56,900	—	—	—	—	—
1990	2,600	10,800	5,700	48,000	—	—	—	—	—
1991	3,200	14,900	5,100	32,500	—	—	—	—	—
1992	2,600	19,300	5,400	58,600	—	—	—	—	—
1993	3,100	18,900	6,000	38,100	—	—	—	—	—
1994	3,600	26,300	6,500	58,000	—	—	—	—	—
1995	2,100	22,300	4,100	34,000	—	—	—	—	—
1996	2,600	13,500	5,000	45,700	—	—	—	—	—
1997	3,800	19,800	5,800	77,200	—	—	—	—	—
1998	3,800	27,900	4,700	40,900	—	—	—	—	—
1999	2,500	14,300	4,800	65,800	11,900	20,700	8,300	500	2,000
2000	1,700	26,300	5,600	60,900	6,900	11,000	3,500	200	600
2001	2,500	8,000	3,600	36,900	6,000	19,600	20,800	200	700
2002	—	—	—	—	5,600	16,100	6,600	400	700
2003	—	—	—	—	9,300	20,400	6,700	800	1,200
2004	—	—	—	—	19,200	39,000	9,600	400	1,500
2005	—	—	—	—	9,500	41,400	10,900	300	1,100
2006	—	—	—	—	8,700	18,800	8,600	400	700
2007	—	—	—	—	8,000	13,500	10,200	300	500
2008	—	—	—	—	11,200	19,600	24,700	<50	600

4.1.11 Crows

Three species of crow occur in the U.S. and are similar in appearance, although their vocalizations are different and provide the most reliable characteristic in identification.

4.1.11.1 Habitat

American Crow

The American crow is one of the most widespread North American birds and occurs throughout the conterminous U.S. except for the southwestern part of the country, and also in the southern half of Canada, except for eastern British Columbia (Sibley 2000; Verbeek and Caffrey 2002). The species is known for its intelligence and for being a foraging opportunist, doing such things as tearing a hole in a garbage bag or emptying an unattended lunch bag. American crows occupy a wide range of habitats, such as farmland, city parks and golf courses, feedlots, forest campgrounds, and shores of watercourses and marshes, but prefer open landscapes with scattered trees and small woodlots (Verbeek and Caffrey 2002). The birds roost communally, often in the same sites each year. Such roosts may contain thousands of individuals outside of the breeding season. When these communal roosts are located in cities, they may become a nuisance requiring management (Verbeek and Caffrey 2002).

Fish Crow

The fish crow is found primarily in the southeastern part of the U.S. (Sibley 2000) and is recognized as a despoiler of other birds' nests, especially those of colonial waterbirds (Mcgowan 2001). The fish crow is less a bird of agricultural lands than the American crow (Johnston 1961). Fish crows are habitat generalists, but seem to prefer open areas with deciduous and coniferous trees along rivers and streams. Additionally, fish crows occur in coastal areas and can become a nuisance species in orchards, urban parks, and suburban areas. Outside of the breeding season, fish crows often gather in large groups to forage, and congregate into large roosts to sleep (Mcgowan 2001).

Northwestern Crow

The northwestern crow is found along the coast from southern Alaska to the northern tip of Washington, primarily in the intertidal zone (Sibley 2000; Verbeek and Butler 1999). The northwestern crow also occurs in coastal villages, towns, cities, and campgrounds, and on farmland and other cleared land (Campbell et al. 1997).

4.1.11.2 Populations and Status

American Crow

The American crow is more abundant now than it was when the first European settlers arrived (Verbeek and Caffrey 2002). This population increase likely is due to forest clearing, planting of trees around prairie homesteads and urban centers, and tilling of agricultural land that created additional habitat (Verbeek and Caffrey 2002). The American crow, along with the fish crow, exhibit stable or increasing populations (Table 4.17).

Table 4.17. Estimating-equation trend estimates for American and fish crows based on Breeding Bird Survey data collected from 1966–2006 in the Atlantic and Mississippi Flyways, Eastern, Central and Western regions, and the entire United States. For estimation details, see Link and Sauer (1994) and http://www.mbr-pwrc.usgs.gov/bbs/ Sauer et al. (2008).

Species	Region	Trend	Variance	Routes	*P* value
American crow					
	Atlantic	0.93	0.0361	1,089	<0.001
	Mississippi	0.78	0.0185	833	<0.001
	Eastern	0.86	0.0201	1,670	<0.001
	Central	1.10	0.0369	739	<0.001
	Western	0.11	0.2465	750	0.832
	United States	0.94	0.0304	2,526	<0.001
Fish crow					
	Atlantic	0.19	0.3352	369	0.749
	Mississippi	5.02	2.3377	116	0.001
	Eastern	0.29	0.3189	399	0.604
	Central	4.76	3.9986	105	0.019
	Western	--[a]	--	--	--
	United States	0.45	0.300	504	0.412

[a]Outside distribution range.

Fish Crow

Fish crow populations have increased in upland habitats (Johnston 1961). Fish crows have become common in urban areas in recent decades over much of their range (McNair 1989).

Northwestern Crow

Densities of northwestern crows generally are low along most coastal areas away from human habitation. However, northwestern crows flock together in groups of several thousand individuals to move to and from roosts in rural areas. Individuals and small numbers of birds frequent playgrounds, suburban yards, parks, and fast-food outlets. Flocks of hundreds or thousands of birds congregate at garbage dumps outside of the breeding season (Verbeek and Butler 1999). Analysis of BBS results (Sauer et al. 2008; http://www.mbr-pwrc.usgs.gov/bbs/bbs.html) indicate that range-wide abundance is significantly higher in recent years than between 1966 and 2000.

4.1.11.3 Harvest

Crows are defined as migratory birds under the MBTA. Under Federal and State laws and regulations, crows are not listed as game birds, but hunting and depredation orders are allowed over most of their range. Federal regulations allow States to establish dates and durations of hunting seasons, bag and possession limits, and methods of taking crows, subject to limitations defined in 50 CFR §20.133. The hunting season for crows can have a maximum of 124 days within a calendar year because of specific provisions included in the treaty with Mexico, and should not coincide with the peak of the nesting period within a State. However, some States allow crow hunting four days a week, extending the open season nearly eight months. Moreover, most States have no daily bag limit on crows.

Crows also can be taken under depredation orders as defined in 50 CFR §21.43. A Federal permit is not required when crows commit or are about to commit depredations or when concentrated in such high numbers as to be considered a nuisance or health hazard. States can authorize the take of crows by opening a hunting season and/or using the depredation order.

4.1.12 Other Migratory Birds (seabirds, shorebirds, and waterbirds [species not discussed earlier])

Many species of non-game migratory birds are harvested by subsistence hunters in Alaska. These include 30 species of seabirds, 18 species of shorebirds, and six species of waterbirds.

4.1.12.1 Habitat

Alaska covers a surface area of approximately 586,000 square miles, which equals almost one-fifth of the conterminous U.S. Over 80% of Alaska's land mass is north of 60^{o} N latitude, so most bird species are associated with tundra, taiga or the edge of the sea-ice. Alaska has been subdivided into the following six biogeographic regions: central, southeastern, southcoastal, southwestern, western, and northern Alaska (Kessel and Gibson 1978). Central Alaska consists of taiga habitats dissected by several major river systems, including the upper Yukon, upper Tanana, and upper Copper-River drainages. The southeastern panhandle, which stretches 370 miles along the Canadian border, is bounded by the Coast Range and contains a maze of inlets, fjords, and numerous small islands and reefs. A number of species reach either their northern or their southern distribution extremes in this region. Southcoastal Alaska is a mountainous region, including the St. Elias, Chugach, and Kenai Mountains, and the major embayment of Prince William Sound and Cook Inlet. The region includes the northernmost extent of open water for many overwintering shorebirds and major migration stops for migrants. Southwestern Alaska includes the Alaska Peninsula and Aleutian Islands, with the volcanically active Aleutian Mountains extending hundreds of miles. Numerous migrants regularly pass through this region and thousands of seabirds breed there. Seabirds generally winter in pelagic, offshore, and near-shore ice-free areas south of the Bering Sea. Western Alaska includes the low-lying Seward Basin and Bering-Coast uplands through which the two largest rivers in Alaska, the Yukon and the Kuskokwim, flow from the interior into the Bering Sea. Both rivers carry sediment from far inland and have established huge deltas. Northern Alaska is characterized by a fairly uniform, wide coastal plain where tundra habitat predominates. The Arctic Coastal Plain has a diverse and large number of shorebirds that come to the area to breed.

4.1.12.2 Populations and Status

Seabirds

Twenty-one percent of the North American seabird taxa breed solely within Alaska. The most accurate population trend information is available from seabird colonies where annual counts are conducted. These counts indicate that trends differ by colony and oceanic region (Dragoo et al. 2006). Alaskan population estimates of common murre and thick-billed murre are six million each. Trends in murre numbers indicate that abundances are stable or increasing at Cape Lisburne and Cape Thompson in the Chukchi Sea, Bluff in the North Bering Sea, St. George in the southeastern Bering Sea, Puale Bay/Cape Unalishagvak along the Alaska Peninsula, and East Amatuli Island in the Gulf of Alaska (Dragoo et al. 2008). There are, however, declining murre colonies, including St. Paul Island in the southeastern Bering Sea, Middleton Island in the Gulf of Alaska, and St. Lazaria Island in southeastern Alaska (Dragoo et al. 2008). Horned puffin and tufted puffin are thought to number one and a half and four million, respectively. At most monitored tufted puffin colonies (Bogoslof Island, Aiktak Island, St. Lazaria and E. Amatuli Island), populations appear to be increasing or stable (Dragoo et al. 2008). Auklet populations are estimated to be nine million least auklets, three million crested auklets, and one million parakeet auklets. Auklet population trend data are only available from Kasatochi Island in the southwest Bering Sea, where least auklets are declining and crested auklets are increasing (Dragoo et al. 2008).

In Alaska, Aleutian terns number about 20,000, and Arctic terns number about 50,000 (U.S. Fish and Wildlife Service 2007e, unpublished data). Gulls are important to migratory bird subsistence activities because of the associated egg take. Of the gulls, glaucous, glaucous-winged, and mew gulls are thought to number 40,000, 500,000, and 40,000, respectively (U.S. Fish and Wildlife Service 2007e, unpublished data). Bonaparte's gull is described as being common in Alaska, but no population estimates are known. Overall, gull populations in Alaska are believed to be stable or increasing. Black- and red-legged kittiwakes have restricted breeding distributions in Alaska. Black-legged are the most numerous at two million, and red-legged much less numerous at about 250,000 (Dragoo et al. 2008). Abundances of black-legged kittiwakes vary and are stable or increasing at seven of 10 monitored colonies, and declining on St. Paul Island in the Pribilofs and on Middleton Island. Red-legged kittiwakes are declining on St. Paul Island and on Koniuji Island (Aleutians), but are increasing on Buldir Island in the western Aleutians (Dragoo et al. 2008). Kittiwakes are used for subsistence purposes currently in the Pribilofs. Pelagic cormorant populations of the Bering Sea have remained stable since the 1980s; however, there has been a downward trend at Chiniak Bay and Middleton Island in the Gulf of Alaska (Dragoo et al. 2008). Red-faced cormorants (*Phalacrocorax urile*) also have declined at Chiniak Bay (Dragoo et al. 2008).

<u>Shorebirds</u>

Of the 73 species of shorebirds that have been recorded in Alaska, 46 species have been documented as breeding within Alaska (37 regularly and nine irregularly; Alaska Shorebird Group [ASG] 2008). These 73 species represent one-third of the world’s shorebird species. Population sizes of these species range from a few thousand to several million (ASG 2008). Three species and six subspecies of shorebird breed solely or mostly within Alaska (ASG 2008). Population estimates exist for Alaskan shorebirds (ASG 2008; Morrison et al. 2006), although these estimates and associated trends frequently are rough estimates. Many species of shorebirds that have been traditionally harvested by subsistence hunters in Alaska have recently been identified as species of conservation concern. The global population of black oystercatchers is estimated at 10,000 birds, with approximately 65% nesting in Alaska (Tessler et al. 2007). The American golden plover is a species of high conservation concern because of an apparent population decline and significant potential threats on the non-breeding grounds (ASG 2008). The Alaskan race of whimbrel (*Numenius phaepus rufiventris*) is a species of high conservation concern, due to the rapid elimination of much of their Latin American wintering habitat (ASG 2008). Bristle-thighed curlews, which breed exclusively in Alaska, are estimated at 3,200 pairs, with a total global population that probably does not exceed 10,000 (Marks et al. 2002). Several lines of evidence suggest that the population is being negatively affected by anthropogenic factors on the non-breeding grounds in central Oceania (ASG 2008). All *baueri* subspecies of bar-tailed godwits breed in Alaska (ASG 2008). Due to concern about population status, marbled and Hudsonian godwits, bristle-thighed curlews, American and Pacific golden plovers, whimbrels, and buff-breasted sandpipers were not included on the list of species open for subsistence harvest in the initiation of the subsistence harvest program.

Waterbirds

The following five species of loons breed in Alaska and are taken for subsistence purposes: red-throated loon, Pacific loon, Arctic loon, common loon, and yellow-billed loon. Yellow-billed loons were not included on the list of species open for subsistence harvest at the initiation of the subsistence harvest program in 2003. Currently, a limited take of up to 20 yellow-billed loons is permitted when take occurs in subsistence fishing activities in the North Slope region. Alaska is home to 100% of the U.S. breeding populations of red-throated, Pacific, Arctic and yellow-billed loons. Groves et al. (1996) estimated that the mean loon abundances during 1971–1993, were about 15,000 red-throated, 69,000 Pacific, 9,000 common, and 2,600 yellow-billed loons. From 1971 to 1993, red-throated loons declined 53%, to a population size of 9,800 birds, whereas no significant change was detected in numbers for the three other species. Earnst et al. (2005) reported a yellow-billed loon population for the North Slope of Alaska at 3,369 birds and speculated that there are < 1,000 nesting pairs inhabiting northern Alaska in most years. In an area of the State not covered by the Earnst et al. (2005) estimate (Seward Peninsula and Cape Krusenstern), a 2005 survey documented numbers of local yellow-billed loons at 418 birds. Also, the same survey reported 1,348 and 83 Pacific and red-throated loons, respectively (Mallek et al. 2006, unpublished report).

Grebe observations are recorded during aerial surveys conducted to monitor other species. Due to low densities and poor detection rates, their numbers are seldom reported. However, Larned (2004, unpublished) reported an average of 192 red-necked grebes and one horned grebe for 1992 through 2004 on surveys of southwest Alaska. Bird surveys conducted from small boats reported populations of 427 red-necked and 66 horned grebes in Cook Inlet in the winter of 1994, and none during the summer in Cook Inlet (Agler et al. 1994, unpublished report). Similar surveys conducted from boats in Prince William Sound from 1990 through 2005 estimated 400 to 3,863 horned and 572 to 1,878 red-necked grebes during March, and 0 to 43 horned and 0 to 100 red-necked grebes during July (McKnight et al. 2006, unpublished report).

4.1.12.3 Harvest

These non-game species are available for egg-gathering as well as hunting. A Statewide survey to estimate subsistence harvest of non-game species in Alaska has recently been instituted (Naves 2009). Prior to this recent Statewide survey, several important regions were surveyed periodically (Wentworth 2007, unpublished data). Seabirds and shorebirds make up 9.5% of the subsistence harvest of migratory birds (the remainder being mostly waterfowl). Results from surveys estimated that ≈32,000 seabirds, shorebirds, and waterbirds and ≈138,000 of their eggs were harvested by subsistence hunters in 13 regions of Alaska in 1994 (Table 4.18). Most species of shorebirds are taken incidentally, although significant numbers of a few species (e.g., bar-tailed godwit) are harvested annually.

Table 4.18. Estimated statewide subsistence harvest of seabirds, shorebirds, and non-game waterbirds from 13 regions in Alaska[1] in 2004, classified by group and species.[2]

Group/Species	# Birds Harvested	95% Confidence Interval	# Eggs Harvested	95% Confidence Interval
SEABIRDS				
Murres	12,062	(10,298, 37,173)	90,537	(76,627, 269,756)
Auklets	7,724	(6,590, 13,977)	139	(120, 2,047)
Cormorants	3,590	(3,065, 9,449)	0	(0, 0)
Glaucous gull	1,404	(1,011, 9,280)	22,989	(10,845, 84,321)
Kittiwakes	964	(824, 5,547)	376	(302, 7,595)
Guillemots	480	(410, 2,835)	0	(0, 0)
Mew gull	349	(210, 4,538)	9,980	(6,905, 51,847)
Herring gull	265	(21, 2,901)	2,301	(740, 19,601)
Puffins	60	(51, 1,420)	29	(25, 1,684)
Arctic tern	26	(13, 527)	4,888	(3,199, 30,232)
Sabine's gull	7	(7, 72)	27	(22, 309)
Unidentified gull	0	(0, 0)	1,584	(796, 11,879)
SHOREBIRDS				
Godwit	1,351	(1,045, 8,209)	0	(0, 0)
Small shorebirds	466	(261, 2,875)	2,677	(1,873, 13,000)
Whimbrel	154	(122, 1,236)	36	(32, 327)
Golden plover	137	(53, 2,146)	215	(144, 2,067)
Bristle-thighed curlew	9	(4, 154)	0	(0, 0)
Large shorebirds	0	(0, 0)	0	(0, 0)
WATERBIRDS				
Pacific loon	634	(512, 1,729)	227	(152, 1,663)
Common loon	592	(476, 2,244)	261	(176, 1,622)
Yellow-billed loon	331	(282, 1,002)	58	(29, 652)
Red-throated loon	79	(60, 617)	70	(44, 712)
Miscellaneous seabirds, shorebirds, and waterbirds	615	(387, 4,591)	1,443	(131, 21,251)
TOTAL	**31,299**	(25,700, 61,450)	**137,836**	(102,162, 351,650)

[1]Bering Strait/Seward Peninsula region, Bristol Bay region, Cook Inlet/Prince William Sound region, Kodiak Island Villages, Copper River region, Innoko National Wildlife Refuge (NWR), Kanuti NWR, Koyukuk NWR, Nowitna NWR, other interior areas, Tetlin NWR, Yukon Flats NWR, Yukon-Kuskokwim NWR.
[2]Source: Wentworth 2007, unpublished data.

4.2 PUERTO RICO AND THE VIRGIN ISLANDS

Doves and pigeons also are hunted in Puerto Rico and the Virgin Islands. Regulations are developed separately from regulations for the same species on the U.S. mainland. These species include the Zenaida dove, mourning dove, white-winged dove, and the scaly-naped pigeon.

4.2.1 Habitat

4.2.1.1 Zenaida dove

The Zenaida dove is a year-round resident of the West Indies. It also is found on the coast of the Yucatan Peninsula and offshore islands, and is reported occasionally in coastal areas of southern Florida (Raffaele et al. 1998). This dove is a habitat generalist that inhabits coastal dry forests, high-elevation wet forests, agricultural areas, plantations, shrublands, suburban and urban areas. The habitat includes at least 64% (572,274 ha) of Puerto Rico (Rivera-Milán 1995a, 1999; Rivera-Milán and Schaffner 2002; Gould 2006).

4.2.1.2 Mourning dove and white-winged dove

The range of the white-winged dove and mourning dove in the insular Caribbean includes the Bahamas and Cayman Islands and the Greater Antilles (Raffaele et al. 1998). The mourning dove is not abundant, but white-winged dove numbers appear to be increasing in the U.S. Virgin Islands (D.B. McNair and F.F. Rivera-Milán, personal observations). Both species are habitat generalists that occur from coastal dry forests to high-elevation moist-wet forests, mangroves, agricultural areas, shrublands, suburban and urban areas. The habitats of the white-winged dove and mourning dove include at least 55% (487,655 ha) and 30% (267,912 ha) of Puerto Rico, respectively (Rivera-Milán 1995a; Gould 2006).

4.2.1.3 Scaly-naped pigeon

The scaly-naped pigeon also is a year-round resident throughout much of the West Indies, including the islands off Venezuela (Raffaele et al. 1998). It is a vagrant on Jamaica. This pigeon is a habitat generalist that occurs in coastal dry forests, high-elevation wet forests, coffee plantations, and suburban areas. The habitat includes at least 46% (408,863 ha) of Puerto Rico (Rivera-Milán 1995a,b; Gould 2006).

4.2.2 Populations and Status

The three dove species are abundant throughout most of their range. The scaly-naped pigeon is abundant on some islands but rare on others due to lack of habitat and possibly due to hunting impacts. Monitoring data are scarce even for islands where pigeons and doves are heavily hunted.

A monitoring program for pigeons and doves was established on Puerto Rico in 1986 (Rivera-Milán 1993; Rivera-Milán et al. 2003). For the past 23 years, the density of Zenaida doves ranged from 0.53 to 1.31 individuals/hectare and population size ranged from 303,305 to 749,679 individuals (Rivera-Milán 1995a, 1999; F. F. Rivera-Milán, U.S. Fish and Wildlife Service, personal communication). For 2008, predicted and estimated density was 0.77 and 0.71 Zenaida doves/hectare, and predicted and estimated population size was 437,800 and 403,442 individuals. Historically, white-winged dove densities ranged from 0.08 to 1.47 individuals/hectare and population size ranging from 39,012 to 717,341 individuals. For 2008, predicted and estimated density was 1.26 and 1.46 white-winged doves/hectare, and 612,800 and 712,952 individuals. For the past 23 years, the density of mourning doves ranged from 0.01 to 0.21 individuals/hectare and population size ranged from 3,215 to 56,262 individuals. For 2008, predicted and estimated density was 0.17 and 0.22 mourning doves/hectare, and 46,110 and 59,827 individuals. The density of scaly-naped pigeons ranged from 0.07 to 0.53 individuals/hectare over the past 23 years, and population size ranged from 29,847 to 217,515 individuals. For 2008, predicted and estimated densities were 0.42 scaly-naped pigeons/hectare, and predicted and estimated population size was 173,400 and 171,264 individuals. Although varying over time, the populations of these four game species are currently increasing or stable.

On St. Croix in 2004 and 2005, the density of Zenaida doves was 1.36–1.71 individuals/hectare and population size was 29,743–37,343 individuals (McNair 2004). The density of scaly-naped pigeons was 0.36–0.46 individuals/hectare and population size was 7,916–9,966 individuals. Data for other species and years are not available. St. Croix is the largest (21,890 ha) of the U.S. Virgin Islands, and the only one where Zenaida dove hunting is allowed (U.S. Fish and Wildlife Service 2007d). Other columbids currently are not hunted on St. Croix or any other of the U.S. Virgin Islands.

4.2.3 Harvest

On Puerto Rico during 1986–2006, total harvests per year were 7,726–21,027 Zenaida doves, 1,973–37,824 white-winged doves, 1,470–9,049 mourning doves, and 6,188–31,574 scaly-naped pigeons per year (F. F. Rivera-Milán, U.S. Fish and Wildlife Service, personal communication). Until the 2008 hunting season, the daily bag limits were five pigeons and 15 doves in the aggregate (U.S. Fish and Wildlife Service 2007d). For the 2009–2011 hunting seasons, the daily bag limit was increased to 20 doves, including not more than three mourning doves and 10 Zenaida doves, to direct more hunting pressure toward the rapidly increasing white-winged dove population. Approximately 3,000 licensed pigeon and dove hunters occur in Puerto Rico, and only approximately 12 on St. Croix (McNair 2004). The Zenaida dove populations of both islands are fairly large and can be hunted sustainably. Hunting also is sustainable for white-winged doves, mourning doves, and scaly-naped pigeons on Puerto Rico. Harvests correlate with abundance and currently are stable or increasing for the four columbid game species of Puerto Rico.

4.3 INDIRECTLY AFFECTED ENVIRONMENTAL ASPECTS

In addition to those migratory bird stocks directly harvested by the establishment of Federal regulations, there are a number of other animals, plants, and components of the human environment that may experience indirect impacts due to migratory bird hunting. Below is a brief description of several different categories for which the Service has examined the potential impacts of migratory bird hunting.

4.3.1 Other Wildlife

Many species of wildlife that are hunted are not under Federal jurisdiction except where they occur on Federal lands, or if they are identified under other Federal legislation (i.e., ESA). These species include: (1) large animals (e.g., deer, bear, elk), (2) small game species (e.g., rabbits, squirrels), and (3) resident game birds (e.g., quail, partridge, pheasant (pheasant is an introduced exotic species that is managed as a game bird in many States)). A detailed synopsis of the life history of these species is not provided in this document because these species are not taken directly by regulations resulting from the proposed action. However, potential and cumulative impacts on these species as a result of the proposed action are examined in Chapter 6.

In a given area, there are also many species of wildlife that are not hunted under either State or Federal authority. Such species include non-game animals (e.g., amphibians, reptiles, small mammals such as mice), and non-game birds, to include non-hunted migratory birds. These non-hunted species may be found in areas that are open to hunting and may be impacted by hunting activities even though direct take by hunting is not permitted.

4.3.2 Threatened and Endangered Species

Federally-listed threatened or endangered species are those species, or portions thereof, that have been listed under the ESA. The purpose of the ESA is to protect and recover endangered and threatened species and the ecosystems upon which they depend. A total of 409 animal species and 601 plant species are currently listed as endangered in the U.S. (http://ecos.fws.gov/tess_public/TESSBoxscore), and 165 animal and 148 plant species are listed as threatened (http://ecos.fws.gov/tess_public/TESSBoxscore).

4.3.3 Vegetation

In addition to those plant species identified as Threatened or Endangered (above section 4.3.2), common wetland, riparian, upland and agricultural plant species could be impacted by migratory bird hunting activities.

4.3.4 Other Outdoor Recreational Activities

In addition to the impact(s) migratory bird hunting may have on other wildlife species, wildlife dependent outdoor recreational activities (e.g., bird watching, photography) may also be affected. The potential impacts to wildlife recreation are considered in greater depth in Chapter 6.

4.3.5 Physical and Cultural Resources

Migratory bird hunting activities may impact the Nation's natural resources (e.g., air, soil, water), natural areas (e.g., national parks, refuges), facilities (e.g., roads, trails, parking lots), and/or structures of national historic importance. Potential impacts to these resources are provided in consideration of the proposed alternatives (see Chapter 6).

4.3.6 Socioeconomic/Administrative Environment

4.3.6.1 Individuals

Fall-Winter Hunters

Annual hunting regulations have a profound effect on hunters. In 2006, over 12.5 million people 16 years of age and older participated in hunting, spending an average of 18 days afield (U.S. Department of the Interior, Fish and Wildlife Service, and U.S. Department of Commerce, U.S. Census Bureau 2007). Big game, such as deer and elk, attracted 10.7 million hunters (85%), who spent 164 million days afield. Nearly five million hunters (38%) pursued small game, including squirrels, rabbits, quail, and pheasant on 53 million days afield. Migratory birds—doves, waterfowl, and American woodcock—attracted 2.3 million hunters (18%) who spent 20 million days hunting (U.S. Department of the Interior, Fish and Wildlife Service, and U.S. Department of Commerce, U.S. Census Bureau 2007). Hunting of other animals such as coyote, fox, prairie dog and raccoon attracted 1.1 million hunters (9%) who spent 15.2 million days afield (U.S. Department of the Interior, Fish and Wildlife Service, and U.S. Department of Commerce, U.S. Census Bureau 2007).

Among hunters selectively hunting migratory birds, 1.1 million pursued ducks on 12 million days afield. In 2006, approximately 1.2 million hunters pursued dove on six million days afield, and 700,000 hunters hunted geese on six million days afield (U.S. Department of the Interior, Fish and Wildlife Service, and U.S. Department of Commerce, U.S. Census Bureau 2007). Other migratory bird species attracted 150 thousand people who hunted on one million days afield.

In 2006, approximately 1.3 million people participated in waterfowl hunting. While some hunters hunt both ducks and geese, nearly 90% of waterfowl hunters at least hunt ducks. By region of the U.S., the majority of waterfowl hunters consulted in the 2006 Survey live in the South (42%) and the Midwest (32%). While 17% of waterfowl hunters live in the West, only 9% live in the Northeast. The majority of waterfowl hunters live in the Mississippi Flyway (45%). The three States with the most waterfowl hunters were Texas (121,000 hunters), Arkansas (100,000 hunters), and Louisiana (74,000 hunters) (Carver 2008).

For waterfowl hunters, participation increases with age until the 35–44 age category (29%), after which, participation decreases with age (Carver 2008). This pattern is similar for all hunters as well. Forty-nine percent of all waterfowl hunters are 25 to 44 years old. Waterfowl hunters also tend to have at least a high school diploma; only 202,000 waterfowl hunters (6%) have not obtained their high school degrees. Waterfowl hunting is positively correlated with income (Carver 2008). Income also is positively correlated with the amount of participation of all hunters. However, all hunters do not tend to be as affluent as waterfowl hunters. Approximately 885,000 waterfowl hunters (74%) have an annual household income of over $50,000, compared to only 52% for all hunters (6.5 million hunters).

Hunting participation by residents of Metropolitan Statistical Areas (MSA) differs from that of individuals living outside of MSAs. An MSA is a heavily populated area comprising a central city or urban core of 50,000 or more people and its surrounding counties or communities, as identified by the U.S. Census Bureau. A vast majority of the U.S. population lives in these areas. Not surprisingly, most hunters also live in these areas. In 2006, 83% of the U.S. population 16 years of age and older, 62% of all hunters, and 70% of waterfowl hunters, lived in MSAs (U.S. Department of the Interior, Fish and Wildlife Service, and U.S. Department of Commerce, U.S. Census Bureau 2007; Carver 2008). In contrast, only 17% of the U.S. population lived outside MSAs, compared with 38% of all hunters and 30% of waterfowl hunters. Hunters are less urban-oriented than the population as a whole, and a non-metropolitan resident has a higher percentage chance of being a hunter than does a metropolitan resident. In 2006, 12% of all non-metropolitan residents hunted and 2% hunted waterfowl, while only 4% of all metropolitan residents hunted and 1% hunted waterfowl (U.S. Department of the Interior, Fish and Wildlife Service, and U.S. Department of Commerce, U.S. Census Bureau 2007; Carver 2008).

Subsistence Hunters

Subsistence hunters consist of residents of rural Alaska where the subsistence harvest is an integral component of the socioeconomic system. The people include both Alaska Natives and non-Natives. The historical emphasis has been on Native subsistence, however, because of the role the harvest of migratory birds plays in the traditional use patterns of the Native community, which is supported by archeological data carbon-dated to 11,000–15,000 years before present (Holmes 1996; Holmes et al. 1996). More recently, as non-Natives began to inhabit Alaska, they also made migratory birds part of their food supply when necessary.

Geographically, virtually all of rural Alaska may have some levels of harvest of migratory birds that could be classified as subsistence harvest, although some of the harvest occurs during the fall-winter season that begins on September l. Permanent residents of a village within a subsistence harvest area are eligible to harvest migratory birds and their eggs for subsistence purposes in the spring and summer. Village areas located within the Alaska Peninsula, Kodiak Archipelago, the Aleutian Islands, or in areas north and west of the Alaska Range, are subsistence harvest areas. Villages within these areas not meeting the criteria for a subsistence harvest area are excluded from the spring and summer subsistence harvest. As of the 2000 Census, these eligible areas include 84,217 people, organized in 23,845 households. Preliminary figures from the 2000 U.S. Census placed the population of Alaska at 626,932. Of this number, 69% were Caucasian, and the remainder included Alaska Natives (19%), African-Americans (4%), Asian and Pacific Islanders (5%), and "other" (1%).

Non-Hunters

The number of non-hunters interested in migratory birds, and therefore having some degree of interest in annual hunting regulations, has been studied extensively over the past 10 years through the “National Survey of Fishing, Hunting, and Wildlife-Associated Recreation.” Wildlife watching is a popular outdoor recreation activity. The 2006 survey uses a strict definition of wildlife watching. Participants must either take a “special interest” in wildlife around their homes or take a trip for the “primary purpose” of wildlife watching. Secondary wildlife-watching activities, such as incidentally observing wildlife while pleasure driving, are not included. The information presented below was taken from the 2006 National Overview Survey (U.S. Department of the Interior, Fish and Wildlife Service, and U.S. Department of Commerce, U.S. Census Bureau 2007).

4.3.6.2 Organizations

Many of the organizations that have an interest in migratory birds specifically represent a wide range of interests and philosophies concerning the hunting of migratory birds. Included are large or otherwise nationally prominent organizations, such as the NWF, Ducks Unlimited, the Audubon Society, the Humane Society of the United States, and Defenders of Wildlife.

4.3.6.3 Businesses

Limited information is available on the number of businesses and individuals in the various categories who are impacted by migratory bird hunting regulations. This is not surprising considering that those who provide equipment, supplies and services to migratory bird hunters often provide identical or similar items to non-hunters. For example, a motel in a waterfowl hunting area may obtain a portion of its income from waterfowl hunters and others from bird watchers. Registrants are not requested to indicate the nature of their travel. The same situation prevails for food-service establishments, gasoline stations, and other establishments.

It is possible to obtain an estimate of the number of sporting goods stores in the U.S. However, such stores usually cater to a multitude of sports (e.g., fishing, bowling, skiing, jogging, etc.) in addition to hunting. Without knowledge of their specialty, knowing the number of sporting goods stores is not sufficient for estimating hunting expenditures alone.

Total Industry Output

Total output includes the direct, indirect, and induced effects of the expenditures associated with waterfowl hunting. Direct effects are the initial effects or impacts of spending money, for example, purchasing ammunition or a pair of binoculars. An example of an indirect effect would be the purchase of the ammunition by a sporting goods retailer from the manufacturer. Finally, induced effects refer to the changes in production associated with changes in household income (and spending) caused by changes in employment related to both direct and indirect effects. More simply, people who are employed by the sporting goods retailer, by the wholesaler, and by the ammunition manufacturer spend their income on various goods and services which, in turn, generate a given level of output (induced effects) (U.S. Fish and Wildlife Service 2005).

Employment and Employment Income

Jobs and job income include direct, indirect, and induced effects in a manner similar to total industrial output. Jobs include both full and part-time jobs, with a job defined as one person working for at least part of the calendar year. Job income consists of both employee compensation and proprietor income.

4.3.6.4 Governments

Costs Associated with Implementation of Regulations

Administration of annual migratory bird hunting regulations involves the collection and analysis of status, production, and harvest information of migratory bird populations, promulgation of annual regulations, publication of migratory bird hunting regulations, and enforcement of those regulations. Costs of these activities are shared among State and Federal government agencies, therefore a comprehensive total expenditure is not available. However, the costs of the different alternatives under the seven regulatory components of the proposed action are assessed relative to the current costs of establishing regulations (see Chapter 6).

Federal and State Taxes

Federal and State tax revenues are derived from waterfowl hunting-related recreational spending.

State and Federal Impacts

The economic impact of a given level of expenditures depends, in part, on the degree of self-sufficiency of the area under consideration. An area with a high degree of self-sufficiency (out-of-area imports are comparatively small) will generally have a higher level of impact associated with a given level of expenditures than an area with significantly higher imports (a comparatively lower level of self-sufficiency). Thus, the economic impacts of a given level of expenditures will generally be less for rural and other less economically integrated areas compared with more economically diverse areas or regions (U.S. Fish and Wildlife Service 2005). The impacts in each State are only those impacts that occur within the State, and a State's multiplier is typically smaller than the multiplier for the U. S. because of the more limited geographic scope.

Federal Migratory Bird Hunting and Conservation Stamps (Ducks Stamps) are pictorial stamps produced by the U.S. Postal Service for the Service. Originally created in 1934 as the Federal licenses required for hunting migratory waterfowl, Federal Duck Stamps have a much larger purpose today. Besides serving as a hunting license and a conservation tool (by providing a source of revenue for wetland habitat acquisition), a current year's Federal Duck Stamp also serves as an entrance pass for NWRs where admission is normally charged. Federal Duck Stamps and the products that bear duck stamp images are also popular collector items. The Federal Aid in Wildlife Restoration Act (Pittman-Robertson Act, named after its principal sponsors, Senator Key Pittman of Nevada, and U.S. Representative A. Willis Robertson of Virginia) was enacted into law by President Franklin D. Roosevelt on September 2, 1937. Wildlife Restoration funds are accumulated from an excise tax of 11% on bows, arrows, parts, and accessories, an excise tax of 10% on pistols and revolvers, and 11% on other firearms, shells, and cartridges.

4.3.6.5 Landowners

Approximately 73% of our Nation's land is privately owned and the majority of our fish and wildlife resources occur on those lands. Landowners provide extensive habitat for migratory birds and some actively manage their lands to benefit this public resource. Lands owned by any private individual, corporation or association are considered under this category.

4.3.6.6 Social Values and Considerations

Hunting is an important cultural activity for many Americans and migratory bird hunting is an important component of the overall hunting constituency. In addition to the active participation and economic contributions made by hunters, the potential cultural impacts of hunting were considered when developing the alternatives of the seven regulatory components of the proposed action. Consideration of these aspects is part of the study of human dimensions in wildlife management and include identifying how people are affected by hunting, attempting to understand people's reactions, and incorporating this information into policy and management decision-making processes and programs (Decker and Chase 1997).

4.3.6.7 Other Socioeconomic Factors

The geographic extent of migratory game bird breeding, migration and wintering areas is continental in scope and encompasses a variety of historical sites and cultural resources. Areas such as national parks, historic landmarks, and important cultural sites could potentially be affected by migratory bird hunting activities. These areas are considered in the evaluation of the various alternatives contained in the seven regulatory components of the proposed action.

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CHAPTER 5
ALTERNATIVES, INCLUDING THE PROPOSED ACTION

5.1 DEVELOPMENT OF ALTERNATIVES

5.1.1 FES 75 Alternatives

The 1975 Final Environmental Statement (FES 75) presented a preferred alternative to continue the issuance of annual regulations allowing the hunting of migratory birds. The preferred alternative selected was to continue issuing annual regulations which establish open seasons, season lengths, daily bag limits, shooting hours, area closures, and other species-management provisions, thus permitting the hunting of migratory birds in the families Anatidae (ducks, geese and swans), Gruidae (cranes), Rallidae (rails, moorhens, gallinules and coots), Scolopacidae (woodcock and Wilson's snipe), and Columbidae (pigeons and doves), which will allow perpetuation of these migratory bird resources. The four alternatives that were considered, but rejected, included: (1) no action, therefore no hunting, (2) regulations set by the States, (3) establish International regulations, and (4) issue regulations for periods longer than one year.

5.1.2 SEIS 88 Alternatives

SEIS 88 adopted the same proposed action as FES 75, to continue issuing annual migratory bird hunting regulations, but presented several new alternative approaches. Two main alternatives dealt with whether framework regulations should be adjusted annually or stabilized for a specific period, barring any significant population changes. Three sub-alternatives were presented to consider whether the usage of special regulations should be subject to stricter control, expanded, or reduced. The preferred alternative selected was to stabilize regulations with the controlled use of special regulations. The five alternatives that were considered, but rejected, included: (1) stabilized regulations with expanded use of special regulations, (2) stabilized regulations with reduced use of special regulations, (3) annually adjusted regulations with expanded use of special regulations (this was considered the 'no change' alternative), (4) annually adjusted regulations with controlled use of special regulations, and (5) annually adjusted regulations with reduced use of special regulations.

SEIS 88 proposed that annual framework regulations (e.g., framework dates, season length, daily bag limits) would remain unchanged when population levels or other evaluation parameters fell within a broad, defined range of conditions. This approach to regulations development was evaluated during the Stabilized Regulations Study (1980–84) and, in fact, had been the *de facto* approach to setting framework regulations for several groups of birds for some time. The "controlled use of special regulations" subalternative in SEIS 88 held all special regulations, new and existing, subject to stricter experimentation and evaluation procedures, and required that they be re-evaluated periodically.

SEIS 88 recognized but did not consider the alternatives presented in FES 75, stating that: “most alternatives of FES 75 are inappropriate today. Regulations set by States, international regulations, and regulations issued for longer than one year as defined in FES 75 are no longer viable alternatives. The general issue of whether to hunt migratory birds, which was implicit in FES 75 alternatives 1 and 2, is not relevant today. Migratory bird hunting is generally recognized as a firmly established, adequately justified activity.”

5.2 Alternatives Considered but Eliminated From Detailed Analysis

Following the guidance cited in FES 75, we continue to emphasize that alternatives should reflect the significant questions and issues surrounding the proposed action: The issuance of regulations for the hunting of migratory birds. The primary focus of SEIS 2010 is directed at the process by which hunting regulations for migratory birds are developed and administered. Therefore, SEIS 2010 limits examination of biological issues to those aspects that deal with the regulatory decision-making process.

5.2.1 The Hunting of Migratory Birds

As stated in SEIS 88, the question of whether to hunt migratory birds is not considered a relevant issue and the alternative of not issuing annual regulations is not considered in this assessment. In fact, a no-hunting alternative would fail to achieve the purpose and need of the proposed action. There is a clear legislative mandate, under the provisions of the MBTA, that:

“…the Secretary of the Interior is authorized and directed, from time to time, having due regard to the zones of temperature and to the distribution, abundance, economic value, breeding habits, and times and lines of migratory flight of such birds, to determine when, to what extent, if at all, and by what means, it is compatible with the terms of the conventions to allow hunting, taking, capture, killing, possession, sale, purchase, shipment, transportation, carriage, or export of any such bird, or any part, nest, or egg thereof, and to adopt suitable regulations permitting and governing the same, in accordance with such determinations, which regulations shall become effective when approved by the President (16 U.S.C. §704).”

The Service considers a decision to not promulgate hunting regulations in a particular year (i.e., a closed season) to be an appropriate option for any or all given species and/or populations of migratory birds as part of the regulatory decision-making process. Closed seasons will continue to be considered one of the regulatory options in Federal frameworks; however, as explained above in section 5.1.2, the broader issue of allowing hunting is not considered here.

5.2.2 International Regulations

As also stated in SEIS 88, development of a regulatory process that would establish international regulations is not considered a viable alternative and was not considered in detail in this SEIS. The U.S. has worked closely with its fellow signatory nations (Canada, Mexico, Russia and Japan) to develop migratory bird programs that include general population and habitat objectives for all migratory bird species, including those that are hunted. Shared population objectives have served to coordinate harvest management successfully for the past 90 years, and the added complexity and administration necessary to promulgate specific international regulations are not viewed as necessary in the case of migratory birds. The Treaties themselves indicate that each sovereign nation will authorize or allow activities regarding migratory birds within each nation's own domestic authorities in accordance with the overall obligations of the Treaties. Coordination with each counterpart nation helps achieve the common purposes of the Treaties.

5.3 Rationale for Alternatives

The Federal process of establishing migratory bird hunting regulations in the U.S. has existed for the past 91 years. The Service characterizes the goal for migratory bird hunting regulations as:

> To establish regulations consistent with the long-term conservation of each species and recognized populations (specific objectives are presented in section 2.1.3.1).

Specific population objectives for waterfowl species, populations, or groups of species are established under the auspices of the NAWMP (U.S. Department of the Interior and Environment Canada 1986; U.S. Department of the Interior, Environment Canada and Secretario de Desarrollo Social Mexico 1994) or through biological assessments and knowledge of historic population levels.

A testament to the success of this endeavor is that migratory game bird populations have been maintained throughout this 91 year period. Only three game birds have been listed as either threatened or endangered (Aleutian Canada goose, Steller's and spectacled eiders), and in none of these instances was hunting believed to be the cause. In addition, one of the three (Aleutian Canada goose) recently has been delisted, having increased from as few as 800 individuals to approximately 80,000, a level at which some harvest is again being permitted. Many species of ducks were at or near their highest population levels (for the 1955-2009 time period, the period when operational WBPHS surveys have been conducted) as recently as 1995 (see Chapter 4). These high population numbers support the validity of the general regulatory approach practiced by the Service over the past century and supports the fact that properly managed harvest is consistent with long-term conservation. Additionally, as would be expected of waterfowl stocks that are heavily dependent on widely fluctuating environmental conditions, some have experienced reduced abundances at times, and some of these reductions have been related to harvest. The Service's approach is to reduce harvest opportunities during such periods to ensure harvest does not exceed what is sustainable at the lower population levels. Many of the stocks that have experienced reduced numbers have recovered when environmental conditions became more favorable.

The Federal process for issuing regulations has continued to evolve over time. Annual regulations have been designed to maintain harvest opportunity commensurate with the biological capacity of the stocks to sustain themselves over the long-term. However, the role of harvest in determining population status remains a subject of debate, and specific regulatory decisions reflect this uncertainty, with the Service historically opting for more conservative regulations. Recognition of this uncertainty, and the Service's commitment to support continued improvement of the Federal regulatory process, led to the 1995 adoption of an AHM approach (based on mallards) for determining the general duck seasons. Since then, the Service has remained committed to using this objectively-driven, biologically-based, and structured decision-making process to determine annual duck hunting regulations.

AHM is a tool used in the annual process that relies on resource monitoring, data analyses, and rule-making for determining hunting regulations (see Chapter 3 for more details). The AHM process requires: (1) clearly stated objective(s), (2) a description of the system dynamics that embodies the uncertainty of the system, (3) a limited number of regulatory alternatives and, (4) monitoring and assessment, with provisions for comparing predicted to observed results and updating the description of the system dynamics. This process outlines recommended regulatory options that provide the optimum harvest opportunity annually while ensuring the long-term conservation of the resource (see Chapter 3). The use of a clearly defined population objective is required to follow the AHM protocol. Use of AHM as a tool to determine appropriate harvest regulations is, at present, only used for some stocks of migratory birds. The Service does not currently believe that this approach is necessary for all harvest management decisions. However, in cases where disagreement exists regarding appropriate regulatory decisions for long-term conservation, and where sufficient information is available to develop and implement the general approach, the Service will continue to employ this general framework.

Examples of stocks that are not presently managed under an AHM protocol include most goose stocks, which are managed under cooperatively-developed (between the Service and Flyway Councils; see Chapter 3) management plans, and many of these plans embody specific population objectives and prescriptive harvest strategies. Although the Service does not sign these plans and is not bound to make regulatory decisions based on their content, it does base harvest management decisions on the guidelines these plans contain, unless there is compelling biological evidence suggesting that the guidelines should not be followed. In the case of webless species, harvest management policies are currently prescriptive in nature or the basis for regulatory decisions is not explicitly stated. Webless species are managed by the general objective of maintaining harvest opportunity consistent with long-term conservation. An AHM protocol is currently being developed to guide mourning dove harvest regulations. The Service anticipates that implementation of an AHM protocol for mourning doves will occur within the next five years.

Harvest objectives may vary among different stocks depending upon biological factors (i.e., population status, migration, survival, and harvest rate), with some consideration given to sociological and other management factors, such as agricultural depredation concerns. The Service believes that for every stock where adequate population and demographic information is available, the harvest objective level should be established as a point to the right of the peak on the derived yield curve (Figure 3.4, Chapter 3). This use of yield curves to establish harvest objectives will enhance the Service's ability to provide ample harvest opportunity and to achieve greater coherence between population and habitat management activities. For stocks that lack sufficient information for determination of the current yield curve, the Service would maintain harvest opportunity consistent with historic population levels and past harvest experience.

Although AHM (based on mallards) for general duck seasons was first implemented in 1995, the process has undergone adjustments as additional information has been acquired. The Service expects this evolution to continue on an annual basis as new information, a greater understanding about specific issues, and increased and improved analytical procedures become available. The concept of continuing evolution in the tools used to determine appropriate annual regulations is an important one. The Service makes harvest strategies available for public comment via the existing *Federal Register* process for the establishment of annual regulations, and expects that the development and improvement of these strategies will continue into the foreseeable future. The Service will annually review and update progress through the existing *Federal Register* process, allowing for input from States and the public using public comment for individual decisions during the development.

The Service believes that the use of more objective regulatory processes provides an opportunity to examine the basic structure of the annual Federal regulatory process and affords the opportunity to institute changes. The Service's proposed action is comprised of the preferred alternatives to seven components regarding how annual regulations are established for the hunting of migratory birds. The first six components deal with the fall-winter hunting seasons and include: (1) the schedule and timing of the general regulatory process, (2) frequency of review and adoption of duck regulatory packages, (3) stock-specific harvest strategies, (4) special regulations, (5) management scale for the harvest of migratory birds, and (6) zones and split seasons. The seventh component of the proposed action concerns the process for considering subsistence-hunting regulations.

5.4 DESCRIPTION OF ALTERNATIVES

5.4.1 Schedule and Timing of the General Regulatory Process

Promulgation of annual hunting regulations relies on a well-defined process of monitoring, data collection, and scientific assessment. At key points during that process, Flyway Technical Committees, Flyway Councils, and the public review and provide valuable input on technical assessments or other documents related to proposed regulatory frameworks. The Service then finalizes the frameworks and forwards them to the Assistant Secretary of the Interior for Fish and Wildlife and Parks for final approval. After approval, each State selects its seasons, usually following its own schedule of public hearings and other deliberations. After State selections are completed, the Service adopts them as Federal regulations by publication in the *Federal Register.*

Alternative 1 (*no change alternative*). Promulgate annual regulations using separate early and late season processes based on previous or current year biological information and established harvest strategies.

The Federal process of establishing migratory bird hunting regulations currently includes two separate annual schedules based on 'early' and 'late' hunting seasons. For each cycle, Service biologists gather, analyze and interpret all available survey data. Early season regulations are based on survey information from the prior year(s) or current year, and late season regulations are based on information from the current calendar year available to Service biologists in July. These biological data are distributed through a series of published status reports and presentations to Flyway Councils and other interested parties. The Flyway Councils and Technical Committees meet in their respective flyways to evaluate the information, develop their recommendations for appropriate regulations, and then forward the recommendations to the Service for consideration. Early season Flyway Technical Committee meetings convene in February/March, whereas late season meetings are in July. The SRC considers the recommendations made by the Flyway Councils and Service staff in late June (early season) or late July/early August (late season) and forwards recommendations to the Director and Assistant Secretary for proposed regulations. A set of proposed frameworks is developed and published in the *Federal Register* for public comment by mid-July (early season) or late August (late season). Following the comment period, the Service finalizes the frameworks and submits them for approval to the Assistant Secretary of the Interior (mid-August for the early season; mid-September for the late season). After approval, States select their seasons and the Service adopts them as Federal regulations by publication in the *Federal Register*. The final hunting season selections are published by the end of August for the early season and by the end of September for the late season. Early hunting seasons begin prior to the last week in September and focus on doves, American woodcock, rails, gallinules, cranes, Wilson's snipe, sea ducks, September duck seasons, and all migratory game bird seasons in Alaska, Puerto Rico and the Virgin Islands. In contrast, late seasons start during or after the last week in September and focus on seasons that have not already been established, primarily those for ducks, geese, and swans in the conterminous U.S.

Alternative 2 (*preferred alternative*). Promulgate annual regulations using a single process for early and late seasons based on predictions derived from long-term biological information and established harvest strategies.

This alternative would combine the current early and late season regulatory actions into a single process for establishing migratory bird hunting regulations annually. Regulatory proposals would be developed based on data from the previous year(s), model predictions, or current-year information (if available at the time proposals are being formulated). Existing individual harvest strategies would be modified and based either on data from the previous year(s), model predictions, or current year's data (if available). The Flyway Technical Committee and Council Meetings would be held in mid-April and their recommendations would be forwarded to the SRC for their meeting in late April. The SRC would make their recommendations to the Service Director and Assistant Secretary, and the resulting proposed frameworks would be published in the *Federal Register* by early June. A public comment period of at least 30 days would be established for review of the proposed regulations. During this period, the status of duck populations for the current year would be made publically available. Following the close of the comment period, a final rule would be published, and States would submit their season selections. The final *Federal Register* containing the seasons selected by the States would be published in mid-August. If extreme and unexpected changes in population status were discovered during the annual survey, the Service could modify the proposed rule to reflect these unexpected circumstances prior to September 1.

Alternative 2 reduces the number of annual Flyway Council meetings from two to one. In addition, the SRC would convene twice rather than three times, once in late January to announce the issues and regulatory changes anticipated for the coming year, and once in late April to formulate its recommendations for regulatory proposals for decisions to be made by the Service Director and the Assistant Secretary.

Alternative 3 Promulgate biennial (or longer) regulations using separate early and late season processes.

This alternative would have the same separate schedules for early and late season regulation processes that are described under Alternative 1. This alternative differs from Alternative 1, however, in that the Flyway Council and SRC would not meet each year. Instead, early and late season regulations would be set according to the most up-to-date biological data in the first year, and the framework regulations developed in the first year would then be carried over into a second (or more) year. Guidelines would be developed through the *Federal Register* process to establish criteria for emergency considerations. Such considerations could involve meeting and revising frameworks if compelling biological evidence suggests that the frameworks are no longer consistent with long-term conservation. State selections would also be held constant in years during which framework regulations were not reviewed. Minor shifts to accommodate calendar changes would be allowed (e.g., Saturday openings and Sunday closings).

Alternative 4 Promulgate biennial (or longer) regulations using a single process for early and late seasons.

This alternative would combine the early and late season regulation processes as described under Alternative 2. As in Alternative 2, regulatory proposals would be developed using data from the previous year(s), model predictions, or current year information (if available when proposals are formulated). However, like Alternative 3, framework regulations developed in a given year would remain in place for two (or more) consecutive years. Guidelines would be developed through the *Federal Register* process that would establish criteria for emergency considerations. Such considerations could involve meeting and revising frameworks if compelling biological evidence suggests the frameworks are no longer consistent with long-term conservation. State selections also would be held constant in years in which framework regulations were not reviewed. Minor shifts to accommodate calendar changes would be allowed (e.g., Saturday openings and Sunday closings). A summary of the four alternatives for this component of the proposed action is provided below (Table 5.1).

Table 5.1. Summary of the alternatives to the schedule and timing of the general regulatory process.

Schedule and Timing of the General Regulatory Process	Alternative 1 (no change)	Alternative 2 (preferred)	Alternative 3	Alternative 4
Frequency of promulgation of regulations	Annual	Annual	Biennial (or longer)	Biennial (or longer)
Seasons	Separate early and late seasons	A single process for early and late seasons	Separate early and late seasons	A single process for early and late seasons
Committee meetings	February/March (early seasons) July (late seasons)	Mid –April	Every other year: February/March (early seasons) July (late seasons)	Every other year: Mid –April
Publication of proposed frameworks	Mid-July (early seasons) Late August (late seasons)	Early June	Mid-July (early seasons) Late August (late seasons)	Early June
Publication of final frameworks	Late August (early seasons) Late September (late seasons)	Mid-August	Late August (early seasons) Late September (late seasons)	Mid-August

5.4.2 Frequency of Review and Adoption of Duck Regulatory Packages

Duck regulatory packages are the set of framework regulations that apply to the general duck hunting seasons. Packages include opening and closing dates, season lengths, daily bag limits, and shooting hours. Current regulatory packages contain a set of frameworks for each of the four flyways and a set of four regulatory alternatives; restrictive (relatively short seasons and low daily bag limits), moderate (intermediate season lengths and daily bag limits), liberal (longer seasons, higher daily bag limits), and closed. The differences in season lengths and daily bag limits among flyways reflect the difference in waterfowl abundance and hunter numbers in these regions. Each regulatory package has an associated target harvest rate, which is based on mallards since mallards are the most well-studied and most heavily harvested (nationally) of all duck species. Each year the AHM models are run, with the most up-to-date harvest survey data included, and one of the regulatory alternatives (i.e., restrictive, moderate, or liberal) is selected based on the AHM process (described in Chapter 3). These regulatory packages apply to all duck species except those for which specific individual harvest strategies exist or, in some cases, for species in which separate daily bag limits have been established. Daily bag limit restrictions within the general duck seasons are used to limit the harvest of certain less abundant species (e.g., American black duck, wood duck, mottled duck). Refer to Chapter 3, section 3.1.2, for a more in-depth description of how duck regulatory packages are developed. The duck regulatory packages currently in use are presented below (Table 5.2).

Table 5.2. Current (1997–to date) duck regulatory packages.

	Flyway			
Regulation	Atlantic[1]	Mississippi	Central[2]	Pacific[3, 4]
Shooting Hours	One-half hour before sunrise to sunset			
	Framework Dates			
Restrictive Package	Oct. 1 – Jan. 20	Saturday nearest Oct. 1 to the Sunday nearest Jan. 20		
Moderate and Liberal		Saturday nearest September 24 to the last Sunday in January		
	Season Length (Days)			
Restrictive	30	30	39	60
Moderate	45	45	60	86
Liberal	60	60	74	107
	Daily bag limit (total / mallard / female mallard)			
Restrictive	3 / 3 / 1	3 / 2 / 1	3 / 3 / 1	4 / 3 / 1
Moderate	6 / 4 / 2	6 / 4 / 1	6 / 5 / 1	7 / 5 / 2
Liberal	6 / 4 / 2	6 / 4 / 2	6 / 5 / 2	7 / 7 / 2

[1]Maine, Massachusetts, Connecticut, Pennsylvania, New Jersey, Maryland, Delaware, West Virginia, Virginia, and North Carolina are permitted to exclude Sundays, which are closed to hunting, from their total allotment of season days.
[2]The High Plains Mallard Management Unit is allowed 8, 12 and 23 extra days in the restrictive, moderate, and liberal alternatives, respectively.
[3]The Columbia Basin Mallard Management Unit is allowed seven extra days under all three alternatives.
[4]In Alaska, framework dates, daily bag limits, and season length would be different than the remainder of the Pacific Flyway. Under the restrictive option, the daily bag limit would be 5-7, and 7-10 for the moderate and liberal packages. No restrictions on pintails; canvasback limit of 1. Possession limits in AK are three-times the daily bag limit. Under all options, season length would 107 days and framework dates would be Sep 1-Jan 26.

It is an important consideration in employing the AHM approach that the regulatory packages remain relatively constant over time, as the optimization process assumes that the expected harvest rates resulting from the various packages remains constant. However, the uncertainty in harvest rates from what is projected and what is realized in any given year is a component that is accounted for in the process, thus there is room for modification. Therefore, recognizing the desire of many constituents to make adjustments to the basic packages, a regular process to review and incorporate possible modifications is necessary. The intent, regardless of the alternative selected below, is to have the first open review and possible modification of these packages begin in the year following the finalization of the SEIS. A summary of the two alternatives for this component of the proposed action is provided below (Table 5.3).

Alternative 1 (*no change alternative*). Regulatory packages adopted annually.

Duck regulatory packages are currently reviewed and adopted on an annual basis (see above). This would continue under this alternative.

Alternative 2 (*preferred alternative*). Establish regulatory packages for five-year periods.

A description of duck regulatory packages is provided above. Under this alternative, the set of regulatory packages would be adopted for a five-year period instead of annually, and changes would be considered at the time of renewal. The first review period would coincide with the initial implementation of the proposed action.

Table 5.3. Summary of the alternatives to the frequency of review and adoption of duck regulatory packages

Frequency of Review and Adoption of Duck Regulatory Packages	**Alternative 1** (no change)	**Alternative 2** (preferred)
Frequency of review and adoption	Packages adopted annually.	Packages adopted for five-year periods.

5.4.3 Stock-Specific Harvest Strategies

Harvest strategies have been developed for stocks deemed not biologically capable of sustaining the same harvest levels that jointly managed stocks are capable of sustaining, or whose migration and distribution do not conform to patterns followed by the most commonly harvested species. There also is a desire to have a known set of conditions under which regulations would be changed for species covered by these strategies. The formal strategies provide this information by describing abundance levels and other demographic factors that would result in changes in harvest opportunity. Stock-specific harvest strategies formally adopted by the Service include those for canvasbacks (U.S. Fish and Wildlife Service 2008), northern pintails (U.S. Fish and Wildlife Service 2007a), and scaup (Boomer and Johnson 2007;

Boomer et al. 2007). In addition, an interim harvest strategy has been developed and implemented for mourning doves. Draft harvest strategies for American black duck and wood duck currently are in development and may be considered for adoption in the future. The Service has adopted stock-specific strategies for ducks and mourning doves through the *Federal Register* process (canvasback: 59 FR 49312 [1994 adoption]; 73 FR 43295 [2008 update]; pintail: 62 FR 39721 [1997 adoption], 72 FR 18334 [2007 most recent update]; scaup: 73 FR 43296 [2008 adoption], and mourning dove: 73 FR 50679 [2008 endorsement of interim strategies]). Harvest guidelines for goose, swan and crane populations are addressed in flyway-specific management plans. Although these harvest guidelines are not formally adopted by the Service, the Service gives strong consideration to these plans when formulating annual regulatory proposals. Refer to Chapter 3, section 3.3 for a more in-depth description of stock-specific harvest strategies. A summary of the three alternatives for this component of the proposed action is provided below (Table 5.4).

Alternative 1 (*no change, preferred alternative*). Continue use of currently employed stock-specific harvest strategies and develop new strategies when necessary.

Alternative 2 Significantly reduce the use of stock-specific harvest strategies.

This action would be accomplished by reducing general seasons to a structure that can be sustained by more stocks than the existing aggregate structures are able to sustain. For example, a simplified set of regulations for general duck seasons would result in a reduction in the number of separate harvest strategies that would be needed for ducks (e.g., duck limits overall would be reduced to those appropriate for scaup or northern pintails, whichever of these required the most conservative regulations).

Alternative 3 Expand the use of stock-specific harvest strategies to include most individual stocks.

This alternative would lead to additional stock-specific regulations that would eventually result in separate hunting seasons for most, if not all, recognized stocks for which harvest is allowed.

Table 5.4. Summary of the alternatives to stock-specific harvest strategies.

Stock-Specific Harvest Strategies	**Alternative 1** (no change, preferred)	**Alternative 2**	**Alternative 3**
Use of stock-specific strategies	Continue current use of individual stock harvest strategies; minimal additions or deletions as warranted by status.	Significantly reduce the use of individual stock harvest strategies.	Expand the use of stock-specific harvest strategies to include most individual stocks.

5.4.4 Special Regulations

Special regulations differ from stock harvest strategies because they entail additional days of harvest opportunity outside the established frameworks for general seasons. Special regulations are employed to provide additional harvest opportunity on overabundant species, species that are lightly harvested and can sustain greater harvest pressure, and/or stocks whose migration and distribution provide opportunities outside the time period in which regular seasons are held. Currently, special regulations include: (1) September teal seasons in the Atlantic, Mississippi, and Central Flyways; (2) September teal and wood duck seasons in Florida, Kentucky, and Tennessee; (3) the special sea duck season along the Atlantic Coast; and (4) special regulations on overabundant resident Canada geese. The Service has required that States implementing special regulations conduct experiments that assess the biological impacts of those seasons on both target and non-target stocks. Refer to Chapter 2 for a more in-depth description of special regulations. A summary of the two alternatives for this component of the proposed action is provided below (Table 5.5).

Alternative 1 (*no change alternative*). No change to currently-allowed special regulations.

Maintain requirement for experimental evaluation of any proposed new special regulations and periodic assessments of the effects of special regulations.

Alternative 2 (*preferred alternative*). Eliminate experimental evaluation requirements for special regulations on overabundant resident Canada geese, periodically re-evaluate other existing special regulations on a case-by-case basis to determine whether they are still justified, and require experiments for any new special regulations not involving resident Canada geese.

Table 5.5. Summary of the alternatives to special regulations.

Special Regulations	Alternative 1 (no change)	Alternative 2 (preferred)
Development of special regulations	Maintain current special regulations on teal, wood duck, sea duck, and overabundant resident Canada geese seasons	Simplify development of special regulations for resident Canada geese
Require experimental evaluation for new special seasons?	Yes, continue current practice	Yes, except for resident Canada geese
Periodically re-evaluate special regulations?	Yes, continue current approach of conducting reviews when biological information or other factors suggest re-evaluation is warranted.	Yes, review other existing special season regulations starting with those for teal and sea ducks. Re-evaluate others when biological information or other factors suggest re-evaluation is warranted.

5.4.5 Management Scale for the Harvest of Migratory Birds

Management scale is defined as the geographic area in which stocks are monitored and harvest is managed. Determining the appropriate scale of harvest management is important for two primary reasons: (1) scale determines the degree to which harvest regulations can differ geographically, and (2) management at smaller geographic scales commits management agencies to increased monitoring efforts on greater numbers of stocks of migratory birds. The finer the scale of management employed in harvest management, the higher the cost of monitoring to management agencies. The desire for smaller management scales is driven by the potential for increased harvest opportunity associated with more refined geographic management. Refer to Chapter 2 for a more in-depth description of management scale. A summary of the three alternatives for this component of the proposed action is provided below (Table 5.6).

Alternative 1 (*no change, preferred alternative*). Maintain the current scale of management for all migratory bird species.

Under this alternative, ducks would be managed by flyway on the basis of three mallard stocks; eastern, western, and mid-continent. For duck species that are covered by harvest strategies (e.g., pintails, scaup, and canvasbacks), the management scale would continue to be continental. New strategies would include geographic definitions of the applicable scale as part of their descriptions. American woodcock would continue to be managed as two units and mourning doves as three. Sandhill cranes, geese, tundra swans, and band-tailed pigeons would be managed as the currently defined individual populations. American black duck and wood duck seasons would remain as currently implemented. All geographic scales would be subject to periodic review and revision when new information becomes available, or if population distributions shift markedly in the future. This approach provides considerable allowances for differences in hunting opportunity based on geographic differences in population status and distribution, yet limits the number of different stocks that require individual monitoring to a manageable level.

Alternative 2 Expand the existing management scale by reverting to a single continental management scale for population monitoring of ducks, mourning doves and American woodcock. The existing harvest-management units (e.g., flyways, management units) would be maintained to account for regional differences in hunter numbers and harvest pressure.

This alternative would establish a continental scale for the monitoring of migratory game birds and harvest management decisions. Regional differences in population status and trends would not be taken into account when making regulatory decisions. The only geographic differences in harvest opportunity would be based on the traditional differences that have been established among flyways and among/between mourning dove, tundra swan, and American woodcock management units.

Alternative 3 Work to further geographically refine the scale of duck harvest management, and maintain existing management scales for other stocks.

Monitoring programs would be established wherever sufficient biological evidence suggests further geographic refinement is possible for any stocks. The monitoring programs would allow for differential harvest regulations within the defined range of each stock. Conceptually, this would greatly increase the number of stocks for which separate regulations would be established independently. This could include subdividing the traditional management units of flyways (in the case of ducks), or the management units, in the case of mourning doves or American woodcock.

Table 5.6. Summary of the alternatives to the management scale for the harvest of migratory birds.

Management Scale for the Harvest of Migratory Birds	**Alternative 1** (no change; preferred)	**Alternative 2**	**Alternative 3**
	Maintain the current management scale	Expand the management scale	Further refine the management for ducks, maintain the current scale for other species
Duck management	By flyway on the basis of three mallard stocks	Continental	Increase to more than three mallard stocks
Woodcock management	Two management units	Continental	Two management units
Dove management	Three management units	Continental	Three management units
Goose management	34 management populations	34 management populations	34 management populations
Sandhill crane management	Six management populations	Six management populations	Six management populations
Tundra swan management	Two management populations	Two management populations	Two management populations
Band-tailed pigeon management	Two management populations	Two management populations	Two management populations
Ducks covered by harvest strategies	Continental	Continental	Smaller than continental
Black duck	Flyway basis	Continental	Smaller than flyway
Wood Duck	Flyway basis	Continental	Smaller than flyway
Subject to periodic review and revision?	Yes	Yes	Yes

5.4.6 Zones and Split Seasons

A zone is a geographic area or portion of a State, with a contiguous boundary, for which an independent season may be selected. A split is a situation where a season is broken into two or more segments with a closed period between segments. The combination of zones and split seasons allows a State to maximize harvest opportunity within the Federal frameworks without exceeding the number of days allowed for a given season. Guidelines for the use of zones and splits have been formalized for ducks and doves. For these species, States select zone/split configurations for five year periods. After each five year period, States have the opportunity to change their configurations within the provisions of the guidelines. The use of zones and split seasons for other migratory game birds is handled on a case-by-case basis. Refer to Chapter 2 for a more in-depth description of zones and splits. A summary of the two alternatives for this component of the proposed action is provided below (Table 5.7).

Alternative 1 (*no change, preferred alternative*). Continue the current use of zones and split seasons and the five-year schedule for consideration of changes.

Alternative 2 Allow annual adjustments to zone/split-season configurations for all migratory game birds.

Table 5.7. Summary of the alternatives to zones and split seasons.

Zones and Splits	Alternative 1 (no change; preferred)	Alternative 2
Continue use of zones and split seasons	Yes	Yes
Adjustments to selections	Every five years	Annually

5.4.7 Subsistence-Harvest Regulatory Process

Regulations governing the subsistence harvest of migratory birds provide a framework that enables the continuation of customary and traditional subsistence uses of migratory birds in Alaska. These regulations are subject to annual review and are developed under a co-management process involving the Service, the Alaska Department of Fish and Game, and Alaska Native representatives. This annual review process establishes regulations that prescribe frameworks for dates when harvesting of birds may occur, species that can be taken, and methods and means that are excluded from use.

Alternative 1 (*no change, preferred alternative*). Allow a spring-summer subsistence hunting season with regulations necessary to ensure the long-term conservation of the migratory bird resource.

Under this alternative, the Service would allow a spring-summer harvest of migratory birds. The harvest would, to the extent possible, be consistent with the customary and traditional subsistence harvest of migratory birds by Alaskan indigenous inhabitants, while providing for the long-term sustained use of the migratory bird resource. Egg gathering would be consistent with the customary and traditional subsistence harvest of eggs by Alaskan indigenous inhabitants.

Only bird populations that are determined to be capable of supporting this sustained use would be open to harvest. An example of the *Federal Register* process for the establishment of annual regulations for subsistence hunting seasons is provided in Appendix 6.

In general, the Service will consider the following actions when establishing subsistence hunting regulations consistent with the long-term conservation of species open to subsistence harvest. The species open to harvest will be determined annually based on conservation status and determination that harvest is consistent with long-term conservation. The secondary consideration of the Service in establishing subsistence harvest regulations will be to preserve the customary and traditional practices of the rural residents of Alaska to the maximum extent possible after ensuring the long-term conservation of species harvested. The third consideration of the Service in establishing subsistence harvest regulations will be to determine that the proposed harvest is consistent with the MBTA, as modified by amendments to the Protocols of Migratory Bird Treaties with Canada and Mexico. A summary of the potential management tools that could be employed to regulate subsistence harvest under these actions is as follows:

(A) Closures to protect nesting birds. For all species, the Service will require at least a 30 day closure to protect nesting birds. In-season closures of a minimum of 30 days will be set for each region to protect nesting birds. The closed period will apply every year; however, the dates of the closures may be altered to adapt to changes in the nesting cycle of birds. Regions may have different closures for different taxonomic groups. Closures may be set in advance in regulation or may be set in-season, based upon data collected by field biologists and subsistence users. In the case of closures set in-season, the dates will be announced by the U.S. Fish and Wildlife Service Regional Director (or designee) and then broadcast widely.

(B) Species closures to all harvest. Seasons for certain species may be closed when there is a conservation concern. Harvest will be resumed when the species recovers to a status sufficient to ensure sustainability.

(C) Species closures to egg-gathering. Species may be closed to egg-gathering when there is a conservation concern. Egg harvest may be resumed when the species recovers to a status sufficient to ensure sustainability.

(D) Special area closure. A defined area may be closed to all harvest of a species when there is a conservation concern. The closure may be lifted when the species has recovered. A defined area also may be closed to all harvest of a particular species when the species in question has not been traditionally harvested or the Regional Council, which represents the land in question, recommends the closure.

(E) Early season closure. A season may be closed early for a defined area to protect birds staging during migration when there is a conservation concern or the birds are vulnerable to excessive harvest.

(F) Establishment of a community bag limit. A community or regional bag limit may be implemented only in the case in which the affected species would otherwise be closed to all harvest.

(G) Special opening for a specified area. Special openings (i.e., egg gathering) may be created to allow for the customary and traditional use of a migratory bird species in areas that are not otherwise eligible to participate in subsistence harvest seasons. Such areas will be recommended by Regional Councils and such recommendations will be based on evidence of customary and traditional subsistence harvest practices.

(H) Individual bag limits. Personal harvester bag limits may be imposed in the case of a declining population of a species which would otherwise be closed, or an increasing population that is closed to harvest and would not otherwise be open. Personal bag limits will be employed only after consultation with respective regional management bodies affected through the AMBCC process described in Appendix 6.

Alternative 2 Open a spring-summer subsistence hunting season which incorporates fall-winter hunting season regulations (e.g., bag limits, shooting hours).

Under this alternative, the Service would replace the current spring-summer subsistence hunting season regulations with regulations consistent with the fall harvest. Methods and means required for fall-winter hunting would be adopted, daily bag limits for individual hunters would be imposed, and fall regulations concerning exchange and transport of birds and bird parts would apply. Egg gathering would, to the extent possible, be consistent with the customary and traditional subsistence harvest of eggs by Alaskan indigenous inhabitants.

The regulations of Title 50 CFR, Subpart C - Taking, apply in this alternative with the exception of closed seasons (§20.22). Subpart D - Possession, also applies with the exception of §20.32. The final frameworks approved by the Secretary of the Interior for the Pacific Flyway season would apply with the following exceptions: (1) shooting hours would not be specified, (2) the season would be from 2 April through 31 August, and (3) the closed periods to protect nesting birds described in Alternative 1 would apply. A summary of the two alternatives for this component of the proposed action is provided below (Table 5.8).

Table 5.8. Summary of the alternatives to the subsistence harvest regulatory process.

Subsistence Harvest Regulatory Process	**Alternative 1** (no change; preferred)	**Alternative 2**
Level of regulation for spring-summer subsistence harvest	Traditional subsistence harvest	Replace current subsistence hunting regulations with fall-winter hunting season regulations

CHAPTER 6
ENVIRONMENTAL CONSEQUENCES

Federal regulations governing annual hunting of migratory birds have been issued since 1918 (the date that the Migratory Bird Treaty Act took effect). The proposed action of SEIS 2010 is to adopt a process for authorizing migratory bird hunting in accordance the MBTA (16 U.S.C. §703-712) and the four bilateral conventions (see section 1.5.2). The purpose of this chapter is to discuss the potential environmental impacts and consequences of the proposed action relative to the affected environment as described in Chapter 4. In addition, the potential impacts of the alternatives for each of the seven components of the proposed action will be discussed. An environmental impact is defined as a change in the quality or quantity of a given resource due to a change in the existing environment following human action. Impacts may be beneficial or harmful, direct or indirect, permanent or temporary, and can vary in degree.

6.1 GENERAL EFFECTS OF REGULATIONS

6.1.1 Introduction

Migratory birds are an important international resource, having a long history of cultural, economic and recreational value. Regulating the hunting of migratory birds can significantly impact these bird populations, potentially affect other wildlife species, and/or result in social, economic, and administrative consequences. Preservation of healthy migratory bird populations and other wildlife, including Federally protected species, is of special concern. For game species, management goals aim to maintain healthy bird populations while providing appropriate harvest opportunity. Therefore, the general objective for migratory bird hunting regulations, in accordance with the MBTA and the four conventions, is to establish regulations that are consistent with the long-term conservation of each species and recognized population.

The social and economic impacts may involve direct consumptive and non-consumptive benefits (i.e., harvest, recreation, observation), or indirect benefits (i.e., ecological, educational). Administrative impacts primarily concern logistics and the expenses of the Service and State agencies associated with each management decision. This section discusses potential impacts and consequences that could result from the implementation of alternative strategies to seven separate components of the proposed action. Consideration of these alternatives is necessary in order to evaluate unintended detrimental impacts on migratory bird populations as well as unnecessary loss of hunting opportunity. This analysis compares the impacts and consequences of the components of the proposed action and their associated alternatives. In most instances, the components and their associated alternatives describe different ways of implementing the proposed action. Each of the alternatives results in the hunting of migratory birds, and none of alternative ways of doing so affect the environment any differently than discussed in this section. Specifically, the impacts the alternatives have on other wildlife, threatened and endangered species, vegetation, other outdoor recreational activities, physical and cultural resources, and the socioeconomic/administrative environment do not vary much, if at all. For this reason, the impacts are addressed in sections 6.1.5–6.1.10, and are not duplicated within section 6.2 (consequences of alternatives). The following discussion presents an assessment of the general effects of annual migratory bird hunting regulations and the specific environmental impacts and consequences of the seven components when considered in total.

Many factors impact migratory bird populations, including biological factors (e.g., predators, disease), abiotic influences (e.g., environmental changes) and human effects (e.g., hunting pressure, land-use factors). Of these, resource managers have the most control of the impacts of hunting via the use of regulatory mechanisms. The relative impact of the various factors is unknown and varies greatly according to population and environmental circumstances. However, in most cases, the role of hunting is thought to be less than the impact of large-scale environmental changes and broad-scale land use changes (U.S. Department of the Interior 1988). In general, predation may have as great or greater impact on populations than hunting, while hunting is thought to have a larger impact than disease for the populations/species that constitute the bulk of the harvest (U.S. Department of the Interior 1988).

6.1.2 Regulations and Harvested Populations

The direct role of hunting regulations in migratory bird management can be expressed, at least conceptually, in terms of: (1) the impact of regulations on harvest levels, and (2) the impact of harvest levels on population status. Hunting in the fall-winter season removes a portion of the birds from a population while they are migrating and over-wintering. The harvest can affect population status directly, through the removal of birds, and indirectly, through possible density dependencies in survival rates, reproduction rates, and other population parameters. In addition, a number of factors influence harvest levels, such as population status, hunter behavior, environmental conditions, and hunting regulations. Assessment of the impact regulations have on migratory bird populations often is confounded by a combination of several of the above factors.

Two competing hypotheses have been developed to describe the relationship between hunting mortality and annual survival. These hypotheses are described by Anderson and Burnham (1976) and are known as the additive mortality hypothesis and the compensatory mortality hypothesis. The additive mortality hypothesis proposes that any increase in hunting mortality results in an increase in total mortality. The compensatory mortality hypothesis postulates that the total mortality of a population will remain unchanged at low to intermediate harvest levels because, as population density is reduced by hunting mortality, natural mortality decreases to compensate for the reduction. The compensation occurs because individuals that have escaped hunting mortality will have a higher survival rate until the next reproductive event. SEIS 88 (U.S. Department of the Interior 1988) reviewed in detail the studies that had examined the direct relationship between harvest and subsequent survival rates of various duck species. Most of these studies were based on the historic mallard banding data that were available at the time of the study. Similar approaches also were used on several other duck species. The conclusions at the time of these studies were equivocal.

The mid-continent mallard AHM process explicitly takes the two competing hypotheses into account by incorporating separate models for each hypothesis into the optimization process. Thus, although the definitive answer to the issue of whether hunting mortality is compensated for by decreased natural mortality is not known, the system takes both hypotheses into account and bases regulations on a combination of both possibilities weighted by which model does the best job of predicting the subsequent breeding population status over time. This system, in effect, removes the debate of whether harvest is a form of additive or compensatory mortality from the regulations process, and allows the observed population data to make the best weighted decision based on both hypotheses. The ability to incorporate competing models of system performance is seen as one of the chief advantages of the adaptive process for regulations setting.

The magnitude of the annual harvest varies greatly by species. The overall number of birds harvested is greatest for mourning doves, followed by ducks, and then geese. All other species constitute a much smaller proportion of the overall harvest (Figure 6.1). In general, the magnitude of harvest is proportional to abundance, partly because of opportunity and encounter probabilities and partly because regulations have always been based on abundance, with more abundant stocks being afforded more liberal daily bag limits and season lengths. For example, mourning dove populations are estimated to be in the range of 350 million in North America (Otis et al. 2008). The average annual harvest during the period from 1999 to 2008 was approximately 22 million mourning doves in the U.S. (Otis et al. 2008). Thus, although the harvest of mourning doves exceeds that of all other harvested migratory birds (Figure 6.1), it represents less than 10% of the estimated population size in any given year. Similarly, total annual duck harvest in the U.S. was estimated at approximately 14 million during the period from 1999 to 2008 (Richkus et al. 2008), and this harvest is derived from an estimated Fall Flight of 80–120 million ducks (Martin et al. 1979). These examples illustrate the fact that the annual harvest is a small proportion of the overall size of harvested migratory bird populations, even though the activity does remove substantial numbers of individuals from these populations.

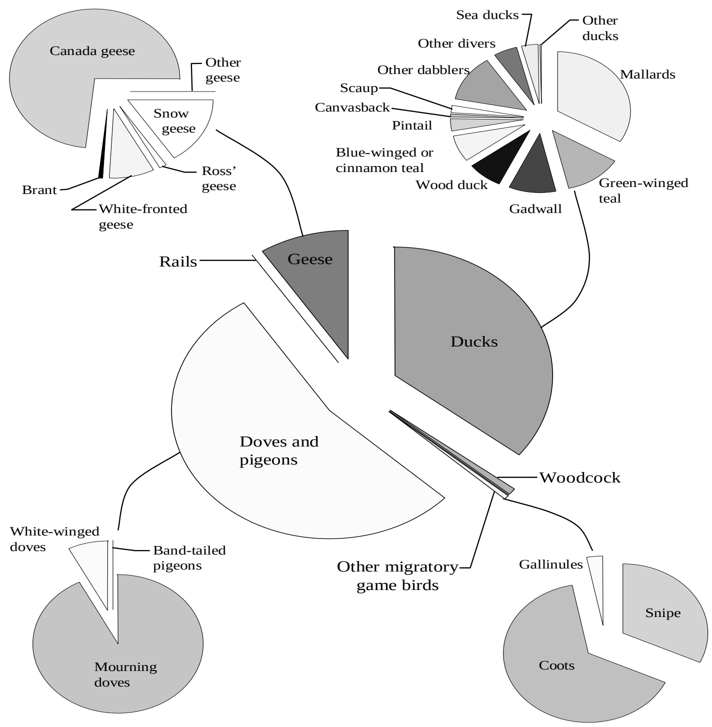

Figure 6.1. Distribution of total migratory bird harvest in the U.S. among and within species groups.

6.1.3 Migratory Bird Harvests on National Wildlife Refuges

Many NWRs provide migratory bird hunting opportunities (Table 6.1). In this section, the general impact of cumulative harvest of migratory birds on all NWRs is briefly discussed to place refuge hunting in context with the overall migratory bird harvest in the U.S. Waterfowl harvests at these refuges were estimated by multiplying the average waterfowl hunter use days on NWRs (over a four-year period) by the average daily harvest, which was calculated using annual Hunter Information Program (HIP) estimates for each State. The harvest on NWRs for each State was then compared to the total average harvest estimates for waterfowl from the same survey (Table 6.1). The vast majority of the total waterfowl harvest on refuges is comprised of various duck species in similar proportion to the overall waterfowl harvest shown above in (Figure 6.1). This assessment suggests that, on average, the total waterfowl harvest on the Nation's NWRs constitutes approximately 6% of the national waterfowl harvest (Table 6.1). Given this small proportion of the overall harvest, allowing this harvest opportunity on individual NWRs does not cumulatively constitute a significant effect on waterfowl populations. The Service reached this conclusion by considering the magnitude of the overall total waterfowl harvest and the fact that the total waterfowl harvest has not significantly impacted waterfowl populations at the levels historically permitted by regulation.

Table 6.1. Average waterfowl harvest on National Wildlife Refuges (NWRs) in the United States.

State	Number of NWRs	NWRs that allow hunting	NWRs that allow waterfowl hunting	Average NWR hunter use days*	Average NWR waterfowl harvest*	Estimated total waterfowl harvest*	% of total harvest on NWR
AK	16	16	16	9,710	24,275	74,442	32.6%
AL	10	4	2	595	1,119	183,393	0.6%
AR	10	9	7	132,756	334,545	1,252,148	26.7%
AZ	9	8	4	4,003	8,206	47,390	17.3%
CA	38	18	18	52,906	154,486	1,629,320	9.5%
CO	8	4	4	1,413	2,218	193,461	1.1%
CT	1	1	1	31	50	45,355	0.1%
DE	2	2	2	2,638	4,537	72,767	6.2%
FL	28	8	6	5,146	11,836	172,417	6.9%
GA	9	7	1	80	123	123,473	0.1%
IA	5	5	2	3,960	5,465	278,873	2.0%
ID	6	6	6	10,778	25,004	302,391	8.3%
IL	8	7	7	13,942	19,658	564,792	3.5%
IN	3	3	1	4,205	6,181	189,336	3.3%
KS	4	4	4	12,285	26,044	286,070	9.1%
KY	1	1	1	4,300	7,439	213,704	3.5%
LA	23	19	19	18,189	49,110	1,296,809	3.8%
MA	11	5	4	1,706	2,747	43,895	6.3%
MD	5	3	1	400	716	328,891	0.2%
ME	9	3	2	2,044	3,352	64,442	5.2%
MI	7	3	1	558	764	483,991	0.2%
MN	12	9	5	9,637	13,781	827,608	1.7%
MO	8	6	5	2,222	4,200	478,454	0.9%
MS	14	12	11	8,043	21,555	358,325	6.0%
MT	23	10	9	5,082	11,079	165,628	6.7%
NC	10	9	7	2,872	4,825	288,264	1.7%
ND	65	14	3	1,131	3,393	599,061	0.6%
NH	4	2	1	250	260	20,396	1.3%
NE	6	4	3	403	653	258,781	0.3%
NJ	5	5	4	2,790	5,357	102,314	5.2%
NM	7	5	4	701	1,598	47,037	3.4%
NV	9	7	6	6,741	14,897	52,425	28.4%
NY	10	3	2	894	1,725	332,780	0.5%
OH	3	1	1	1,026	1,272	232,124	0.5%
OK	9	8	6	24,047	68,293	401,117	17.0%
OR	19	11	8	9,890	26,209	560,106	4.7%
PA	2	1	1	1,092	1,409	352,692	0.4%
RI	5	1	1	47	89	14,673	0.6%
SC	7	6	2	753	1,175	195,762	0.6%
SD	6	4	2	845	1,893	315,288	0.6%
TN	7	7	5	11,304	20,573	382,521	5.4%
TX	20	12	7	15,407	39,134	1,413,113	2.8%
UT	4	3	3	9,643	19,865	275,525	7.2%
VA	14	11	2	406	690	200,170	0.3%
VT	1	1	1	599	869	29,827	2.9%
WA	21	9	9	20,719	53,248	504,769	10.5%
WI	7	5	3	1,092	1,070	517,701	0.2%
WV	2	2	2	165	249	10,569	2.4%
WY	7	3	2	326	610	63,217	1.0%
Total	520	307	224	8,567	20,568	343,829	6.0%

The geographic boundaries of some NWR extend into two or more States. There are 548 NWRs in the United States. The 28 NWRs not shown in the table are in Hawaii (10), American Samoa (1), Guam (1), Puerto Rico (5), Virgin Islands (3) and outlying islands (8).
Average NWR waterfowl harvest was calculated by multiplying the average NWR hunter use day by the average daily harvest for each State, which was calculated using Hunter Information Program (HIP) data for the corresponding State. Total waterfowl harvest was estimated using HIP data. *Averaged from four years of data.

6.1.4 Falconry Harvests

Another component of the overall harvest is the amount of harvest attributable to falconry. Falconry harvest is not measured annually. The total migratory bird harvest by falconers, however, is believed to be between five and ten thousand migratory birds per year, based on information from surveys of falconers (Files DMBM). This harvest is a very small component of the overall migratory bird harvest. This small take is not likely to be of any significance to migratory bird populations. SEIS 2010 does not include alternatives specific to falconry but, for completeness, SEIS 2010 acknowledges that this component of the annual migratory bird harvest does take a limited number of birds.

6.1.5 Regulations and Other Wildlife

States have the primary trust responsibility for managing and perpetuating resident wildlife species for the citizens of their respective States, and each State manages its resident wildlife slightly differently. Activities associated with the hunting of migratory birds may have an impact on these resident wildlife species. In addition, non-hunted migratory birds and wildlife species that are not regulated by either State or Federal statutes (primarily non-native species that have been introduced to North America from other parts of the world) also may be affected by migratory bird hunting. The physical presence of hunters, travel to and from hunting destinations, use of hunting dogs, and noise from gunshots are all factors that cause various levels of disturbance to other wildlife species. Many species leave or avoid areas where humans are present (e.g., Stalmaster and Newman 1978; Burger 1981; Gander and Ingold 1997), especially when the people are accompanied by dogs (Lenth et al. 2006), whereas some species simply shift their periods of activity to avoid humans (George and Crooks 2006). However, population redistribution (geographical or spatial) due to hunting activity is expected to be temporary in nature (Madsen 1998), and limited to times and places where migratory bird hunting is permitted. Areas that are not open to migratory bird hunting serve as refuges for displaced wildlife species (Madsen 1998). Madsen and Fox (1995) indicated that there is little understanding about the direct impact of hunting disturbance on birds at the population level.

Hunting is just one of a multitude of ways in which migratory birds are disturbed throughout their annual cycle. Other forms of disturbance include aircraft, fishing activities, other recreational boating activities, hiking, skiing, farming, and pet activities. Wildlife disturbance due to human activities is well documented (review by Dahlgren and Korschgen 1992). However, most assessments of disturbance have focused on the behavioral responses of animals to human disturbance, but have not demonstrated adverse effects on survival or reproduction of the species studied (Gill et al. 2001). Gill et al. (2001) noted that, “From a conservation perspective, human disturbance of wildlife is important only if it affects survival or fecundity and hence causes a population to decline." Migratory bird hunting disturbance has no direct effect on the fecundity of most species, since hunting does not occur to any significant degree during the breeding seasons of most birds, mammals, reptiles, amphibians, or insects. Even the limited subsistence season in Alaska is closed during the peak nesting period for birds. During much of the migratory bird hunting period, especially in winter, disturbance effects are likely negligible for many species because winter is a period of minimal activity. For example, bats and several other small mammals are inactive in most of the U.S. during the winter, as are reptiles, amphibians, and most insects.

Some individual animals exposed to hunting activities would likely experience increased energy costs as a result of avoiding hunters (Dahlgren and Korschgen 1992). Such costs, outside of the breeding season, are within the ability of most individual animals to safely absorb. In addition, it is important to recognize that these small energy costs borne by individual animals are more than offset by the contributions hunters make to maintain and enhance wildlife habitat that attracts and sustains a multitude of species (U.S. Fish and Wildlife Service 2000). In cases where combined disturbances, from hunting and other sources, are determined excessive, local regulation restrictions to reduce the potential impacts would be imposed. Currently there are no reported cases where disturbance from hunting has adversely affected the reproduction or survival rate of any population or species.

6.1.6 Regulations and Threatened and Endangered Species

The Service annually conducts Section 7 consultation and obtains a biological opinion before establishing any special hunting seasons for any migratory game bird in the contiguous U.S., Alaska, Hawaii, Puerto Rico, and the Virgin Islands. This consultation ensures that there will be no likelihood of jeopardizing a listed species or its critical habitat as a result of establishing hunting regulations. The "Section 7 Consultation on the Proposed 2009-2010 Migratory Game Bird Hunting Regulations" from 24 August, 2009 is available electronically by searching document ID 'FWS-R9-MB-2008-0124-0058' on the website: http://www.regulations.gov, or directly, by clicking the following web-link: http://www.regulations.gov/search/Regs/home.html#documentDetail?R=0900006480a11301.

The Section 7 Consultation for 2009 indicated that proposed hunting regulations were not likely to adversely affect the great majority of threatened and endangered species or their critical habitats. Only two threatened or endangered species were identified that may be adversely impacted by migratory bird hunting: whooping cranes and Steller's eiders. In both cases, the concern was that migratory bird hunting has some potential to result in incidental take of those species, because hunted migratory bird species that are somewhat similar in appearance are taken by hunters in areas where some individual whooping cranes and Steller's eiders are present. Individuals of other threatened and endangered species also may be impacted temporarily by disturbance due to the proximity of hunters, but the impact is expected to be minimal and temporary (e.g., see Madsen 1998).

There was one documented shooting of a whooping crane from 1950-1987 (Lewis et al. 1992), and six more whooping cranes have died as the result of being shot since then (T.V. Stehn, USFWS, personal communication). The Contingency Plan for Federal-State Cooperative Protection of Whooping Cranes was implemented in 1996 to prevent the incidental take of whooping cranes. This plan provides a protective program in 13 States through which whooping cranes migrate or in which they winter. In addition, the State of Kansas has implemented specific restrictions to avoid accidental shootings, including delaying the opening of the sandhill crane hunting season until after the period when most whooping cranes migrate through the State, and requiring a mandatory species identification test for sandhill crane hunters. To prevent take of Steller's eiders, the Service has initiated conservation measures that increase migratory bird hunter outreach prior to the opening of the hunting season, increase Service enforcement of migratory bird regulations, and conducts in-season harvest verification of Steller's eider mortality and injury.

The annual Section 7 consultation process has sometimes resulted in modification of previous hunting regulations, and the final migratory bird hunting frameworks reflect those modifications. Furthermore, under federal regulations (50 CFR §20.26), "The (USFWS) Director may close or temporarily suspend any season … upon a finding that a continuation of such a season would constitute an imminent threat to the safety of any endangered or threatened species." Thus, threats caused by the establishment of migratory bird hunting regulations are considered for all threatened and endangered species, and adequate protections are implemented each year to ensure that the hunting regulations adopted do not significantly impact any threatened or endangered species.

6.1.7 Regulations and Vegetation

Migratory bird hunting activity can have both positive and negative impacts on vegetation composition and structure. Both short and long-term impacts can occur, but most short-term impacts resulting from hunting activities tend to be localized. Long-term impacts can occur on public hunting areas due to the concentration of hunting activity. In some cases, control of access points has been implemented to minimize these impacts. Overall, disturbance due to human recreation (e.g., skiing, fishing, hunting, mountain biking, hiking, mountaineering) can result in long lasting effects on vegetation (Parsons 2002). The impact hunting activities alone have on this resource, however, has yet to be quantified.

The largest positive impact on natural and agricultural habitats results from land use practices for habitats that are specifically created, improved, or maintained for hunting purposes on lands that are in private or public ownership. Most management activities occur on public hunting areas and private hunting clubs. Heitmeyer et al. (1989) state that 65% of the wetlands in California's Central valley are in private ownership and mostly used for duck hunting. In the Central Valley of California, it has been concluded that existing waterfowl populations could not be sustained without the wetland resources provided by private duck clubs (Central Valley Joint Venture 2006). In situations where vegetative response for wetland dependent migratory bird species is desired, water control structures and irrigation practices are often necessary to influence the composition, growth, or availability of vegetation to birds. Management activities to reduce vegetative cover can also include the use of grazing, mowing and burning to achieve desired effects on vegetation. In some instances, the standard agricultural use of fertilizers, insecticides and pesticides can enhance vegetative response and seeding practices. Upland, lowland, and submerged aquatic vegetation all can be influenced by combinations of these management activities.

Hunting also can provide a measure of control on migratory bird populations that have reached population levels that are adversely impacting natural vegetative habitats (i.e., light goose FEIS), or are causing agricultural depredation concerns (i.e., Canada goose FEIS). A secondary benefit, as a result of this hunting activity, could be improved vegetative cover, plant regeneration, improved abundance and vegetative community structure, and possibly controlling or eliminating invasive species.

A negative impact that could potentially occur is localized trampling of vegetation, especially on public hunting areas. Trampling is most prevalent near parking lots and on footpaths leading to hunting areas. Disturbance to vegetative habitats by travel to and from hunting sites can also occur. In some cases, local control of access points for limiting access is used to minimize these impacts. However, most trampling occurs during plant-dormant periods in the fall and winter periods, and little long-term impact is experienced. Long-term impacts can result with the creation of trails from parking areas to hunting areas. The compaction of soil on trails could affect the regeneration of vegetation or possibly enhance mammalian predator access to migratory birds. In some breeding areas, trampling could change the structure of residual cover and could impact the availability of suitable nesting cover the following spring. These types of impacts would likely be minimal, but the lack of experimental data makes it impossible to provide an exact measure. Driving on harvested fields generally results in no long-term effect, but certain crops are generally avoided, such as seeded fields (e.g., winter wheat).

Hunters sometimes cut or uproot vegetation and remove it to construct blinds or provide enhanced concealment in certain hunting situations. However, most of these impacts are very localized and of a short-term nature since migratory bird hunting activity primarily occurs during the time of the year when plants are dormant.

Other impacts are those associated with accessing hunt areas by motorized vehicles or boats. The running over of upland or emergent vegetation can reduce vegetative community structure. In some cases, the substrate on the bottom of marshes, lakes and rivers can be disturbed, which increases turbidity of the water. Some positive benefits could also accrue from creating open areas in heavy stands of cattail. Most impacts resulting from these types of activities would be extremely minor and of a short-term nature.

6.1.8 Regulations and Other Outdoor Recreational Activities

Approximately 87.5 million U.S. residents 16 years of age and older participate in wildlife-related recreation annually (U.S. Department of Interior 2008; U.S. Department of the Interior, Fish and Wildlife Service, and U.S. Department of Commerce, U.S. Census Bureau 2007). Of that total, 30.0 million people fish, 12.5 million hunt, and 71.1 million participate in at least one type of wildlife-watching activity such as observing, feeding, or photographing fish and other wildlife. Although there is overlap in these user groups, migratory bird hunters represent only 18% (2.3 million) of all hunters and less than 3% of all residents that participate in wildlife-related recreation (U.S. Department of Interior 2008; U.S. Department of the Interior, Fish and Wildlife Service, and U.S. Department of Commerce, U.S. Census Bureau 2007). Therefore, migratory bird hunting regulations have the potential to affect only a relatively small percentage of the U.S. population that participates in outdoor recreation.

In general, other outdoor activities are not precluded during migratory bird hunting seasons. However, hiking, photography, and bird watching do not generally occur in areas being actively hunted. This partitioning does not occur because of regulation, but rather as a result of most non-hunting outdoor enthusiasts recognizing the safety issues involved and avoiding active hunting areas on public lands. Hunting that occurs on private lands does not generally pose a conflict, because access is limited to those with permission in most states. Several States do have regulations that limit access to some public lands reserved for hunting during the hunting season. In addition, the hunt programs on NWRs are generally structured to ensure separation in time and space between actively hunted areas and areas that remain open for other outdoor recreational activities. Therefore, some recreational activities are impacted to accommodate migratory bird hunting. Overall, these impacts are insignificant and, culturally, the public has adapted to seasonal hunting effects. Hunting waterfowl has been a tradition for centuries in this country and federally regulated waterfowl hunting seasons have been ongoing since 1918.

6.1.9 Regulations and Physical and Cultural Resources

Each year, approximately 12.5 million people 16 years or older enjoy hunting a variety of animals in the U.S. However, only 2.3 million of these hunters pursue migratory birds (U.S. Department of the Interior, Fish and Wildlife Service, and U.S. Department of Commerce, U.S. Census Bureau 2007; U.S. Department of Interior 2008). Therefore, in relation to all hunting activities, establishment of migratory bird hunting regulations represents a relatively small factor that could impact natural resources (e.g., soil, water, air), natural areas (e.g., national parks, refuges), facilities (e.g., roads, trails, parking lots), and/or structures of national historic importance. Of all trip-related expenditures on migratory bird hunting, only 38% were related to transportation (U.S. Department of the Interior, Fish and Wildlife Service, and U.S. Department of Commerce, U.S. Census Bureau 2007; U.S. Department of Interior 2008). Therefore, impacts of migratory bird hunting regulations on general air, soil and water quality are expected to be minimal, and generally limited to increased emissions associated with automobile and boat travel to and from hunting areas. This impact is unavoidable, and in the absence of establishing migratory bird hunting regulations affording participants the opportunity to hunt, many of these same individuals would be expected to seek outdoor recreation of a different sort, thus continuing to be a minor source of increased air emissions. Approximately 48% of the annual 25 million hunter days spent on migratory bird hunting in the U.S. is related to duck hunting, which is more aquatic-based than other migratory bird hunting activity (U.S. Department of the Interior, Fish and Wildlife Service, and U.S. Department of Commerce, U.S. Census Bureau 2007; U.S. Department of Interior 2008). Information on the impact of duck hunting on aquatic sediments and vegetation is not available. However, such activities are usually limited to well-defined boat lanes and small areas surrounding duck blinds, and do not represent a significant source of impact to physical resources.

Historically, the principal cause of lead poisoning in waterfowl was the deposition of high densities of lead shot in sediments associated with migratory bird hunting activities on wetlands (Kendall et al. 1996). In 1991, as a result of high bird mortality, the Service instituted a nation-wide ban on the use of lead shot for hunting waterfowl and coots (51 FR 42107). The Service requires any new shot types to undergo rigorous testing in a three-tier approval process that involves an ecological risk assessment and an evaluation of the candidate shot's physical and chemical characteristics, short- and long-term effects on reproduction in waterbirds, and potential toxic effects on invertebrates, therefore, this issue is no longer an ecological concern (62 FR 63607).

The geographic extent of migratory bird hunting is continental in scope and encompasses a variety of historical sites and cultural resources. The management alternatives analyzed in this document do not involve construction of new buildings, excavations, or other activities that normally disturb historical sites or cultural resources. As has been determined in other EISs involving take of migratory birds (U.S. Department of Interior 2007a), the Service expects no impacts to historical or cultural resources under any of the alternatives analyzed in this document.

6.1.10 Regulations and Socioeconomic Environment

The Service's most significant effort at analyzing economic impacts of annual migratory bird hunting regulations centers on the effects of changing daily bag limits and season lengths, the two most important variables in the Federal framework (U.S. Department of the Interior 2008). Additional economic statistics are available (U.S. Department of the Interior, Fish and Wildlife Service, and U.S. Department of Commerce, U.S. Census Bureau 2007), but these do not fully reflect the value of migratory bird hunting, which includes intangible but substantive social and cultural values. Expenditures tend to understate the net social benefits attributable to recreational activities, and hunting likely has an especially high value to participants.

6.1.10.1 Individuals

Fall-Winter Hunters

The "National Survey of Fishing, Hunting, and Wildlife-Associated Recreation" (U.S. Department of the Interior, Fish and Wildlife Service, and U.S. Department of Commerce, U.S. Census Bureau) provides information on the number of participants in fishing, hunting (fall-winter hunters), and wildlife watching (observing, photographing, and feeding wildlife), as well as the amount of time and money spent on these activities. The Survey has been conducted approximately every five years since 1955 and is one of the Nation's most important wildlife recreation databases. The Survey is the only source of comprehensive information on participation and expenditures that is comparable on a State-by-State basis. Data are used for estimating the economic impact of wildlife-related recreation for each State, estimating the value of wildlife resources lost due to pollution or disease (e.g., whirling disease in fish), use in critical habitat analysis of threatened species, and for preparing EISs, budgets, and legislative proposals. The Survey is sponsored by the Service at the request of State fish and wildlife agencies. The information presented below reflects the analyses from the 2006 Survey (U.S. Department of the Interior, Fish and Wildlife Service, and U.S. Department of Commerce, U.S. Census Bureau 2007).

Migratory bird-related spending for trips and equipment was $1.3 billion in 2006. Of this amount, $691 million was spent on hunting trips. An estimated $261 million (38%) of all trip expenditures were on food and lodging, and $266 million (38%) were on transportation. Other trip expenses accounted for $165 million (24%) of the total trip-related expenditures for migratory bird hunters. Equipment purchases for migratory bird hunting totaled $658 million in 2006. Of this amount, $416 million, or 63%, was spent on hunting equipment (firearms, ammunition, etc.). Spending on auxiliary equipment was $68 million (10%), and $174 million (26%) was spent on special equipment.

Waterfowl hunters spent $494 million on trip expenditures and $406 million on equipment expenditures in 2006. Of trip expenditures, 36% was spent for food and lodging, 37% was spent on transportation, and 27% was spent on other costs, such as guide fees and land-use fees. According to the Service's "Economic Impact of Waterfowl Hunting in the United States" report (Carver 2008), which is based on the 2006 National Survey of Fishing, Hunting, and Wildlife Associated Recreation, waterfowl hunters have an important economic impact on local, State, and national economies, more so than the average migratory bird hunter. In 2006, waterfowl hunters represented 10% of all hunters, 7% of all hunting trip-related expenditures, and 6% of all hunting equipment expenditures.

Waterfowl hunters who hunt both ducks and geese average over twice as many days afield (21 days) as waterfowl hunters who do not hunt both. On average, duck hunters spend more days hunting (11 days) than goose hunters (9 days). All hunters average about 18 days per year, which is greater than the estimate for all waterfowl hunters (10 days). In addition to hunting two more days on average, duck hunters also tend to spend more money than goose hunters annually (Carver 2008). However, waterfowl hunters who hunt both ducks and geese spend over 50% more ($854) than duck hunters or goose hunters.

What is not measured by this survey is the importance of hunting to many citizens of the U.S. The hunting tradition has been a central part of the American culture throughout its history. Hunters joined with other conservation groups in the early 1900's to support and enact legislation promoting long-term resource conservation throughout the U.S. Today, hunting remains an important activity to many Americans as evidenced by the financial statistics above. It is clear that hunting provides considerable economic support to State and Federal government agencies that directly support the long-term conservation of all of the nation's valuable wildlife resources. Continuation of migratory bird hunting will not only maintain important economic stimulation, but will perpetuate a recreational activity that holds valuable cultural roots for hundreds of thousands of families and communities.

Subsistence Hunters

Today in Alaska, subsistence harvests of migratory birds occur primarily in rural areas where fishing and hunting are major components of the regional economy. Most rural communities are supported by traditional mixed cash and subsistence economies, wherein families support themselves through some combination of employment for wages, commercial fishing and trapping, and subsistence activities (Lonner 1980; Petterson et al. 1988). Often, subsistence harvest activity is limited to a few individuals in the community or family who share the products of hunting, fishing and gathering with others. In areas where migratory bird harvest is greatest, approximately 60% of households harvest migratory birds and up to 86% of households use the migratory bird resource. Due to the tradition of sharing, the number of households using birds typically is greater than those taking birds.

Many traditional subsistence ways of life have changed with existing technology. Now cash is necessary to purchase modern equipment to hunt, fish and gather. Migratory bird take is only one of the traditional subsistence activities that produce wild foods (Lonner 1980; Petterson et al. 1988).

Historically, little documentation existed regarding the subsistence harvest of migratory birds in Alaska, especially outside of the Y-K Delta area, because of the difficulty in obtaining data. Estimates of annual subsistence harvest in limited areas of Alaska for the 1960s–1970s consisted of 239,740 migratory birds, of which 125,900 (54%) were ducks, 105,120 (44%) were geese, 5,700 (2%) were swans, 1,300 (~0.5 %) were cranes, and 1,720 (~0.5 %) were seabirds. In addition, approximately 50,600 eggs of migratory birds were taken annually (U.S. Department of the Interior 1980). These figures compare to a national fall-winter harvest of about 1.7 million geese and 15.1 million ducks for the 1978–79 season. Thus, during that year, subsistence harvest constituted only a very small percentage of the overall harvest that occurred.

Presently, in areas eligible for migratory bird subsistence in Alaska, an estimated combined average of 236,000 migratory birds was reported taken annually for subsistence from the early/mid-1990s through 2000 (U.S. Fish and Wildlife Service 2003c). Based on annual fluctuations in areas where multi-year data are available, the harvest may have ranged from 200,000 to 250,000 birds, depending on the year. This harvest estimate is based on data from about 75% of the total population and 149 of the 166 communities in areas eligible for subsistence. Subsistence harvest figures from the North Slope communities of Barrow, Pt. Hope, Pt. Lay, and Wainwright (total population 6,131), the city of Kodiak (population 12,973), and several small communities in interior Alaska (total population 1,564), are not available so were not included in this analysis. In the late 1980s, subsistence harvests from Barrow, Wainwright, and Pt. Lay averaged 13,600 migratory birds, with a range from 11,000–17,000 birds (5,000–6,300 geese and 6,000–10,600 ducks; Braund 1993a; 1993b).

Of the combined reported subsistence harvest estimate of 226,000 migratory birds, approximately 160,000 birds (70%) were taken in the spring-summer and 66,000 birds (30%) were taken in the fall (U.S. Fish and Wildlife Service, unpublished data, Anchorage, AK). An unknown portion of the fall subsistence harvest occurs in August, before the fall-winter non-subsistence hunt begins. Of the reported combined migratory bird harvest, 82,300 (36%) were geese, 108,700 (48%) were ducks, 7,500 (3%) were tundra swans, 6,000 (3%) were sandhill cranes, and 21,500 (10%) were seabirds and shorebirds (U.S. Fish and Wildlife Service, unpublished data, Anchorage, AK).

Species composition of harvest differed somewhat between spring-summer and fall. Of the combined spring-summer harvest estimate of 160,000 birds, 40% were geese, 44% were ducks, 3% were tundra swans, 3% were sandhill cranes, and 10% were seabirds and shorebirds. Of the combined fall harvest estimate of 66,000 birds, 28% were geese, 59% were ducks, 3% were tundra swans, 3% were sandhill cranes, and 7% were seabirds and shorebirds. This suggests that geese are more important in the spring-summer harvest, and duck harvests are more important in the fall. However, based on numbers alone, almost twice as many ducks are taken in spring-summer than in fall.

Because geese weigh approximately three times as much as ducks (an average of three pounds usable meat compared with an average of one pound), their contribution by weight to the subsistence diet is much greater than ducks. Similarly, swans and cranes contribute eleven pounds and seven pounds of usable meat, respectively. Thus, the spring-summer harvest contributes >70% of the total subsistence migratory bird diet, by weight, due to relatively more geese being taken (Wentworth and Wong 2001).

The area of Alaska with the highest migratory bird harvests (1992/95–2000) was the Y-K Delta. Of the statewide migratory bird harvest taken in subsistence eligible areas, an estimated 99,000 (44%) birds were taken on the Y-K Delta. The Y-K Delta harvest also accounts for over half (53%) of the geese and 40% of the ducks reported (U.S. Fish and Wildlife Service, unpublished data, Anchorage, AK). Bristol Bay and the Bering Strait mainland were next highest in total harvests, accounting for 25,000 birds each, followed by the Northwest Arctic Alaska region at 23,000 birds. Of the 21,500 reported Alaska seabirds and shorebirds harvested, most were taken on St. Lawrence Island (86%).

The estimated harvest of migratory bird eggs in subsistence-eligible areas in Alaska averaged 109,000 between 1992/95 and 2000. Of this number, most eggs (82%) were taken from seabirds, primarily gulls and murres, and 14% were from waterfowl (U.S. Fish and Wildlife Service, unpublished data, Anchorage, AK). The Y-K Delta had the highest harvests of waterfowl egg, accounting for 58% of the statewide estimate. Bristol Bay, Bering Strait, St. Lawrence Island, and the Northwest Arctic took most of the seabird eggs.

The intensity of migratory bird and egg harvest efforts varies regionally in Alaska. For migratory birds (1992/95–2000), the three top areas in terms of per capita migratory bird harvest were the Siberian Yupik communities of Gambell and Savoonga on St. Lawrence Island, the small communities of Kodiak Island (Akhiok, Karluk, Larsen Bay, Old Harbor, Ouzinke, and Port Lions), and the 38 Central Yupik communities of the Y-K Delta. St. Lawrence and Little Diomede Islands had the highest per capita egg harvests, which included almost all common murre eggs (U.S. Fish and Wildlife Service, unpublished data, Anchorage, AK).

To place subsistence harvest in perspective, recent Alaska subsistence harvest estimates can be compared with national HIP estimates. The 2007 HIP estimate for ducks was 14.6 million (including seaducks). Alaska's HIP estimate, which is included in the national estimate, was 67,900 ducks in 2007 (Richkus et al. 2008). The average Alaska subsistence harvest estimate was 148,906 (only 10% of the Alaska HIP estimate came from hunters living in the subsistence-eligible areas, so there is little overlap between these two figures). The Alaska subsistence harvest of ducks, therefore, amounts to 1% of the total national HIP estimate (Collins and Trost 2009).

Total national harvest of geese, according to HIP estimates, was 3.7 million in 2007 (including brant). The Alaska HIP estimate for geese was 6,800 in 2007 (Richkus et al. 2008). The Alaska subsistence harvest estimate for 2007 was 126,749 geese, amounting to approximately 3.5% of nationwide goose harvest.

The Alaskan subsistence take of sandhill cranes is proportionally larger than that for ducks or geese. Total national harvest of cranes (not including subsistence) was estimated at 20,625 in 2007 (Kruse 2009). Of this, 596 cranes in 2007 were taken by non-subsistence hunters in Alaska (Kruse 2009). Canadian harvest of sandhill cranes was approximately 11,786 in 2007 (Kruse 2009). The annual Alaska subsistence harvest was estimated at 5,671(Collins and Trost 2009), representing about 17.5% of total North American sandhill crane harvest in recent years. Alaska subsistence tundra swan harvest is almost entirely for the western population and has been approximately equal to the fall-winter harvest for this population in recent years. Tundra swans are not hunted in Canada. Crane and swan populations have continued to increase over time (see Chapter 4), therefore, no measurable impact of this harvest has been observed. This harvest is a continuation of the cultural and traditional use of these species to rural Alaskan natives that is being conducted in a sustainable fashion.

<u>Non-Hunters</u>

According to the National Survey of Fishing, Hunting, and Wildlife-Associated Recreation, more than 71 million people aged 16 years old or older (31% of all Americans) fed, photographed, and observed wildlife in 2006 and spent nearly $45 billion on their activities. Of these, almost 23 million (32%) participated in taking trips away from home and nearly 68 million (95%) participated around their home. Away-from-home participants are defined as those who travel more than a mile from home to engage in wildlife watching, and around-the-home participants are those who engage in wildlife watching within a mile of home.

Among the 67.8 million around-the-home participants, feeding wildlife was the most popular activity. Wildlife feeding was conducted by nearly 56 million individuals, 78% of all wildlife watchers. Nearly 45 million people (63%) observed wildlife, while 18.8 million (26%) photographed wildlife. Another 13.3 million (19%) visited public parks or natural areas to enjoy wildlife, and 14.5 million recreationists (20%) maintained plantings or natural areas for the benefit of wildlife.

Comparing the 2006 Survey with the two previous surveys shows an 8% increase from 2001 to 2006 and a 13% increase from 1996 to 2006 in overall wildlife watching. From 2001 to 2006, the increases in both around-the-home and away-from-home wildlife watching were comparable at 8% and 5%, respectively. However, from 1996 to 2006, away-from-home wildlife watching decreased by 3%.

Overall expenditures pursuant to wildlife watching increased 2% from 2001 to 2006 and increased 19% from 1996 to 2006. Trip-related expenditures were up 40% from 2001 to 2006, but were similar in 1996 and 2006. From 2001 to 2006, spending for wildlife-watching equipment and auxiliary equipment increased 20% and 34%, respectively, while spending for special equipment decreased 29%.

Other non-hunters potentially interested in the migratory bird resource include members of animal rights or anti-hunting organizations in the U.S. These organizations support a range of positions, from ending all hunting and trapping, to ending specific forms of hunting. Anti-hunting organizations often are active in litigation and legislative programs, (e.g., lobbying legislators, committee chairpersons, government officials, and policy makers), and fundraising against forms of hunting. The top 10 anti-hunting organizations in the U.S. raised a combined total of over $250 billion dollars (U.S. Sportsman's Alliance 2007), portions of which support anti-hunting measures.

The alternatives to the seven components of the proposed action are not likely to have a significant impact on the nonhunting public. Overall, however, some individuals may be opposed to the hunting of migratory birds. In general, nonhunters who do not oppose hunting on ethical grounds but are interested in long-term wildlife conservation will experience positive impacts from the proposed action. Positive environmental effects will be realized because a portion of the funding required to develop, preserve and/or enhance vital wildlife habitat is provided directly by hunters or via costs associated with hunting. For those ethically opposed to hunting, these environmental benefits will likely be outweighed by their personal opposition to hunting. For this group of citizens, the proposed action will have an adverse impact.

6.1.10.2 Organizations

The number of organizations worldwide that support conservation totals over 4,221, according to the National Wildlife Federation (NWF). The NWF compiled the largest database of conservation organizations on a centralized website. Within the U.S., there are 64 commercial/for-profit, nine foundation/benefactor, 1,006 Governmental (Federal), 624 Governmental (State and local), 1,820 nonprofit/non-governmental, and 325 school/college/university organizations that focus on conservation. Among these organizations, 1,384 focus on wildlife and wildlife species, and 126 focus on habitat quality. These organizations represent a wide range of interest and philosophies concerning the hunting of migratory birds. Overall, the alternatives to the seven components of the proposed action are not likely to have a significant impact on organizations. However, the proposed action will have an adverse impact for organizations ethically opposed to hunting. Organizations that are not opposed to hunting, but that are concerned with habitat conservation, are likely to experience positive impacts as hunters provide revenue for the preservation and enhancement of vital wildlife habitat.

6.1.10.3 Businesses

Migratory bird hunting generates significant economic activity for small businesses. Nationwide, migratory bird hunters spent $1.3 billion at small businesses in 2006 (U.S. Department of the Interior, Fish and Wildlife Service, and U.S. Department of Commerce, U.S. Census Bureau 2007). As many as 961,309 small businesses shared in these sales. All but four of the States derive, as a minimum, in excess of $2 million in small business sales from migratory bird hunting.

Based on the 2006 survey, waterfowl hunters spend money on a variety of goods and services for trip-related and equipment-related purchases. Trip expenditures include food, lodging, transportation, and other incidental expenses. Equipment expenditures consist of guns, decoys, hunting dogs, camping equipment, special hunting clothing, and other costs. Migratory bird hunters spent $1.27 billion for guns, ammunition, travel, and recreational services in 2006. By having ripple effects throughout the economy, these direct expenditures are only part of the economic impact of waterfowl hunting. The effect on the economy in excess of direct expenditures is known as the multiplier effect. For example, an individual may purchase decoys to use while duck hunting. Part of the purchase price will stay with the local retailer. The local retailer, in turn, pays a wholesaler who, in turn, pays the manufacturer of the decoys. The manufacturer then spends a portion of this income to pay businesses supplying the manufacturer. In this sense, each dollar of local retail expenditures can affect a variety of businesses. Thus, expenditures associated with waterfowl hunting can ripple through the economy by impacting economic activity, employment, and household income. To measure these effects, a regional input/output modeling method is utilized to derive estimates for total industry output, employment, employment income, and tax revenue associated with waterfowl hunting.

The economic effect of expenditures by waterfowl hunters in 2001, including their trip and equipment expenditures totaling $934.8 million, generated $2.3 billion in total output in the U.S. (U.S. Fish and Wildlife Service 2005). Waterfowl hunting expenditures in 2001 created 21,415 jobs and $725.2 million in employment income (U.S. Fish and Wildlife Service 2005). Thus, each job had an average annual salary of $33,860. Local economies/businesses have varying dependence on revenue received from migratory bird hunters. Guides, hunting club operators, and those in the business of manufacturing and selling hunting equipment and supplies depend on hunting for major portions of their income. In addition, restaurants and hotels near major hunting areas may depend on hunters for a substantial portion of their income. The alternatives to the seven components of the proposed action will likely not have a significant impact on businesses. The proposed action itself, however, will perpetuate the economic benefits (e.g., billions of dollars and thousands of jobs annually) associated with migratory bird hunting.

6.1.10.4 Governments

Federal and State tax revenues are derived from waterfowl hunting related recreational spending. In 2001, over $129.5 million in State tax revenue and $201.8 million in Federal tax revenue were generated. The economic impacts of trip-related and equipment-related waterfowl hunting expenditures vary by State. In 2001, Texas, California, and Arkansas generated the largest amount of total output at $206.0 million, $143.7 million, and $133.6 million, respectively (U.S. Fish and Wildlife Service 2005).

After the Federal Aid in Wildlife Restoration Act (Pittman-Robertson Act) was passed, all States enacted laws prohibiting use of license revenue for any purpose other than to operate their States' wildlife agency. About $336 million is the apportionment for fiscal year 2009 to States for Wildlife Restoration (U.S. Fish and Wildlife Service, Final Certificates of Apportionment). The 2009 Wildlife Restoration apportionment is the highest ever for the program, because of the strong partnership between the Excise Tax Working Group, IRS, and industry. On average, approximately 60% of Wildlife Restoration funds available to the States are used to buy, develop, maintain, and operate wildlife management areas, with about 68 million acres acquired through simple fee title purchases, leases, or easements. Since the program began, more than 350 million acres have been operated and maintained. About 26% of Wildlife Restoration funds are used for surveys and research. Numerous species, such as the wild turkey, white-tailed deer, pronghorn antelope, wood duck, beaver, black bear, American elk, desert bighorn sheep, bobcat, mountain lion, and several species of predatory birds, also have increased in abundance due to improved research and habitat management.

Over nine million landowners were provided management assistance on wildlife species. Over 26 million acres of habitat upgrades were completed, over 43,000 acres of waterfowl impoundments were developed, and over 395,000 acres were improved. Not only does the program benefit firearm users and archery enthusiasts, it benefits birdwatchers, nature photographers, painters and sketchers, and other groups that do not hunt or shoot firearms. Approximately $39 million helped the States fund their hunter-education and shooting-range programs in FY 2009, which trained about 8.6 million students in hunter safety over a span of 38 years.

The Wildlife Restoration Act benefits primarily game species, but also benefits songbirds, bald eagles, sea otters, prairie dogs, and other non-game species. More than $5.3 billion in Federal excise taxes have been collected since the program began in 1937. Federal funds have been leveraged with more than $1.3 billion in State matches (license revenue). The National Shooting Sports Foundation estimates that through excise taxes and license fees, sportsmen and women contribute about $3.5 million each day to wildlife conservation. The Wildlife Restoration program is one of the most successful programs administered by the Service and, under the proposed action, the Service expects this positive economic impact to continue.

6.1.10.5 Landowners

In 2006, seventy-five percent of the hunting days afield (164 million) occurred on private land, of which 13 million (68%) were in the pursuit of migratory birds. Direct financial benefits to private landowners can accrue through sale or lease of hunting rights. The conservation lands held by Federal and State agencies and other conservation groups cannot completely provide for fish and wildlife needs. Because the habitat needs of all Federal trust species cannot be met solely on public lands, public funds also are expended on private lands to accomplish habitat improvements through cooperative conservation programs, such as the Service's Partners for Fish and Wildlife Program (Partners), the Natural Resources Conservation Service Wetlands Reserve Program (WRP), and the Farm Services Agency CRP.

The Partners Program was established in 1987 with a core group of biologists and a small budget for on-the-ground wetland restoration projects on private lands. This successful, results-oriented program has garnered support through the years and has grown into a larger and more diversified habitat restoration program, assisting thousands of private landowners across the Nation. The Partners Program provides technical and financial assistance to private landowners and Tribes who are willing to work with the Service and other partners on a voluntary basis to help meet the habitat needs of Federal trust species. The Partners Program can assist with projects in all habitat types that conserve or restore native vegetation, hydrology, and soils associated with imperiled ecosystems, such as longleaf pine, bottomland hardwoods, tropical forests, native prairies, marshes, rivers and streams, or otherwise provide an important habitat requisite for a rare, declining or protected species. As of 2005, the Partners Program has worked with over 37,700 private landowners to restore 753,000 acres of wetlands, 1.86 million acres of native grasslands and other uplands, and 6,806 miles of riparian and in-stream habitat, and remove 260 fish passage barriers (U.S. Fish and Wildlife Service 2007f).

The Wetlands Reserve Program (WRP) is a voluntary program. WRP provides technical and financial assistance to eligible landowners to address wetland, wildlife habitat, soil, water, and related natural resource concerns on private lands in an environmentally beneficial and cost-effective manner. The program provides an opportunity for landowners to receive financial incentives to restore, protect, and enhance wetlands in exchange for retiring marginal land from agriculture. WRP was reauthorized in the Farm Security and Rural Investment Act of 2002 (Farm Bill). The Natural Resources Conservation Service (NRCS) administers the program. Funding for WRP comes from the Commodity Credit Corporation (CCC).

The CRP provides technical and financial assistance to eligible farmers and ranchers to address soil, water, and related natural resource concerns on their lands in an environmentally beneficial and cost-effective manner. The program provides assistance to farmers and ranchers in complying with Federal, State, and Tribal environmental laws, and encourages environmental enhancement. The program is funded through the CCC. CRP is administered by the Farm Service Agency, with NRCS providing technical land-eligibility determinations, conservation planning and implementation. These conservation efforts occur, in part, due to the public's desire to hunt migratory birds on private lands. The proposed action will continue to influence these efforts.

6.1.10.6 Social Values and Considerations

Wildlife populations provide a range of social and economic benefits (Decker and Goff 1987). These include direct benefits related to consumptive and non-consumptive use (e.g., wildlife-related recreation, observation, harvest), indirect benefits derived from vicarious wildlife related experiences (e.g., reading, television viewing), and the personal enjoyment of knowing wildlife exists and contributes to the stability of natural ecosystems (e.g., ecological, existence, bequest values) (Bishop 1987). Aesthetics is the philosophy dealing with the nature of beauty, or the appreciation of beauty. Therefore, aesthetics is truly subjective in nature, dependent on what an observer regards as beautiful. Wildlife generally is regarded as providing economic, recreational, and aesthetic benefits (Decker and Goff 1987).

Direct benefits are derived from a user's personal relationship to animals and may take the form of direct consumptive use (using the animal) or non-consumptive use (viewing the animal in nature, a zoo, or for photography) (Decker and Goff 1987). Indirect benefits or indirectly exercised values arise without the user being in direct contact with the animal, and come from experiences, such as looking at photographs and films of wildlife, reading about wildlife, or benefitting from activities or contributions of animals, including their use in research (Decker and Goff 1987). Indirect benefits come in two forms, bequest and pure existence (Decker and Goff 1987). Bequest is providing for future generations, and pure existence is merely knowledge that the animals exist (Decker and Goff 1987). Public reaction is variable and mixed because there are numerous philosophical, aesthetic, and personal attitudes, values, and opinions about hunting migratory birds. Overall, however, the Service considers hunting to be a positive impact of benefit to millions of Americans each year.

6.1.10.7 Other Socioeconomic Factors

The management alternatives analyzed in this document do not involve construction of new facilities, excavations, or other activities that normally disturb historical sites or cultural resources, therefore, the proposed action and associated components are not expected to have any significant impact on these types of resources.

6.2 CONSEQUENCES OF ALTERNATIVES

6.2.1 Introduction

The following sections describe the expected impacts of the alternatives for each of the seven regulatory components considered in the proposed action. These seven components and their associated alternatives deal with the process of adopting migratory bird hunting regulations. The alternatives are expected to have similar impacts on many of the components of the affected environment (e.g., other wildlife, threatened/endangered species, vegetation, recreation, and physical/cultural resources), and are described above (sections 6.1.5–6.1.9). No further discussion of the impacts to these particular components is provided. Instead, discussion is limited to instances where the alternatives are expected to have impacts different from those presented under sections 6.1.5–6.1.9.

6.2.2 Main Alternatives for Fall-Winter Season

6.2.2.1 Schedule and Timing of the General Regulatory Process

A summary of the impacts the four alternatives to this component of the proposed action will have on the affected environment is provided in Table 6.2.

Alternative 1 *(no change alternative).* Promulgate annual regulations using separate early and late season processes based on previous or current year biological information and established harvest strategies.

Effects: target populations, socioeconomic/administrative.

Target populations – Alternative 1 (no change) uses the most current data regarding population size, distribution, breeding status and habitat conditions to determine appropriate regulations for each species. Early seasons are based on surveys from prior year(s) or current information when available. Data for late seasons are available in July of the current year. Regulatory responses to population changes are faster with annual regulations than with biennial (or longer) regulations (Alternatives 3 and 4). Changes in the regulations to reflect population status also result in achieving optimal harvest levels more consistently. In addition, recovery time for population densities below optimal may be shortened by employing annual versus biennial (or longer) regulations (see Alternatives 3 and 4) because harvest levels would be adjusted in a more timely fashion.

Socioeconomic/Administrative – Alternative 1 describes the current timing and schedule of the Federal administrative process. As the result of Congressional action, the Service altered the late season framework opening and closing dates in 1998, as recommended by several States (63 FR 63580). Given this change in framework dates, the administrative process currently faces severe time constraints and is becoming increasingly untenable. Under the current system, the biological information used to establish hunting seasons does not become available until approximately the same time that recommendations by the Councils must be made in the existing late season process. This schedule leaves limited time for consultation and deliberation, and restricts the amount of time allowed for public comment and for States to conclude their own regulatory process. Cooperation among State, Federal and International agencies is a critical element in this process; thus, sufficient time to consider biological information and to assess the ramifications of the proposals is vital because of the time it takes to promulgate regulations through both the State and Federal regulatory processes. In addition, sufficient time for public consideration and input is necessary because such review is a requirement of the regulatory process, and because public input is valuable in ensuring that proposed rules are both understood and supported by the public. Businesses associated with supplying goods and services to hunters have little lead time to take the hunting season frameworks into consideration, resulting in limited time to adequately adjust inventories to meet changes in demand that might result from changes in regulation. Individuals opposed to hunting also have limited time for input into the proposed regulations. Non-hunters and people generally not interested in the issue likely would not notice an impact.

An additional factor to consider is the administrative strain the current system imposes on available resources. The Service and the States spend significant amounts of time and money in the development of these regulations. The number of meetings that are necessary to implement this system is administratively burdensome and inefficient.

Alternative 2 *(preferred alternative).* Promulgate annual regulations using a single process for early and late seasons based on predictions derived from long-term biological information and established harvest strategies.

Effects: target populations, socioeconomic/administrative.

Target populations - The impact of Alternative 2 on hunted populations of migratory birds compared to the no change alternative is likely to be minimal. Alternative 2 would combine the current early and late season regulatory actions into a single process. Regulatory proposals would be developed using biological data from the preceding year(s), model predictions, or most recently accumulated data that are available at the time the proposals are being formulated. Individual harvest strategies (Chapter 5, section 5.4.3) would be modified using either data from the previous year(s) or model predictions because current year data would not be available for many of these. Considerable technical work would be necessary over a period of years to adjust the underlying biological models to the new regulatory time scale. During this transition period, harvest strategies and prescriptions would be modified to base decisions on the preceding three-year average population status in order to avoid unnecessary regulatory responses to annual variations in status information. This adjustment could be accomplished immediately upon adoption of the new process. Many existing regulatory prescriptions used for Canada geese currently work on this basis. The process would be somewhat less precise in some instances because population projections would be used instead of current-year status information. The use of population projections rather than current year population estimates would add variability to the population estimate from which the regulations are based. However, the uncertainty associated with these status predictions would be accounted for and incorporated into the process. This uncertainty would not result in a disproportionately higher harvest rate for any stock, either annually or on a cumulative basis, because regulations likely would become slightly more conservative due to the increased uncertainty of the population status.

Socioeconomic/Administrative – Under this alternative, the SRC would meet in late April (current: early season – late June; late season – late July/early August) and proposed frameworks would be available for public review by early June (current: early season – mid-July; late season – mid-September). Final frameworks would be published by mid-August (current: early season – late August; late season – late September). The schedule proposed under Alternative 2 would allow 30-60 days for public input and comments (currently the comment period is as short as 10 days). The four Flyway Councils would meet only once instead of twice, and the SRC would meet twice a year, once in January and once in April, instead of the three times they currently convene. The reduced number of meetings would lower administrative costs by 40% per year and substantially lower the Service's carbon footprint due to a decrease in travel and a reduction in the costs associated with the additional meetings.

Alternative 3 Promulgate biennial (or longer) regulations using separate early and late season processes.

Effects: target populations, socioeconomic/administrative.

Target populations – The impact of Alternative 3 on hunted populations of migratory birds may be greater than Alternative 1 or Alternative 2, due to increased time and uncertainty regarding how populations will change as time between setting regulations increases. Alternative 3 would maintain the separate schedules for early and late seasons as described for Alternative 1, but the Flyway Council and SRC would not meet every year. Instead, regulations would be set according to the most up-to-date biological data in the first year and the framework regulations developed in the first year would be carried over into a second (or more) years. Thus, there would be no adjustment made based on the status information from the second year. It is this lack of adjustment based on the current year's data that makes this alternative less responsive to quick changes in status. Even if regulations are adopted that are more conservative on average from the annual process, there would still be the possibility that marked changes in status would not have been properly accounted for. In the years in which only previous-year population status is available, harvest could be slightly above or below the optimal harvest level. The general AHM process would take into account the increased uncertainty caused by the unknown population status every second year, likely resulting in somewhat more conservative regulations overall. For species currently without an AHM process, the Service would address the increased uncertainty by establishing slightly more conservative regulations. Consideration of even longer time periods would result in proportional increases in uncertainty, and thus increasingly more conservative regulations.

The hunting public may be concerned about lost opportunity during times when regulations were not considered but status information suggested additional opportunity might be afforded. Likewise, the hunting public may also consider it questionable management to retain regulations based on data from previous years while not taking into account more current information. Given the preceding caveats, the Service believes that this approach could work for some species. However, there are some species (e.g., geese, cranes) where currently the Service sees no alternative to annual regulatory review because more rigorously defined harvest strategies have been defined that rely on harvest allocations based on current year information. Non-hunters and those opposed to hunting would likely be far more concerned about the possibility of over-harvest and its potential impact on populations.

Socioeconomic/Administrative – Time constraints would still be an issue as described under Alternative 1 in years when regulations were established. This alternative would result in a reduction in administrative costs because the Flyway Councils would meet twice every other year (or longer), but not at all in the intervening year(s). The administrative costs to the Service would be 50% less than Alternative 1 over two years. This alternative would result in greater savings than the preferred alternative

(Alternative 2), but this savings is more than offset by the potential biological costs associated with having an inflexible second year of regulations for some stocks of migratory birds (i.e., geese and cranes). The biological cost stems from the fact that the information on which regulations would be set would be two years out of date during the second year.

Alternative 4 Promulgate biennial (or longer) regulations using a single process for early and late seasons.

Effects: target populations, socioeconomic/administrative.

Target populations – The impact of Alternative 4 on hunted populations of migratory birds will likely be greater than any of the other Alternatives, due to the length of time between decisions and the use of predictions. Alternative 4 is a combination of Alternatives 2 and 3. This alternative would combine the early and late season regulation processes using the data of the preceding year(s), model predictions and any available current data as described under Alternative 2, but maintain framework regulations developed in one year for two (or more) consecutive years (as described in Alternative 3). As such, Alternative 4 would not use current-year population and habitat data to set regulations for any year. This would result in regulations based on population information that was three years out-of-date (instead of two years out-of-date as described above for Alternative 3) during the regulatory process in the second year. The further the removal from current-year measurement of population status, the greater the uncertainty associated with the regulations. However, even taking average performance into account and adjusting regulations to be more conservative is no guarantee that a change of unexpected magnitude will be properly accounted for. Thus, the regulations resulting from this process likely would become more conservative than for any of the other alternatives.

As the most conservative process, this alternative would result in the greatest loss of hunting opportunity compared to the other alternatives. In addition, the potential that the actual population estimates would deviate from the projected estimates (as described in Alternative 3) would increase. Given the preceding caveats, the Service believes that this approach could work for some species. However, there are some species (e.g., geese, cranes) where currently the Service sees no alternative to annual regulatory review because of the limitations caused by harvest allocations based on annual data.

Socioeconomic/Administrative – Time constraints within the year in which regulations were established would be alleviated and additional time would be available for public review and comment (similar to Alternative 2). The administrative costs would be the lowest of all of the alternatives.

Table 6.2. Impacts that alternatives to the schedule and timing of the general regulatory process will have on the affected environment.

Schedule and Timing of the General Regulatory Process	**ALTERNATIVES**			
ENVIRONMENTAL CONSEQUENCES	Alternative 1 *(no change)* Promulgate annual regulations using separate early and late season processes based on previous or current year biological information and established harvest strategies.	Alternative 2 *(preferred)* Promulgate annual regulations using a single process for early and late seasons based on predictions derived from long-term biological information, established harvest strategies, and current year information when available.	Alternative 3 Promulgate biennial (or longer) regulations using separate early and late season processes based on previous or current year biological information and established harvest strategies.	Alternative 4 Promulgate biennial (or longer) regulations using a single process for early and late seasons processes based on previous or current year biological information and established harvest strategies.
Target populations	Fast regulatory response to population changes; optimal harvest levels consistently achieved; short recovery time for below-optimal level populations.	Fast regulatory response to population changes; shorter recovery time for below-optimal level populations.	Regulatory response to population changes not as fast as Alternative 1 and 2; optimal harvests not based on most current population information during second year and beyond. Increased uncertainty and thus more conservative regulations expected to result.	Regulatory response to population changes not as fast as Alternative 1 or 2; optimal harvests not based on most current population information during second year and beyond. Increased uncertainty and thus more conservative regulations expected to result.
Socioeconomic/Administrative	Allows limited time for consultation, review, and public input; little lead time for businesses and individuals to take regulations into consideration, most administratively expensive alternative.	Allows more time for consultation, review and public comment than Alternative 1, less precise predictions may lead to slightly more conservative regulations and less hunting opportunity; meeting expenses ~40% less than current practice (Alternative 1).	Allows limited time for consultation, review, and public input for years for which regulations are set, less precise predictions may lead to more conservative regulations than would result from either alternative 1 or 2, thus less hunting opportunity than Alternative 1 or 2; meeting expenses ~50% less than current practice (Alternative 1) over two years	Allows more time for consultation, review, and public input for years for which regulations are set; less precise predictions may lead to more conservative regulations and less hunting opportunity than any of the other alternatives; meeting expenses ~70% less than current practice (Alternative 1) over two years.
Other wildlife, threatened/endangered species, vegetation, recreation, and physical/cultural resources	-*	-*	-*	-*

* No difference among alternatives; for a review of the impacts/consequences of hunting in general on this environmental aspect, please refer to sections 6.1.5-6.1.9.

6.2.2.2 Frequency of Review and Adoption of Duck Regulatory Packages

A summary of the impacts the two alternatives to this component of the proposed action will have on the affected environment is provided in Table 6.3.

Alternative 1 (*no change alternative*). Regulatory packages adopted annually.

Effects: target populations, socioeconomic/administrative.

Target populations – Annual review and adoption of the basic duck regulatory packages is not likely to have a direct impact on the population status of hunted species. However, although the Service currently adopts the basic duck regulatory packages annually, it has resisted changes to them, with the exception of specific stocks with separate harvest strategies that prescribe when changes are necessary (see section 3.3). The reason the Service has resisted change in the basic duck regulatory packages is because of the need to maintain predictable harvest projections for the optimization step in the current AHM process (see section 3.1.2). Annual changes to the basic duck regulatory packages are expected to have some potential negative impact because the harvest projections would be expected to change with changes to the basic packages. The result of such changes is greater uncertainty resulting from forecasting the impacts of the regulatory alternatives on the appropriate package for a given set of environmental and biological conditions.

Socioeconomic/Administrative – Alternative 1, compared to Alternative 2, significantly increases the administrative cost by annually engaging all stakeholders in a general debate regarding the composition of the basic packages. If changes were to be made either annually or frequently, alternative 1 also threatens the ability to learn in the AHM process by failing to provide a consistent framework of regulatory alternatives on which to evaluate performance.

Alternative 2 *(preferred alternative).* Establish regulatory packages for five-year periods.

Effects: target populations, socioeconomic/administrative.

Target populations – Alternative 2 would allow review and adoption of regulatory packages every five years instead of annually. Adopting such a process would result in limited impacts on population status. Limiting changes to a five-year interval is expected to result in an improvement over the current situation. The improvement would result because of the reduced variability in harvest rates that are expected when compared to allowing annual changes in the basic duck regulatory packages. Adopting packages annually as is presently done could increase variability, if the packages are actually changed annually. In fact, and in recognition of this problem, the Service has kept packages stable, although it reviews and adopts them each year.

Socioeconomic/Administrative – Alternative 2 minimizes the frequency of changes, thereby improving the learning potential under the AHM process, while still affording the option to adjust packages at regular intervals in recognition of changing bird status, environmental conditions, and socioeconomic changes.

Table 6.3. Impacts that alternatives to the frequency of review and adoption of duck regulatory packages will have on the affected environment.

Frequency of Review and Adoption of Duck Regulatory Packages	**ALTERNATIVES**	
ENVIRONMENTAL CONSEQUENCES	Alternative 1 *(no change)* Regulatory packages adopted annually.	Alternative 2 *(preferred)* Establish regulatory packages for five-year periods.
Target populations	This is the current practice and is not likely to significantly impact target populations	Not likely to significantly impact target populations compared to current practice
Socioeconomic/Administrative	Very costly in terms of additional administrative burden to negotiate packages annually. Additionally, the lost learning opportunity caused by more frequent changes is expensive both in terms of harvest opportunity and costs associated with monitoring for less return.	Lowers administrative costs while providing some flexibility to address changing environmental circumstances, increases learning potential compared to alternative 1.
Other wildlife, threatened/endangered species, vegetation, recreation, and physical/cultural resources	-*	-*

* No difference among alternatives; for a review of the impacts/consequences of hunting in general on this environmental aspect, please refer to sections 6.1.5-6.1.9.

6.2.2.3 Stock-Specific Harvest Strategies

A summary of the impacts the three alternatives to this component of the proposed action will have on the affected environment is provided in Table 6.4.

Alternative 1 *(no change, preferred alternative).* Continue use of currently employed stock-specific harvest strategies and develop new strategies when necessary.

Effects: target populations, socioeconomic/administrative.

Target populations – Stock-specific harvest strategies protect individual species deemed biologically incapable of sustaining the harvest levels imposed on jointly managed stocks. Alternative 1 reduces the risk of overharvesting specific stocks without unnecessarily reducing harvest opportunities on more abundant species.

Socioeconomic/Administrative – Alternative 1 allows hunters, businesses and governments to plan for hunting expenses and regulations in advance, since it provides a set of conditions under which regulations would be changed, and the extent of change in those regulations. However, adding additional strategies could increase regulatory complexity because there could be new strategies developed, as needed, to address additional stocks of migratory birds.

Alternative 2 Significantly reduce the use of stock-specific harvest strategies.

Alternative 2 would be accomplished by reducing general seasons to a structure that can be sustained by more stocks than the existing aggregate structures are able to sustain. For example, a simplified set of regulations for general duck seasons would result in a reduction in the number of separate harvest strategies that would be needed for ducks, such as those presently used for northern pintail and scaup.

Effects: target populations, socioeconomic/administrative.

Target populations – Under Alternative 2, stocks currently regulated by the various harvest strategies will be affected in one of two ways, depending on whether the basic duck regulatory packages are reduced. If the regulatory packages were reduced (i.e., reduced season lengths and total daily bag limits) to the level that the less-abundant stocks could sustain the expected harvests, there would be a significant reduction in overall harvest. The population sizes of many of the more abundant duck stocks might be expected to increase up to the limits possible given existing environmental and habitat availability constraints. If the regulatory packages were not reduced, significant increases in harvest would be expected in those stocks currently governed by separate harvest strategies, and further reductions in their population status likely would occur. Due to the disparate status of many migratory bird species currently harvested under general regulations, all separate stock-specific harvest strategies cannot likely be safely eliminated without risk of adverse population/species level impacts. This is because some stocks simply cannot sustain levels of harvest that would be warranted for the majority of stocks. In addition, future circumstances might warrant development of new stock-specific harvest strategies, due to changes in the population status of some stocks. These factors suggest that unless the regulatory packages were reduced, this alternative would be difficult to implement while ensuring sustainability of all of the various migratory bird stocks currently managed.

Socioeconomic/Administrative – The administrative process would not be markedly affected by adoption of Alternative 2 compared to current practice. Regulations still would be established annually (or periodically, depending on the frequency and timing of the regulatory process). The analytical burden associated with special harvest strategies would be lessened because the stocks assessments required by the separate harvest strategies would be reduced significantly. If regular seasons were reduced to the lowest level deemed appropriate for the stocks requiring the most conservative regulations, very significant reductions in hunting opportunity would be expected. Local economies have varying dependence on revenue received from migratory bird hunters. Businesses devoted to selling hunting equipment and supplies, hunting clubs, guides, and hotels and restaurant near major hunting areas depend on hunting for major portions of their annual income. Much of this economic benefit would be lost if seasons were reduced to low levels. If the existing regulatory packages remained unchanged, however, harvest in excess of what the reduced-status populations could withstand would be expected. One advantage is that regulations would be simpler and easier for hunters in terms of understanding and compliance, and would likely result in fewer violations of the bag limit restrictions associated with the separate harvest strategies currently used.

Alternative 3 Expand the use of stock-specific harvest strategies to include most individual stocks.

Effects: target populations, socioeconomic/administrative.

Target populations – This alternative would provide some additional limited protection from potential overharvest, since all stocks would have strategies specifically tailored to their status and population dynamics. However, there is no evidence suggesting that treating most duck stocks in the aggregate is detrimental to any individual stock because most duck stocks experience the same changing environmental effects in any given year and their populations generally respond to these changes in a similar fashion. In those few cases were a specific stock experienced markedly lowered population status (e.g., northern pintails, scaup), development of a stock-specific harvest strategy has helped to stabilize the population. It should be noted that the reasons for such declines cannot be shown to be directly related to harvest management practices (Miller and Duncan 1999; Boomer et al. 2004). For some stocks presently treated in the aggregate, harvest likely would be increased.

Socioeconomic/Administrative – Alternative 3 would provide the maximum harvest opportunity for each stock because strategies would be based on the status of individual stocks. This alternative would be difficult to implement, however, because of the complexity it would generate. Annual regulations, including daily bag limits and season lengths, would likely vary for each independently managed stock. Planning for and executing these annual regulations would be difficult, and it would significantly increase the costs incurred by the States and the Service to promulgate such complex regulations. Significant increases in enforcement expenditures would result, and the predicted increase in hunting violations likely would lead to reduced participation by hunters, particularly hunters who are not comfortable making the numerous species identifications that would be required under this alternative.

Table 6.4. Impacts that alternatives to stock-specific harvest strategies will have on the affected environment.

Stock-Specific Harvest Strategies	**ALTERNATIVES**		
ENVIRONMENTAL CONSEQUENCES	Alternative 1 (*no change, preferred*) Continue use of currently employed stock-specific harvest strategies and develop new strategies when necessary.	Alternative 2 Significantly reduce the use of stock-specific harvest strategies, reducing seasons to those that can be sustained by the most sensitive species.	Alternative 3 Expand the use of stock-specific harvest strategies to include most individual stocks.
Target populations	Reduces the chance of overharvesting; does not limit harvest of abundant migratory game bird species.	Reduction would lead to reduced harvest and increased population sizes for all stocks; nonreduction would lead to increased harvest and population reductions.	Substantially reduces the risk of overharvest.
Socioeconomic/Administrative	Allows hunters, businesses and governments to plan for expenses in advance; adding strategies could increase regulatory complexity.	May lead to decreased hunting opportunity; potentially less resources required for analysis; may result in simpler regulations that would benefit understanding and compliance.	Difficult for hunters, businesses and governments to plan for expenses in advance; regulatory complexity would increase substantially; promulgating such complex regulations would increase state and federal costs; enforcement expenses would rise; regulation complexity may decrease participation by potential hunters who are uncomfortable making numerous species identifications.
Other wildlife, threatened/endangered species, vegetation, recreation, and physical/cultural resources	-*	-*	-*

* No difference among alternatives; for a review of the impacts/consequences of hunting in general on this environmental aspect, please refer to sections 6.1.5-6.1.9.

6.2.2.4 Special Regulations

Special regulations entail additional days of harvest opportunity outside the established frameworks for general seasons, and are employed to provide additional harvest opportunity on overabundant species, species that are lightly harvested and can sustain greater harvest pressure, and/or stocks whose migration and distribution provide opportunities outside the time period in which regular seasons are held. Currently, special regulations include: (1) September teal seasons in the Atlantic, Mississippi, and Central Flyways; (2) September teal and wood duck seasons in Florida, Kentucky, and Tennessee; (3) the special sea duck season along the Atlantic Coast; and (4) special regulations on overabundant resident Canada geese. A summary of the impacts the two alternatives to this component of the proposed action will have on the affected environment is provided in Table 6.5.

Alternative 1 (*no change alternative*). No change to currently-allowed special regulations.

Alternative 1 would maintain the existing special regulation, and the requirements for experimental evaluation of any proposed new special regulations, and periodic assessments of the effects of special regulations.

Effects: target populations, socioeconomic/administrative.

Target populations – The Service does not expect any changes in the current status of target populations under Alternative 1. The long-term population trends of blue-winged and green-winged teal and wood ducks are increasing or stable, thus the special seasons for these species do not appear to have any adverse effects on their population status. Sea duck population trends are not well known (Sea Duck Joint Venture Management Board 2001), however, the estimated harvest remains small relative to the best estimates of population size. Therefore, present practices are not believed to be adversely impacting population status. Despite implementation of many special seasons designed to reduce growth rates and/or numbers of overabundant resident Canada geese, populations in all four flyways continue to increase in many areas, suggesting that increased harvest opportunities alone may not reduce some of these overabundant stocks.

Socioeconomic/Administrative – Under Alternative 1, current harvest opportunities would be maintained, the current number of hunters and/or the number of days they hunt are not expected to change as a result of this alternative. Thus, current economic impacts of migratory bird hunting on businesses and communities would not be altered under Alternative 1 compared to current practice. Administrative costs would be maintained and experimental requirements would remain in place for all new special regulations. Costs of conducting experiments would be borne by those requesting the new seasons.

Alternative 2 (*preferred alternative*). Eliminate experimental evaluation requirements for special regulations on overabundant resident Canada geese, periodically re-evaluate other existing special regulations on a case-by-case basis to determine whether they are still justified, and require experiments for any new special regulations not involving resident Canada geese.

Effects: target populations, socioeconomic/administrative.

Target populations – Several target populations would benefit from the biological review that would determine if special harvest opportunities were still warranted. In particular, special seasons for sea ducks and teal would be considered. Elimination of experimental season evaluations for overabundant resident Canada geese is not expected to alter their population status, but is expected to expedite actions designed to increase harvest of these birds. Sufficient experimentation already has been conducted, and the results indicate that these seasons will not endanger the resident geese. There are some risks to non-target migrant Canada goose populations; however, recent studies provide sufficient data regarding select areas where such seasons could pose a problem for non-target goose populations and those areas would be addressed on a case-by-case basis to ensure non-resident stocks are not negatively impacted.

Socioeconomic/Administrative – Alternative 2 would lead to increased administrative costs associated with the re-evaluation of the existing special regulations. The Service has historically reviewed special regulations when changes in status or environmental conditions suggest there is a reason to do so. This alternative would continue that practice. Although there would be an initial increase in cost associated with such re-evaluations, there could be financial savings associated with elimination of the experimental evaluation requirement for most resident Canada goose special regulations. Depending on findings, the results of those evaluations could lead to expansion of one or more of the current special duck seasons or establishment of additional special seasons, either of which would result in more hunting opportunity and the associated economic benefits. On the other hand, evaluations could lead to reduction or elimination of one or more current special seasons, resulting in reduced hunting opportunity and some negative impacts on local economies. There would be some financial savings associated with elimination of the experimental evaluation requirement for most resident Canada goose special regulations. Expediting the approval of additional special regulations for resident Canada geese would increase harvest and result in fewer of those birds, which in turn would reduce crop depredation and other conflicts caused by their overabundance.

Table 6.5. Impacts alternatives to special regulations will have on the affected environment.

Special Regulations	**ALTERNATIVES**	
ENVIRONMENTAL CONSEQUENCES	Alternative 1 *(no change)* No change to currently-allowed special regulations.	Alternative 2 *(preferred)* Eliminate experimental evaluation requirements for special regulations on overabundant resident Canada geese, periodically re-evaluate other existing special regulations on a case-by-case basis to determine whether they are still justified, and require experiments for any new special regulations not involving resident Canada geese.
Target populations	No adverse consequences to teal or wood ducks (population trends are increasing or stable), consequences to sea ducks uncertain, but believed minor, resident Canada goose populations expected to stabilize or continue to increase.	Biological reviews would be beneficial for some species; lack of additional biological review not expected to impact resident geese; some risk to non-target migrant Canada goose populations.
Socioeconomic/administrative	Current special regulations provide additional hunting opportunity; have positive impacts on hunters and local economies and reduce crop depredation and other adverse impacts of overabundant resident Canada geese.	Biological reviews of special duck regulations could result in either more hunting opportunity and positive impacts on local economies, or less hunting opportunity and negative economic impacts; expediting special regulations for Canada geese would increase hunting opportunity and benefit local economies, and farmers would benefit from less crop depredation.
Other wildlife, threatened/endangered species, vegetation, recreation, and physical/cultural resources	-*	-*

* No difference among alternatives; for a review of the impacts/consequences of hunting in general on this environmental aspect, please refer to sections 6.1.5-6.1.9.

6.2.2.5 Management Scale for the Harvest of Migratory Birds

Management scale refers to the geographic area in which stocks are monitored and harvest is managed. The management scale determines the degree to which harvest regulations can differ geographically. The finer the scale, the higher the cost monitoring will be to management agencies. The desire for smaller management scales is driven by the potential for increased harvest opportunity associated with more refined geographic management. A summary of the impacts the three alternatives to this component of the proposed action will have on the affected environment is provided in Table 6.6.

Alternative 1 *(no change, preferred alternative).* Maintain the current scale of management for all migratory bird species.

Ducks would be managed by flyway based on the status of three mallard stocks (eastern, western, and mid-continent) except the species covered by species-specific harvest strategies, which would be managed at the continental scale. Mourning doves would be managed separately in three regions of the U.S., woodcock in two regions, and geese, sandhill cranes, tundra swans, and band-tailed pigeons would be managed as currently defined individual populations. Coots, gallinules and moorhens, snipe, and rails would be managed at the continental scale.

Effects: target populations, socioeconomic/administrative.

Target populations – This alternative ensures sustainable continental populations of mallards and other duck species that are the subjects of species-specific harvest strategies, because those harvest strategies are supported by adequate population size, harvest monitoring programs, and other relevant population statistics. Likewise, geese, mourning doves, woodcock, sandhill cranes, tundra swans, and band-tailed pigeons are monitored at their current management scales to ensure sustainability. However, if distinct subpopulations exist within any of the currently defined populations/species, and have demographics that differ greatly from the management-scale-wide average, those subpopulations could undergo undetected growth or decline under Alternative 1. Coots, gallinules, moorhens, snipe, and rails are managed at the continental scale under this alternative.

Socioeconomic/Administrative – Alternative 1 maintains the traditional approach of allowing for recognition of geographic variation in harvest opportunity while maintaining a relatively limited number of geographic units that must be monitored and managed separately. Costs of monitoring and managing at the current scale have been considered acceptable to the public and the cooperating management agencies. To date, the level of hunting opportunity that this alternative affords has been adequate to satisfy migratory bird hunters in most years. This approach represents a compromise between recognition of existing natural variation in abundance and distribution with the costs associated with managing at more refined geographic scales, such as is considered in Alternative 3 for this component.

Alternative 2 Expand the existing management scale by reverting to a single continental management scale for population monitoring of ducks, mourning doves, and American woodcock. The existing harvest-management units (e.g., flyways, management units) would be maintained to account for regional differences in hunter numbers and harvest pressure.

Effects: target populations, socioeconomic/administrative.

Target populations – This alternative would use the continental population status of ducks to determine the hunting regulations. This was the approach used prior to the 1990s (see Chapter 2). Traditional flyway differences would be preserved with regard to the composition of the duck regulatory packages, the primary difference being that the package (restrictive, moderate, liberal or closed) selected by the AHM process would apply to all four flyways. The present system allows the regulatory package selection for the general duck season to vary in the Atlantic and Pacific Flyways from what is chosen for the Central and Mississippi Flyways. Under this alternative, duck hunting regulations would be more conservative on average because the harvest potential of mid-continent mallards is less than that of the eastern and western stocks. The resulting reduction in harvest would yield slightly greater population sizes of most duck species over the long term. The existing mourning dove and American woodcock harvest-management units would be maintained, but as with ducks, the regulatory package selected would be based on continental monitoring and would apply to all three (mourning doves) or both (woodcock) management units. If any stock of mourning dove or woodcock has lower or higher harvest potential than the overall continental population, that stock could be over- or under-harvested under Alternative 2.

Socioeconomic/Administrative – The costs of monitoring would be reduced somewhat because special surveys and increased banding efforts (conducted to monitor eastern and western mallards) could be reduced or eliminated. Other survey and banding programs might be reduced if additional management units were combined. Because the Atlantic and Pacific Flyways generally support more stable mallard populations with greater harvest potential than the mid-continent region, they would have more conservative duck hunting regulations on average under this alternative, and thus, less hunting opportunity over the long term. Given the current status of mourning doves and woodcock, we would expect minimal impact on hunting opportunity for those species.

Alternative 3 Further geographically refine the scale of duck harvest management, to a greater degree than is currently done, and maintain existing management scales for other stocks (see Chapter 5.4.5).

Effects: target populations, socioeconomic/administrative.

Target populations – Additional geographic refinement for hunted migratory bird populations would not affect those populations more than Alternative 1 except to further reduce the risk of exceeding a sustainable harvest, because the further refinement would be based on additional biological information and tailored to the specific stocks.

Socioeconomic/Administrative – Alternative 3 is the least cost-effective alternative because further geographic refinement can only be achieved by increasing the intensity of current monitoring activities, and this comes at an increased cost to management agencies. To date, geographic refinement of duck regulations has not resulted in pronounced gains in hunting opportunity, and further geographic refinement for most hunted migratory birds is not likely to yield markedly increased harvest opportunities. Thus, the additional administrative and monitoring costs associated with this alternative are unlikely to yield significant increases in socioeconomic benefit.

Table 6.6. Impacts that alternatives to the management scale for the harvest of migratory birds will have on the affected environment.

Management Scale for the Harvest of Migratory Birds	**ALTERNATIVES**		
ENVIRONMENTAL CONSEQUENCES	Alternative 1 *(no change, preferred)* Maintain the current scale of management for all migratory bird species.	Alternative 2 Expand the existing management scale by reverting to a single continental management scale for population monitoring of ducks, mourning doves, and American woodcock.	Alternative 3 Work to further geographically refine the scale of duck harvest management, and maintain existing management scales for other stocks.
Target populations	Provides population and harvest monitoring that ensures sustainable populations of all hunted species, but does not guarantee protection of all subpopulations.	More conservative hunting regulations for ducks resulting in slightly higher populations over the long term; individual stocks of mourning doves or woodcock could be over- or under-harvested.	Same impact as Alternative 1, except less risk of exceeding sustainable harvest.
Socioeconomic/administrative	Provides levels of hunting opportunity that have been adequate to satisfy migratory bird hunters most years; expenses at this level of management are moderate and acceptable.	Duck harvest opportunities, and spending in local economies, may be reduced in the Atlantic and Pacific Flyways; expenses associated with monitoring would lessen.	Harvest opportunities may increase slightly over levels provided by Alternative 1, but expenses associated with administration and monitoring would increase substantially.
Other wildlife, threatened/endangered species, vegetation, recreation, and physical/cultural resources	-*	-*	-*

* No difference among alternatives; for a review of the impacts/consequences of hunting in general on this environmental aspect, please refer to sections 6.1.5-6.1.9.

6.2.2.6 Zones and Split Seasons

Zoning involves the division of a State into two or more areas, each of which is permitted a full season at different times. States may then split their hunting season (for most species) into two or more nonconsecutive segments, with a closed period between segments. The combination of zones and split seasons allows a State to maximize harvest opportunity within the Federal frameworks without exceeding the number of days allowed for a given season. Currently, States select zone/split configurations for five year periods for ducks and doves. After each five year period, States have the opportunity to change their configurations within the provisions of the guidelines. The use of zones and split seasons for other migratory game birds is handled on a case-by-case basis. A summary of the impacts the two alternatives to this component of the proposed action will have on the affected environment is provided in Table 6.7.

Alternative 1 (*no change, preferred alternative*). Continue the current use of zones and split seasons and the five-year schedule for consideration of changes.

Effects: target populations, socioeconomic/administrative.

Target populations – Use of zones and split seasons results in some additional harvest, but the incremental impacts of each State's existing zone and split season configuration on the overall harvest of ducks and doves are unknown. However, most duck and dove populations are stable or increasing, indicating that within the context of other framework regulations, current zone and split season configurations are not adversely impacting those populations. When reductions in harvest are necessary, they are accomplished through framework regulations, taking into account the effects of existing zone and split season configurations. Thus, Alternative 1 is not expected to have any measurable impacts on target duck and dove populations compared to current practice.

Socioeconomic/Administrative – Use of zones and split seasons enables States to maximize hunting opportunity, thereby encouraging participation in migratory bird hunting and resulting in increased benefits to local economies. Alternative 1 would maintain those benefits at current levels. Limiting the frequency of potential changes to the proposed five-year interval for zone/split-season configurations would continue to be somewhat less responsive to public desires for adjustments, but there is no evidence that this has impacted hunter participation negatively. States incur some costs associated with contacting their hunting publics to assess their desires with regard to zone locations and dates for split seasons, primarily through public meetings and surveys.

Alternative 2 Allow annual adjustments to zone/split-season configurations for all migratory game birds.

Effects: target populations, socioeconomic/administrative.

Target populations – The consequences of Alternative 2 to target populations are not expected to differ from those of Alternative 1, except that annual adjustments to zone and split configurations would complicate any attempt to assess the impacts of zones and split seasons on target populations and add increased uncertainty to the predicted harvest that would be expected to result from the annual framework regulations that were established.

Socioeconomic/Administrative – Annual adjustments to zone and split season configurations are administratively burdensome and would increase the costs associated with the annual promulgation of regulations. Alternative 2 might increase hunter satisfaction by allowing States to respond more rapidly (i.e., annually) to hunters' preferences for changes in zone/split configurations than Alternative 1 allows. However, waterfowl hunter attitude surveys conducted by Ringleman (1997) suggest that neither zones nor split seasons were issues that mattered much to the majority of duck hunters he surveyed. There is no information available on whether annual adjustments to zones and split seasons would result in more hunter participation and the associated increase in economic benefits, but based on the study by Ringleman, this seems unlikely.

Table 6.7. Impacts that alternatives to zones and split seasons will have on the affected environment.

Zones and Split Seasons	**ALTERNATIVES**	
ENVIRONMENTAL CONSEQUENCES	**Alternative 1** (*no change, preferred alternative*). Continue the current use of zones and split seasons and the five-year schedule for consideration of changes.	**Alternative 2** Allow annual adjustments to zone/split-season configurations for all migratory game birds.
Target populations	No impact – target populations will continue to be harvested at levels that maintain healthy populations, based on framework regulations that take zones and split seasons into account	No impact – target populations will continue to be harvested at levels that maintain healthy populations, based on framework regulations that take zones and split seasons into account
Socioeconomic/administrative	Administrative costs would continue to be moderate; States would only be able to respond to hunter preferences on zones and split seasons periodically, potentially reducing hunter satisfaction	Administrative costs would increase substantially; States could respond to hunter preferences on zones and split seasons annually, potentially increasing hunter satisfaction
Other wildlife, threatened/endangered species, vegetation, recreation, and physical/cultural resources	-*	-*

* No difference among alternatives; for a review of the impacts/consequences of hunting in general on this environmental aspect, please refer to sections 6.1.5-6.1.9.

6.2.2.7 Subsistence-Harvest Regulatory Process

A summary of the impacts the two alternatives to this component of the proposed action will have on the affected environment is provided in Table 6.8.

Alternative 1 *(no change, preferred alternative).* Allow a spring-summer subsistence hunting season with regulations necessary to ensure the long-term conservation of the migratory bird resource.

Under Alternative 1, the Service would continue to allow a spring-summer harvest of migratory birds. The harvest would, to the extent possible, be consistent with the customary and traditional subsistence harvest of migratory birds by Alaskan indigenous inhabitants, while providing for their long-term sustained use. Egg gathering would be consistent with the customary and traditional subsistence harvest of eggs by Alaskan indigenous inhabitants. Only bird populations that are determined to be capable of supporting this sustained use would be open to harvest. The Service will consider several actions when establishing subsistence hunting regulations consistent with the long term-conservation of species open to subsistence harvest. A summary of the potential management tools that could be employed to regulate subsistence harvest under these actions are listed and described in Chapter 5, section 5.4.7.

Effects: target populations, socioeconomic/administrative.

Target populations – The Preamble of the 1995 Protocol to the Migratory Bird Treaty Amendment states, "…*it is not the intent of this Protocol to cause significant increases in the take of species of migratory birds relative to their continental population sizes*." The use of household surveys of subsistence harvest areas will enable tracking of participation in subsistence harvest activities and the extent of the take. Should the harvest significantly increase relative to continental populations, then regulatory actions would be taken to keep harvest in compliance with the Protocol Amendment.

Socioeconomic/Administrative – Under Alternative 1, law enforcement efforts would be carried out commensurate with threats to migratory bird populations to ensure that compliance is achieved to maintain harvest at prescribed levels. The subsistence economies of rural areas would continue to benefit from an important food resource which is traditionally shared among members of a community. In addition, this alternative promotes the establishment of regulations recommended by the AMBCC which, along with the regional management bodies, is the embodiment of the co-management process. Greater compliance with regulations developed through the co-management process is more likely than with Alternative 2 (which was not recommended by the AMBCC). By being part of the regulatory process, subsistence hunters, and those who share in the harvest, will have a sense of ownership, leading to greater compliance. An example of how this has worked in the past is the population recovery of cackling Canada geese that nest on the Y-K Delta, in Alaska. The institution of the Hooper Bay agreement in advance of the Migratory Bird Treaty Amendment led to reduced subsistence and reduced fall-winter harvests of cackling Canada geese and helped the population recover from a low of about 25,000 birds to the current population size of approximately 200,000 (Pamplin 1986; Collins and Trost 2009). Participation in the regulatory process also is anticipated to result in greater participation in the harvest survey. Broader coverage of the survey would lead to more accurate harvest data because it would include the harvest of more of the subsistence hunter population.

Alternative 2 Open a spring-summer subsistence hunting season which incorporates fall-winter hunting season regulations (e.g., bag limits, shooting hours).

Under Alternative 2, the Service would replace the current spring-summer subsistence hunting season regulations with a spring-summer harvest of migratory birds, utilizing the same regulations as those previously described for the fall-winter period in all States. Thus, the methods and means required for fall-winter hunting would be adopted, including daily bag limits for individual hunters, species restrictions (as applicable), shooting hours, etc. In addition, the fall-winter regulations concerning exchange and transport of birds and bird parts also would apply.

Effects: target populations, socioeconomic/administrative.

Target populations – Under Alternative 2, daily bag and possession limits would be imposed for all species, unlike Alternative 1 which imposes very limited use of bag limits and only for select species of conservation concern. With increased use of bag limits, the legal take of birds could be reduced (depending on the level at which bag limits were established). Egg gathering would, to the extent possible, be consistent with the customary and traditional subsistence harvest of eggs by Alaskan indigenous inhabitants. The concept of daily bag limits is foreign to subsistence harvesters and considerable education would be required to make such limits effective.

Socioeconomic/Administrative – Customary and traditional methods for taking migratory birds for subsistence in Alaska differ greatly from non-subsistence hunting. Birds are often the first new food supply available after an Alaskan winter. Subsistence users harvest birds not only for themselves and their immediate families, but also to share with other members of their community. The tradition of sharing is a critical element of the subsistence way of life. Birds are collected by the most efficient methods available, often following traditions within most Alaska Native cultures. The adoption of fall-winter harvest regulations would require great changes to the customary and traditional use practices. If individual daily bag limits were imposed in addition to fall-winter season methods and means, Alaskan subsistence communities may not be able to meet their nutritional needs. Changes in traditional harvest approaches would also require considerably higher expenditures by management agencies on education and enforcement to successfully implement the new approaches.

Table 6.8. Impacts that alternatives to the subsistence-harvest regulatory process will have on the affected environment.

Subsistence-Harvest Regulatory Process	**ALTERNATIVES**	
ENVIRONMENTAL CONSEQUENCES	Alternative 1 *(no change, preferred alternative)* Allow a spring-summer subsistence hunting season with those regulations necessary to ensure the long-term conservation of the migratory bird resource.	Alternative 2 Replace the current spring-summer subsistence hunting season regulations with a spring-summer subsistence hunting season that incorporates fall-winter hunting season regulations (e.g., bag limits, shooting hours).
Target populations	Birds would be impacted but no change from current harvest levels would be anticipated because this is the no change alternative. Current harvest levels have proven to be sustainable.	Some additional regulations would apply, a shot-shell limit (3) would be imposed for shotguns used for hunting migratory birds, hunting hours would be established daily from ½ hour before sunrise until sunset, and daily bag limits would be imposed. All of these regulations would likely lead to a reduction in overall harvest, but would likely be of little population level impact because current levels of subsistence take with existing regulations have proven to be sustainable.
Socioeconomic/administrative	Subsistence communities in rural Alaska would benefit from the migratory bird resource; traditional cultural practices would be sustained; a higher level of compliance is more likely with the regulations that are established; the spirit of cooperation and participation in surveys is likely to be greater because these regulations would conform to current cultural practices.	The number of birds taken by a single individual could decrease, potentially resulting in less food available to communities in rural Alaska; compliance with regulations would likely to be difficult to achieve because such regulations are not current cultural practices; expenses to enforce compliance and educate the subsistence hunting public would likely increase and participation in cooperative management programs and harvest surveys would likely decrease
Other wildlife, threatened/endangered species, vegetation, recreation, and physical/cultural resources	-*	-*

* No difference among alternatives; for a review of the impacts/consequences of hunting in general on this environmental aspect, please refer to sections 6.1.5-6.1.9.

6.2.2.8 Consequences of Alternatives Summary

None of the proposed alternatives would result in a harvest strategy that is not sustainable. All of the specific regulatory decisions will be revisited annually and the regulations will be adjusted based on the observed status and trends of the stock at issue. Changes in status due to factors other than hunting (i.e., climate change, disease, catastrophic weather events, etc.) would be taken into account and addressed in the subsequent year's hunting regulations. Most other potential impacts to the affected environment associated with the issuance of hunting regulations are not significant and no long-term impacts are anticipated. The major environmental consequences of the alternatives presented in SEIS 2010 are administrative (the annual process of how the regulations are established) and socioeconomic (i.e., variations in hunting opportunity and the costs and benefits associated with these variations), so a summary of the socioeconomic/administrative environmental cumulative impacts is warranted. At one extreme, the most administratively burdensome (thus most costly) regulatory actions lead to increased hunting opportunity, lower average population levels, and the most complex regulations on an annual basis. Those regulatory actions that are the least administratively burdensome (thus less costly) result in lower levels of hunting opportunity, generally higher average population levels, and the least complex regulations that would be established on an annual basis. From a biological perspective, either extreme is sustainable as described in these actions and their alternatives.

The fundamental issue addressed by the proposed action is determining how to balance complexity and administrative burden with appropriate levels of harvest opportunity in establishing annual migratory bird hunting regulations. The alternatives outlined in this document strike various levels of balance between these extremes and are based on the entire history and experience derived from the successful harvest management of migratory birds gained over the past century. The overall impact will be the sustainable harvest of millions of migratory birds annually, providing millions of hours of outdoor recreation for millions of Americans, and resulting in billions of dollars of expenditures in local economies, primarily rural, that support hunter activities throughout the U.S. As stated previously, no component associated with the proposed action considered in this document is expected to threaten the long-term viability of any hunted migratory bird population.

6.3 RELATIONSHIP TO LAWS AND POLICIES

6.3.1 Conventions

6.3.1.1 Convention between the United States and Great Britain (for Canada) for the Protection of Migratory Birds.

This 1916 treaty adopted a uniform system of protection for certain species of birds which migrate between the U.S. and Canada to assure the preservation of species, either harmless or beneficial to man. It sets certain dates for closed seasons on migratory game birds and prohibits hunting insectivorous birds but allows killing of birds under permit when injurious to agriculture. Implementing legislation for the U.S. was accomplished by enactment of the MBTA of 1918.

6.3.1.2 Convention between the United States of America and the United Mexican States for the Protection of Migratory Birds and Game Mammals.

This 1936 treaty adopted a system for the protection of certain migratory birds in the U.S. and Mexico. It allows, under regulation, the rational use of certain migratory birds and provides for enactment of laws and regulations to protect birds by establishment of closed seasons and refuge zones. It was signed in Mexico City, February 7, 1936. Implementation of the treaty was accomplished by amending the MBTA of 1918. The treaty was amended March 10, 1972, to add 32 additional families of birds, including eagles, hawks, owls, crows and jays.

6.3.1.3 Convention between the Government of the United States of America and the Government of Japan for the Protection of Migratory Birds and Birds in Danger of Extinction, and Their Environment.

This Convention was designed to provide for the protection of species of birds which are common to both countries or which migrate between them by: (1) enhancement of habitat, (2) exchange of research data, and (3) regulation of hunting. The treaty was signed in Tokyo on March 4, 1972, and documents of ratification were exchanged September 19, 1974. The Convention entered into force September 19, 1974.

6.3.1.4 Convention between the United States of America and the Union of Soviet Socialist Republics Concerning the Conservation of Migratory Birds and Their Environment.

This Convention, signed in Moscow on November 19, 1976, provides for protection of species of birds that migrate between the U.S. and the Soviet Union or that occur in either country and "have common flyways, breeding, wintering, feeding or moulting areas." The Convention also encourages actions to identify and protect important habitat and to cooperate in measures to protect migratory birds identified as being in danger of extinction. It also provides for the subsistence use of the migratory bird resource, under regulations, by inhabitants of Alaska. Documents of ratification were exchanged on October 13, 1978, and it was implemented on November 8, 1978.

6.3.2 Laws

6.3.2.1 Migratory Bird Treaty Act of 1918, as amended

The Service carries out the duties and responsibilities of the Secretary of the Interior with regard to the MBTA (16 U.S.C. §703-712). The MBTA implements four bilateral conventions for the conservation of migratory birds with Canada, Mexico, Japan, and Russia. Unless permitted by regulations adopted pursuant to the MBTA, it is unlawful to pursue, hunt, take, capture or kill; attempt to take, capture or kill; possess, offer to or sell, barter, purchase, deliver or cause to be shipped, exported, imported, transported, carried or received any migratory bird, part, nest, egg or product, manufactured or not. The Secretary is authorized and directed to determine "when, to what extent, if at all, and by what means, it is compatible with the terms of the conventions to allow hunting, taking, capture, killing, possession, sale, purchase, shipment, transportation, carriage, or export of any such bird, or any part, nest, or egg thereof, and to adopt suitable regulations permitting and governing the same, in accordance with such determinations...” (16 U.S.C. §704). This proposed action is undertaken expressly to address how such regulations will be developed and implemented. The treaties with Japan and the Soviet Union include specific mandates to protect migratory bird habitats.

6.3.2.2 Administrative Procedure Act of 1946

Public Law 79-404, as amended. This Act is designed to improve the administration of justice by prescribing fair administrative procedure. It outlines several forms of administrative proceedings (hearings, adjudication, etc.) and prescribes procedural and substantive limitations thereon.

6.3.2.3 Migratory Bird Hunting and Conservation Stamp Act, as amended

The "Duck Stamp Act," as this March 16, 1934 Act is commonly referred to, requires waterfowl hunters 16 years of age or older to possess a valid Federal hunting stamp. Receipts from the sale of the stamp are directed to the acquisition of migratory bird refuges under provisions of the Migratory Bird Conservation Act, as amended, and since August 1, 1958, (Public Law 85-585) for acquisition of "Waterfowl Production Areas." The Postal Service prints, issues and sells the stamp and is reimbursed for its expenses from money in the fund. A 1976 amendment changed the name of the stamp from "Migratory Bird Hunting Stamp" to "Migratory Bird Hunting and Conservation Stamp."

6.3.2.4 National Historic Preservation Act (NHPA) of 1966, as amended

The National Historic Preservation Act (NHPA) of 1966, and its implementing regulations (36 CFR §800), require Federal agencies to: (1) determine whether any undertaking (Federally-funded or assisted project) will result in changes in the character or use of historic properties (buildings, structures, objects, sites, districts, and archeological resources); (2) if so, to evaluate the impact such undertakings would have on the historic properties and consult with the State Historic Preservation Office regarding the value and management of specific resources; and (3) consult with appropriate American Indian Tribes to determine whether they have concerns for traditional culture properties in areas of these Federal undertakings. Activities, as described under the proposed action, do not cause ground disturbances, nor do they have the potential to significantly affect visual, audible, or atmospheric elements of historic properties and are thus not undertakings as defined by the NHPA. A copy of the Draft SEIS 2010 has been provided to the Bureau of Indian Affairs to allow them an opportunity to express any concerns that might need to be addressed prior to a decision.

6.3.2.5 National Environmental Policy Act of 1969 (NEPA), as amended (42 U.S.C. §4321-4347)

Public Law 91-190, approved January 1, 1970. NEPA requires Federal agencies to evaluate the potential environmental impacts when planning a major Federal action and ensures that environmental information is available to public officials and citizens before decisions are made and before actions are taken. In general, the NEPA process entails: determining what need must be addressed, identifying alternative ways of meeting the need, analyzing the environmental impacts of each alternative, and deciding which alternative to pursue and how. There are seven major steps in the planning process for the development of an EIS and the implementation of the proposed action. These include:

(1) **Publication of Notice of Intent** – The Notice of Intent to prepare a SEIS on the Hunting of Migratory Birds was published in the *Federal Register* (70 FR 53376) on September 8, 2005. This initiated the scoping process.

(2) **Identification of Issues and Concerns** – The Notice of Intent solicited public participation in the scoping process, which is the chief way that issues, concerns, and potential management options are communicated from the public to the lead agency. In addition to writing or e-mailing comments, citizens could attend any of 12 public meetings held across the U.S. These meetings were publicized in the March 9, 2006 *Federal Register* (71 FR 12217). In addition to these public meetings, the Service established a website to receive electronic comments and solicited written comments. The Service also announced that all comments received from the initiation of this process on September 8, 2005 until May 30, 2006 would be considered in the development of the SEIS. A report summarizing the scoping comments and scoping meeting was prepared and made available on the Service's website at: http:www.fws.gov/migratorybirds.

(3) **Development of Alternatives** – Following scoping, the Service determined that there are six components of the proposed action for which alternatives can be considered regarding how annual regulations are to be established for the hunting of migratory birds at this time. In addition, alternatives for the subsistence-hunting regulations process should be considered. These alternatives were based on NEPA regulations, public comments, interagency meetings, internal discussion, and review of available scientific information.

(4) **Analysis of Environmental Effects** – After significant issues and alternatives were established, environmental analyses were prepared in order to help the decision-makers and the public understand the environmental consequences of the various alternatives.

(5) **Publication of Notice of Availability of the draft SEIS** – This *Federal Register* publication will announce the completion of the draft SEIS and its availability for public review. An extended

comment period (beyond the customary 60 days) will be offered, during which several public meetings will be held.

(6) **Publication of Notice of Availability of Final Supplemental Environmental Impact Statement** – This *Federal Register* publication follows the public comment period and the review and revision of the draft, based on the comments received for the DEIS; and announces the completion of the Final SEIS, followed by a 30-day waiting period, prior to the beginning of any implementation of the components of the proposed action.

(7) **Publication of Record of Decision and National Management Plan** – This is the final step of the SEIS decision-making process, which states the selected alternative and why it was chosen. The actions associated with the SEIS cannot be taken until the Record of Decision is issued.

6.3.2.6 Endangered Species Act of 1973

Public Law 93-205 of December 28, 1973. The Act provides for the conservation of threatened and endangered species of fish, wildlife and plants by Federal action and by encouraging the establishment of State programs. Specifically, the Act: authorizes the determination and listing of species as endangered and threatened and the range in which such conditions exist, prohibits unauthorized taking, possession, sale, transport, etc., of endangered species, authorizes the establishment of cooperative agreements and grants-in-aid to those States which establish and maintain an active and adequate program for endangered and threatened species, and authorizes the assessment of civil and criminal penalties for violating the Act or regulations. The 1978 amendment made substantial changes to the original law, especially regarding Federal construction projects, consultation processes, designating critical habitats, and listing and reviewing listed species.

Section 7 of the Endangered Species Act (ESA), as amended (16 U.S.C. §1531–1543; 87 Stat. 884) provides that "The Secretary shall review other programs administered by him and utilize such programs in furtherance of the purposes of this Act" [Section 7 (a)(1)] and shall "… insure that any action authorized, funded, or carried out … is not likely to jeopardize the continued existence of any endangered species or threatened species or result in the destruction or adverse modification of [critical] habitat ..." [Section 7 (a)(2)]. Section 7 consultation under the ESA for this proposed action has been initiated and the result of the consultation is available to the public at the following website: (http://www.regulations.gov/search/Regs/home.html#documentDetail?R=0900006480a11301).

6.3.2.7 Freedom of Information Act

Public Law 93-502 of November 21, 1974. This Act requires all Federal agencies to make available to the public for inspection and copying, administrative staff manuals and staff instructions, official published and unpublished policy statements, final orders deciding case adjudication and other documents. Certain categories of privileged material are exempt.

6.3.2.8 Fish and Wildlife Improvement Act of 1978

Public Law 95-616 of November 8, 1978. Among other things, this Act amended the MBTA of 1918 to authorize the Secretary of the Interior to issue regulations to implement the Convention between the U.S. and the Union of Soviet Socialist Republics Concerning the Conservation of Migratory Birds and their Environment. The amendment also authorizes the Secretary to issue regulations to assure the subsistence rights of indigenous inhabitants of the State of Alaska in accordance with the Soviet Treaty.

6.3.2.9 Regulatory Flexibility Act

Public Law 96-354 of September 19, 1980. The Regulatory Flexibility Act of 1980 (5 U.S.C. §601 et seq) requires the preparation of flexibility analyses for actions that will have a significant effect on a substantial number of small entities, which include small businesses, organizations, or governmental jurisdictions. The economic impacts of the annual hunting regulations on small business entities are analyzed in detail and summarized in section 6.1.10.3 as part of the cost-benefit analysis discussed under Executive Order 12866 (below). This analysis was revised annually during 1990–1995. In 1995, the Service issued a Small Entity Flexibility Analysis (Analysis), which was subsequently updated in 1996, 1998, 2004, and 2008. The primary source of information about hunter expenditures for migratory game bird hunting is the National Hunting and Fishing Survey, which is conducted at five-year intervals. The 2008 Analysis was based on the 2006 National Hunting and Fishing Survey and the U.S. Department of Commerce's County Business Patterns, from which it was estimated that migratory bird hunters would spend approximately $1.2 billion at small businesses in 2008. Copies of the Analysis are available from our website: http://www.fws.gov/migratorybirds/reports/reports.html or at http://www.regulations.gov.

6.3.2.10 Alaska National Interest Lands Conservation Act of 1980

Public Law 96-487 of December 2, 1980. Among other things, this Act in Title VIII addresses in length provisions for subsistence taking of fish and game in Alaska; however, an exception for migratory birds is contained in Section 815 of that Title. Specifically, Section 815 says that nothing in Title VIII shall be construed as modifying or repealing the provisions of any Federal law governing conservation or protection of fish and wildlife (e.g., MBTA, Fish and Wildlife Improvement Act).

6.3.2.11 Unfunded Mandates Reform Act

Public Law 104-4 of March 22, 1995. The Unfunded Mandates Reform Act of 1995 requires agencies to assess the effects of Federal regulatory actions on State, local, and Tribal governments and the private sector. The purpose of the Act is to strengthen the partnership between the Federal Government and State, local and Tribal governments and to end the imposition, in the absence of full consideration by Congress, of Federal mandates on these governments without adequate Federal funding, in a manner that may displace other essential governmental priorities. It has been determined, in compliance with the requirements of the Unfunded Mandates Reform Act, 2 U.S.C. §1502 et seq., that the proposed action would not impose a cost of $100 million or more in any given year on local or State government or private entities. Therefore, this action is not a “significant regulatory action” under the Unfunded Mandates Reform Act.

6.3.3 Executive Orders

6.3.3.1 Federal Regulation

Executive Order 12291 of February 17, 1981, seeks to reduce the burdens of existing and future regulations, increase agency accountability for regulatory actions, provide for Presidential oversight of the regulatory process, minimize duplication and conflict of regulations, and ensure well-reasoned regulations.

6.3.3.2 Regulatory Planning Process

Executive Order 12498 of January 4, 1985, seeks to create a coordinated process for developing (on an annual basis) the Administration Regulatory Program, establish Administration regulatory priorities, increase the accountability of agency heads of the regulatory actions of their agencies, provide Presidential oversight of the regulatory process, reduce the burdens of existing and future regulations, minimize duplication and conflict of regulations, and enhance public and Congressional understanding of the Administration’s regulatory objectives.

6.3.3.3 Taking Implication Assessment

In accordance with Executive Order 12630 of March 18, 1988 entitled, “Governmental Actions and Interference with Constitutionally Protected Property Rights.” The proposed action does not have significant “taking implications” and does not infringe upon any constitutionally-protected property rights. The proposed action will not result in the physical occupancy of property, the physical invasion of property, or the regulatory taking of any property.

6.3.3.4 Regulatory Planning and Review

Executive Order 12866 of September 30, 1993. The Office of Management and Budget (OMB) has determined that this action is significant and has reviewed this action under Executive Order 12866. OMB bases its determination upon the following four criteria: (1) whether the action will have an annual effect of $100 million or more on the economy or adversely affect an economic sector, productivity, jobs, the environment, or other units of the government; (2) whether the action will create inconsistencies with other Federal agencies' actions; (3) whether the action will materially affect entitlements, grants, user fees, loan programs, or the rights and obligations of their recipient; and (4) whether the action raises novel legal or policy issues. The economic impacts of annual hunting regulations on small business entities are discussed in greater detail under the heading Regulatory Flexibility Act (above).

6.3.3.5 Environmental Justice

Executive Order 12898 of February 11, 1994, entitled, "Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations," promotes the fair treatment of people of all races, income levels and cultures with respect to the development, implementation and enforcement of environmental laws, regulations and policies. Environmental justice is the pursuit of equal justice and protection under the law for all environmental statutes and regulations without discrimination based on race, ethnicity, or socioeconomic status. Environmental justice is a priority within the Service. Executive Order 12898 requires Federal agencies to make environmental justice part of their mission, and to identify and address disproportionately high and adverse human health and environmental effects of Federal programs, policies and activities on minority and low-income persons or populations.

The Service implements Executive Order 12898 principally through compliance with NEPA. All activities are evaluated for their impact on the human environment and compliance with Executive Order 12898. It is not anticipated that the proposed action would result in any adverse or disproportional environmental impacts to minority and low-income persons or populations.

6.3.3.6 Civil Justice Reform

Executive Order 12988 of February 5, 1996. The Department, in promulgating this proposed action, has determined that this proposed action will not unduly burden the judicial system and that it meets the requirements of sections 3(a) and 3(b)(2) of Executive Order 12988.

6.3.3.7 Protection of Children from Environmental Health Risks and Safety Risks

Executive Order 13045 of April 21, 1997. Children may suffer disproportionately from environmental health and safety risks, which may affect their physical and/or mental development. The Service makes it a high priority to identify and assess environmental health and safety risks that may disproportionately impact children. The consequences of this proposal have been considered, and determined that the proposed action does not represent a risk to children.

6.3.3.8 Federalism Effects

Executive Order 13132 of August 4, 1999. Due to the migratory nature of certain bird species, the Federal Government has been given statutory responsibility over these species by the MBTA. Frameworks from which States make selections regarding the hunting of migratory birds are promulgated annually. In addition, guidelines regarding special regulations on Federal Indian Reservations and ceded lands are also established. This process preserves the ability of the States and Tribes to determine which seasons meet their individual needs. Any State or Tribe may be more restrictive than the Federal frameworks at any time. The frameworks are developed in a cooperative process with the States and Flyway Councils. This process allows States to participate in the development of frameworks from which they will make selections, thereby having an influence on their own regulations.

The proposed action was developed following extensive input from the Flyway Councils, States, and Native American communities. The proposed action does not have a substantial direct effect on fiscal capacity, change the roles or responsibilities of Federal or State governments, or intrude on State policy or administration. Therefore, in accordance with Executive Order 13132, this proposed action does not have significant federalism effects and does not have sufficient federalism implications to warrant the preparation of a Federalism Assessment.

6.3.3.9 Responsibilities of Federal Agencies to Protect Migratory Birds

Executive Order 13186 of January 10, 2001 directs any Federal agency whose actions have a measurable negative impact on migratory bird populations to develop a Memorandum of Understanding (MOU) with the Service to promote conservation of migratory birds. The MOUs would establish protocols to guide future agency regulatory actions and policy decisions; renewal of permits, contracts or other agreements; and the creation of or revisions to land management plans. The Executive Order also requires the Secretary of the Interior to establish a Council for the Conservation of Migratory Birds to oversee implementation of the Executive Order. The council is composed of representatives from the Department of the Interior; the Departments of Commerce, Agriculture, State, Transportation, Energy, and Defense; the Environmental Protection Agency; and other agencies as appropriate.

6.3.3.10 Energy Effects

Executive Order 13211 of May 18, 2001. Executive Order 13211 requires agencies to describe the effects regulatory actions have on energy supply, distribution, or use. Executive Order 13211 requires agencies to prepare a Statement of Energy Effects when undertaking certain actions. The proposed action will not significantly affect energy supplies, distribution, or use. For this reason, no Statement of Energy Effects is required.

6.3.3.11 Facilitation of Hunting Heritage and Wildlife Conservation

Executive Order 13443 of August 16, 2007 directs the Department of the Interior and its component agencies, bureaus and offices "to facilitate the expansion and enhancement of hunting opportunities and the management of game species and their habitat." Federal agencies shall work in coordination with the Sporting Conservation Council Federal Advisory Committee, State and Tribal Fish and Wildlife agencies and the public to achieve this goal. Agencies are required to consider the effect their actions have on hunting participation, consider the economic and recreational values of hunting, and manage wildlife and wildlife habitats on public lands in ways that will enhance hunting opportunities to the public. In addition, Federal agencies shall work with State and Tribal governments to establish goals to manage and conserve wildlife and their habitats to ensure healthy and productive populations, and in a manner that respects private property rights and provides opportunities for individuals to hunt those species. Furthermore, the Order requires that Federal actions take into account programs and recommendations of comprehensive planning efforts, such as State Wildlife Action Plans and the NAWMP. This action is specifically intended to document the process by which annual hunting regulations are established and to further the intent of this Order by providing harvest opportunities consistent with the long-term conservation of the migratory bird resource.

6.3.4 Presidential Documents

Government-to-Government Relationship with Tribes

In accordance with the President's memorandum of April 29, 1994 "Government-to-Government Relations with Native American Tribal Governments" (59 FR 22951), E.O. 13175, and 512 DM 2, it has been determined that this action has no effect on Indian trust resources other than those specifically addressed in this document.

6.4 CUMULATIVE IMPACTS

Cumulative impacts, as defined by the U.S. Council on Environmental Quality (40 CFR §1508.7), are impacts on the environment which results from the incremental impact of the proposed action when added to other past, present, and reasonably foreseeable future actions regardless of what agency (Federal or non-Federal) or person undertakes such actions. Cumulative impacts can result from individually minor but collectively significant actions taking place over a period of time. This analysis considers all reasonably foreseeable, relevant factors that could contribute to cumulative impacts on hunted migratory bird species and their associated biological/socioeconomic environmental factors. In addition, the cumulative impacts of the alternatives to the components of the proposed action are briefly discussed.

Fall-winter hunting of migratory birds removes a portion of the population during their staging and wintering cycles. Hunting has been federally regulated since 1918 to ensure that the number of birds taken by hunters does not adversely impact the long term health of the bird populations. To accomplish this, data are collected each year from monitoring activities, such as aerial surveys and hunter questionnaires, to acquire information on population sizes, habitat conditions, and previous harvest levels. These data are then used to establish current year harvest regulations for migratory bird species, assuring that the vitality of the populations will not be jeopardized by hunting.

Significant numbers of birds also are killed every year by other means (Stout and Cornwell 1976). Anthropogenic-related sources of mortality for migratory birds include collisions with buildings, aircraft, communication towers, powerlines, wind turbines, trains, and automobiles; exposure to toxins and pollution (e.g., oil spills, pesticides, lead shot, acid rain; Brown and Drewien 1995; Read 1999; Bolen 2000; Langen et al. 2007); and electrocution (Erickson et al. 2005). Many birds are taken annually by non-human, natural and introduced predators (including feral and domestic cats; Sargeant et al. 1995; Bowman et al. 2004; Bielefeld and Cox 2006), and some birds perish when vital resources are usurped by natural and/or exotic competitors (DuBowy 1988). Disease, such as avian cholera, duck plague and avian botulism, and adverse weather conditions (especially during migration) also claim the lives of numerous birds each year (Fredrickson 1969; Fedynich and Godfrey 1988, Samuel et al. 1999; Hollmén et al. 2003). The Service recognizes that these factors will continue to play a role in the mortality of migratory birds on an annual basis, although the intensity of any one factor may vary from year to year, making it difficult to predict the exact cumulative impact. Regardless of the potential impacts of these factors on populations, the adaptive process employed in setting regulations (based on annual assessments of population status) ensures that harvest regulations are consistent with long-term conservation.

Wind farm projects are expected to expand in the reasonably foreseeable future and, therefore, their impact on migratory bird populations warrants further discussion here. Much of the land where wind energy development is likely to occur falls within the Central and Pacific Flyways. Birds migrating north from wintering areas to breeding areas use these flyways in the spring, and birds migrating southward to wintering areas use them in the fall. Each flyway encompasses broad geographic areas, and many specific routes and subroutes within the flyways are used by different species of migratory bird. Wind energy constructions sites may have short term negative impacts on birds foraging or nesting in the affected areas, due to increased noise and disruption associated with developing the site and access roads. In the long term, wind energy sites may negatively impact migratory bird populations more directly. Bird injury and/or mortality from electrocution or collision with transmission lines and turbines is likely to increase as the number of wind farms increase. Furthermore, wind energy sites may directly interfere with migratory flight lines. In 2003, the Service published its Interim Guidelines to Avoid and Minimize Wildlife Impacts from Wind Turbines (http://www.fws.gov/habitatconservation/wind.html). The interim guidelines were produced with the best available science, with the understanding that they would be updated as new information becomes available. The guidelines were published simultaneously with a *Federal Register* Notice of Availability and a request for comments on the guidelines (68 FR 41174).

After reviewing the comments received, the Secretary of the Interior established a Wind Turbine Guidelines Advisory Committee (72 FR 11373), composed of 22 members appointed by the Secretary to achieve balanced representation of wind energy development, wildlife conservation, and government. The Committee, formed in accordance with the Federal Advisory Committee Act, provides advice and recommendations to the Secretary on developing effective measures to avoid or minimize impacts to wildlife and their habitats related to land-based wind energy facilities. These measures ensure that such developments are implemented in a fashion that will not adversely impact migratory bird populations. The electrocution and collision of birds along transmission and distribution lines, which impacts hundreds of bird species, is a well known problem (Bevanger 1994). In the introduced Rocky Mountain population of whooping cranes, powerline collisions were the number one cause of fledgling mortality (Brown et al. 1987). A 1995 study of powerline related avian deaths in the San Luis Valley, Colorado, reported that >80% of mortalities were of waterfowl and cranes (Brown and Drewien 1995). At a wind power development site on Buffalo Ridge, Minnesota, 71% of the fatalities reported during 1996-1999 were migrant birds (Johnson et al. 2002). The number of fatalities due to collisions at wind energy sites across the U.S. averages 2.19 bird deaths (all species) per turbine per year, with resident species suffering a much higher incidence of injury/death than migratory species (Erickson et al. 2001). However, wind energy development sites will likely continue to contribute to the mortality of migratory bird species.

Habitat has the most significant impact on the size and health of any migratory bird population (Banks 1979). Many species may experience population declines in response to destruction and fragmentation of prime habitat as land is converted to accommodate the growing human population. For example, as the human population expands, swamps, wetlands, plains and other natural systems are likely to be lost to urban development, mines, and agriculture. It is estimated that over one-half of the original wetlands in the conterminous U.S. have been lost to such development since the time of the European settlement of North America (Dahl 2000). In recognition of the impact habitat loss may have on migratory bird species, numerous government (e.g., NAWMP, National Wildlife Refuge System, National Parks, establishment of wilderness areas, etc.) and private programs (e.g., Ducks Unlimited, Nature Conservancy) have been implemented to maintain and restore wildlife habitat throughout North America. Although these programs cannot completely stop the loss of wildlife habitat, they do serve to protect existing resources, restore degraded habitat, and maintain quality habitat for the nation's valuable wildlife resources.

A very serious concern is the impact global climate change will have on the remaining valuable migratory bird habitats. The rate of global climate change is accelerating, and many areas are predicted to experience extensive warming, changing precipitation patterns, shifts in vegetation, rising sea levels, increased frequency and intensity of severe weather events (e.g., fire, flood, drought), increased numbers of pests, pathogens, and invasive species, changes in the timing and length of the seasons, and declining snow packs (MacCracken et al. 2000; Inkley et al. 2004; IPCC 2007). These effects are likely to have a significant impact on migratory bird species, either directly or indirectly. The specific impacts will depend greatly upon local conditions and the ability of different species to respond to various components of the changing environment. Computer-run, mathematical simulations of the atmosphere and ocean are the principal tool for predicting the projected outcome of global climate change.

Model predictions forecast climate and habitat changes for nearly every region important to migratory birds in North America. The impact these changes will have on migratory bird species is uncertain in many cases, but recent studies suggest that factors such as timing of migration, range distribution, and productivity may all be affected (Crick 2004). For example, the Western Boreal Forest region of Alaska and northwestern Canada supports a significant portion of the Nation's breeding waterfowl. This region is projected to be among the habitats most affected by global warming as it experiences the consequences of significantly higher temperatures, such as melting permafrost, rising sea levels, extended ice-free seasons on lakes and rivers, early runoff, and shifts in vegetation (Inkley et al. 2004). All of these changes will impact migratory bird populations. The extent to which migratory birds will be able to adapt to these changes is not presently known. Complete adaption by all species, however, is viewed as highly unlikely (Crick 2004). The Service's approach to harvest management will continue to be one of annual assessment and regulation of harvest opportunity to be consistent with population status. Thus, changes in populations will be detected, and appropriate adjustments to harvest management implemented (e.g., changes to bag limits, season length, framework dates, etc.), based on the anticipated continuing changing status of hunted migratory bird populations.

Rising sea levels associated with increased global temperatures are projected to have a devastating impact on coastal wetland habitat. Regions with coastal habitats that are critical to breeding and migrating bird species include the Pacific Northwest region, the Central California Coast, the Gulf Coastal Prairie, and the Mid-Atlantic Coast. Sea levels in these regions are expected to rise an average of 0.48 meters (U.S. Global Change Research Program 2000), and will have varying impacts on different coastal habitats. Of certainty are the serious negative effects increased water levels and saltwater intrusion will have on tidal wetlands and marshes. A majority of these prime waterfowl habitats will be lost permanently since extensive land development prohibits their reestablishment (U.S. Climate Change Science Program 2009). On the Atlantic coast, up to 45% of wetland habitat important to waterfowl is projected to be destroyed by rising sea levels (Yaich and Wentz 2007). A similar scenario is expected on the Pacific coast. Regions of the Gulf Coast, such as the Chenier Plain marshes, which currently support over 1.3 million waterfowl, are projected to be so inundated by sea water that they will eventually only support 1% of current populations (Yaich and Wentz 2007).

Other regions important to breeding, staging and wintering migratory birds, such as the Mississippi Alluvial Valley, Great Basin, southern Great Plains, and the U.S. Great Lakes region, are likely to encounter a different sort of problem. The changes in precipitation, higher temperatures, and increased evaporation predicted for these regions are likely to lead to lower water levels in streams, lakes, and in underground aquifers (Milly et al. 2005). An increase of 2.4º C is predicted to lead to a 17% reduction in runoff in the Colorado River Basin (Christensen et al. 2004). Many wetlands are likely to become short lived or non-existent, particularly in the more arid western regions (Milly et al. 2005). Competition among domestic, industrial, and agricultural uses of water will likely increase, leaving even less water for wildlife related needs. It is estimated that lowering water levels in the Upper Great Lakes area could result in a 39% decrease in regional duck populations (Yaich and Wentz 2007).

Lastly, the Prairie Pothole Region (PPR) of the north central U.S. is an area of particular importance to waterfowl productivity in North America. A significant percentage of North America’s ducks get their start in the PPR. In fact, the PPR provides approximately 50% of the breeding habitat for North American ducks (Linduska 1964). Many waterfowl require 2.5 to 3.5 months of wetland habitat in order to raise their young to fledgling, and for adult birds to complete their molt (Baldassarre and Bolen 1994). Climate models predict that increasing temperatures and shifting climate patterns associated with global warming will lead to reductions in water volume and longevity in wetland habitat, as well as changes in wetland vegetation. These changes will severely reduce the time waterfowl can make use of wetlands during the breeding season (Glick 2005; Johnson et al. 2010). In the PPR specifically, models indicate that a 4°C increase in temperature is likely to substantially decrease breeding waterfowl abundance in the PPR. This decrease will result as habitat in both the eastern and western prairie potholes becomes too dry to support historical levels of waterfowl (Johnson et al. 2010).

The Service's proposal to establish hunting regulations annually takes these incremental impacts into account and bases the level of harvest on current population size and habitat conditions. If the size of any hunted migratory bird population is too small (due to the impacts described above) then the hunting season will be closed until the populations can sustain hunting again.

Given that the development of hunting regulations is an adaptive process, the threat of incremental environmental impacts based on the seven components of the proposed action and their associated alternatives is quite low. The impact of concern pertains to the effect these alternatives will have, in combination with other biotic and abiotic population limiting factors, on the long-term sustainability of migratory bird populations that are hunted. None of the proposed alternatives would result in a harvest strategy that is not sustainable. All of the specific regulatory decisions will be revisited annually and the regulations will be adjusted based on the observed status and trends of the stock at issue. Thus, changes in status due to factors other than hunting (i.e., climate change, disease, catastrophic weather events, etc.) would be taken into account and addressed in the subsequent year's hunting regulations.

6.5 UNAVOIDABLE ADVERSE IMPACTS

Unavoidable adverse impacts include effects that are directly related to the proposed action and which adversely affect the environment, the health of biological resources, and/or social systems. Unavoidable adverse impacts are likely to occur from the implementation of several alternatives associated with the seven components of the proposed action, some of which have already been outlined in the preceding paragraph. There will be costs associated with the proposed action, and all alternatives will require annual funding from Federal, State, and local organizations. Annual monitoring requirements of population status and harvest would continue to be borne by the cooperating national and international agencies. All of the components of the proposed action will result in the harvest of millions of migratory birds annually and those that are opposed to such harvest on moral or ethical grounds will not be in favor of these actions. Depending on the component of the proposed action or alternative, economic costs will be variable, but the end result will be similar in magnitude to current expenditures and activity regardless of the action or alternative chosen. Alternatives that increase hunting opportunity will also increase economic benefits and also increase administrative costs as discussed above. In addition, unavoidable adverse social and cultural impacts would follow adoption of alternative 2 under the subsistence-harvest regulatory action. This subsistence-harvest alternative would alter a customary and traditional cultural activity that has great importance among Alaska Natives and other rural Alaskan residents, as well as potentially remove a resource that provides them with necessary nutrition.

6.6 IRREVERSIBLE AND IRRETRIEVABLE COMMITMENTS OF RESOURCES

Any irreversible and irretrievable commitment of resources by a proposed action must be stated. The proposed action concerns wildlife, a renewable resource; thus, the effects of the proposed action are not irreversible or irretrievable.

CHAPTER 7

LIST OF PREPARERS

SEIS 2010 was prepared by the Division of Migratory Bird Management, U.S. Fish and Wildlife Service, under the direction of Office Chief, Robert Blohm. The Service's writing team was led by principal author Robert Trost (Pacific Flyway Representative, Portland, OR) and included Paul Padding (Atlantic Flyway Representative, Laurel, MD), David Sharp (Central Flyway Representative, Denver, CO), and James Kelley, Jr. (Mississippi Flyway Representative, Fort Snelling, MN). The chief editorial assistant was Catherine Palmer (Wildlife Biologist - SEIS, Portland, OR). Editorial reviews were provided by Kenneth Gamble (USFWS, retired), Jerome Serie (USFWS, retired), Alan Palisoul (DOI, retired), and Glenn Smith (DOI, Office of the Solicitor).

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CHAPTER 8

CONSULTATION AND COORDINATION

Copies of the draft of SEIS 2010 will be sent to the following agencies, organizations and individuals for review.

Federal Agencies

Canadian Wildlife Service
Department of Defense
Army Corps of Engineers
Department of the Interior
  Bureau of Indian Affairs
  Bureau of Land Management
  Bureau of Reclamation
  National Park Service
Federal Aviation Administration
U.S. Department of Agriculture
  Forest Service
  Animal and Plant Health Inspection Service; Wildlife Services
U.S. Environmental Protection Agency

Flyway Councils

Atlantic Flyway Council
Central Flyway Council
Mississippi Flyway Council
Pacific Flyway Council
Flyway Council Chairmen
Flyway Council Technical Section Chairmen

State/Provincial Agencies

Alabama Department of Conservation and Natural Resources
Alaska Department of Fish and Game
Alberta Natural Resource Services
Arizona Game and Fish Department
Arkansas Game and Fish Commission
British Columbia Ministry of Environment and Parks
California Department of Fish and Game
Colorado Division of Wildlife
Connecticut Department of Environmental Protection
Delaware Division of Fish and Wildlife
Florida Fish and Wildlife Conservation Commission
Georgia Department of Natural Resources
Government of Nunavut Department of Environment
Government of Newfoundland and Labrador Environment and Conservation Department
Government of Northwest Territories Department of Environment and Natural Resources
Government of Northwest Territories Wildlife and Fisheries Division

Hawaii Division of Forestry and Wildlife
Idaho Department of Fish and Game
Illinois Department of Natural Resources
Indiana Department of Natural Resources
Iowa Department of Natural Resources
Kansas Department of Wildlife and Parks
Kentucky Department of Fish and Wildlife Resources
Louisiana Department of Wildlife and Fisheries
Maine Department of Inland Fisheries and Wildlife
Manitoba Department of Natural Resources and Energy
Maryland Department of Natural Resources
Massachusetts Division of Fisheries and Wildlife
Michigan Department of Natural Resources
Minnesota Department of Natural Resources
Mississippi Department of Wildlife, Fisheries and Parks
Missouri Department of Conservation
Montana Department of Fish, Wildlife and Parks
Nebraska Game and Parks Commission
Nevada Division of Wildlife
New Brunswick Department of Natural Resources
New Hampshire Fish and Game Department
New Jersey Division of Fish and Wildlife
New Mexico Department of Game and Fish
New York Department of Environmental Conservation
North Carolina Wildlife Resources Commission
North Dakota Game and Fish Department
Nova Scotia Department of Natural Resources
Ohio Division of Natural Resources
Oklahoma Department of Wildlife Conservation
Ontario Ministry of Natural Resources
Oregon Department of Fish and Wildlife
Pennsylvania Game Commission
Prince Edward Island Department of Environment, Energy, and Forestry
Puerto Rico Department of Natural and Environmental Resources
Quebec Ministère des Ressources Naturelles et de la Faune
Rhode Island Division of Fish and Wildlife
Saskatchewan Environment and Resource Management
South Carolina Department of Natural Resources
South Dakota Game, Fish and Parks Department
Tennessee Wildlife Resources Agency
Texas Parks and Wildlife Department
Utah Division of Wildlife Resources
Vermont Fish and Wildlife Department
Virginia Department of Game and Inland Fisheries
Virgin Islands Division of Fish and Wildlife
Washington Department of Fish and Wildlife
West Virginia Division of Natural Resources
Wisconsin Department of Natural Resources
Wyoming Game and Fish Department
Yukon Department of Renewable Resources; Wildlife

Tribal

Aleutian/Pribilof Island Association
Association of Village Council Presidents
Bristol Bay Native Association
Chugach Regional Resources Commission
Colorado River Indian Tribes Department of Fish and Game
Confederated Salish and Kootenai Tribes of the Flathead Nation
Copper River Native Association
Crow Creek Sioux Tribe
Fond du Lac Band of Lake Superior Chippewa Tribe
Grand Transverse Band of Ottawa and Chippewa Indians
Great Lakes Indian Fish and Wildlife Commission
Kalispel Tribe Kalispel Natural Resources Department
Kawerak, Inc.
Leech Lake Reservation
Lower Brule Sioux Tribe Department of Wildlife, Fish and Recreation
Maniilaq Association
National Congress of American Indians
National Tribal Chairman's Association
Native American Rights Fund
North Slope Borough
Oneida Tribe of Indians of Wisconsin
Point No Point Treaty Tribes
Seminole Tribe of Florida
Southeast Inter-tribal Fish & Wildlife Commission
Squaxin Island Tribe
Sun'aq Tribe of Kodiak
Swinomish Indian Tribal Community
Tanana Chiefs Conference
The Jicarilla Apache Tribe
The Klamath Tribes; Natural Resources
The Navajo Nation
The Shoshone-Bannock Tribes
The Tulalip Tribes of Washington
Tulalip Department of Natural Resources
White Earth Reservation
White Mountain Apache Tribe
Yankton Sioux Tribe

Organizations and Individuals

Copies are available to organizations and individuals via a link on the Division of Migratory Bird Management website: http://www.fws.gov/migratorybirds/

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CHAPTER 9

LITERATURE CITED

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SECTION B. APPENDICES

APPENDIX 1

NATIONAL ENVIRONMENTAL POLICY ACT DOCUMENTS RELATING TO MIGRATORY BIRDS

Final Environmental Statement on Issuance of Annual Regulations Permitting the Sport Hunting of Migratory Birds. 1975. The proposal recommends that annual regulations continue to be issued permitting and regulating the hunting of migratory birds in the Anatidae (ducks, geese and swans), Gruidae (cranes), Rallidae (rails, gallinules, and coot), Scolopacidae (woodcock and snipe) and Columbidae (doves and pigeons) families throughout the United States. The proposal protects migratory birds from indiscriminate hunting and permits continuation of nationwide recreational opportunities associated with hunting. Adverse impacts include annual reductions in populations, occasional losses of endangered and other protected species, some trampling and cutting of vegetation, littering, the consumption of 175 million gallons of fuel annually and moral or emotional disturbance for those who are opposed to the killing of wild animals. Alternatives considered include: (A) no action, (B) regulations set by the States, (C) establish international migratory game bird regulations, and (D) issue regulations for periods longer than one year.

Environmental Assessment on Extension of Length of Duck Hunting Season in Western Louisiana. 1975. The proposal to zone Louisiana and allow a five-day extension of the (Mississippi Flyway) season length in the western part of the State evolved from a question as to whether Louisiana waterfowl would be managed more properly as part of the Central Flyway rather than the Mississippi Flyway population. During a four-year period, waterfowl harvest and population in Louisiana will be intensively monitored and wintering populations of major species banded to determine recovery rates, survival rates, and distribution of the harvest between the two flyways. An increased harvest of 73,500 ducks (principally dabbling ducks) other than mallards is not expected to be detrimental to the resource.

Environmental Assessment on Proposed Open Season on Atlantic Brant. 1975. Proposal recommends an open season on Atlantic brant in the Atlantic Flyway in 1975, not to exceed 30 days, daily bag limit four, and possession limit eight. A 48-hour emergency enclosure provision is to be invoked in the event productivity or winter food supply are not sufficient to permit a harvest. The Proposed action will remove individual birds from the population. Some vegetation destruction, vandalism, and disturbance of the birds and decreased accessibility to the non-hunting public is expected. Hunting opportunity will be increased.

Environmental Assessment on Proposed Open Season on Greater Snow Geese. 1975. Proposal recommends an open season on greater snow geese in the Atlantic Flyway in 1975, not to exceed 30 days, daily bag limit two, and possession limit four. The Proposed action will remove individual birds from the population. Some vegetation destruction, vandalism, disturbance of the birds and decreased accessibility to the non-hunting public is expected. Hunting opportunity will be increased.

Final Environmental Statement on Proposed Use of Steel Shot for Hunting Waterfowl in the United States. 1976. Proposal recommends that in hunting ducks, geese, swans and coots, shot shells loaded with steel or other approved pellets be required in the U.S. beginning in the years 1976 through 1978 in different Flyways, in the areas described and/or States designated. Lead poisoning due to ingestion of lead shotgun pellets by aquatic birds would be alleviated. Adverse effects relate to increased costs to waterfowl hunters.

Environmental Assessment on Proposed Hunting Regulations on Black Ducks. 1976. The proposal recommends the continued taking of black ducks at optimal levels of recreational hunting consistent with the maintenance of the resource base. Stabilized regulations are recommended for four years along with a reward band study to establish a data base on survival, and harvest rates.

Environmental Assessment on Proposed Hunting Regulations on Canvasback and Redhead Ducks. 1976. Proposal is to permit a daily bag limit of at least one canvasback (*Aythya valisineria*) and one redhead (*Aythya americana*) throughout each Flyway, subject to possible retention of certain areas closed to the hunting of these species and to population status equal to or greater than that of 1975.

Environmental Assessment on Proposal for Continuation of September Hunting of Mourning Doves. 1977. Proposal is to continue regulations permitting the initiation of mourning dove hunting on September 1, as permitted under provisions of the Migratory Bird treaty Act of 1918. In most States the dove season has opened in September since 1918.

Environmental Assessment on Proposed Shooting Hours Regulations. 1977. The Fish and Wildlife Service, U.S. Department of the Interior, proposes to continue regulations permitting the hunting of migratory game birds during the hours applied in recent years, i.e., from one-half hour before sunrise until sunset for most species of migratory game birds. Special situations require some exceptions to the general shooting hours framework, and it is proposed that these would continue. As provided generally under the Migratory Bird Treaty Act, states would continue to have the option of making more restrictive exceptions within the framework.

Environmental Assessment on Proposal to Establish Harvest Regulations by Zones for the Sport Hunting of Ducks. 1978. Proposed action allows use of experimental duck harvest zones to determine their effects on duck harvest and hunter activity. A Memorandum of Agreement specifying the terms of a zoning study must be concluded between the State(s) and the Service before a zoning experiment will be conducted. Zoning will be for the primary purpose of providing equitable distribution of hunting opportunity within a State or region and not for the purpose of increasing total annual waterfowl harvest in the zoned areas.

Environmental Assessment on Proposed Hunting Regulations on Wood Ducks. 1978. The proposal provides for an early duck season in 11 southeastern States with no restriction on the wood duck daily bag limit. In point system States the wood duck will be a mid-point bird. The proposed action will allow an increase in the harvest of wood ducks native to the southeastern States. Available banding data indicate that these populations can sustain some additional harvest without adverse effects.

Environmental Assessment on Proposal to Extend the Waterfowl Hunting Season Framework in Mississippi. 1979. The Mississippi Department of Wildlife Conservation proposes a change in the closing date of the waterfowl framework from January 20 to January 31 to improve the distribution of harvest opportunity among waterfowl hunters in Mississippi. Harvest trends are more closely correlated with the number of hunting season days after December 15 than with total season length. However, the increase in suitable habitat caused by late-winter flooding will permit wider dispersal of waterfowl, which could reduce hunter success.

Environmental Assessment on Proposal to Increase Harvest Opportunity on Blue-Winged Teal in Iowa. 1979. The Iowa Conservation Commission proposes a change in the opening date of the waterfowl hunting from October 1 to September 20 to ensure consistent harvest opportunity on blue-winged teal. The blue-wing is a lightly-harvested, early-migrating species whose emigration from Iowa in many years is either mostly or entirely completed prior to October 1. The proposal will allow an increase in the average annual harvest of blue-winged teal in Iowa. This species is lightly harvested and the increase should have insignificant impact on its population status or on other waterfowl species.

Environmental Assessment on Stabilized Season Lengths and Basic Bag Limits for Hunting Ducks. 1980. Proposal is to stabilize season length and bag limit regulations for five years on an experimental basis. Stabilized hunting regulations will provide an improved basis for evaluating the effect of hunting regulations on duck harvests and populations, and will enable the Service to determine more precisely the compensatory or non-compensatory nature of hunting mortality compared to non-hunting mortality. The Service has considered the alternatives of continuing to change these regulations annually or setting regulations on a Flyway basis, neither of which will illuminate the effect of hunting mortality on duck populations. The status of all migratory game bird populations and endangered or threatened species involved will continue to be monitored and reviewed on an annual basis.

Environmental Assessment on Subsistence Hunting of Migratory Birds in Alaska and Canada. 1980. Proposal is to seek amendments to migratory bird treaties with Canada, Mexico, and Japan to make these treaties consistent with the Soviet Union regarding subsistence hunting of migratory birds in Alaska and Canada. Wild birds comprise up to eight percent annually of the wildlife harvested for sustenance by people living in rural Alaska.

Environmental Assessment on Proposed Hunting Regulations on Black Ducks. 1983. The U.S. Fish and Wildlife Service has determined that the harvest of black ducks should be reduced by means of further restrictions on hunting regulations beyond those restrictions in effect previously. The proposed action will allow continued hunting of black ducks but will reduce the number of days in which black duck hunting will occur or reduce the daily bag and possession limit on this species or both in individual States of the Atlantic Flyway and throughout the Mississippi Flyway.

Environmental Assessment on Proposed Hunting Regulations on Canvasback Ducks. 1983. The U.S. Fish and Wildlife Service has determined that canvasback ducks should be managed as eastern and western populations and that modification of harvest strategies is required in the three eastern Flyways. Accordingly, the Service proposes to manage canvasbacks as two separate populations, to change the focus of harvest regulation from one of area closure to one of restrictive bag limits, and to initiate an experimental canvasback season in portions of the closed area in the Atlantic Flyway when established criteria are met. The Service has considered the alternatives of a return to procedures used prior to 1973 or no action, neither of which provide for an improved management of the resource. The effects of these management changes will continue to be monitored through operational and special surveys on an annual basis.

Environmental Assessment on Proposed Hunting Regulations on Eastern Population of Whistling (Tundra) Swans. 1984. The U.S. Fish and Wildlife Service has determined that hunting of eastern population (EP) whistling (tundra) swans is justified based on population levels occurring in specific habitats during migration and winter. Accordingly, the Service proposes to establish an experimental hunting season of these birds in North Carolina in the Atlantic Flyway and in Montana and North and South Dakota in the Central Flyway. The Service has considered the alternative of continuing to manage swans in the Atlantic Flyway without a harvest program or no action. The effects of these management changes will be monitored through operational and special surveys on an annual basis.

Environmental Assessment on Proposed Guidelines for Migratory Bird Hunting Regulations on Federal Indian Reservations and Ceded Lands. 1985. The proposal establishes guidelines for migratory bird hunting regulations on Federal Indian reservations (including Indian Territory) and ceded lands. The guidelines provide members of tribes that have recognized reserved hunting rights some flexibility in migratory bird hunting regulations while maintaining the closed season requirement mandated by the 1916 Migratory Bird Treaty with Canada. The guidelines also offer the possibility for tribes with full wildlife management authority to establish migratory bird hunting seasons for non-tribal members that may differ from those in the State(s) in which the reservations are located. Opening and closing dates and season length for non-tribal members on these reservations would still have to be within Federal frameworks for migratory bird hunting seasons, and all other Federal hunting regulations also would apply to non-tribal hunters. Most such seasons will be established experimentally, and safeguards make it unlikely that the hunting seasons will have adverse impacts on the migratory bird resource.

Environmental Assessment to Establish Restrictive Hunting Regulations to Reduce Waterfowl Harvest, 1985 Hunting Season. 1985. Proposal establishes duck hunting regulations during the 1985 hunting season that are more restrictive than during recent years, because of unusually low numbers of most duck species. The reduced numbers largely are due to drought conditions on the principal breeding grounds in Canada and the United States. The more restrictive regulations are needed to ensure that hunting loss will not further reduce duck numbers or prevent population increases when environmental conditions improve. Goose populations have been affected much less adversely by drought, and regulations for most goose populations are similar to those established in the 1984–85 hunting season.

Environmental Assessment on Proposed Hunting Regulations on Eastern Population of Woodcock. 1985. Proposal is to restrict woodcock hunting season to 45 days in the Atlantic Flyway with a daily bag limit of three. A significant decline in woodcock abundance has occurred since the 1960s in the East, and the proposed action may help stabilize or increase the population over the three-year period of the proposal.

Environmental Assessment on Waterfowl Hunting Regulations Frameworks for 1986. 1986. Because duck populations were down and breeding habitats suffered drought, conservative harvest regulations were established for the 1985–86 hunting season to return additional ducks to the breeding grounds and rebuild populations. Improvements were observed in breeding habitat conditions and duck population levels in 1986, but restrictive regulation frameworks need to be continued to ensure that hunting will not further reduce the subsequent breeding population of ducks or hinder population recovery when environmental conditions improve on the breeding grounds.

Environmental Assessment on North American Waterfowl Management Plan. 1986. The Proposal is to develop joint Federal/private initiatives restoring waterfowl populations to numbers present during the 1970s. Approval of this Plan by the governments of the U.S. and Canada would not constitute a binding commitment by the two nations to carry out all strategies in the Plan or to bear all costs of execution. Rather, this Plan would be a vehicle to draw in non-government sources to take direct action to benefit the waterfowl resources.

Final Supplemental Environmental Impact Statement: Issuance of Annual Regulations Permitting the Sport Hunting of Migratory Birds. 1988. SEIS 88 updated the 1975 Final Environmental Statement for the Issuance of Annual Regulations Permitting the Sport Hunting of Migratory Birds (FES 75). The proposed action of SEIS 88 was the same as that of FES 75, i.e., to continue issuing annual migratory bird hunting regulations. New alternative approaches to issuing the regulations, however, were considered. The Service's preferred alternative in SEIS 88 was to stabilize the 'framework' regulations (i.e., season lengths and daily bag limits) for fixed periods of time, subject to annual review and possible change according to population status; and to control the use of 'special' regulations (i.e., bonus bags, special regulations). SEIS 88 presented detailed information on migratory bird hunting regulations and the current status of migratory bird populations.

Environmental Assessment: Proposal to Establish Operational General Swan Hunting Seasons in the Pacific Flyway. 2003. A tundra swan hunting season that also permitted the take of a limited number of trumpeter swans in the Pacific Flyway was instituted in 1995. The Service issued a sequence of Environmental Assessments in August 1995, July 2000 and June 2001 that found no significant impact with respect to general swan hunting seasons in the Pacific Flyway. The 2003 Environmental Assessment addresses information gained over two hunting seasons and includes discussion of public comments and concerns during the entire history of this process, new and supplemental information gathered by the Service and cooperators during fall and winter surveys, as well as updated harvest information from the past two hunting seasons.

Final Environmental Impact Statement on Resident Canada Goose Management. 2005. The objective of the FEIS is to provide a regulatory mechanism that would allow State and local agencies, other Federal agencies, and groups and individuals to respond to damage complaints or damages by resident Canada geese. The FEIS is a comprehensive programmatic plan intended to guide and direct resident Canada goose population growth and management activities in the conterminous United States. The Draft Environmental Impact Statement (DEIS) was published in March 2002. Over 2,700 public comments were considered when revising the document.

Final Environmental Impact Statement on Light Goose Management. 2007. The FEIS analyzes the potential environmental impacts of several management alternatives for addressing problems associated with overabundant light goose populations. The FEIS analyzes the direct, indirect, and cumulative impacts related to several management alternatives and provides the public with responses to comments from the Draft EIS.

Final Environmental Assessment Proposed Hunting Regulations for the Lower Colorado River Valley Population of Greater Sandhill Cranes in the Pacific Flyway. 2007. This assessment considers the action to institute a limited harvest of sandhill cranes from the Lower Colorado River Valley Population by reviewing current management strategies and population objectives, and examining alternatives to current management programs.

Environmental Assessment Duck Hunting Regulations for 2008. The Service proposes to issue liberal duck hunting regulations in 2008 and the projected harvest under this alternative is about 15.8 million ducks. This alternative was viewed appropriate for a number of reasons including: (1) these regulations likely will not prevent mallards in the Mid-continent region from reaching the population goal of 8.7 million next spring, (2) these regulations are consistent with the long-term welfare of mallards in the eastern U.S. and Canada, and (3) most other duck populations are either near or at their population goals.

APPENDIX 2

WATERFOWL FLYWAY COUNCILS

[Originally published as Circular 78, 1959 by the Department of the Interior]

THE WATERFOWL COUNCILS

A Conservation Partnership

What is a Waterfowl Council?

It's doubtful if many duck hunters know the answer to that question. Yet these Councils are responsible for the planning of many programs that will influence the kind of duck hunting these same sportsmen will have in the future.

Because the activities of the Waterfowl Councils do mean so much to so many people – not only to duck hunters but to the millions of people who get their fun just watching the birds – this circular has been prepared to tell the Council story. Its purpose is to explain the basic waterfowl problem and the current approach to a solution, why the Councils came into existence, how they are organized, what they seek to do to improve management of the waterfowl resource, and ways in which interested people can help to achieve the goals that the Waterfowl Councils establish.

Right at the outset it should be explained that the Federal Government under international treaties with Canada and Mexico is responsible for the conservation – that also includes management – of migratory waterfowl. The discharge of that responsibility rests with the U. S. Department of the Interior and, more specifically, with the Bureau of Sport Fisheries and Wildlife of the Fish and Wildlife Service. However, the Service recognizes that Uncle Sam by himself can never do the job that's called for in waterfowl management. He must have the active assistance of every other agency interested in wildlife resources – both governmental and private – if the job is to be done. It was to develop such a partnership approach to the terrific task of solving today's waterfowl problem that Waterfowl Councils were created.

Our Waterfowl Problem

Our present waterfowl conservation difficulties are the result of three things. The number of people on this Continent is rocketing upward and more and more of us are turning to the outdoors and wildlife resources for recreation. As the demand for more opportunity to enjoy wildlife increases, the habitat needed to produce and maintain wildlife shrinks steadily in the face of urban, industrial, and agricultural encroachment. At the same time, man's advances toward an easier way of life for himself through technology – modern highways, high-speed cars, electronic bird calls, better guns, drainage, and pesticides – are giving the wild creatures new troubles in their reduced living space. How to approach this big problem of keeping our waterfowl in a complex world is the concern of wildlife managers generally.

Ducks Supply the Pattern

The ducks themselves have had something to say about how we should organize our conservation efforts. Basically, waterfowl of this Continent are divided into groups that have discernible patterns of migration between their nesting and wintering grounds. Hunters, by returning the bands they find on the legs of ducks and geese they shoot, have produced this information. Although there is considerable overlapping of these flight lanes and a certain amount of trading back and forth between them by waterfowl, studies of band recoveries have shown that the various migration patterns for ducks and geese break down into four major flyways. They are referred to as the Pacific, Central, Mississippi, and Atlantic Flyways.

Because of this distinct pattern of waterfowl movement and the relationship of nesting migration, and wintering areas for various groups of birds in these lanes, it became obvious that plans for the resource had to be designed on a flyway basis if they were to be successful and meet future needs.

To develop adequate flyway planning, it is necessary to understand how the birds in each flyway behave and how various conditions affect their numbers. Also, ways had to be found to correct the limiting factors and to manipulate the waterfowl population and its environment so that an increase in numbers would result. All this is the role of research. Waterfowl management then employs the various tools and programs developed by this research.

Waterfowl management involves many things. It includes the maintenance of present wildlife habitat, development of additional good waterfowl areas, manipulation of water levels, planting of crops for food and cover to maintain increased numbers of wild fowl, and regulated harvest of the annual surplus of waterfowl by hunting. It means establishing refuges, both State and Federal, to give the birds places to feed and rest and to provide people greater opportunities to enjoy the resource. The locations of these managed areas also are designed to provide better distribution of the birds during their annual migrations.

Plans for all these studies and developments must be geared to the waterfowl situation, flyway by flyway. Sportsmen-in-the know recognize the value of this approach and support it vigorously.

So, too, well-informed sportsmen support the regulation of hunting flyway by flyway. Before the flyway concept was developed, waterfowl managers established hunting regulations on a nationwide basis. This had the great disadvantage of forcing hunting restrictions on all areas when they were actually needed only in certain sections. Conversely, nationwide relaxations in regulations permitted excessive harvest in some areas and of some species that conditions did not warrant. Regulations of hunting by flyways not only benefits the ducks and geese, but it also permits maximum hunting opportunity consistent with the local waterfowl situation.

Within a flyway, there is good reason to be concerned about what happens in other parts of the flyway. On the other hand, except for the common effort to make certain no abuse of the waterfowl resource occurs, there is little reason for people in one flyway to enter into management decisions elsewhere unless their own waterfowl populations are also affected.

How Waterfowl Councils Originated

Once the flyway concept as a basis for hunting regulations had been advanced by the Fish and Wildlife Service, it was not long before the need for cooperative efforts in other fields of waterfowl management and research began to receive greater attention. Federal-State partnership in wildlife management received its first real stimulus from the Pittman-Robertson Act of 1937, which created the Federal Aid in Wildlife Restoration program. This Act established a close working arrangement between Federal and State wildlife agencies. From such a fertile field of common interest, cooperative efforts branched out rapidly, including some work with waterfowl.

The partnership effort in waterfowl management on a flyway basis, however, did not make its appearance until after World War II, and research needs originally prompted this development. In each flyway, the pressing demand for quick answers to special problems launched cooperative projects as the most effective way to do the job. In the Atlantic Flyway, a group of Northeastern States and several conservation organizations in 1946 formed a Joint Black Duck Committee. Later this committee became the Joint Waterfowl Committee and a South Atlantic Waterfowl Committee was formed in the Southeastern States. In 1947, waterfowl technicians of the Northern States in the Mississippi Flyway started a team approach to their problems. The following year the Pacific Flyway Study Committee was formed and State and Federal workers in the Central Flyway began to explore ways to help each other in duck programs.

Spurred by the success of these first cooperative efforts, the International Association of Game, Fish, and Conservation Commissioners adopted a resolution at its 1951 convention in Rochester, N.Y., calling for the setting up of a National Waterfowl Council and also a Waterfowl Council in each of the flyways. The National Council would be composed of two representatives from each Flyway Council to deal with nationwide problems. The next year the four Flyway Councils and the National Council were organized.

What is the Flyway Council?

The Flyway Council is a formal organization representing all State fish and game agencies in a flyway. Each State has one vote – cast either by the Director or his designated representative. In the Eastern Flyway, the Council is called the Atlantic Waterfowl Council. The other Councils are known as the Mississippi, Central, and Pacific Flyway Councils. The U. S. Fish and Wildlife Service, through its Bureau of Sport Fisheries and Wildlife, and the Canadian Wildlife Service work closely with these Councils in all phases of waterfowl management, including setting up the hunting regulations. Canadian provincial wildlife agencies now participate in Council activities, too. In addition, representatives of private, national conservation organizations often attend the Council sessions to coordinate their work with the Council programs.

The sole purpose of the four Flyway Councils is to preserve the valuable waterfowl resource for all the people. The Councils seek to achieve this goal by assisting in cooperative planning and action by Federal, State, and Provincial Governments, private conservation agencies, and the general public – on both sides of the border. Their chief tools are research and proved wildlife management techniques.

How the National Waterfowl Council Functions

Two representatives elected by each of the four Flyway Councils make up the National Waterfowl Council. Each year, members of this National Council along with representatives of other national conservation organizations discuss waterfowl regulations with the Fish and Wildlife Service. This entire group is known as the Waterfowl Advisory Committee.

The Waterfowl Advisory Committee makes recommendations to the Director of the Bureau of Sport Fisheries and Wildlife regarding the proposed hunting regulations. With his staff, the Director then drafts the regulations. Following review of the proposed regulations by the Commissioner of Fish and Wildlife and the Assistant Secretary for Fish and Wildlife, these proposals go to the Secretary of the Interior for his action. The States then establish their waterfowl hunting season dates within the framework that is finally adopted.

A Planned Attack

Although Flyway Council members give serious attention to the matter of annual regulations to guide the hunting harvest, they recognize that the task of highest priority is to provide comprehensive solutions for the basic problems that threaten the future of American waterfowling.

Under the impetus of the council approach, wildlife technicians – Federal, State, and private – in all four flyways have dug into the task of improving waterfowl management with renewed vigor. As they progressed, the need for a blueprint to guide waterfowl research and management efforts in each flyway became increasingly clear to them. No one agency had the resources or personnel to do the big job called for: it had to be a well-coordinated, full-partnership team effort. A waterfowl management plan for each flyway that would spell out in detail what has to be done, by whom, and in what order, thus became a necessity.

With Federal waterfowl biologists assigned to the task of coordinating these efforts, each flyway now is implementing such a plan.

Flyway Plan Objective

These flyway management plans generally are designed to:

1. Accelerate collection and analysis of banding information and other biological data which will indicate important nesting, migration, and wintering areas and the segments of the North American waterfowl population associated with them.

2. Establish the pattern, priority, and responsibility for acquiring areas needed for managing waterfowl populations and for continuing our enjoyment of the resource.

3. Give greater emphasis to the research needed to improve waterfowl management practices, including those related to producing more ducks and geese and permitting a safe harvest of the resource each year.

4. Promote the increased use on all areas under public jurisdiction of the findings of wildlife research workers and the experience of management.

5. Create incentives to preserve existing habitat and develop new habitat, and encourage beneficial practices for waterfowl on private lands.

6. Obtain public understanding and support for the waterfowl program and its objectives.

How We Can All Help

Here is the key to a successful flyway program! Whether we are hunters, bird-lovers, or plain American citizens, young or old, men or women, we can all help by-

1. Supporting the steps our Government and cooperating private agencies take to carry out the waterfowl program in our flyways.

2. Promoting, - wherever we have the opportunity and in every possible way, measures that benefit waterfowl, such as those that-

(a) Oppose projects that are unnecessarily destructive to waterfowl or the wetland habitat they must have.

(b) Encourage others to conduct local projects to restore wetlands designated as important to waterfowl.

(c) Endorse efforts to incorporate in Government construction projects necessary developments to enhance waterfowl values.

(d) Develop or help others develop small marshes to serve as nesting, resting, or feeding areas for ducks and other wildlife.

(e) Assist others to carry out land and water management practices which your local wildlife officials indicate are beneficial to waterfowl.

(f) Seek and follow the advice of wildlife technicians on your local waterfowl problems.

(g) Join in local efforts to resolve conservation issues.

3. Observe the hunting regulations, which are necessary to ensure a fair opportunity for everyone to enjoy the resource, and practice good sportsmanship.

That's the story of the Flyway Councils and their role in meeting the needs of migratory waterfowl in America's Space Age future.

[Note: Identical MOUs are in effect with all four Flyway Councils]

MEMORANDUM OF UNDERSTANDING

between the

U.S. FISH AND WILDLIFE SERVICE

and the

PACIFIC FLYWAY COUNCIL

for the

COOPERATIVE EXCHANGE, INTERPRETATION, AND EVALUATION OF DATA AND INFORMATION USED FOR DEVELOPING MIGRATORY BIRD REGULATIONS

This Memorandum of Understanding is between the Pacific Flyway Council, represented by the Chairperson, and hereinafter referred to as the Council; and the U.S. Fish and Wildlife Service, represented by the Director, and hereinafter referred to as the Service.

WHEREAS, the Council has the responsibility under its Bylaws to represent the states comprising the Pacific Flyway, namely, Alaska, Washington, Oregon, Idaho, California, Utah, Arizona and the Pacific Flyway portions of Colorado, New Mexico, Montana, and Wyoming, regarding cooperative State-Federal management of all species of migratory birds (as listed in the List of Migratory Birds in Title 50 of the Code of Federal Regulations, Section 10.13) in the Pacific Flyway; and

WHEREAS, the Service has the responsibility under various acts, laws and treaties of the United States, notably the Migratory Bird Treaty Act of 1918 and the Fish and Wildlife Conservation Act of 1980, as amended, to manage migratory bird resources of North America while they are within the United States; and

WHEREAS, the Service has designated a staff member (Pacific Flyway Representative) that is assigned to serve as a liaison for the coordination of management activities of the member states and the U.S. Fish and Wildlife Service and to make such findings available to the Pacific Flyway Council; and

WHEREAS, the management of the migratory bird resources in the Pacific Flyway has traditionally been conducted cooperatively between the Service and member States of the Council, and includes survey and monitoring activities such as the banding and marking of migratory birds; conducting populations surveys; conducting experiments on the effects of regulatory changes on allowable take and population status; and migratory bird populations; inventorying, monitoring, acquiring, and managing migratory bird habitats; assisting in the development of Cooperative Flyway Management Plans; and conducting public information and education programs; and

WHEREAS, the expenses of conducting these management functions are provided jointly by the Service and member states of the Council, the latter utilizing both Federally-provided and State monies; and

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WHEREAS, the issuance and enforcement of regulations occurs at both the Federal and State levels as a primary means of affording adequate protection to the migratory bird resources within the Pacific Flyway;

NOW, THEREFORE, it is mutually agreed that:

1. The Service will annually request the Pacific Flyway Council to name no more than two persons, hereinafter named Flyway Migratory Bird Consultants, to represent the Council in working with the Service.

2. The Flyway Migratory Bird Consultants, or in the event they find themselves unable to serve, their Council-appointed alternates shall be available for participation in meetings of the Service Regulations Committee.

3. The Flyway Migratory Bird Consultants will serve on a calendar year basis, in order to best provide technical input into the development of migratory bird regulations. The Council will inform the Service prior to January 1 of each year the individuals selected by the Council to serve as the Flyway Migratory Bird Consultants during the ensuing calendar year.

4. The Flyway Migratory Bird Consultants shall serve without compensation.

5. The Flyway Migratory Bird Consultants will participate in meetings of the Service Regulations Committee, and other meetings as may be deemed appropriate, by providing statistical data and information, including interpretation thereof, to the Service Regulations Committee. The purpose of this technical input will be to assist the Service Regulations Committee to develop national and Pacific Flyway migratory bird regulations recommendations for consideration by the Director. Final decisions are reserved for the Service Director.

6. To facilitate the participation of the Flyway Migratory Bird Consultants, the Service shall reimburse the participants directly for actual travel from their normal places of employment to and from meeting locations of the Service Regulations Committee and such other meetings as may be deemed appropriate, and for per diem at authorized rates.

7. In exchange for the participation of the Flyway Migratory Bird Consultants, the Service shall provide International, continental, flyway, national, and available State information on migratory bird populations and habitats, along with necessary technical assistance required for the interpretation, evaluation, and analysis of such information and data. Such materials may include technical publications, administrative reports, and unpublished data.

8. In turn, the Flyway Migratory Bird Consultants shall provide to the Service additional materials from Flyway Council member states related to the subjects listed in item 7 which may not otherwise be available to the Service. Such materials may include technical publications, administrative reports, and unpublished data.

9. Each and every provision of this Memorandum of Understanding is subject to the laws of the United States and the laws and regulations of the various States from which the Flyway Migratory Bird Consultants may be selected.

10. Nothing in this Memorandum of Understanding shall be construed as obligating either party to the expenditure of funds or for the future payment of money in excess of appropriations authorized by law.

11. Nothing contained herein shall be construed as limiting in any way the responsibility and authority, as defined by law, of the Director, U.S. Fish and Wildlife Service, and as defined by Bylaws, of the Chairperson, Pacific Flyway Council.

12. This Memorandum of Understanding shall become effective when signed by the parties hereto and shall continue in force until terminated by either party upon notice in writing to the other of his intention to do so. Amendments to this Memorandum of Understanding may be proposed by either party and shall become effective upon written approval by both parties.

13. This Memorandum of Understanding supersedes all previous Memoranda of Understanding executed with the Pacific Flyway Council relating to migratory game bird regulations and has been expanded to include all migratory game and non-game birds.

IN WITNESS WHEREOF, the parties hereto have executed this Memorandum of Understanding as of the date last signed below.

U.S. FISH AND WILDLIFE SERVICE

By:______________________________ **____________________**
DIRECTOR **(Date)**

PACIFIC FLYWAY COUNCIL

By:______________________________ **____________________**
CHAIRPERSON **(Date)**

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APPENDIX 3

NORTH AMERICAN GAME BIRDS HUNTED DURING THE FALL-WINTER SEASON

English Name	Scientific Name
SWANS, GEESE, AND DUCKS	**FAMILY ANATIDAE**
	Subfamily Anserinae
Swans	**Tribe Cygnini**
Tundra Swan	*Cygnus columbianus*
Trumpeter Swan	*Cygnus buccinator*
*Whooper Swan	*Cygnus cygnus*
Geese	**Tribe Anserini**
Greater White-fronted Goose	*Anser albifrons*
Subspecies	
Tule White-fronted Goose	*Anser albifrons elgasi*
Lesser White-fronted Goose	*Anser erythropus*
Snow Goose	*Chen caerulescens*
Subspecies	
Lesser Snow Goose	*Chen caerulescens caerulescens*
Greater Snow Goose	*Chen caerulescens atlantica*
Ross' Goose	*Chen rossii*
*Emperor Goose	*Chen canagica*
Brant	*Branta bernicla*
Subspecies	
Atlantic Brant	*Branta bernicla hrota*
Black Brant	*Branta bernicla nigricans*
Canada Goose	*Branta canadensis*
Subspecies	
Cackling Canada Goose	*Branta canadensis minima*
Aleutian Canada Goose	*Branta canadensis leucopareia*
Taverner's Canada Goose	*Branta canadensis taverneri*
Dusky Canada Goose	*Branta canadensis occidentalis*
Interior Canada Goose	*Branta canadensis interior*
Western Canada Goose	*Branta canadensis moffitti*
Lesser Canada Goose	*Branta canadensis parvipes*
Giant Canada Goose	*Branta canadensis maxima*
Atlantic Canada Goose	*Branta canadensis canadensis*
Richardson's Canada Goose	*Branta canadensis hutchinsii*
Vancouver Canada Goose	*Branta canadensis fulva*
Ducks	**Subfamily Dendrocygninae**
Whistling-Ducks	**Tribe Dendrocygnini**
Fulvous Whistling-Duck	*Dendrocygna bicolor*
Black-bellied Whistling-Duck	*Dendrocygna autumnalis*
	Subfamily Anatinae
Shelducks	**Tribe Cairinini**
Wood Duck	*Aix sponsa*
Muscovy Duck	*Cairina moschata*
Dabbling Ducks	**Tribe Anatini**
Green-winged Teal	*Anas crecca*
American Black Duck	*Anas rubripes*
Mottled Duck	*Anas fulvigula*
Mallard	*Anas platyrhynchos*
Northern Pintail	*Anas acuta*
Blue-winged Teal	*Anas discors*
Cinnamon Teal	*Anas cyanoptera*
Northern Shoveler	*Anas clypeata*
Gadwall	*Anas strepera*
American Wigeon	*Anas americana*

*No current open season

English Name	Scientific Name
Pochards and Allies	**Tribe Aythyini**
Canvasback	*Aythya valisineria*
Redhead	*Aythya americana*
Ring-necked Duck	*Aythya collaris*
Greater Scaup	*Aythya marila*
Lesser Scaup	*Aythya affinis*
Eiders, Scoters, Mergansers and Allies	**Tribe Mergini**
Common Eider	*Somateria mollissima*
Subspecies	
American Eider	*Somateria mollissima dresseri*
Northern Eider	*Somateria mollissima borealis*
Pacific Eider	*Somateria mollissima v-nigra*
King Eider	*Somateria spectabilis*
*Spectacled Eider	*Somateria fischeri*
*Steller's Eider	*Polysticta stelleri*
Harlequin Duck	*Histrionicus histrionicus*
Subspecies	
Pacific Harlequin Duck	*Histrionicus histrionicus pacificus*
*Atlantic Harlequin Duck	*Histrionicus histrionicus histronicus*
Long-tailed Duck	*Clangula hyemalis*
Black Scoter	*Melanitta nigra*
Surf Scoter	*Melanitta perspicillata*
White-winged Scoter	*Melanitta fusca*
Common Goldeneye	*Bucephala clangula*
Barrow's Goldeneye	*Bucephala islandica*
Bufflehead	*Bucephala albeola*
Hooded Merganser	*Lophodytes cucullatus*
Common Merganser	*Mergus merganser*
Red-breasted Merganser	*Mergus serrator*
Stiff-tailed Ducks	**Tribe Oxyurini**
Ruddy Duck	*Oxyura jamaicensis*
RAILS, GALLINULES AND COOTS	**FAMILY RALLIDAE**
Clapper Rail	*Rallus longirostris*
Subspecies	
*Yuma Clapper Rail	*Rallus longirostris yumanensis*
*California Clapper Rail	*Rallus longirostris obsoletus*
*Light-footed Clapper Rail	*Rallus longirostris levipes*
King Rail	*Rallus elegans*
Virginia Rail	*Rallus limicola*
Sora	*Porzana carolina*
Purple Gallinule	*Porphyrio martinica*
Common Moorhen	*Gallinula chloropus*
American Coot	*Fulica americana*
Yellow Rail	*Coturnicops noveboracensis*
Black Rail	*Laterallus jamaicensis*
CRANES	**FAMILY GRUIDAE**
Sandhill Crane	*Grus canadensis*
Subspecies	
*Cuban Sandhill Crane	*Grus canadensis nesiotes*
*Florida Sandhill Crane	*Grus canadensis pratensis*
*Mississippi Sandhill Crane	*Grus canadensis pulla*
Canadian Sandhill Crane	*Grus canadensis rowani*
Lesser Sandhill Crane	*Grus canadensis canadensis*
Greater Sandhill Crane	*Grus canadensis tabida*
*Whooping Crane	*Grus americana*

*No current open season

English Name	Scientific Name
	FAMILY SCOLOPACIDAE
	Subfamily Scolopacinae
Snipe	**Tribe Gallinagoini**
Wilson's snipe	*Gallinago delicata*
Woodcock	**Tribe Scolopacini**
American Woodcock	*Scolopax minor*
PIGEONS AND DOVES	**FAMILY COLUMBIDAE**
	Subfamily Columbinae
Scaly-naped Pigeon	*Patagioenas squamosa*
White-crowned Pigeon*	*Patagioenas leucocephala*
Band-tailed Pigeon	*Patagioenas fasciata*
Subspecies	
Pacific Band-tailed Pigeon	*Patagioenas fasciata monilis*
Interior Band-tailed Pigeon	*Patagioenas fasciata fasciata*
	Subfamily Leptotilinae
White-winged Dove	*Zenaida asiatica*
Zenaida Dove	*Zenaida aurita*
Mourning Dove	*Zenaida macroura*
White-tipped Dove	*Leptotila verreauxi*
CROWS AND JAYS	**FAMILY CORVIDAE**
American Crow	*Corvus brachyrhynchos*
Fish Crow	*Corvus ossifragus*
Northwestern Crow	*Corvus caurinus*

*No current open season

APPENDIX 4

BIRD SPECIES TAKEN BY SUBSISTENCE HUNTERS
(as of 19 May, 2009 [74 FR 23336-23349])

English Name	Scientific Name
SWANS, GEESE, AND DUCKS	**FAMILY ANATIDAE**
Whistling-Ducks, Swans, and Geese	**Subfamily Anserinae**
Swans	**Tribe Cygnini**
Tundra Swan *except no hunting or egg gathering in Units 9(D) and 10.*	*Cygnus columbianus*
Geese	**Tribe Anserini**
Greater White-fronted Goose	*Anser albifrons*
Snow Goose	*Chen caerulescens*
Lesser Canada Goose	*Branta canadensis parvipes*
Taverner's Canada Goose	*Branta canadensis taverneri*
Aleutian Canada Goose *except in the Semidi Islands.*	*Branta canadensis leucopareia*
Cackling Canada Goose *except no egg gathering is permitted.*	*Branta canadensis minima*
Black Brant *except no egg gathering is permitted in the Yukon/Kuskokwim Delta and the North Slope regions.*	*Branta bernicla nigricans*
Ducks	**Subfamily Anatinae**
Dabbling Ducks	**Tribe Anatini**
Green-winged Teal	*Anas crecca*
Mallard	*Anas platyrhynchos*
Northern Pintail	*Anas acuta*
Blue-winged Teal	*Anas discors*
Northern Shoveler	*Anas clypeata*
Gadwall	*Anas strepera*
American Wigeon	*Anas americana*
Eurasian Wigeon	*Anas penelope*
Pochards and Allies	**Tribe Aythyini**
Canvasback	*Aythya valisineria*
Redhead	*Aythya americana*
Ring-necked Duck	*Aythya collaris*
Greater Scaup	*Aythya marila*
Lesser Scaup	*Aythya affinis*
Eiders, Scoters, Mergansers and Allies	**Tribe Mergini**
Common Eider	*Somateria mollissima*
King Eider	*Somateria spectabilis*
Harlequin Duck	*Histrionicus histrionicus*
Long-tailed Duck	*Clangula hyemalis*
Black Scoter	*Melanitta nigra*
Surf Scoter	*Melanitta perspicillata*
White-winged Scoter	*Melanitta fusca*
Common Goldeneye	*Bucephafa clangula*
Barrow's Goldeneye	*Bucephafa islandica*
Bufflehead	*Bucephafa afbeoloa*
Hooded Merganser	*Lophodytes cucullatus*
Common Merganser	*Mergus merganser*
Red-breasted Merganser	*Mergus serrator*
LOONS	**FAMILY GAVIIDAE**
Red-throated Loon	*Gavia stellata*
Arctic Loon	*Gavia arctica*
Pacific Loon	*Gavia pacifica*
Common Loon	*Gavia immer*
Yellow-billed Loon *In the North Slope Region only, a total of up to 20 yellow-billed loons inadvertently caught in fishing nets may be kept for subsistence purposes.*	*Gavia adamsii*

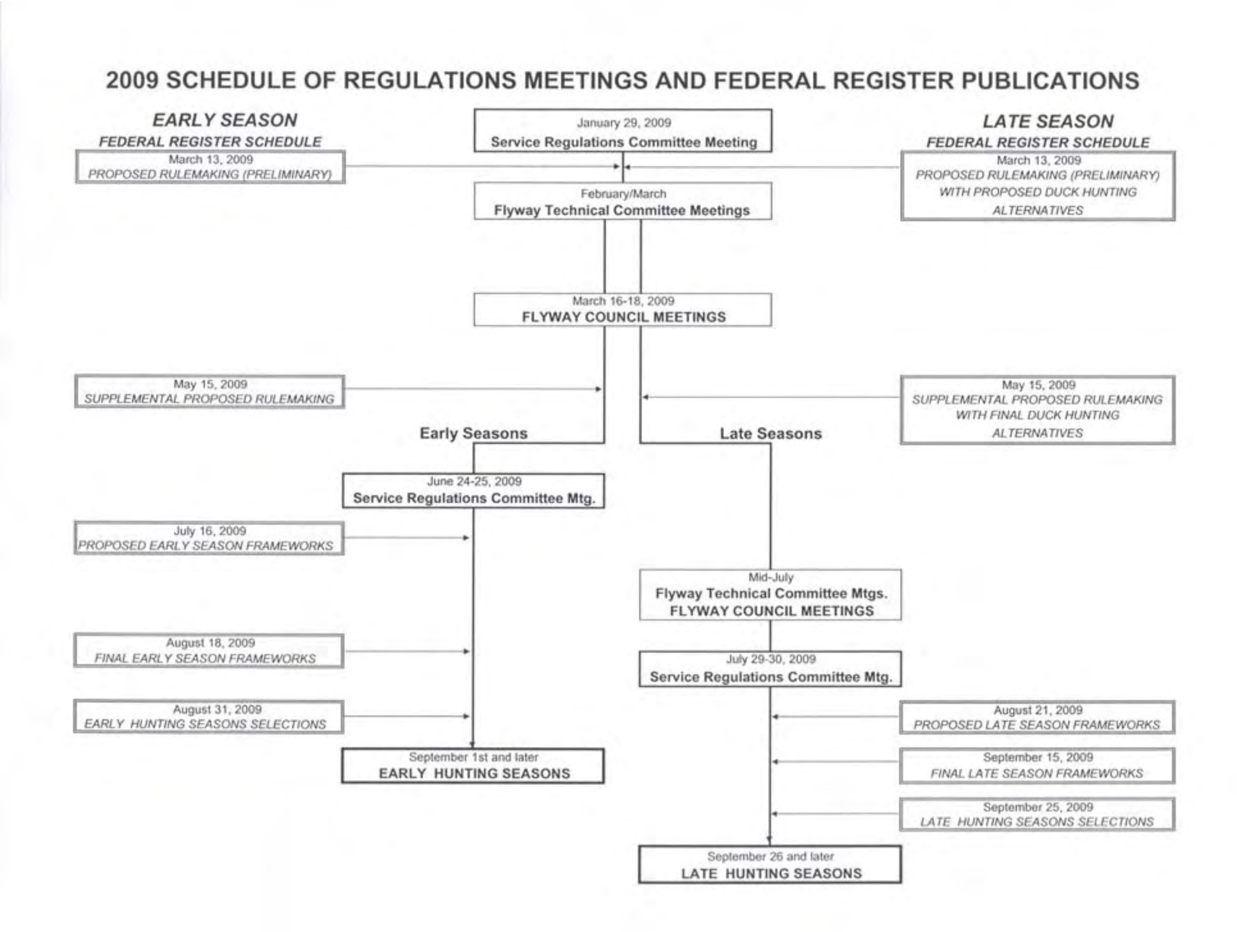
English Name	Scientific Name
GREBES	**FAMILY PODICIPEDIDAE**
Horned Grebe	*Podiceps auritus*
Red-necked Grebe	*Podiceps grisegena*
PETRELS AND SHEARWATERS	**FAMILY PROCELLARIIDAE**
Northern Fulmar	*Fulmarus glacialis*
CORMORANTS AND SHAGS	**FAMILY PHALACROCORACIDAE**
Double-crested Cormorant	*Phalacrocorax auritus*
Pelagic Cormorant	*Phalacrocorax pelagicus*
CRANES	**FAMILY GRUIDAE**
Sandhill Crane	*Grus canadensis*
PLOVERS	**FAMILY CHARADRIIDAE**
Black-bellied Plover	*Pluvialis squatarola*
Common Ringed Plover	*Charadrius hiaticula*
OYSTERCATCHERS	**FAMILY HAEMATOPODIDAE**
Black Oystercatcher	*Haematopus bachmani*
SNIPE, WOODCOCK, SANDPIPERS, TURNSTONES, AND ALLIES	**FAMILY SCOLOPACIDAE**
Greater Yellowlegs	*Tringa melanoleuca*
Lesser Yellowlegs	*Tringa flavipes*
Spotted Sandpiper	*Actitis macularia*
Bar-tailed Godwit	*Limosa lapponica*
Ruddy Turnstone	*Arenaria interpres*
Semipalmated Sandpiper	*Calidris pusilla*
Western Sandpiper	*Calidris mauri*
Baird's Sandpiper	*Calidris bairdii*
Sharp-tailed Sandpiper	*Calidris acuminata*
Least Sandpiper	*Calidris minutilla*
Dunlin	*Calidris alpina*
Long-billed Dowitcher	*Limnodromus scolopaceus*
Common Snipe	*Gallinago gallinago*
Red-necked Phalarope	*Phalaropus lobatus*
Red Phalarope	*Phalaropus fulicaria*
GULLS, TERNS, AND SKIMMERS	**FAMILY LARIDAE**
Pomarine Jaeger	*Stercorarius pomarinus*
Parasitic Jaeger	*Stercorarius parasiticus*
Long-tailed Jaeger	Stercorarius longicaudus
Bonaparte's Gull	*Larus philadelphia*
Mew Gull	*Larus canus*
Herring Gull	*Larus argentatus*
Slaty-backed Gull	*Larus schistisagus*
Glaucous-winged Gull	*Larus glaucescens*
Glaucous Gull	*Larus hyperboreus*
Sabine's Gull	*Xema sabini*
Black-legged Kittiwake	*Rissa tridactyla*
Red-legged Kittiwake	*Rissa brevirostris*
Ivory Gull	*Pagophila eburnea*
Arctic Tern	*Sterna paradisaea*
Aleutian Tern	*Sterna aleutica*

English Name	Scientific Name
PUFFINS, MURRES, AUKLETS AND RELATIVES	**FAMILY ALCIDAE**
Common Murre	*Uria aalge*
Thick-billed Murre	*Uria lomvia*
Black Guillemot	*Cepphus grylle*
Pigeon Guillemot	*Cepphus columba*
Cassin's Auklet	*Ptychoramphus aleuticus*
Parakeet Auklet	*Aethia psittacula*
Least Auklet	*Aethia pusilla*
Whiskered Auklet	*Aethia pygmaea*
Crested Auklet	*Aethia cristatella*
Rhinoceros Auklet	*Cerorhinca monocerata*
Horned Puffin	*Fratercula corniculata*
Tufted Puffin	*Fratercula cirrhata*
OWLS	***FAMILY STRIGIDAE***
Great Horned Owl	*Bubo scandiacus*
Snowy Owl	*Nyctea scandiaca*

APPENDIX 5

EXAMPLES OF FEDERAL REGISTER DOCUMENTS PERTAINING TO THE ESTABLISHMENT OF ANNUAL REGULATIONS FOR FALL-WINTER SEASONS, 2009

Hunting regulation proposals are developed according to early and late season schedules (the cycle is illustrated in the Figure below) and the Service adopts them as Federal regulations by publication in the *Federal Register*.



A list of *Federal Register* documents pertaining to the establishment of annual regulations for 2009-10 is provided below, as are the internet links for accessing electronic copies of each document. Alternatively, each document can be downloaded directly from the following web address: http://www.gpoaccess.gov/fr/ or http://www.regulations.gov.

If you would like a hard copy of any of these documents, please mail your request to the contact address listed at the front of this publication.

Federal Register/Vol. 74/No. 68/April 10, 2009/16339-16348
Migratory Bird Hunting; Proposed 2009-10 Migratory Game Bird Hunting Regulations (Preliminary) With Requests for Indian Tribal Proposals and Requests for 2010 Spring and Summer Migratory Bird Subsistence Harvest Proposals in Alaska; Proposed Rules. Document ID: FWS-R9-MB-2008-0124-0005
http://www.regulations.gov/search/Regs/home.html#documentDetail?R=090000648094e290

SUMMARY: The U.S. Fish and Wildlife Service proposes to establish annual hunting regulations for certain migratory game birds for the 2009-10 hunting season. We annually prescribe outside limits (frameworks) within which States may select hunting seasons. This proposed rule provides the regulatory schedule, describes the proposed regulatory alternatives for the 2009-10 duck hunting seasons, requests proposals from Indian Tribes that wish to establish special migratory game bird hunting regulations on Federal Indian reservations and ceded lands, and requests proposals for the 2010 spring and summer migratory bird subsistence season in Alaska. Migratory game bird hunting seasons provide opportunities for recreation and sustenance; aid Federal, State, and Tribal governments in the management of migratory game birds; and permit harvests at levels compatible with migratory game bird population status and habitat conditions.

Federal Register/Vol. 74/No. 100/May 27, 2009/25209-25213
Migratory Bird Hunting; Supplemental Proposals for Migratory Game Bird Hunting Regulations for the 2009-10 Hunting Season; Notice of Meetings; Proposed Rules. Document ID: FWS-R9-MB-2008-0124-0009
http://www.regulations.gov/search/Regs/home.html#documentDetail?R=09000064809b8f21

SUMMARY: We, the U.S. Fish and Wildlife Service, proposed in an earlier document to establish annual hunting regulations for certain migratory game birds for the 2009-10 hunting season. This supplement to the proposed rule provides the regulatory schedule, announces the Service Migratory Bird Regulations Committee and Flyway Council meetings, and provides Flyway Council recommendations resulting from their March meetings.

Federal Register/Vol. 74/No. 141/July 24, 2009/36869-36890
Migratory Bird Hunting; Proposed Frameworks for Early-Season Migratory Bird Hunting Regulations; Notice of Meetings; Proposed Rule. Document ID: FWS-R9-MB-2008-0124-0033
http://www.regulations.gov/search/Regs/home.html#documentDetail?R=09000064809fa17c

SUMMARY: The U.S. Fish and Wildlife Service is proposing to establish the 2009-10 early-season hunting regulations for certain migratory game birds. We annually prescribe frameworks, or outer limits, for dates and times when hunting may occur and the maximum number of birds that may be taken and possessed in early seasons. Early seasons may open as early as September 1, and include seasons in Alaska, Hawaii, Puerto Rico, and the U.S. Virgin Islands. These frameworks are necessary to allow State selections of specific final seasons and limits and to allow recreational harvest at levels compatible with population status and habitat conditions. This proposed rule also provides the final regulatory alternatives for the 2009-10 duck hunting seasons

Federal Register/Vol. 74/No. 163/August 25, 2009/43007-43024
Migratory Bird Hunting; Final Frameworks for Early-Season Migratory Bird Hunting Regulations; Final Rule. Document ID: FWS-R9-MB-2008-0124-0060
http://www.regulations.gov/search/Regs/home.html#documentDetail?R=0900006480a11b8a

SUMMARY: This rule prescribes final early-season frameworks from which the States, Puerto Rico, and the Virgin Islands may select season dates, limits, and other options for the 2009-10 migratory bird hunting seasons. Early seasons are those that generally open prior to October 1, and include seasons in Alaska, Hawaii, Puerto Rico, and the Virgin Islands. The effect of this final rule is to facilitate the selection of hunting seasons by the States and Territories to further the annual establishment of the early-season migratory bird hunting regulations.

Federal Register/Vol. 74/No. 167/August 31, 2009/45031-45067
Migratory Bird Hunting; Early Seasons and Bag and Possession Limits for Certain Migratory Game Birds in the Contiguous United States, Alaska, Hawaii, Puerto Rico, and the Virgin Islands; Final Rule. Document ID: FWS-R9-MB-2008-0124-0061
http://www.regulations.gov/search/Regs/home.html#documentDetail?R=0900006480a18c65

SUMMARY: This rule prescribes the hunting seasons, hours, areas, and daily bag and possession limits of mourning, white-winged, and white-tipped doves; band-tailed pigeons; rails; moorhens and gallinules; woodcock; common snipe; sandhill cranes; sea ducks; early (September) waterfowl seasons; migratory game birds in Alaska, Hawaii, Puerto Rico, and the Virgin Islands; and some extended falconry seasons. Taking of migratory birds is prohibited unless specifically provided for by annual regulations. This rule permits taking of designated species during the 2009-10 season.

Federal Register/Vol. 74/No. 155/August 13, 2009/41007-41031
Migratory Bird Hunting; Proposed Framework for Late-Season Migratory Bird Hunting Regulations; Proposed Rule. Document ID: FWS-R9-MB-2008-0124-0050
http://www.regulations.gov/search/Regs/home.html#documentDetail?R=0900006480a084e4

SUMMARY: The Fish and Wildlife Service is proposing to establish the 2009-10 late-season hunting regulations for certain migratory game birds. We annually prescribe frameworks, or outer limits, for dates and times when hunting may occur and the number of birds that may be taken and possessed in late seasons. These frameworks are necessary to allow State selections of seasons and limits and to allow recreational harvest at levels compatible with population and habitat conditions.

Federal Register/Vol. 74/No 184/September 24, 2009/48821-48844
Migratory Bird Hunting; Final Frameworks for Late-Season Migratory Bird Hunting Regulations; Final Rule. Document ID: FWS-R9-MB-2008-0124-0063
http://www.regulations.gov/search/Regs/home.html#documentDetail?R=0900006480a2b0cc

SUMMARY: The Fish and Wildlife Service prescribes final late-season frameworks from which States may select season dates, limits, and other options for the 2009-10 migratory bird hunting seasons. These late seasons include most waterfowl seasons, the earliest of which commences on September 26, 2009. The effect of this final rule is to facilitate the States' selection of hunting seasons and to further the annual establishment of the late-season migratory bird hunting regulations.

APPENDIX 6

EXAMPLES OF FEDERAL REGISTER DOCUMENTS PERTAINING TO THE ESTABLISHMENT OF ANNUAL REGULATIONS FOR SUBSISTENCE HUNTING SEASONS, 2009–20010

A list of *Federal Register* documents pertaining to the establishment of annual regulations for the 2009-10 subsistence hunting seasons is provided below, as are the internet links for accessing electronic copies of each document. Alternatively, each document can be downloaded directly from the following web address: http://www.gpoaccess.gov/fr/ or http://www.regulations.gov.

If you would like a hard copy of any of these documents, please mail your request to the contact address listed at the front of this publication.

Federal Register/Vol. 73/No. 244/December 18, 2008/76994-76999
Migratory Bird Subsistence Harvest in Alaska; Harvest Regulations for Migratory Birds in Alaska During the 2009 Season; Proposed rule. Document ID: FWS-R7-MB-2008-0126-0001
http://www.regulations.gov/search/Regs/home.html#documentDetail?R=09000064807e05bf

SUMMARY: The U.S. Fish and Wildlife Service proposes migratory bird subsistence harvest regulations in Alaska for the 2009 season. The proposed regulations would enable the continuation of customary and traditional subsistence uses of migratory birds in Alaska and prescribe regional information on when and where the harvesting of birds may occur. These proposed regulations were developed under a co-management process involving the Service, the Alaska Department of Fish and Game, and Alaska Native representatives. The rulemaking is necessary because the regulations governing the subsistence harvest of migratory birds in Alaska are subject to annual review. This rulemaking proposes region-specific regulations that would go into effect on April 2, 2009, and expire on August 31, 2009.

Federal Register/Vol. 74/No. 95/May 19, 2009/23336-23349
Migratory Bird Subsistence Harvest in Alaska; Harvest Regulations for Migratory Birds in Alaska During the 2009 Season; Final rule. Document ID: FWS-R7-MB-2008-0126-0014
http://www.regulations.gov/search/Regs/home.html#documentDetail?R=090000648099fcbf

SUMMARY: The U.S. Fish and Wildlife Service establishes migratory bird subsistence harvest regulations in Alaska for the 2009 season. These regulations will enable the continuation of customary and traditional subsistence uses of migratory birds in Alaska and prescribe regional information on when and where the harvesting of birds may occur. These regulations were developed under a co-management process involving the Service, the Alaska Department of Fish and Game, and Alaska Native representatives. The rulemaking is necessary because the regulations governing the subsistence harvest of migratory birds in Alaska are subject to annual review. This rulemaking establishes region-specific regulations that go into effect on the date of publication in the Federal Register and expire on August 31, 2009.

Federal Register/Vol. 74/No. 223/November 20, 2009/60228-60234
Migratory Bird Subsistence Harvest in Alaska; Harvest Regulations for Migratory Birds in Alaska During the 2010 Season; Proposed rule. Document ID: FWS-R7-MB-2009-0082-0001
http://www.regulations.gov/search/Regs/home.html#documentDetail?R=0900006480a5b4d3

SUMMARY: The U.S. Fish and Wildlife Service proposes migratory bird subsistence harvest regulations in Alaska for the 2010 season. These regulations will enable the continuation of customary and traditional subsistence uses of migratory birds in Alaska and prescribe regional information on when and where the harvesting of birds may occur. These regulations were developed under a co-management process involving the Service, the Alaska Department of Fish and Game, and Alaska Native representatives. The rulemaking is necessary because the regulations governing the subsistence harvest of migratory birds in Alaska are subject to annual review. This rulemaking proposes region-specific regulations that go into effect on April 2, 2010, and expire on August 31, 2010.

APPENDIX 7

EXAMPLES OF FEDERAL REGISTER DOCUMENTS PERTAINING TO THE ESTABLISHMENT OF ANNUAL REGULATIONS FOR HUNTING ON NATIONAL WILDLIFE REFUGES

A list of *Federal Register* documents pertaining to the establishment of annual regulations for hunting on national wildlife refuges is provided below, as are the internet links for accessing electronic copies of each document. Alternatively, each document can be downloaded directly from the following web address: http://www.gpoaccess.gov/fr/ or http://www.regulations.gov.

If you would like a hard copy of any of these documents, please mail your request to the contact address listed at the front of this publication.

Federal Register/Vol. 74./No. 8/January 13, 2009 1837-1865
2008-2009 Refuge-Specific Hunting and Sport Fishing Regulations - Modifications; Proposed Rule. Document ID: FWS-R9-NSR-2008-0042-0001
http://www.regulations.gov/search/Regs/home.html#documentDetail?R=090000648081ccf2

SUMMARY: The Fish and Wildlife Service proposes to implement pertinent refuge-specific regulations and amend other existing refuge-specific regulations that pertain to migratory game bird hunting, upland game hunting, big game hunting, and sport fishing for the 2008-2009 season.

Federal Register/Vol. 74/No. 170/September 3, 2009/45673-45701
2008-2009 Refuge-Specific Hunting and Sport Fishing Regulations--Modifications; Final Rule. Document ID: FWS-R9-NSR-2008-0042-0009
http://www.regulations.gov/search/Regs/home.html#documentDetail?R=0900006480a1c344

SUMMARY: The Fish and Wildlife Service implements pertinent refuge-specific regulations and amends other existing refuge-specific regulations that pertain to migratory game bird hunting, upland game hunting, big game hunting, and sport fishing for the 2008-2009 season.

Federal Register/Vol. 74/No. 189/October 1, 2009/50736-50737
2008-2009 Refuge-Specific Hunting and Sport Fishing Regulations--Modifications; Corrections. Document ID: FWS-R9-NSR-2008-0042-0011
http://www.regulations.gov/search/Regs/home.html#documentDetail?R=0900006480a34d59

SUMMARY: On September 3, 2009, we published a final rule in the Federal Register implementing pertinent refuge-specific regulations and amending other existing refuge-specific regulations that pertain to migratory game bird hunting, upland game hunting, big game hunting, and sport fishing for the 2008-2009 season. The rule contained errors in the amendatory language and the regulatory text. This document corrects those errors.

Federal Register/Vol. 74/No. 248/December 29, 2009/68967-68981
2009-2010 Refuge-Specific Hunting and Sport Fishing Regulations--Additions; Proposed Rule. Document ID: FWS-R9-NSR-2009-0023-0001
http://www.regulations.gov/search/Regs/home.html#documentDetail?R=0900006480a73293

SUMMARY: The Fish and Wildlife Service proposes to add two refuges to the list of areas open for hunting and/or sport fishing programs and increase the activities available at eight other refuges for the 2009-2010 season. One refuge will see a decrease in activities and another refuge will see no net change in activities for the 2009-2010 season.

APPENDIX 8

EXAMPLES OF FEDERAL REGISTER DOCUMENTS PERTAINING TO MIGRATORY BIRD HUNTING REGULATIONS ON CERTAIN FEDERAL INDIAN RESERVATIONS AND CEDED LANDS, 2009–2010

A list of *Federal Register* documents pertaining to the establishment of annual regulations for hunting on certain Federal Indian reservations and ceded lands (2009-10) is provided below, as are the internet links for accessing electronic copies of each document. Alternatively, each document can be downloaded directly from the following web address: http://www.gpoaccess.gov/fr/ or http://www.regulations.gov.

If you would like a hard copy of any of these documents, please mail your request to the contact address listed at the front of this publication.

Federal Register/Vo. 74/No. 153/August 11, 2009/40138-40154
Migratory Bird Hunting; Proposed Migratory Bird Hunting Regulations on Certain Federal Indian Reservations and Ceded Lands for the 2009-10 Season; Proposed rule. Document ID: FWS-R9-MB-2008-0124-0041
http://www.regulations.gov/search/Regs/home.html#documentDetail?R=0900006480a058a1

SUMMARY: The U.S. Fish and Wildlife Service proposes special migratory bird hunting regulations for certain Tribes on Federal Indian reservations, off-reservation trust lands, and ceded lands for the 2009-10 migratory bird hunting season.

Federal Register/Vol. 74/No. 169/September 2, 2009/45343-45353
Migratory Bird Hunting; Migratory Bird Hunting Regulations on Certain Federal Indian Reservations and Ceded Lands for the 2009-10 Early Season; Final rule. Document ID: FWS-R9-MB-2008-0124-0062
http://www.regulations.gov/search/Regs/home.html#documentDetail?R=0900006480a1b4a4

SUMMARY: This rule prescribes special early season migratory bird hunting regulations for certain tribes on Federal Indian reservations, off-reservation trust lands, and ceded lands. This responds to tribal requests for U.S. Fish and Wildlife Service recognition of their authority to regulate hunting under established guidelines. This rule allows the establishment of season bag limits and, thus, harvest at levels compatible with populations and habitat conditions.

Federal Register/Vol. 74/No. 185/September 25, 2009/49291-49297]
Migratory Bird Hunting; Migratory Bird Hunting Regulations on Certain Federal Indian Reservations and Ceded Lands for the 2009-10 Late Season; Final Rule; Document ID: FWS-R9-MB-2008-0124-0065
http://www.regulations.gov/search/Regs/home.html#documentDetail?R=0900006480a2c1ed

SUMMARY: This rule prescribes special late-season migratory bird hunting regulations for certain tribes on Federal Indian reservations, off-reservation trust lands, and ceded lands. This rule responds to tribal requests for U.S. Fish and Wildlife Service recognition of their authority to regulate hunting under established guidelines. This rule allows the establishment of season bag limits and, thus, harvest at levels compatible with populations and habitat conditions.

Federal Register/Vol. 74/No. 207/October 28, 2009/55467-55468
Migratory Bird Hunting; Migratory Bird Hunting Regulations on
Certain Federal Indian Reservations and Ceded Lands for the 2009-10
Late Season; Final rule; correcting amendments. Document ID: FWS-R9-MB-2008-0124-0066
http://www.regulations.gov/search/Regs/home.html#documentDetail?R=0900006480a4cb83

SUMMARY: On September 2 and 25, 2009, we, the U.S. Fish and Wildlife Service, published two final rules that established special early- and late-season migratory bird hunting regulations for certain tribes on Federal Indian reservations, off-reservation trust lands, and ceded lands. In error, the second of these rules omitted from the regulatory text pertaining to late-season hunting by the White Mountain Apache Tribe the dates and bag limits for duck and Canada goose. This document corrects those errors.

APPENDIX 9

PROTOCOL AMENDING THE 1916 CONVENTION FOR THE PROTECTION OF MIGRATORY BIRDS

S. Treaty Doc. No. 104-28
(Cite as: 1995 WL 8771 99 (Treaty))

Canada

*1 PROTOCOL AMENDING THE 1916 CONVENTION FOR THE PROTECTION OF MIGRATORY BIRDS

Signed December 5, 1995
Read the first time in the Senate August 2, 1996

LETTER OF TRANSMITTAL

THE WHITE HOUSE, August 2, 1996.

To the Senate of the United States:

With a view to receiving the advice and consent of the Senate to ratification, I transmit herewith the Protocol between the United States and Canada Amending the 1916 Convention for the Protection of Migratory Birds in Canada and the United States, with a related exchange of notes, signed at Washington on December 14, 1995.

The Protocol, which is discussed in more detail in the accompanying report of the Secretary of State, represents a considerable achievement for the United States in conserving migratory birds and balancing the interests of conservationists, sports hunters, and indigenous people. If ratified and properly implemented, the Protocol should further enhance the management and protection of this important resource for the benefit of all users.

The Protocol would replace a protocol with a similar purpose, which was signed January 30, 1979, (Executive W, 96th Cong., 2nd Sess. (1980)), and which I, therefore, desire to withdraw from the Senate.

I recommend that the Senate give early and favorable consideration to the Protocol, with exchange of notes, and give its advice and consent to ratification.

WILLIAM J. CLINTON.

LETTER OF SUBMITTAL

DEPARTMENT OF STATE,
Washington, May 20, 1996.

The President,
The White House.

I have the honor to submit to you, with the view to its transmission to the Senate for advice and consent to ratification, a Protocol between the United States and Canada amending the 1916 Convention for the Protection of Migratory Birds in Canada and the United States, with a related exchange of notes, signed at Washington on December 14, 1995.

The 1916 Convention for the Protection of Migratory Birds in Canada and the United States ("the Convention") presently does not permit hunting of the migratory species covered under the Convention from March 10 to September 1 except in extremely limited circumstances. Despite this prohibition, aboriginal people of Canada and indigenous people in Alaska have continued their traditional hunt of these birds in the spring and summer for subsistence and other related purposes. In the United States, the prohibition against this traditional hunt has not been actively enforced. In Canada, as a result of recent constitutional guarantees and judicial decisions, the Canadian Federal Government has recognized a right in aboriginal people to this traditional hunt, and the prohibition has not been enforced for this reason.

The goals of the Protocol are to bring the Convention into conformity with actual practice and Canadian law, and to permit the effective regulation for conservation purposes of the traditional hunt. Timely ratification is of the essence to secure U.S.-Canada conservation efforts.

This Protocol would replace a protocol with a similar purpose, which was signed in 1979, transmitted to the Senate with a message from the President dated November 24, 1980, and which is now pending in the Committee on foreign Relations.(Executive W, 96th Cong., 2nd Sess. (1980).)

A detailed analysis of the Protocol follows.

THE PROTOCOL

The Preamble to the Protocol states as its goals allowing a traditional subsistence hunt and improving conservation of migratory birds by allowing for the effective regulation of this hunt. In addition, the Preamble notes that, by sanctioning a traditional subsistence hunt, the Parties do not intend to cause significant increases in the take of species of migratory birds relative to their continental population sizes, compared to the take that is occurring at present. Any such increase in take as a result of the types of hunting provided for in the Protocol would thus be inconsistent with the Convention.

Article I of the Protocol amends Article I of the Convention to modernize the taxonomy and names of the birds subject to the Convention. Species were not added to our subtracted from the list, however; regulation of birds not included in the original Convention is now within the purview of the Canadian provinces, and any such change to the list would have required time-consuming negotiations between the Canadian federal government and all of the provinces and territories, with uncertain results.

Article II of the Protocol substantially rewrites Article II of the Convention to include new subsistence hunt provisions. An introductory paragraph outlines the conservation principles that apply to all management of migratory birds under the Convention. In addition, this paragraph lists a variety of means to achieve these conservation principles.

The United States and Canada exchanged diplomatic notes at the time of the Protocol signing, in which both governments confirmed that the conservation principles set forth in Article II apply to all activities under Article II. The United States considered this exchange of notes desirable in light of the language of Article II (4)(a), which contains the phrase "subject to existing aboriginal and treaty rights of the Aboriginal peoples of Canada under section 35 of the Constitution Act, 1982, and the regulatory and conservation regimes defined in the relevant treaties, land claims agreements, self-government agreements, and co-management agreements with Aboriginal peoples of Canada...." This phrase was sought by Canada in order to recognize Canadian court decisions that affirm certain rights of aboriginal people to exploit natural resources. However, as the exchange of notes makes clear, this phrase does not override the conservation principles set forth earlier in Article II.

Paragraphs 1, 2, and 3 of Article II of the Protocol continue the basic closed and open seasons for hunting contained in the original Convention, with a closed season between March 10 and September 1. The open season remains limited to three and one half months, which the Parties agreed would be interpreted to mean 107 days. The closed season for migratory insectivorous and nongame birds is maintained. Exceptions to these closed seasons may be made for scientific, educational or other specific purposes consistent with the conservation principles of the Convention. This language is found in similar conventions between the United States and Japan (TIAS 7990; 25 UST 3329) (hereinafter "the Japan Convention") and the successor States to the former U.S.S.R. (TIAS 9073; 29 UST 4647) (hereinafter the "U.S.S.R. Convention"), respectively.

The traditional subsistence hunt is provided for as an exception to the closed season and is dealt within paragraph4, with different provisions for the hunt in Canada and the United States reflecting different domestic legal regimes and practices. Paragraph 4(a) recognizes that in Canada, aboriginal people have a right to harvest birds under the Canadian Constitution, treaties between aboriginal people and the Government, and other provisions of Canadian law, and permits Canada to allow such a harvest as a matter of international law. Paragraph 4(b) authorizes the United States to allow such a harvest only in Alaska.

Under the terms of paragraph 4(a), Canada may allow its aboriginal people to harvest birds, their eggs, and down in any season. In addition, down and non- edible by-products of the traditional harvest may be sold, but only within or between aboriginal communities. Finally, Canada can allow two other small groups of people (estimated to be only a couple of hundred hunters) to harvest birds and eggs outside of the normal open season. The first are non-aboriginal residents of the aboriginal communities who are permitted to hunt by those communities. The second are qualified permanent residents of Yukon and the Northwest Territories who are allowed an earlier fall season to hunt.

Paragraph 4(b) concerns subsistence hunting in Alaska by "indigenous inhabitants of Alaska" (understood for the purposes of the Protocol as meaning Alaska Natives and permanent resident non- natives with legitimate subsistence hunting needs living in designated subsistence hunting areas). This paragraph authorizes the United States to establish a subsistence harvest of birds, their eggs and down in any season. Sale of these items is not permitted, except for limited sale of non-edible by- products of birds taken for nutritional purposes incorporated into authentic articles of handicraft. The harvest of such items must be consistent with "customary and traditional uses" of indigenous inhabitants for their "nutritional and other essential needs."

Paragraph 4(b)(ii) states that any subsistence harvest in Alaska will be managed through domestic management bodies that provide indigenous inhabitants a significant voice.

Additional information about the U.S. domestic implementation of Article II (4)(b) can be found below, under the heading "Domestic Implementation."

The final section of Article II permits a murre hunt in the Province of Newfoundland and Labrador. This traditional hunt was not provided for by the Convention because Newfoundland and Labrador were not part of Canada in 1916.

Paragraph 3 of Article II of the original Convention, which provided for a limited subsistence hunt by "Eskimos and Indians," has been subsumed by this new Article II.

The Protocol does not create any private rights of action under U.S. law, and, in particular, does not create a right of persons to harvest migratory birds and their eggs. Similarly, Canada does not regard the agreement as creating a right in aboriginal people of Canada to harvest birds; this right is implemented by the Canadian Constitution and relevant agreements between the Government of Canada and its aboriginal groups.

Article III of the Protocol replaces Article III of the Convention, which establish a 10-year closed season for certain species and is no longer operative. The new Article III sets out a formal consultation process by which the U.S. and Canada agree to meet regularly to review the progress of implementation of the treaty and any other related issues. This article also reinforces the application of the conservation principles of Article II of the Protocol, and creates a mechanism for dealing with emergencies that threaten particular bird species. The consultation process will ensure that any concerns of interested U.S. groups can be effectively addressed at the bilateral level.

Article IV of the Protocol replaces Article IV of the Convention (dealing with conservation of wood ducks and eiders) which also outlived its usefulness. The new provision states that each government will use its authority to protect and conserve habitats essential to migratory bird populations (including protection from pollution and from alien or exotic species). The Protocol does not, as a practical matter, require either Party to take any steps in this area in addition to those already being taken under existing domestic legal authority. Nevertheless, this Article enshrines in the Convention the principle of habitat conservation, where previously the Convention was silent on the issue.

Article V of Protocol slightly modifies Article V of the Convention by allowing the taking of nests and eggs foreseen in the revised Article II, Section 4 and expanding the permitted taking of nests and eggs to include educational or other specific purposes as long as they are consistent with the conservation principles of the treaty. This language is similar to that contained in the Japan and U.S.S.R. Conventions.

CONSISTENCY WITH OTHER MIGRATORY BIRD CONVENTIONS

As a matter of international law, in order for the United States to take advantage of certain provisions of the Protocol, a conforming amendment to the U.S.-Mexico Convention on the Protection of Migratory Birds and Mammals (TS 912; 50 Stat. 1311) will be required. The U.S.-Mexico Convention currently mandates a "close season for wild ducks from the tenth of March to the first of September," while the Protocol would allow a limited hunt of migratory birds, including ducks, in Alaska during part of this time period.

As a matter of domestic law, a conforming amendment to the U.S.-Mexico Convention would also be required. Specifically, the Department of Interior could not implement a provision of one convention that allows a hunt prohibited by the provision of another, since U.S. courts have held that the statute implementing the various migratory bird conventions should be interpreted to require application of the most restrictive one in the case of conflict. See Alaska Fish & Wildlife Fed'n & Outdoor Council, Inc.v. Dunkle, 829 F.2d 933, 941 (9thCir.1987), cert. den., 485 U.S. 988 (1988).

The United States has indicated to Canada that the provision allowing the hunting of wild ducks during the closed season cannot become effective in the United States until the conforming amendment to the U.S.-Mexico Convention enters into force.

It will not be necessary to amend the U.S.-U.S.S.R. Convention, since it allows a subsistence hunt of the type contained in the Protocol.

The U.S.-Japan Convention contains a more restrictive definition of subsistence hunt than is contemplated by the Protocol. It does not include hunting by resident Alaskans who are not "Eskimos" or "Indians," and the purpose of a subsistence hunt is limited to the provision of food and clothing (excluding, for example, the making of traditional handicrafts). The U.S.-Japan Convention does, however, allow each Party to decide on open seasons for hunting, as long as these seasons are set "so as to avoid *** principal nesting seasons and to maintain *** optimum numbers." In addition, there is a specific prohibition on "any sale, purchase or exchange" of birds and their eggs, by- products or parts. A subsistence hunt under the U.S.-Canada Convention therefore will have to be implemented in a manner consistent with these provisions of the U.S.-

Japan Convention. Thus, for example, avoidance of principal nesting seasons will allow for only limited taking of eggs.

DOMESTIC IMPLEMENTATION

An existing statute (16 U.S.C. §712) authorizes the Department of the Interior to promulgate regulations of the Interior to promulgate regulations to implement migratory bird treaties with a number of countries, including Canada. No additional statutory authority would be required to implement the Protocol.

Principal species customarily and traditionally taken for subsistence in the United States are shown in a list enclosed for your information.

The term "indigenous inhabitants" in Article II (4)(2)(b)of the Protocol refers primarily to Alaska Natives who are permanent residents of villages within designated areas of Alaska where subsistence hunting of migratory birds is customary and traditional. The term also includes non-Native permanent residents of these villages who have legitimate subsistence hunting needs. Subsistence harvest areas encompass the customary and traditional hunting areas of villages with a customary and traditional pattern of migratory bird harvest. These areas are to be designated through a deliberative process, which would include the management bodies discussed below and employ the best available information on nutritional and cultural needs, customary and traditional use, and other pertinent factors.

Most village areas within the Alaska Peninsula, Ko/dak Archipelago, the Aleutian Islands, and areas north and west of the Alaska Range would qualify as subsistence harvest areas. Areas that would generally not qualify for a spring or summer harvest include the Anchorage, Matanuska-Susitna and Fairbanks North Star Boroughs, the Kenai Peninsula roaded area, the Gulf of Alaska roaded area and Southeast Alaska. This list of exceptions does not mean that individual communities within areas that are generally excluded cannot meet the test for designation as subsistence harvest areas. For example, data indicate that there is customary and traditional use of gull eggs by indigenous inhabitants in some villages in Southeast Alaska; these villages could be included for this limited purpose even though indigenous inhabitants in Southeast Alaska generally would be excluded from the spring/summer harvest.

In recognition of their need to assist their immediate families in meeting their nutritional and other essential needs, or for the teaching of cultural knowledge to or by their relatives, Natives residing in excluded areas in Alaska may be invited to participate in the customary spring and summer migratory bird harvest within the designated subsistence harvest areas around the villages in which their immediate families have membership. Such participation would require permission of the village council and an appropriate permit issued through the management body implementing the Protocol. "Immediate family" includes children, parents, grandparents and siblings.

As noted in Article II(4)(2)(b)(ii) of the Protocol, management bodies will be created to ensure an effective and meaningful role for indigenous inhabitants in the conservation of migratory birds. These management bodies will include Native, Federal, and State of Alaska representatives as equals, and will develop recommendations for, among other things: seasons and bag limits; law enforcement policies; population and harvest monitoring; education programs; research and use of traditional knowledge; and habitat protection. Village councils shall be involved to the maximum extent possible in all aspects of management. Relevant recommendations will be submitted to the U.S. Fish and Wildlife Service of the Department of the Interior (hereinafter "DOI/FWS") and to the Flyway Councils. Regulations established should be enforced to prevent conservation problems.

Creation of these management bodies is intended to provide more effective conservation of migratory birds in designated subsistence harvest areas without diminishing the ultimate authority and responsibility of DOI/FWS. It is the intention of DOI/FWS and the Alaska Department of Fish and Game that management information, including traditional knowledge, the number of subsistence hunters and estimates of harvest, will be collected cooperatively for the benefit of management bodies.

Harvest levels of migratory birds in the United States may vary for all users, commensurate with the size of the migratory bird populations. Any restrictions in harvest levels of migratory birds necessary for conservation shall be shared equitably between users in Alaska and users in other states taking into account nutritional needs. The Protocol is not intended to create a preference in favor of any group of users in the United States or to modify any preference that may exist.

The provisions of Article II (4)(b) will be implemented so that birds are taken only for food. Non-edible by-products of birds taken for nutritional purposes incorporated into authentic articles of handicraft by Alaska Natives may be sold in strictly limited situations and pursuant to a regulation by the competent authority in cooperation with management bodies. Regulations allowing such harvest will be consistent with the customary and traditional uses of indigenous inhabitants for their nutritional and other essential needs. The term "handicraft" does not include taxidermy items. The Protocol does not authorize the taking of migratory birds for commercial purposes.

This Protocol represents a major step forward in the conservation and management of migratory birds on a substantial basis. Properly implemented, it will improve the health of the North American migratory bird population and protect the interests of conservationists, sports hunters, indigenous people and all others who value this important resource.

Accordingly I recommend that this Protocol be transmitted to the Senate as soon as possible for its early and favorable advice and consent to ratification.

Respectfully submitted,

WARREN CHRISTOPHER.

Enclosure: As stated.

LIST OF PRINCIPAL SPECIES CUSTOMARILY AND TRADITIONALLY TAKEN FOR SUBSISTENCE IN THE UNITED STATES

Migratory birds known to be used for subsistence in Alaska, from Wolfe, R.J. et al., The Subsistence Harvest of Migratory Bird Species in Alaska (Alaska Department of Fish and Game, Division of Subsistence, Technical Paper No. 197, 1990)

GEESE

White-fronted
Cackling Canada
Lesser snow
Black brant
Lesser Canada
Taverner's Canada
Emperor

DUCKS

Mallard
Gadwall
Shovelor
Ring-necked
Green-winged teal
Bufflehead
Greater scaup
Oldsquaw
Black scoter
Common eider
Spectacled eider
Red-breasted merganser
Pintail
Wigeon
Redhead
Canvasback
Blue-winged teal
Harlequin
Goldeneye
White-winged scoter
Surf scoter
King eider
Common merganser

OTHER

Yellow-billed loon
Common loon
Common murre
Sabine's gull
Arctic tern
Sandhill crane
Red-throated loon
Arctic loon
Mew gull
Glaucous gull
Tundra swan
Miscellaneous shorebirds

PROTOCOL
BETWEEN
THE GOVERNMENT OF THE UNITED STATES OF AMERICA
AND
THE GOVERNMENT OF CANADA
AMENDING THE 1916 CONVENTION
BETWEEN THE UNITED KINGDOMAND THE UNITED STATES OF AMERICA
FOR THE PROTECTION OF MIGRATORY BIRDS
IN CANADA AND THE UNITED STATES

The Government of the United States of America and the Government of Canada,

REAFFIRMING their commitment to achieving the purposes and objectives of the 1916 Convention between the United Kingdom and the United States of America for the Protection of Migratory Birds in Canada and the United States;

DESIRING to amend and update the Convention to enable effective actions to betaken to improve the conservation of migratory birds;

COMMITTED to the long-term conservation of shared species of migratory birds for their nutritional, social, cultural, spiritual, ecological, economic, and aesthetic values through a more comprehensive international framework that involves working together to cooperatively manage their populations, regulate their take, protect the lands and waters on which they depend, and share research and survey information;

AWARE that changes to the Convention are required to ensure conformity with the aboriginal and treaty rights of the Aboriginal peoples of Canada;

ACKNOWLEDGING the intent of the United States to provide for the customary and traditional taking of certain species of migratory birds and their eggs for subsistence use by indigenous inhabitants of Alaska; and

AFFIRMING that it is not the intent of this Protocol to cause significant increases in the take of species of migratory birds relative to their continental population sizes;

HAVE AGREED as follows:

ARTICLE I

In order to update the listing of migratory birds included in the terms of this Convention in a manner consistent with their current taxonomic (Family and Subfamily) status, Article I of the Convention is deleted and replaced by the following:

The High Contracting Powers declare that the migratory birds included in the terms of this Convention shall be as follows:

1. Migratory Game Birds:
Anatidae, or waterfowl (ducks, geese and swans); Gruidae, or cranes (greater and lesser sandhill and whooping cranes); Rallidae, or rails(coots, gallinules and rails); Charadriidae, Haematopodidae, Recurvirostridae, and Scolopacidae, or shorebirds (including plovers and lapwings, oystercatchers, stilts and avocets, and sandpipers and allies); and Columbidae (doves and wild pigeons).

2. Migratory Insectivorous Birds:
Aegithalidae (long-tailed tits and bushtits); Alaudidae (larks); Apodidae (swifts); Bombycillidae (waxwings); Caprimulgidae (goatsuckers); Certhiidae (creepers); Cinclidae (dippers); Cuculidae (cuckoos); Emberizidae (including the emberizid sparrows, wood-warblers, tanagers, cardinals and grosbeaks and allies, bobolinks, meadowlarks, and orioles, but not including blackbirds); Fringillidae (including the finches and grosbeaks); Hirundinidae (swallows); Laniidae (shrikes); Mimidae (catbirds, mockingbirds, thrashers, and allies); Motacillidae (wagtails and pipits); Muscicapidae (including the kinglets, gnatcatchers, robins, and thrushes); Paridae (titmice); Picidae (woodpeckers and allies); Sittidae (nuthatches); Trochilidae (hummingbirds); Troglodytidae (wrens); Tyrannidae (tyrant flycatchers); and Vireonidae (vireos).

3. Other Migratory Nongame Birds:
Alcidae (auks, auklets, guillemots, murres, and puffins); Ardeidae (bitterns and herons); Hydrobatidae (storm petrels); Procellariidae (petrels and shearwaters); Sulidae (gannets); Podicipedidae (grebes); Laridae (gulls, jaegers, and terns); and Gaviidae (loons).

ARTICLE II

Article II of the Convention is deleted and replaced by the following:

The High Contracting Powers agree that, to ensure the long-term conservation of migratory birds, migratory bird populations shall be managed in accord with the following conservation principles:

To manage migratory birds internationally;
To ensure a variety of sustainable uses;
To sustain healthy migratory bird populations for harvesting needs;
To provide for and protect habitat necessary for the conservation of migratory birds; and
To restore depleted populations of migratory birds.

Means to pursue these principles may include, but are not limited to:

Monitoring, regulation, enforcement and compliance;
Co-operation and partnership;
Education and information;
Incentives for effective stewardship;
Protection of incubating birds;
Designation of harvest areas;
Management of migratory birds on a population basis;
Use of aboriginal and indigenous knowledge, institutions and practices; and
Development, sharing and use of best scientific information.

1. Except as provided for below, there shall be established the following close seasons during which no hunting shall be done:

(a) The close season on migratory game birds shall be between March 10 and September 1, and the season for hunting shall be further restricted to such period not exceeding three and one-half months as the High Contracting Powers may severally deem appropriate and define by law or regulation; and

(b) The close season on migratory insectivorous birds and other migratory nongame birds shall continue throughout the year.

2. Except as provided for below, migratory birds, their nests, or eggs shall not be sold or offered for sale.

3. Subject to laws, decrees or regulations to be specified by the proper authorities, the taking of migratory birds may be allowed at any time of the year for scientific, educational, propagative, or other specific purposes consistent with the conservation principles of this Convention.

4. Notwithstanding the close season provisions in paragraph 1 and the prohibition on the taking of eggs in Article V, and respecting aboriginal and indigenous knowledge and institutions:

(a) In the case of Canada, subject to existing aboriginal and treaty rights of the Aboriginal peoples of Canada under section 35 of the Constitution Act, 1982, and the regulatory and conservation regimes defined in the relevant treaties, land claims agreements, self-government agreements, and co- management agreements with Aboriginal peoples of Canada:

(i) Migratory birds and their eggs may be harvested throughout the year by Aboriginal peoples of Canada having aboriginal or treaty rights, and down and inedible by-products may be sold, but the birds and eggs so taken shall be offered for barter, exchange, trade or sale only within or between Aboriginal communities as provided for in the relevant treaties, land claims agreements, self-government agreements, or co-management agreements made with Aboriginal peoples of Canada; and

(ii) Migratory game and non-game birds and their eggs may be taken throughout the year for food by qualified non-aboriginal residents in areas of northern Canada where the relevant treaties, land claims agreements, self- government agreements, or co-management agreements made with Aboriginal peoples of Canada recognize that the Aboriginal peoples may so permit. The dates of the fall season for the taking of migratory game birds by qualified residents of Yukon and the Northwest Territories may be varied bylaw or regulation by the proper authorities. The birds or eggs taken pursuant to this sub-paragraph (ii) shall not be sold or offered for sale.

(b) In the case of the United States:

(i) Migratory birds and their eggs may be harvested by the indigenous inhabitants of the State of Alaska. Seasons and other regulations implementing the non-wasteful taking of migratory birds and the collection of their eggs by indigenous inhabitants of the State of Alaska shall be consistent with the customary and traditional uses by such indigenous inhabitants for their own nutritional and other essential needs; and

(ii) Indigenous inhabitants of the State of Alaska shall be afforded an effective and meaningful role in the conservation of migratory birds including the development and implementation of regulations affecting the non-wasteful taking of migratory birds and the collection of their eggs, by participating on relevant management bodies.

5. Murres may be taken by non-aboriginal residents of the province of Newfoundland and Labrador for food, subject to regulation, during the period from September 1 to March 10, but the murres so taken shall not be sold or offered for sale. The season for murre hunting shall be further restricted to such period not exceeding three and one-half months as the proper authorities may deem appropriate by law or regulation.

ARTICLE III

Article III of the Convention is deleted and replaced by the following:

The High Contracting Powers agree to meet regularly to review progress in implementing the Convention. The review shall address issues important to the conservation of migratory birds, including the status of migratory bird populations, the status of important migratory bird habitats, the effectiveness of management and regulatory systems and other issues deemed important by either High Contracting Power. The High Contracting Powers agree to work cooperatively to resolve identified problems in a manner consistent with the principles underlying this Convention and, if the need arises, to conclude special arrangements to conserve and protect species of concern.

ARTICLE IV

Article IV of the Convention is deleted and replaced by the following:

Each High Contracting Power shall use its authority to take appropriate measures to preserve and enhance the environment of migratory birds. In particular, it shall, within its constitutional authority:

(a) seek means to prevent damage to such birds and their environments, including damage resulting from pollution;

(b) endeavour to take such measures as may be necessary to control the importation of live animals and plants which it determines to be hazardous to the preservation of such birds;

(c) endeavour to take such measures as may be necessary to control the introduction of live animals and plants which could disturb the ecological balance of unique island environments; and

(d) pursue cooperative arrangements to conserve habitats essential to migratory bird populations.

ARTICLE V

Article V of the Convention is deleted and replaced by the following:

The taking of nests or eggs of migratory game or insectivorous or nongame birds shall be prohibited, except for scientific, educational, propagating or other specific purposes consistent with the principles of this Convention under such laws or regulations as the High Contracting Powers may severally deem appropriate, or as provided for under Article II, paragraph 4.

ARTICLE VI

This Protocol is subject to ratification. This Protocol shall enter into force on the date the Parties exchange instruments of ratification, shall continue to remain in force for the duration of the Convention and shall be considered an integral part of the Convention particularly for the purpose of its interpretation.

IN WITNESS WHEREOF the undersigned representatives, being duly authorized by their respective Governments, have signed the present Protocol.

DONE at Washington, this 14th day of December, 1995, in duplicate, in the English and French languages, both texts being equally authentic.

FOR THE GOVERNMENT OF THE UNITED STATES OF AMERICA:

[Signature]

FOR THE GOVERNMENT OF CANADA:

[Signature]

December 14, 1995

His Excellency
Raymond Chretien,
Ambassador of Canada.

Excellency:

I have the honor to present my compliments and to refer to the Protocol Between the Government of the United States of America and the Government of Canada Amending the 1916 Convention Between the United Kingdom and the United States of America for the Protection of **Migratory Birds** in Canada and the United States (hereinafter, the "Protocol"), signed by representatives of our two Governments today.

I have the honor to inform your Excellency that the Government of the United States of America wishes to confirm the following interpretation of Article II. The opening paragraph of Article II states that both governments shall manage **migratory bird** populations in accord with several stated conservation principles. That paragraph also lists illustrative means to pursue those principles. It is the understanding of the Government of United States of America that all of the activities allowed under Article II, including the taking and use of **migratory birds** and their eggs by Aboriginal peoples in Canada and by indigenous inhabitants of Alaska, are, pursuant to the Protocol, to be conducted in accord with these conservation principles.

I would appreciate confirmation that the Government of Canada shares the aforementioned interpretation of Article II of the Protocol.

Accept, Excellency, the renewed assurances of my highest consideration.

[Signature]

Note No. 205

The Honourable Warren Christopher
Secretary of State
Washington, D.C.

Dear Secretary Christopher,

I have the honour to refer to your Excellency's Note of today, concerning the interpretation of the Protocol Between the Government of Canada and the Government of the United States of America Amending the 1916 Convention Between the United Kingdom and the United States of America for the Protection of **Migratory Birds** in Canada and the United States, signed today.

I have the further honour to inform you that the Government of Canada shares the interpretation contained in your Excellency's Note.

Accept, Excellency, the renewed assurances of my highest consideration.

Raymond Chretien
Ambassador
December 14, 1995

Washington, D.C.

S. Treaty Doc. No. 104-28, 1995 WL 877199 (Treaty)

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