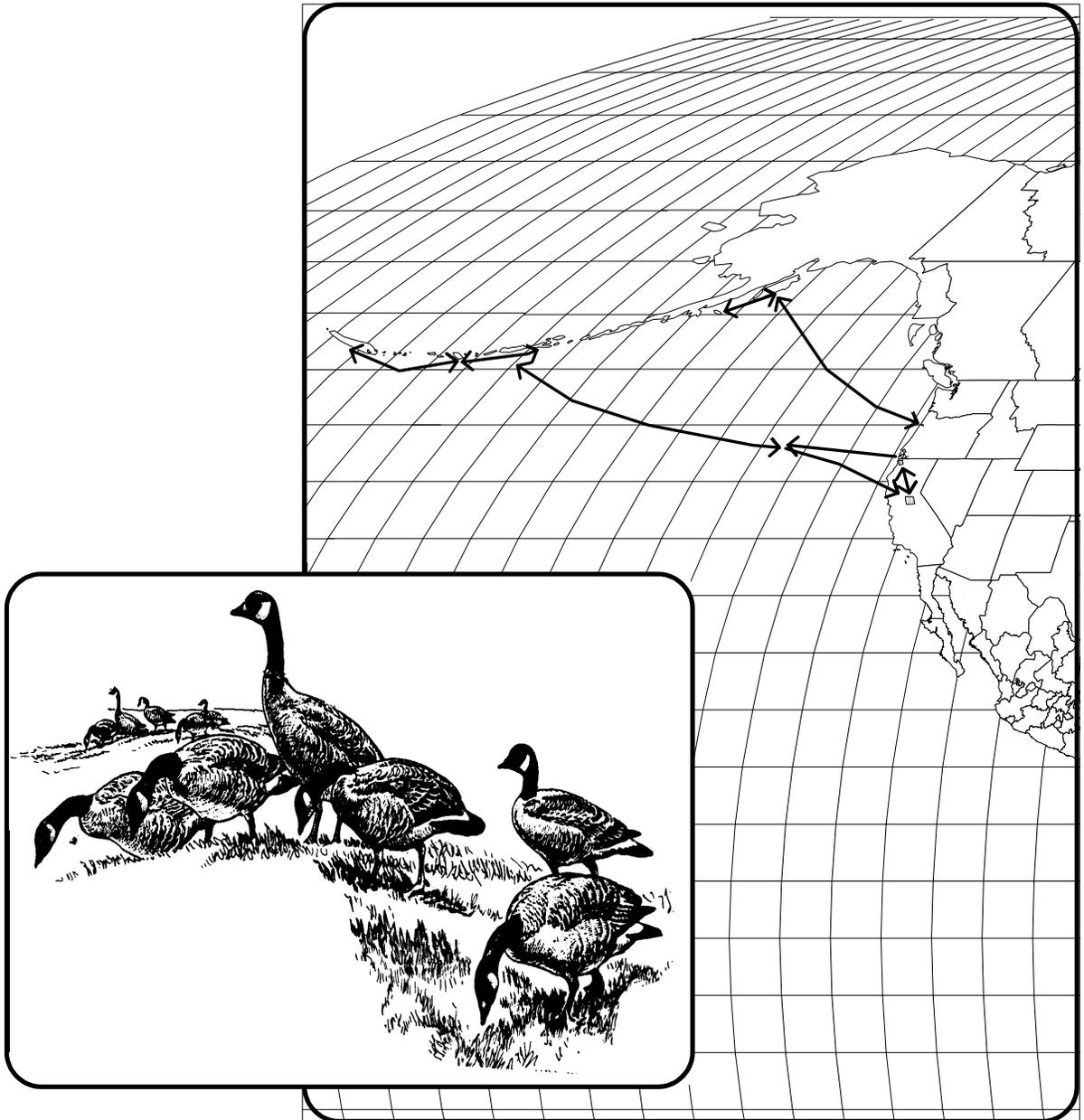


# Aleutian Canada Geese



Pacific Flyway Management Plan for the

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# **ALEUTIAN GOOSE**

**Pacific Flyway Council**

**July 19, 2006**

This management plan is one of a series of cooperatively developed plans for managing migratory birds in the Pacific Flyway. Inquiries about this plan may be directed to the Pacific Flyway Representative, U.S. Fish and Wildlife Service, 911 N.E. 11<sup>th</sup> Avenue, Portland, OR.

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Pacific Flyway Management Plan For the  
Aleutian Goose

Prepared for the:

Pacific Flyway Council  
U.S. Fish and Wildlife Service  
Canadian Wildlife Service

by the

Aleutian Goose Subcommittee of the  
Pacific Flyway Study Committee

July 1999  
Revised July 2006

Approved by: *Terry M. Manfield*  
Chair, Pacific Flyway Council

*7/19/06*  
Date

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# TABLE OF CONTENTS

	<u>Page</u>
LIST OF FIGURES .....	iv
LIST OF APPENDICES.....	iv
INTRODUCTION .....	1
GOAL AND OBJECTIVES .....	5
STATUS .....	5
A. Taxonomy and Description.....	5
B. Historical Range and Abundance.....	6
C. Recovery Efforts Under the ESA (1974-2001).....	7
D. Current Population Abundance and Trends.....	9
E. Current Distribution and Habitat Use.....	10
F. Agricultural Depredation.....	14
G. Public Use.....	15
MANAGEMENT ISSUES .....	16
RECOMMENDED MANAGEMENT STRATEGIES .....	18
A. Habitat.....	18
B. Agricultural Depredation .....	18
C. Population Inventories .....	19
D. Population Management .....	20
E. Research .....	21
ANNUAL PLAN REVIEW.....	22
A. Aleutian Goose Subcommittee .....	22
B. Alaska Migratory Bird Comanagement Council .....	22
LITERATURE CITED.....	23

## **LIST OF FIGURES**

1. Major use areas for Aleutian geese: (a) Alaska; (b) Washington, Oregon and California.
2. Population indices of Aleutian geese from peak direct counts, indirect estimates from marked birds in northwest California (NW), and indirect estimates from marked birds in the Central Valley (CV) of California (Drut and Trost 2005).
3. Indices of Aleutian geese from the Semidi Islands as measured by peak direct counts during winter on the Oregon coast (Springer and Lowe 1998; D. Pitkin, pers. comm.).

## **LIST OF APPENDICES**

- A. Population indices of Aleutian geese from peak direct counts, indirect estimates from marked birds in northwest California (NW), and indirect estimates from marked birds in the Central Valley (CV) of California (Drut and Trost 2005).
- B. Peak winter counts of Semidi Islands Aleutian geese on the Oregon coast.
- C. Summary of translocations and releases of Aleutian geese in the western Aleutian Islands.
- D. Nesting pairs of Aleutian geese on surveyed islands.
- E. Harvest strategy for Aleutian geese during 2006-2010.

# PACIFIC FLYWAY MANAGEMENT PLAN FOR THE ALEUTIAN GOOSE

## INTRODUCTION

The Pacific Flyway Council is an administrative body that forges cooperation among public wildlife agencies for the purpose of protecting and conserving migratory game birds in western North America. The Council has prepared numerous management plans to date for most populations of swans, geese, and sandhill cranes in the Pacific Flyway ([www.pacificflyway.gov](http://www.pacificflyway.gov)). These plans typically focus on populations, which are the primary unit of management, but may be specific to a species or subspecies. Management plans serve to:

- Identify common goals.
- Establish priority of management actions and responsibility for them.
- Coordinate collection and analysis of biological data.
- Emphasize research needed to improve management.

Flyway management plans are products of the Council, developed and adopted to help state and federal agencies cooperatively manage migratory game birds under common goals. Management strategies are recommendations and do not commit agencies to specific actions or schedules. Fiscal, legislative, and priority constraints influence the level and timing of implementation.

This plan establishes guidelines for the cooperative management of Aleutian geese (*Branta hutchinsii leucopareia*) in the Pacific Flyway. This subspecies recently was assigned to a new species (*hutchinsii*) called the “cackling goose” separate from the *canadensis* “Canada goose” (AOU 2004; see below). To avoid confusion with previous population names, we use the common name “Aleutian goose” and refer to *B. h. minima* as “cackling goose” in this plan.

The Aleutian goose historically was thought to have bred from near Kodiak Island, Alaska, to the Kuril Islands in Asia (Figure 1a), and wintered in Japan and from British Columbia to northern Mexico (Delacour 1954). This goose population declined precipitously in the early 1900s, primarily as the result of arctic (*Alopex lagopus*) and red (*Vulpes vulpes*) foxes introduced on nesting islands. This population was listed as endangered by the U.S. Fish and Wildlife Service (USFWS) in 1967 and afforded additional protection with the passage of the Endangered Species Act (16 USC 1531) in 1973 when fewer than 800 birds were counted in winter.

A formal recovery program began in 1974; a recovery plan was approved in 1979 and updated in 1982 and 1991 (USFWS 1991). Actions under the recovery plan produced a gradual improvement in the population in the 1970s and 1980s. By the 1990s Aleutian geese had both increased significantly in overall numbers and in breeding distribution; the population was reclassified from endangered to threatened in 1990 when the population was about 6,300. The subspecies exceeded 28,000 birds and was proposed for removal from the list of endangered and threatened wildlife in August 1999 (USFWS 1999). The population was delisted in March 2001 (USFWS 2001). Aleutian geese continued to increase at a high rate (Figure 2; Appendix A; Drut and Trost 2005) and probably surpassed 100,000 by the winter of 2004-2005. Semidi Islands geese have not increased appreciably since the mid-1980s (Figure 3; Appendix B) and remain the subject of management concerns.

Figure 1a. Major use areas for Aleutian geese in Alaska.

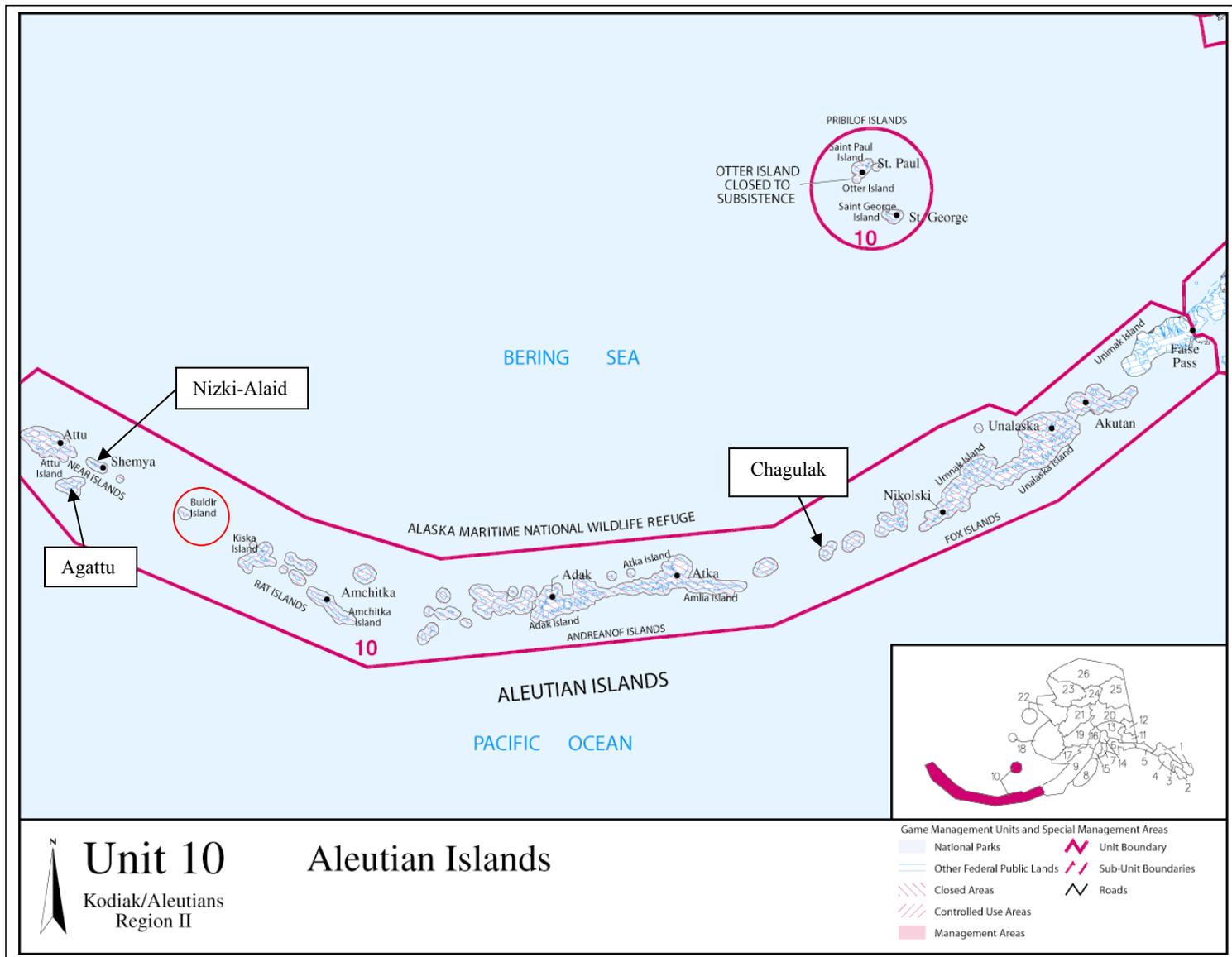
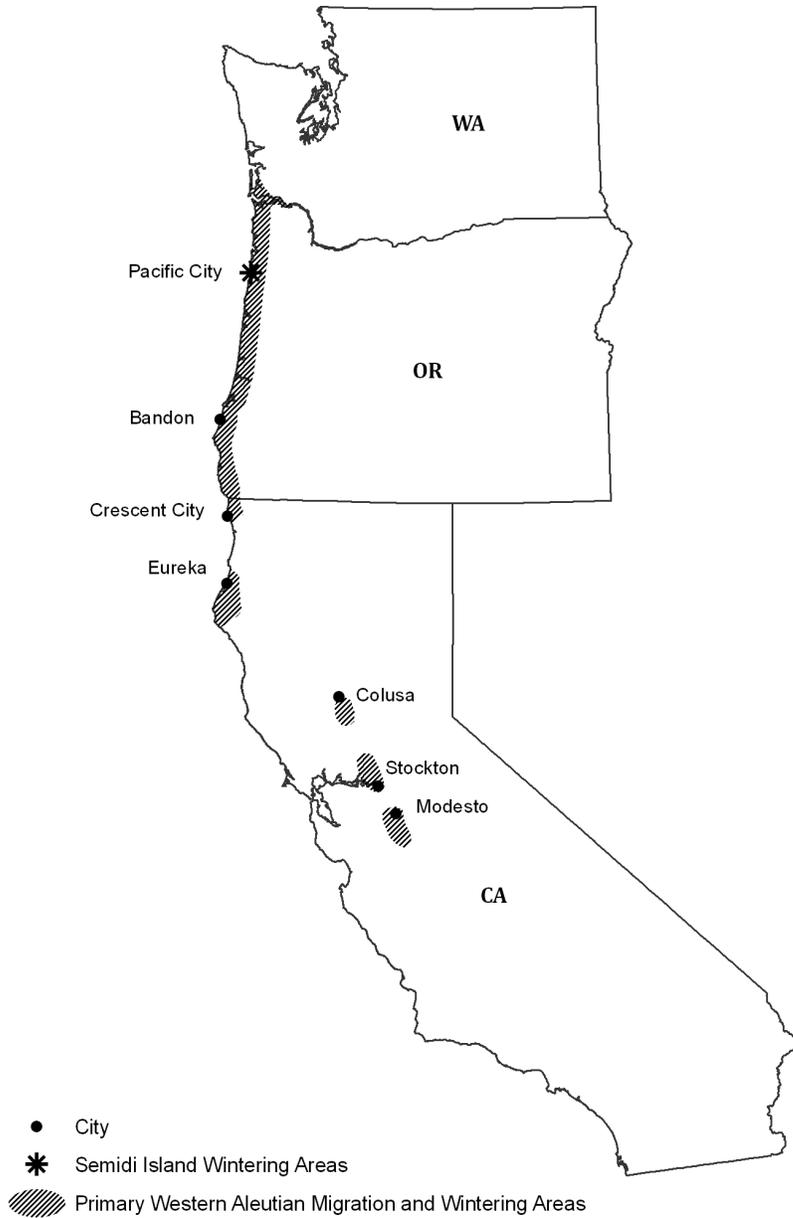


Figure 1b. Major use areas for Aleutian geese in Washington, Oregon, and California.



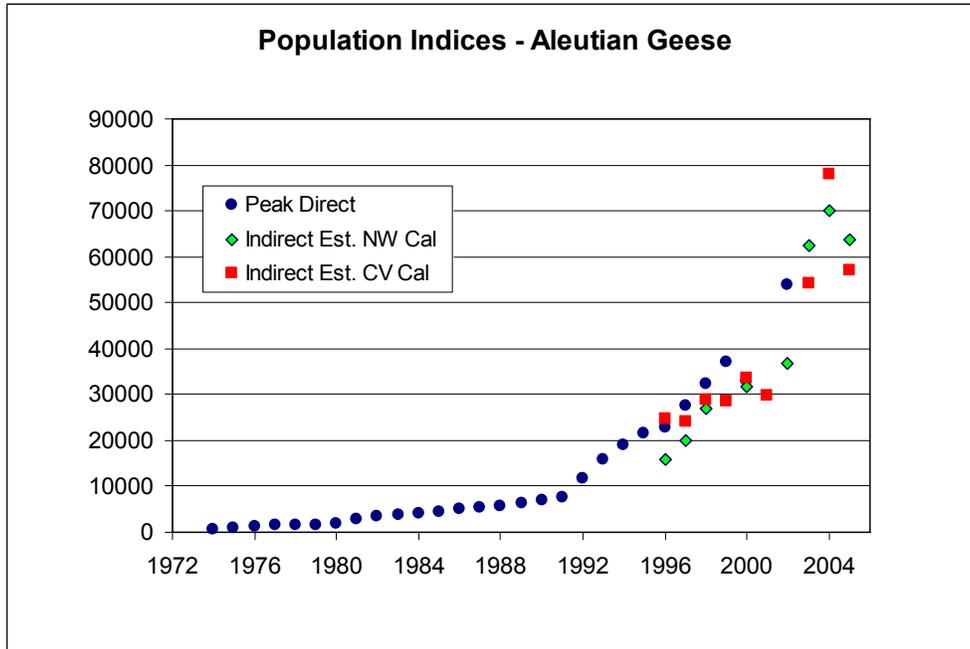


Figure 2. Population indices of Aleutian geese from peak direct counts, indirect estimates from marked birds in northwest California (NW), and indirect estimates from marked birds in the Central Valley (CV) of California (Drut and Trost 2005).

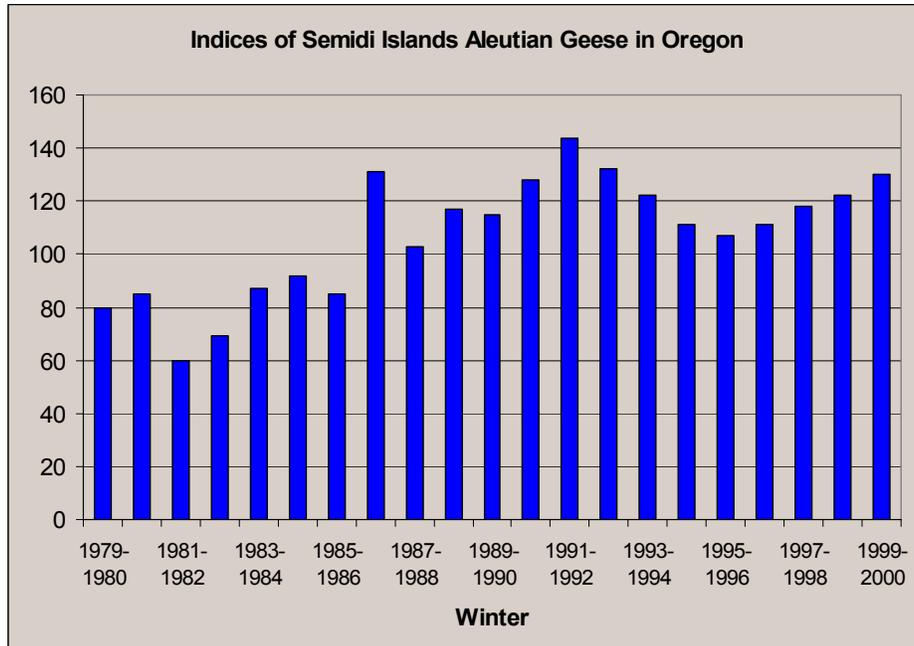


Figure 3. Indices of Aleutian geese from the Semidi Islands as measured by peak direct counts during winter on the Oregon coast (Springer and Lowe 1998; D. Pitkin, pers. comm.).

The first Pacific Flyway plan for Aleutian geese was adopted in 1999 and was based on an extensive body of survey and research information developed in iterations of the Recovery Plan (USFWS 1991). That flyway plan heavily emphasized continued population monitoring, while beginning a transition toward a program of normal management like other waterfowl populations. Through this revision of the plan, the Pacific Flyway Council intends to improve monitoring surveys, develop a progressive harvest strategy, and address agricultural depredation complaints in the context of habitat management efforts. This plan identifies management actions, associated information needs, and agency responsibilities necessary to manage Aleutian geese in the Pacific Flyway for the period from 2006-2010.

## **GOAL AND OBJECTIVES**

The overall goal for this Pacific Flyway management plan is to manage Aleutian geese and other Canada goose populations with which they mix, to provide for optimal aesthetic, educational, scientific, and hunting uses throughout its range.

Objectives:

- A. Maintain the population of Aleutian geese at 60,000 birds, as measured by the 3-year average of indirect estimates obtained in spring. Population objectives for most Flyway plans have been based on historical abundance, but Aleutian geese have only recently recovered from listed status under the Endangered Species Act. Since delisting, Aleutian geese rapidly have exceeded the current capacity of public lands to support them during spring migration. This population objective recognizes that significant agricultural depredation is occurring in northwest California and southwest Oregon.
- B. Achieve and maintain a widely distributed breeding population throughout the historic nesting range.
- C. Manage migration and wintering habitat of sufficient size and quality to sustain the desired population level of Aleutian geese and to minimize agricultural depredation complaints from private landowners.
- D. Maintain current distribution of Aleutian geese on staging and wintering areas.
- E. Continue to provide special management consideration to that segment of the Aleutian goose population that breeds in the Semidi Islands and winters along the Oregon coast.

## **STATUS**

### **A. Taxonomy and Description**

Early attempts to genetically distinguish Canada goose subspecies indicated that Aleutian geese were different from others (Morgan et al. 1977). Mitochondrial DNA studies have shown Aleutian geese to be associated with small-bodied forms of Canada geese that developed west and north of the Alaska Range (Shields and Wilson 1987). This work is the basis for recent

reclassification of Aleutian, cackling (*B. h. minima*), and Taverner's (*B. h. taverneri*) geese in a new species *hutchinsii* under the English name cackling goose (AOU 2004). Further work demonstrated a clear distinction between Aleutian geese and cackling geese that breed to the east on the Yukon-Kuskokwim Delta (Shields and Cotter 1998), and Pierson et al. (2000) have demonstrated genetic differences between western Aleutian birds from Buldir Island (used as translocation stock) and the easternmost remnant population on the Semidi Islands. The taxonomic position of Aleutian geese and other white-cheeked geese is reviewed by Scribner et al. (2003).

Aleutian geese resemble other small relatives such as the cackling goose, Taverner's goose, and lesser Canada goose (*Branta canadensis parvipes*). The Aleutian goose is intermediate in size between cackling geese, the smallest race, and Taverner's geese, but there is overlap in morphological measurements (Johnson et al. 1979). Although there is currently no known single field characteristic that absolutely distinguishes Aleutian geese from the other subspecies, a combination of morphological characters can separate most of the birds. Discriminate function analysis offers a useful method in this regard (Johnson et al. 1979). In general, Aleutian geese have a short, tapering bill with a somewhat pointed nail and a rather square head shape in profile (Sibley 2004).

Plumage criteria may also be used to help separate subspecies. Aleutian geese have pale breasts, usually gray-brown, whereas cacklers are darker with a purplish or tannish cast. Taverner's, lessers, and Aleutians are similar in breast color, usually ranging between brownish-gray and grayish-brown (Johnson et al. 1979). Nearly all Aleutians after their first winter have a prominent white neck ring at the base of their black necks, with blackish feathering at the base of the ring. Other subspecies also contain individuals with white neck rings, but in these subspecies the neck ring is incomplete or, if complete, it is generally narrower than neck rings of Aleutians. For example, P.G. Mickelson (unpubl. data) estimated that less than one-third of the thousands of adult cacklers he observed on the Yukon Delta, Alaska, had white neck rings, and most were less than 10 mm in width. Johnson et al. (1979) found that 23 percent of the Taverner's measured at Cold Bay, Alaska, had complete neck rings that averaged 3-5 mm in width. In Aleutian geese, the cheek patches are restricted and there is nearly always a black throat stripe (Sibley 2004).

## **B. Historical Range and Abundance**

Delineating the historic range of the Aleutian goose is difficult due to the limited written records for the isolated region where it breeds and historical confusion about the taxonomic status of various populations of Canada geese. Nevertheless, anecdotal reports indicate that Aleutian geese bred from the Geese Islands near Kodiak (E.P. Bailey pers. comm.) westerly on islands south of the Alaska Peninsula, throughout the Aleutian (Dall 1874, Turner 1886, Clark 1910, Jochelson 1933, Murie 1959, Pierce 1980) and Commander islands (Stejneger 1885) and at least as far southwest as the central Kuril Islands (Snow 1897) (Figure 1a). Aleutian geese are said to have wintered from British Columbia to northern Mexico in North America and in Japan on the Asian side of the Pacific Ocean (Delacour 1954, Hansen 1968), although Aleutian geese have not been recorded in British Columbia since 1945 (Campbell et al. 1990).

Apparently, remnant breeders survived the fox-farming era on only three fox-free islands, Kiliktagik in the Semidi Islands group (Hatch and Hatch 1983), Chagulak in the central

Aleutians (Bailey and Trapp 1984), and Buldir in the western Aleutians (Coats 1953, Jones 1963). Most of these geese occurred at Buldir Island with only a few pairs at the other islands. Almost nothing is known about the former abundance of this goose except statements by Clark (1910) that it bred in the thousands on Agattu Island. This same description of abundance was used by Turner (1886) for Agattu, and he added that the goose was an abundant nester on Semichi (present-day Alaid, Nizki, and Shemya islands) and occurred in large numbers in fall at Attu Island.

The decline of Aleutian geese coincided with the onset of fur farming on Alaskan and northeastern Asian islands. Arctic and red foxes were released on most goose nesting islands, principally between 1915 and 1939 but dating back as early as the 1750's (Gray 1939, Bailey and Kaiser 1993). Foxes decimated populations of many species of native birds, but the endemic geese were particularly susceptible to predation before the young birds fledged and when the molting adults became flightless. Their demise was apparently rapid as indicated by the following record for Agattu. In the early 1900's Clark (1910) found geese to be abundant on Agattu, and he suggested that such abundance could be attributed to the absence of foxes. From 1923 to 1930, arctic foxes were released in several different years at Agattu (Gray 1939), and by 1936 over 1,000 pelts had been sold from there, indicating how common the foxes had become. In 1937, less than 15 years after the first foxes were released, Murie (1937) found only a few pairs of geese on Agattu, and they probably were extirpated soon thereafter.

### **C. Recovery Efforts Under the ESA (1974-2001)**

Delisting goals were: 1) an overall population of at least 7,500 geese, and an upward long-term trend; 2) at least 50 pairs of geese nesting in each of three geographic parts of the historic range for three or more consecutive years; and 3) a total of 25,000-35,000 acres of feeding and roosting habitat for migration and wintering, secured and managed for Aleutian geese (USFWS 1991).

*Population Studies and Monitoring.*—When studies of wild geese started at Buldir in 1974 (Byrd and Woolington 1983), migration routes and wintering areas were unknown. Aleutian geese that had been marked with color leg bands at Buldir Island were subsequently discovered in several parts of California, providing the basis for delineating the primary use areas (Springer et al. 1978, Woolington et al. 1979). Major migration and wintering areas have been monitored annually in California since 1975.

Banding at Buldir, Chagulak, Kiliktagik, and in California, coupled with annual winter surveys, indicates that there are at least two distinct segments of Aleutian geese. The Buldir, Agattu, and Nizki-Alaid (western Aleutian) breeders stage in fall and spring on the coasts of northern California and Oregon, concentrate in fall in the Sacramento Valley, and spend the winter in the northern San Joaquin Valley (Figure 1b). Some western Aleutian birds, plus geese from Chagulak Island in the central Aleutian Islands, also recently used an area east of San Francisco Bay before joining the main flock in the San Joaquin Valley. In contrast, the Kiliktagik (Semidi Islands) breeders winter in coastal Oregon (Lowe 1986; Springer and Lowe 1998; Figure 1b).

Aleutian geese were reported to be fairly common winter visitors to Japan until 1922 when less than 200 birds were noted (Austin and Kuroda 1953). Since the mid-1970's one or more Aleutian geese have been observed there during winter. During the 1980s, captive-reared birds

from zoos in Japan were released with the wild geese in hopes of increasing this population. In the early 1990s, interest in Russia and Japan prompted development of a cooperative program to reestablish Aleutian geese in Asia. This project involves captive rearing in Russia and release on suitable breeding sites in the Commander Islands. Recent releases on Ekarma Island have resulted in some Aleutian geese wintering in Japan (N. Gerasimov, pers. comm.).

*Restoration Efforts on Breeding Grounds*—Staff at the Aleutian Islands National Wildlife Refuge (NWR) began active fox removal in 1949 using chemical toxicants followed by trapping and shooting. Arctic foxes were eliminated from Amchitka Island by the mid-1960s, by which time a remnant population of Aleutian geese had been discovered at Buldir and captive rearing facilities were being developed. After passage of the Endangered Species Act, restoration efforts were intensified through fox removal, captive propagation, and goose releases onto fox free islands (Appendix C), and concurrent studies and banding of nesting geese.

Complete eradication of foxes, particularly from large islands, proved to be difficult. However, by 1991, foxes had been eliminated from at least eight other, mostly small, islands. Subsequent releases of captive-reared geese onto the newly fox-free islands, such as Amchitka, Agattu, and Nizki-Alaid during 1971-1982 had a low success rate. Consequentially, captive propagation was phased out and family groups of wild geese from Buldir were captured and moved to those new islands for release.

The translocation of wild geese has been much more successful. However, predation by bald eagles (*Haliaeetus leucocephalus*) has proven to be a serious detriment to reestablishment of geese on islands east of Buldir, the western-most extent of this raptor's range. Thus, efforts to reestablish geese have been concentrated in the Near Island group, west of Buldir, where bald eagles do not occur. The absence of bald eagles in the Near Islands has allowed relatively high survival of released geese. Geese began to breed again on Agattu Island by 1984, and by 1990 the nesting population exceeded 50 pairs (Appendix D). A second breeding population at Nizki-Alaid in the Near Island group was started by 1987. Due to continued translocations this population is expanding rapidly.

*Hunting Closures*.—After passage of the Endangered Species Act, the area in Alaska west of Unimak Pass was closed to Canada goose hunting beginning in 1973. Based on winter distribution records, three areas in California were closed beginning in 1975. Additional goose hunting closures to protect migrating and wintering Aleutian geese in Oregon were instituted in 1982. A flyway-wide closure for cackling and Aleutian geese (including Washington) was implemented in 1984. The closure on cackling geese ended in 1994.

*Habitat Protection and Management*.—Most historic nesting islands in Alaska are within the Alaska Maritime NWR; therefore, nesting areas are likely to be protected in the long term under existing public ownership. Maintenance of the Aleutian goose is an important refuge priority.

Since the beginning of the Aleutian goose recovery effort, habitat acquisition and easement programs have resulted in the protection of many of the important areas of Aleutian goose migration and wintering habitat in California. In the spring staging area near Crescent City, offshore roosting habitat was protected through acquisition of the Castle Rock NWR in 1979 and

mainland foraging habitat protected through establishment of the Lake Earl Wildlife Area in 1980. In 1987, the Fish and Wildlife Service established the San Joaquin River NWR at the main Aleutian goose wintering area in the northern San Joaquin Valley. In addition, recent state and federal land acquisitions and conservation easement enrollments throughout the Sacramento and San Joaquin Valleys for other waterfowl and endangered species initiatives have resulted in a large amount of Aleutian goose habitat being protected. Nevertheless, urbanization, other changing land use practices, disease, and chemical pollution continue to pose a threat to geese; thus, a continuing program is needed to ensure long-term habitat protection for a restored population of Aleutian geese.

In Oregon, the major areas used by wintering Aleutian geese (primarily birds breeding in the Semidi Islands) are in private ownership. Nevertheless, the Service obtained authorization in 1990 to establish the Nestucca Bay NWR, which includes areas used by the Semidi Islands segment of Aleutian geese. Migrating Aleutian geese from at least the western Aleutian breeding segment use coastal areas in both private and public ownership during migration. An important migration area near New River, Oregon, includes private lands and lands owned by and managed by the Bureau of Land Management. The Nature Conservancy and BLM have been cooperating to acquire important areas from willing sellers.

#### **D. Current Population Abundance and Trends**

Monitoring Procedures.—Aleutian geese have been monitored by two methods. The first, the peak count method, was instituted in 1975. This method attempted a complete count of all Aleutian geese from ground observations, usually during spring migration near Crescent City, California, by counting the geese as they left the principal roost sites (USFWS 1991; Appendix A). In addition, the Semidi Islands segment has been monitored during the winter by direct counts on the Oregon coast since the winter of 1979/80 (Appendix B). A second method was implemented during the winter of 1995/96, employing observations of marked geese and using a modified Peterson Index (Chapman 1951, in Seber 1973:60) to derive an indirect population estimate (Appendix A). Data for this method were gathered on both the primary wintering area around Modesto, California and the primary spring staging area along the coast in northwestern California and southwestern Oregon. The second method was necessitated by the increasing numbers of Aleutian geese, which made complete total counts logistically difficult and results highly variable. Numbers of Aleutian geese have continued to increase in recent years, and their geographic distribution continues to expand as well. These two factors suggest that direct counts of Aleutian geese will no longer provide a reliable annual population index on which to base management decisions.

Lindberg et al. (2006) conducted a review of datasets and indirect estimates from 1995-2005 and evaluated a variety of models that could be used to estimate the size of the population. With consideration of the analyses in this report and improvements to be made in monitoring procedures, the Flyway will use an indirect estimate based on observations of marked Aleutian geese as the official management index. This method requires maintaining a marked sample of Aleutian geese in the population. Collection of resighting data and other information for the indirect estimate will require a field survey in the San Joaquin Valley for a sample period of 2-3 days and two separate 2-day observation periods in the northwest California and southwest Oregon coastal region.

Concurrent with the timing of the indirect estimates, attempts will be made to estimate the number of Aleutian geese by conducting an aerial survey throughout the same spring staging area, if additional resources are available. If such an aerial inventory procedure can be developed, it would be more cost effective and may be adopted in place of the indirect estimate for future monitoring.

Since 1999, geese from the western Aleutian Islands have begun to winter on the Oregon coast with birds from the Semidi Islands, and they cannot reliably be distinguished. Therefore, winter counts are no longer effective to assess the size of the Semidi Islands population segment. Although winter surveys on the Oregon coast should continue, supplemental surveys in the Semidi Islands may be required to monitor the number of breeding birds.

In addition to annual population monitoring on staging and wintering areas, periodic monitoring should continue in the Aleutian Islands to document trends in breeding birds on primary nesting islands and to assess the extent that Aleutian geese are re-occupying their historic range.

*Recent Abundance.*—Aleutian geese have increased steadily for the past 30 years, under recovery programs under the Endangered Species Act (1973, as amended) and after delisting. Population growth increased notably after 1991 and, by the winter of 1997-98, peak counts of Aleutian geese in California (from segments in the western and central Aleutian Islands) reached about 27,600 (Drut and Trost 1998; Appendix A). The interim goal of 40,000 established in the first iteration of this plan was probably surpassed in 2002, and the population continued rapid growth (Drut and Trost 2005). Subsequent analysis suggests that Aleutian geese likely numbered more than 100,000 by the winter of 2004-2005. Exponential growth has been observed throughout the recovery period, averaging approximately 14% per year during 1974-2004.

The Aleutian geese that breed on the Semidi Islands and winter on the Oregon coast doubled in number from 63 birds in 1980 to about 144 individuals in spring 1992 (Springer and Lowe 1998; Appendix B). Nevertheless, over the past 12 years, this group of birds has averaged fewer than 120 birds and reached 130 in only two years (Pitkin and Lowe 1993, 1994, 1995; D. Pitkin, unpubl. data). Winter counts have fluctuated, in part, from a growing but unknown number of birds from the western Aleutian Islands that have wintered here since the mid-1980s. Based on appearance and age ratios, currently (2004) there may be more than 250 western Aleutian birds wintering on the central Oregon coast; since 1999, the mixture of geese has precluded reliable direct counts of the Semidi Islands population segment.

## **E. Current Distribution and Habitat Use**

*Breeding Range.*—The historical breeding range of Aleutian geese is believed to have extended from the Geese Islands near Kodiak, Alaska, westward on the islands south of the Alaska Peninsula, throughout the Aleutian and Commander Islands (Russia) and at least as far southwest as the central Kuril Islands in Japan (USFWS 1980, 1991). This region is characterized by a polar maritime climate with high humidity, fog, rain, a small diurnal annual range of temperature, and near constant winds (Jones 1963). Nesting areas have been located on grassy hillsides, along streams, in marshes and lagoons, and on rugged sea cliffs cut by watercourses where grasses and sedges grow in profusion (Murie 1959, Jones 1963, USFWS 1980, Byrd and

Woolington 1983). Molting habitat is generally located in the uplands. Night roosting areas include shallow pools and ponds on the islands.

The present breeding range includes eight islands in the western Aleutian Islands (Appendix D). In the Near Island group, Buldir Island supports the largest breeding segment (80%) of this subspecies. The latest census conducted on Buldir Island indicated about 7,000 breeding geese, with a total of about 17,500 birds on the island (Byrd 1995). Agattu and Nizki-Alaid islands also now support substantial numbers of breeding Aleutian geese (Byrd 1998; Byrd and Williams 2004). On Agattu Island, where Aleutian geese were reintroduced between the late 1970s and mid-1980s, an estimated 700 birds were nesting (total 1,750 geese) in 1995 (Byrd 1995). In 2003, nesting pairs numbered in the “low thousands” with room for expansion, giving Agattu the potential of becoming the largest breeding site (Byrd and Williams 2003). In 1995, the number of breeding geese on Nizki-Alaid was estimated at 248 (or 620 total geese); Byrd and Williams (2004) estimate that there are now 541 nests on these islands. Aleutian geese also have begun to nest on Attu, about 60 km from Nizki-Alaid. Foxes were removed from the island in 1999, the first nest was found in 2003, and eight nests were found on surveys in 2005 (Byrd and Williams 2005).

In the Rat Island group, geese were released on Little Kiska Island and Amchitka, and about 10 birds have nested there (Byrd 1995). In the east Andreanof Island group, at least one pair is known to have nested on Amukta Island and geese were translocated to Skagul in 1994 and 1995. The current status of Aleutian geese in these island groups is not known, but the presence of bald eagles on islands east of Buldir Island is believed to be a factor that has limited the success of translocations.

In the Central Aleutian Islands, the small breeding population on Chagulak Island (Bailey and Trapp 1984) is believed to have been stable at about 50 birds between 1990 and 2002 (Byrd 1990; Byrd and Williams 2002); the terrain is steep and nesting habitat is limited. Foxes have been removed from most of the islands near Chagulak, and to bolster the population of geese in this portion of the Aleutians, translocations of geese from Buldir Island to Yunaska Island occurred in 1994 and 1995. At this time, it is unclear whether the translocations have established breeding groups on these islands.

The Semidi Islands host the most disjunct remnant group of Aleutian geese (Hatch and Hatch 1983), which are distinguishable genetically from the birds in the western and central Aleutian Islands (Pierson et al. 2000; USFWS 2001). Surveys in 1995 indicated only 14 nests on Kiliktagik Island, but documented breeding (3 nests) on Anowik Island (Beyersdorf and Pfaff 1995); in total, this was 11 nests fewer than were found on the same islands in 1992. Relatively few hatch-year birds have been seen on the wintering grounds each fall in coastal Oregon (D. Pitkin and R. Lowe pers. comm.). The reason for lower productivity of Aleutian geese in the Semidi Islands is unknown, although nest success and gosling survival are thought to be poor. Abnormalities have been noted in hatchlings. Geese from the Semidi Islands winter exclusively in coastal Oregon.

The availability of nesting habitat in the Aleutian Islands is not likely to limit population growth in the foreseeable future. There is considerable unoccupied nesting habitat available for geese on

some of the existing nesting islands, and there are at least eight other islands with suitable nesting habitat where foxes have been removed. Fox eradication on selected Aleutian Islands to benefit geese and other ground nesting birds should be completed within the next five years. Despite the availability of nesting habitat, rapid natural expansion to unoccupied islands is not expected to occur because of the presence of bald eagles and the strong tendency for Canada geese to return to natal areas to breed.

*Migration Areas.*—In Washington, small numbers of Aleutians are found primarily in southern Willapa Bay (Reikkola Unit of Willapa NWR and adjacent Holtz Ranch) during fall migration, mainly during October and November. A peak count of 330 for Willapa was recorded during November 1996. Aleutians typically are not sighted during December and January in Willapa Bay. Harvested geese are sometimes classified as Aleutians (typically up to 3 per year, but 15 in 2002-03) at southwest Washington hunter check stations, but the classification criteria currently used to discern Canada goose subspecies (culmen length, total tarsus, breast color, age, and sex) do not reliably separate Aleutians from Taverner's. Only one banded Aleutian has been harvested in this area, in October 1983. Small numbers of Aleutians have been recorded during spring migration through Willapa Bay.

During fall migration, Aleutian geese now are seen routinely migrating south along the Oregon coast and stopping at various locations. The most significant aggregation of fall migrants (5,000-15,000) occurs at the New Lake Ranch (Coos and Curry Counties) from mid-October to the first week of November. These geese feed on seedling pasture grasses that are planted in late summer. Small numbers of geese have consistently been observed on agricultural lands along the south end of Tillamook Bay since the mid-1990s. In recent years, sporadic areas of use include areas around Siletz and Coos Bays. Small numbers of Aleutian geese have been recorded moving through the Willamette Valley in fall, and a few remain during winter.

In general, fall migrating Aleutian geese first arrive in California in early October. About 5% may stop on the northwest California coast near Crescent City (Del Norte County) and around Humboldt Bay (Humboldt County) before continuing southward. Small numbers of geese (500-1000) now appear to remain on the California north coast throughout the winter. Most geese go directly to the San Joaquin Valley wintering areas, although 5-15% of the population may use the Sacramento Valley until early November. Here, Aleutians use private agricultural and federal refuge lands in the Butte Sink near Colusa. Historically, a higher proportion of the population used this area and remained near Colusa through late November. On the North Coast, foraging occurs primarily on privately managed pasturelands. In the Sacramento Valley geese forage primarily on harvested beans, corn, and rice. They roost on shallowly flooded wetlands on the Butte Sink NWR, other private seasonal wetlands, and flooded rice.

Northward migration generally begins in January when Aleutian geese start leaving the Modesto area and move to the North Coast near Humboldt Bay and Crescent City. By late February, virtually all the geese have shifted to those areas. In the Crescent City area, the geese roost at night on Castle Rock, Goat Island (offshore of Brookings, Oregon), and to a lesser extent, Prince Island (an offshore island owned by Native Americans). The geese feed during the day on pastures on the mainland. About 800 acres of grassland foraging habitat are managed on state lands at the Lake Earl Wildlife Area (California Dept. of Fish and Game) and the Tolowa Dunes

State Park (California Dept. Parks and Recreation). On private lands, goose grazing occurs primarily on intensively managed dairy farms.

Since 1997, spring staging of Aleutian geese has increased significantly near Humboldt Bay; in March 2002, peak counts reached 19,000 geese and the area may have supported half of the population (Black et al. 2004). In the Humboldt County area, the geese roost on the Humboldt Bay NWR and other seasonal wetlands. With the exception of the refuge, almost all foraging takes place on private land between the managed pastures in the Eel River delta to the south and the more intensively managed dairy pastures to the north (Arcata Bottoms). Aleutian geese preferred areas that had short to medium green grass, associated with some standing water (Black et al. 2004). As the population has increased and hazing intensified in Del Norte County, the numbers of Aleutian geese and depredation conflicts with local landowners have risen in Humboldt County, and the distribution and timing of migration has been affected.

Geese now begin departing northwest California as early as February instead of April (Black et al. 2004; see Springer and Lowe 1998 for comparison), most are in Oregon by mid-April, and they are virtually gone from California by early May. Aleutian geese leaving the California coast are stopping earlier and in larger numbers than in the past along the south coast of Oregon, particularly in the New River Bottoms. They now move to Oregon as early as February and stay until late April. In recent years, 5,000-6,000 geese have accumulated near New River by mid-March and built to over 45,000 in early April. The geese forage heavily in pastures primarily on ranches in New River Bottoms and Lower Fourmile Creek, and roost on offshore rocks near Bandon, Oregon. Concerns about goose depredation of agricultural lands, mainly competition with livestock during spring, are increasing in this area, and a broader dialogue has begun with resource managers and producers in northwest California. Recently, USFWS initiated a feasibility study on establishment of a new National Wildlife Refuge in the New River area, largely to address Aleutian goose management.

*Winter Range.*—The primary wintering area for the Aleutian goose population is centered on roosting and foraging habitat found on the San Joaquin River NWR and adjacent ranches near Modesto (Stanislaus County). Increasing use of islands in the Sacramento-San Joaquin Delta has occurred in recent years. Other use areas during winter include the Grasslands Ecological Area of Merced County, near El Sobrante east of San Francisco Bay, and some reservoirs in the Merced and Stanislaus counties. However, band observations and direct tracking have shown that most of those birds also use the Modesto area.

Historically, Aleutians arrived in the San Joaquin Valley wintering areas beginning in mid to late November. Birds now more typically arrive in early October, staying through January until essentially all have departed by late February. Coincident with the earlier fall arrival has been increased use of the Sacramento-San Joaquin Delta by 25 to 75% of the population during part of the winter. Most birds that use the Delta forage and remain there to roost, although some make daily foraging flights to the Delta from the primary roost on the San Joaquin River NWR.

On wintering grounds in California, Aleutian geese depend on agricultural lands and have shown strong fidelity to certain areas. Primary foraging habitats are harvested cornfields, winter wheat,

alfalfa, and irrigated pasture grasses (Dahl 1995). Roosting habitats are shallowly flooded agricultural lands or seasonal wetlands.

In Oregon, the Semidi Islands geese forage primarily on the pastures of two dairy farms near Pacific City. Both dairies are privately owned but are included within the boundaries of the Nestucca Bay NWR, which would facilitate their acquisition should the USFWS and landowners reach a purchase agreement in the future. The refuge has acquired 120 acres of nearby pasture that is being used by dusky Canada geese (*B. c. occidentalis*) and could be used by Aleutian geese in the future. The Semidi Islands geese roost either on the ocean or on Haystack Rock, which is part of the Oregon Islands NWR. During January and February, some Semidi geese have left the Oregon coast for short periods and have been seen at Astoria and Sauvie Island, Oregon, and Willapa Bay, Washington. Several hundred Aleutian geese from breeding sites in the western Aleutian Islands began wintering in coastal southern Oregon during the mid- to late 1990's. These birds forage on privately-owned pasture, including the south end of Tillamook Bay, and roost on offshore rocks with Semidi Islands birds.

#### **F. Agricultural Depredation**

Although habitat acquisition and easement programs have resulted in the protection of some of the important migration and wintering habitat areas for Aleutian geese on state and federal lands in California, the growth of the population has out-stripped the capability of these lands to provide sufficient forage, especially on the northwest coast of California and other concentration areas. In addition, limited operating budgets and competing management objectives further limit the ability to manage public lands for geese (see Springer and Lowe 1998; Black et al. 2004).

In California's Central Valley, most foraging by Aleutian geese in fall and winter occurs in harvested agricultural habitats and irrigated pastures. Federal refuges plant crop fields specifically for geese, and agricultural conservation easements have been acquired near Aleutian goose major use areas. Because of these factors, crop depredation by Aleutian geese has been much less of an issue in the Central Valley than on the North Coast. However, a limited number of complaints are received when the geese forage in newly sprouting winter wheat or newly established alfalfa fields in the San Joaquin Valley.

Near Crescent City, where historically the entire Aleutian population staged in spring from about February through April, depredation complaints began in 1986 when the goose population was only about 5,000 and still listed as threatened under the ESA. During spring, geese forage heavily on young grass shoots which also are favored by dairy and beef cattle. In Oregon, Aleutian geese are foraging in pastures used by sheep and their lambs. This is a critical time of year for agricultural producers because the grass is at its most nutritious stage, contributing to weight gain and reproduction of livestock.

Beginning in the mid-1990s, cooperative planning and management efforts resulted in some improvements to goose habitat on public lands and allowed limited hazing on private lands. Continued growth in the goose population has increased the scope of depredations and, after the delisting in 2001, widespread and more aggressive hazing has been instituted by private landowners from mid-February through March. In 2001, an effort was initiated to develop a plan for land managers to voluntarily coordinate hazing and habitat management in Del Norte County.

This plan, the Aleutian Goose Wildlife Corridor Enhancement Plan (in prep.), was funded by a grant from the California Coastal Conservancy. Work on this plan was suspended when conceptual agreement could not be reached by all the parties and affected interests. However, coordination among landowners, agencies, and other affected publics now continues in conjunction with a new effort to address depredation in Humboldt County (see below).

The spring use of private pastures by geese began to increase near Humboldt Bay (approximately 90 miles south of Crescent City) in 2001. This was coincident with expanded and more aggressive hazing of geese (e.g., use of ultralight aircraft) in Del Norte County after the Aleutian goose was delisted. This expansion to the south was documented by fewer geese being tallied near Crescent City and the presence of color-marked individuals in the Humboldt Bay area that were seen earlier near Crescent City. By the spring of 2004, more than half of the Aleutian geese on the north coast of California in the spring were in the Humboldt Bay area (Black et al. 2004). Local efforts, similar to those encouraged by the planning funded by the California Coastal Conservancy, are beginning in Humboldt County through the reformation of the regional Aleutian Goose Working Group in northwest California and southwest Oregon to help address depredation concerns.

The level of concern by landowners in other wintering areas could increase in the future if Aleutian geese increase or if current management practices that promote goose use of public lands are changed. Addressing existing depredation issues is anticipated to require planning and management at several scales. At the rangewide scale, this plan establishes an overall population objective for Aleutian geese and strategies to maintain that level. In addition, this plan has a stated objective to maintain current distribution of Aleutian geese on staging and wintering areas. This objective is intended to discourage activities that may exacerbate depredation problems through dispersal of geese (e.g., movements to Oregon). Minimizing the economic effects of grazing by Aleutian geese will require site- or area-specific coordinated management plans of sufficient detail to effectively reduce problems (e.g., Aleutian Goose Wildlife Corridor Enhancement Plan, in prep.). This flyway plan attempts to improve the integration of habitat and population management in relation to the diverse perspectives and issues of all who share this resource.

## **G. Public Use**

Although there are historic records of Aleutian goose harvest, little is known about the magnitude or distribution of harvest in the flyway prior to the 1970s. After the recovery program was instituted and Canada goose hunting closures were established on primary Aleutian goose areas in Alaska (1973), California (1975), and the Oregon Coast (1982), a small incidental harvest of Aleutian geese continued, as documented opportunistically through band returns, check stations, and law enforcement records (Springer and Lowe 1998). In 1984, a closure specific to Aleutian geese was implemented throughout the Pacific Flyway. A simultaneous flywaywide closure of cackling geese likely expanded protection of Aleutian geese in California until it was removed in 1994.

With the significant increase in Aleutian geese in the 1990s and delisting, the flywaywide closure of hunting was lifted for the 2001-2002 season, but key breeding and wintering areas remained closed. Since the reopening of limited seasons in most of the flyway, incidental

records indicate that a relatively small number of Aleutian geese have been taken annually. This plan establishes a harvest strategy (Appendix E) that accommodates substantial increase in harvest to complement management of the population around the objective level. However, there is no recent experience with potential performance of hunting seasons for Aleutian geese. Historically, small Canada geese were included in “dark goose” bag limits, and currently there are no precise estimates of Aleutian goose harvest. Consequently, specific changes to regulations during the term of this plan will be developed, considering maintenance of a secure population, enhancement of various public uses, opportunities to reduce crop depredation problems, and public input on approaches to harvest management in the affected states.

Canada geese are of interest to the public wherever they occur, and Aleutians have been of special interest to the public because of their former status as a rare bird and listing under the ESA. A prime example is the Aleutian Goose Festival hosted during spring in Crescent City. Non-consumptive use of California State Wildlife Areas increased from 53,966 visits in 1973-74 (Calliga 1983) to 223,000 in 1994 (T. Blankinship, Department of Fish and Game, pers. comm.). Total non-consumptive use at Sacramento NWR, alone, was 62,500 visits in 1996 (D. Dachner, Sacramento NWR, pers. comm.). Visits elsewhere are known to occur, but are not measured.

## MANAGEMENT ISSUES

- A. This is the first occasion for regulating the size of a recently delisted population of migratory game birds, and public expectations are diverse.
- B. The high rate of population growth and lack of experience in development of hunting regimes will limit the precision of managing the population.
- C. In spite of notable acquisitions during the recovery program, the capacity of public lands to support these geese is limited, especially along the northwest coast of California, but also potentially in other migration and wintering areas. This places extra emphasis on the effects of goose foraging on private lands where geese conflict with agricultural interests. While there are numerous government support programs available to improve fish and wildlife habitat on private lands, there are no such programs to support preferred habitats, as they currently exist.
- D. Additional funding is needed for management of public lands in staging and wintering areas to provide optimum feeding conditions for geese and to reduce depredations on private lands.
- E. Changing agricultural practices and other land uses may negatively affect current migration and wintering areas.
- F. Public land managers need goose habitat treatments that are cost-effective and balance values for other wildlife.
- G. Avian cholera remains a potential source of mortality of Aleutian geese.

- H. Bald eagle predation (and the lack of native fauna as buffer prey) east of Buldir Island may limit establishment of sustained nesting groups of geese in the central Aleutians.
- I. Introduced rats and ground squirrels may indirectly limit expansion of nesting geese on some former nesting islands that have been cleared of foxes. These introduced predators inhibit recovery of sea birds that are primary buffer prey species for eagles; thus, Aleutian geese are convenient prey.
- J. The increasing Aleutian goose population may be negatively affecting seabird habitats on offshore roosting islands along the northwest California and Oregon coasts.

## RECOMMENDED MANAGEMENT STRATEGIES

The following management procedures are recommended even though the degree and timing of their implementation by the agencies involved may be influenced by human resource, fiscal and legislative constraints. Whenever possible, management procedures in this plan should be integrated with those in plans for other Pacific Flyway goose populations, local and regional land use plans, and habitat conservation programs.

### A. Habitat

1. Protect and manage breeding habitat. Continue to remove introduced foxes and other introduced predators (e.g., ground squirrels) from additional islands within the former breeding range and prevent accidental introductions of rats to existing or potential nesting islands by activating a ship-wreck response plan.

Lead Agency: USFWS R-7  
Participating: ADFG, USCG  
Priority: 2  
Schedule: ongoing

2. Protect and manage migration and wintering habitat. Provide adequate funding to protect and manage goose use areas.

Lead Agency: USFWS R-1  
Participating: CDFG, ODFW, PCJV, CVJV  
Priority: 1  
Schedule: ongoing

3. Monitor Aleutian goose distribution and habitat use on spring staging areas. Conduct aerial and ground surveys to determine the amount and timing of use on staging areas to detect significant shifts in distribution, changes in foraging patterns, and responses to habitat management efforts.

Lead Agency: USFWS R-1  
Participating: CDFG, ODFW  
Priority: 3  
Schedule: ongoing

### B. Agricultural Depredation

1. Coordinate flyway-level population management. Integrate management of population size and distribution with local habitat planning and implementation efforts, especially between Oregon and California.

Lead Agency: CDFG, ODFW, USFWS R-1  
Participating: USDA, CCC  
Priority: 1  
Schedule: ongoing

2. Enhance goose habitat values on public lands. Encourage optimal management of public lands for goose forage, with consideration of other management objectives and statutory requirements

Lead Agency: CDFG, USFWS R-1  
Participating: USDA, CDPR, CCC  
Priority: 1  
Schedule: ongoing

3. Improve management of goose habitat values on private lands. Consider fee acquisition, easements, or other incentive programs to manage habitats for geese and reduce the economic effect of foraging on private lands.

Lead Agency: CDFG, ODFW, USFWS R-1  
Participating: USDA, CDPR, CCC  
Priority: 2  
Schedule: ongoing

### **C. Population Inventories**

1. Annual population indices. Continue field surveys to acquire collar resighting data and other information to produce an annual indirect population index, including a winter survey period in the San Joaquin Valley and two spring survey periods on the northern California and southern Oregon coast.

Lead Agency: USFWS R-1, DMBM  
Participating: CDFG, ODFW  
Priority: 1  
Schedule: ongoing

2. Aerial inventory. During this planning period, design and implement aerial surveys of staging Aleutian geese during spring to evaluate this technique.

Lead Agency: DMBM  
Participating: CDFG, ODFW  
Priority: 2  
Schedule: 2006-2009

3. Annual marking and banding. Continue to annually neck-collar 200 birds in California to support development of indirect population estimates. Where possible, mark an additional 200 birds with leg bands only to evaluate harvest distribution and survival rates. Assess the merits of post-season banding.

Lead Agency: CDFG  
Participating: USFWS R-1  
Priority: 1  
Schedule: ongoing

4. Assessment of the Semidi Islands breeding segment. During this planning period, continue direct counts of Aleutian geese on the Oregon coast during winter. Design and test surveys to provide an operational index of geese in the Semidi Islands.

Lead Agency: USFWS R-7, USFWS R-1  
Participating: ADFG  
Priority: 1  
Schedule: 2006-2007

5. Periodic assessment of breeding distribution. When feasible, survey areas in the historic breeding range where nesting pairs could become established through natural pioneering or previous translocations (e.g., Attu, Little Kiska, Amchitka, Skagul, Amukta, and Yunaska).

Lead Agency: USFWS R-7  
Participating: ADFG  
Priority: 2  
Schedule: 2006-2010

#### **D. Population Management**

1. Harvest management. Implement the harvest strategy described in Appendix E during the term of this management plan, modifying where necessary in response to distributional changes of Aleutian geese.

Lead Agency: USFWS  
Participating: Pacific Flyway Council  
Priority: 1  
Schedule: ongoing

2. Disease control. Conduct regular surveillance to detect outbreaks on major wintering and migration areas. At the onset of outbreaks, implement disease control activities as outlined in the Aleutian Canada Goose Disease and Contamination Hazard Contingency Plan (Aleutian Canada Goose Recovery Team 1996).

Lead Agency: USFWS R-1, USGS-BRD  
Participating: CDFG, ODFW  
Priority: 3  
Schedule: ongoing

3. International cooperation. Support ongoing efforts by the Service and others to restore Aleutian geese to an eastern Asian flyway. Cooperation is needed with the Russian Federation, Japan and others to continue this effort.

Lead Agency: USFWS  
Participating: Pacific Flyway Council  
Priority: 2  
Schedule: ongoing

## E. Research

1. Public pasture management. Develop habitat management practices for public lands to optimize foraging habitat for geese, while balancing needs of other wildlife. Treatments need to be cost-effective and support a variety of public use values.

Lead Agency: USFWS R-1  
Participating: CDFG, CDPR, ODFW  
Priority: 1  
Schedule: ongoing

2. Spring staging habitat carrying capacity. Conduct research to determine the effectiveness of habitat management to support geese and reduce depredation in problem areas.

Lead Agency: USFWS R-1  
Participating: CDFG, CDPR, ODFW  
Priority: 3  
Schedule: 2007

3. Limiting factors for Semidi Islands nesting geese. Conduct research projects to determine what factors are preventing these geese from increasing. Despite the elimination of harvest mortality, the population has not responded, as have the Aleutians from the western Aleutian Islands.

Lead Agency: USFWS R-7, USGS-BRD  
Participating: ADFG, ODFW  
Priority: 2  
Schedule: 2007

## ANNUAL PLAN REVIEW

### A. Aleutian Goose Subcommittee

The Subcommittee shall meet twice annually or as needed to review progress toward achieving the goals and objectives of this plan and to recommend actions and revisions. The Subcommittee shall report to the Pacific Flyway Council, through the Pacific Flyway Study Committee, on accomplishments and shortcomings of management efforts, and shall share its findings with parties responsible for or interested in Aleutian geese.

The Subcommittee shall be comprised of one representative from each federal and state agency having management responsibility for this population. It shall be the responsibility of those members to assure that the objectives and procedures of this plan are integrated and coordinated with those plans and activities of the various wildlife and land management agencies and local planning systems within their agency's purview. Chairmanship shall be rotated biennially among member agencies. The Subcommittee may invite *ex officio* participation by individuals, groups, and agencies whose expertise, counsel or managerial capacity is required for the coordination and implementation of management programs.

Lead Group: Subcommittee

Priority: 1

Meetings: Twice annually, at the March and July meetings of the Pacific Flyway Study Committee.

Schedule for rotation of the chair, beginning October 1:

2004 - Washington

2006 - Oregon

2008 - USFWS – Region 7

2010 - California

2012 - Alaska

2014 - USFWS – Region 1

### B. Alaska Migratory Bird Comanagement Council

Continued coordination with this council will benefit Aleutian geese and other migratory bird populations through cooperative management planning, information exchange, and implementation of conservation measures.

Lead Agency: AMBCC

Participating: USFWS, ADFG, WDFW, ODFW, CDFG

Priority: 1

Schedule: Ongoing

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APPENDIX A. Population indices of Aleutian geese from peak direct counts and indirect estimates from marked birds in northwest California (NW), and indirect estimates from marked birds in the Central Valley (CV) of California (Drut and Trost 2005).

Spring	Direct Count	Indirect Estimate NW Cal/SW Oregon	Indirect Estimate Central Valley
1975	790		
1976	900		
1977	1,280		
1978	1,500		
1979	1,590		
1980	1,740		
1981	2,000		
1982	2,700		
1983	3,500		
1984	3,800		
1985	4,200		
1986	4,300		
1987	5,000		
1988	5,400		
1989	5,800		
1990	6,300		
1991	7,000		
1992	7,680		
1993	11,680		
1994	15,700		
1995	19,150		21,769
1996	21,420	15,986	24,643
1997	22,800	19,957	23,977
1998		26,993	28,984
1999		No estimate	28,628
2000		31,806	33,496
2001		No estimate	29,797
2002		36,834	No estimate
2003		62,395	54,087
2004		69,905	78,034
2005		63,774	57,154

APPENDIX B. Peak winter counts of Semidi Islands Aleutian geese on the Oregon coast.

Winter	Peak Count <sup>a</sup>
1979-1980	80
1980-1981	85
1981-1982	60
1982-1983	69
1983-1984	87
1984-1985	92
1985-1986	85
1986-1987	131
1987-1988	103
1988-1989	117
1989-1990	115
1990-1991	128
1991-1992	144
1992-1993	132
1993-1994	122
1994-1995	111
1995-1996	107
1996-1997	111
1997-1998	118
1998-1999	122
1999-2000	130
2000-2001	114
2001-2002	no estimate <sup>b</sup>
2002-2003	no estimate <sup>b</sup>
2003-2004	no estimate <sup>b</sup>

<sup>a</sup> Data from Lowe (1986); Pitkin and Lowe (1993, 1994, 1995) and Springer and Lowe (1998).

<sup>b</sup> Commingling of geese from the western Aleutian Islands during winter precluded separate estimates of Semidi Islands geese.

APPENDIX C. Summary of translocations and releases of Aleutian geese in the western Aleutian Islands.

Year	Source stock	No. Released	Location
1971	Captive-reared	75	Amchitka
1974	Captive-reared	41	Agattu
	Translocated from Buldir	9	Agattu
1976	Captive-reared	26 <sup>a</sup>	Amchitka
	Translocated from Buldir	3	Amchitka
1978	Captive-reared	117	Agattu
	Translocated from Buldir	22	Agattu
1979	Captive-reared	199	Agattu
	Wild, captive held	8	Agattu
	Translocated from Buldir	35	Agattu
1980	Golden birds <sup>b</sup>	48	Agattu
	Translocated from Buldir	60	Agattu
	Captive-reared	116	Amchitka
	Wild, captive held	3	Amchitka
	Captive-reared	20	Buldir
1981	Golden birds <sup>b</sup>	111	Nizki
	Captive-reared	250	Nizki
	Wild, captive held	2	Nizki
1982	Golden birds <sup>b</sup>	210	Agattu
	Captive-reared	64	Agattu
	Wild, captive held	17	Agattu
	Translocated from Buldir	138	Agattu
1983	Translocated from Buldir	108	Agattu
1984	Translocated from Buldir	86	Agattu
1985	Translocated from Buldir	124	Amchitka
1987	Translocated from Buldir	136	Amchitka
1988	Translocated from Buldir	116	Little Kiska
		12	Nizki
1989	Translocated from Buldir	25	Little Kiska
		118	Nizki
1990	Translocated from Buldir	25	Little Kiska
		38	Nizki
1991	Translocated from Buldir	55	Little Kiska
		92	Nizki
		36	Agattu
1992	Translocated from Buldir	60	Little Kiska
		70	Nizki
1994	Translocated from Buldir	70	Skagul
		81	Yunaska
1995	Translocated from Buldir	81	Skagul
		87	Yunaska

<sup>a</sup> Birds failed to migrate; all not lost to bald eagles (17) were recaptured.

<sup>b</sup> Golden birds are wild, captive-held males paired with captive-reared females, released with their young, foster young, and associated birds.

APPENDIX D. Nesting pairs of Aleutian geese on surveyed islands.

Island	Island Group	Estimated Nesting Pairs	Survey Year	Trend
Agattu	Near	1000s	2003	Increasing
Nizki-Alaid	Near	541	2004	Increasing
Attu	Near	8	2005	Unknown
Buldir	Rat	7000	1995	Increasing
Little Kiska	Rat	1-2	1994	Decreasing
Amchitka	Rat	2-5	1994	Unknown
Chagulak	Andreanof	25	2002	Stable
Amukta	Andreanof	1	1993	Unknown
Kiliktagik	Semidi	14	1995	Decrease from 1991
Anowik	Semidi	3	1995	Unknown

APPENDIX E. Harvest strategy for Aleutian geese during 2006-2010.

Population Status: Aleutian geese have increased steadily for the past 30 years under the protection of the Endangered Species Act (1973, as amended). This increase is the result of the active management program conducted by all of the cooperating agencies as outlined in the Recovery Plan (USFWS 1991). Exponential growth has been observed throughout the recovery period (Figure 2; Appendix A), averaging approximately 14% per year for the 30-year period 1974-2004. Recent estimates suggest that Aleutian geese may have exceeded 100,000 birds by the winter of 2004-2005. The large increase in numbers has led to increasing agricultural depredation complaints in northwestern California and southwestern Oregon. Therefore, unless or until such time as a solution to this problem can be found, the population objective for this population has been established as: maintain the Aleutian goose population at 60,000 birds.

Harvest: Canada goose hunting closures were established on primary Aleutian goose areas in Alaska (1973), California (1975), and the Oregon Coast (1982). In 1984, a closure specific to Aleutian geese was implemented throughout the Pacific Flyway. A simultaneous flywaywide closure of cackling geese likely expanded protection of Aleutian geese in California until it was removed in 1994. Aleutian goose seasons were closed until the 2001-2002 hunting season, when the take of Aleutians was permitted under federal regulation outside of the breeding grounds in Alaska and known concentration areas in Oregon and California. In Oregon they remained under a state endangered listing until the Oregon legislature and Governor approved a statute delisting the bird in June 2005. Washington delisted Aleutian geese from the state threatened species list in 2006. California specifically permits the take of Aleutians and has expanded the times and areas where Aleutian geese may be taken during the hunting season. Provisional information indicates that California harvest may have been about 800 Aleutian geese in the 2003-2004 season and 200 geese in 2004-2005 (Drut and Trost 2004, 2005).

Harvest Strategy 2006-2010 Hunting Seasons: The strategy to be employed during the performance period of this plan is to manage the harvest of Aleutian geese to maintain a population of 60,000 geese in the official inventory. The population exceeded this objective in 2002 and continues to increase. Accordingly, maximum harvest level is determined as follows:

$$\text{Maximum Harvest}_{t+1} = ((PI_t * 1.14) - 60,000) * 0.8$$

Where:

$PI_t$  = Population Index  $t$

1.14 = the average annual growth expected based on the long-term average

0.8 = adjustment for the expected 20% wounding loss

Example: Time $_t$  = 2003/2004

$$\text{Maximum Harvest}_{(2004/2005)} = ((70,000_{(2003/2004)} * 1.14) - 60,000) * 0.8 = 15,840$$

This strategy does not specify a need for geographic hunting closures, except that closures will be maintained in areas used by Semidi Islands geese until their status improves.