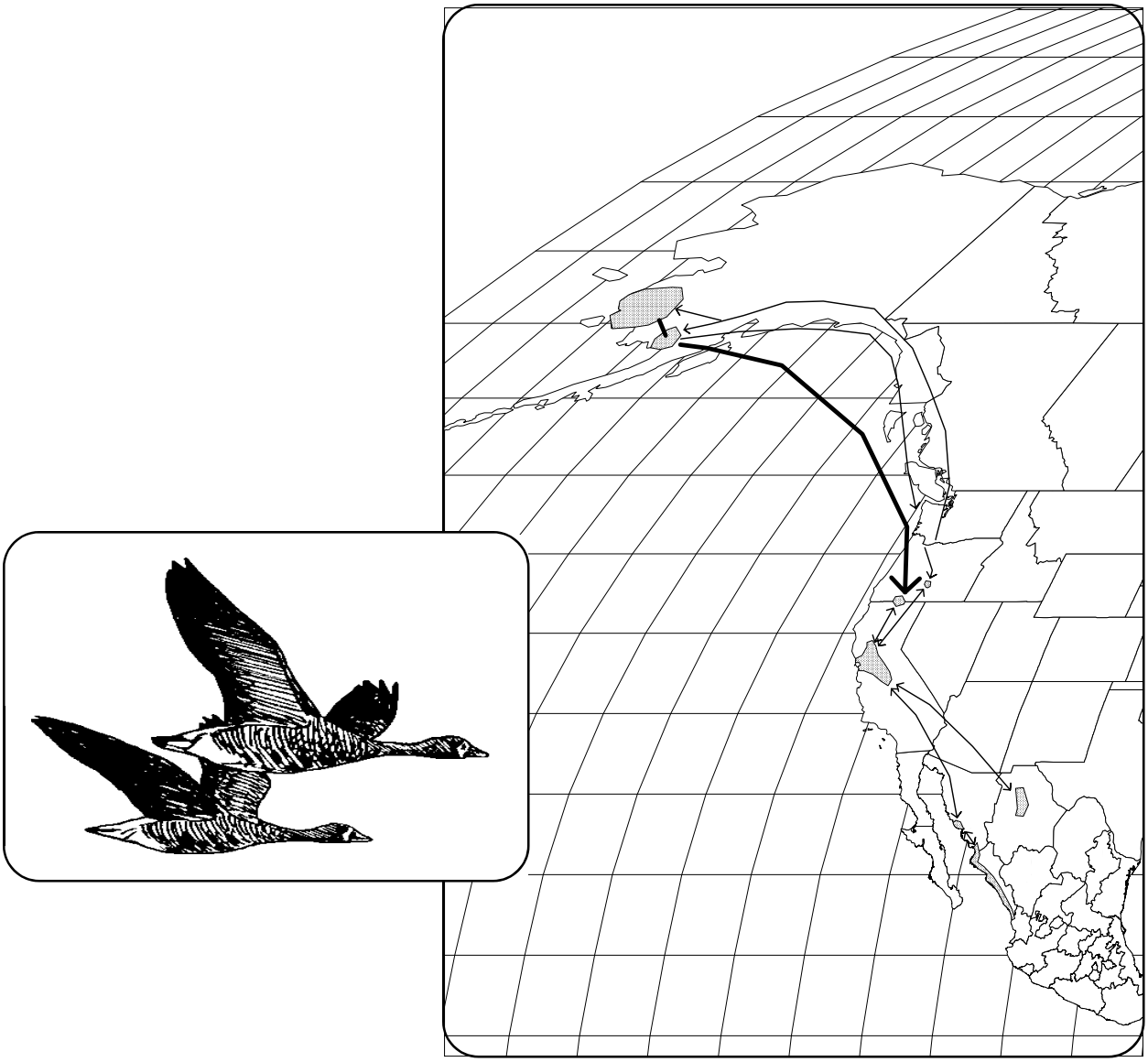
Pacific Flyway Management Plan for the

Pacific Flyway Population of Greater White-fronted Geese



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. 11th Avenue, Portland, OR.

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Pacific Flyway Management Plan For
The Pacific Flyway Population of Greater White-Fronted Geese

Prepared for the:

Pacific Flyway Council
U.S. Fish and Wildlife Service
Canadian Wildlife Service
Dirección General de Conservación Ecológica de Recursos Naturales

by the

White-fronted Goose Subcommittee of the
Pacific Flyway Study Committee

July 2003

Approved by: _____ _____
Chair, Pacific Flyway Council Date

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PACIFIC FLYWAY MANAGEMENT PLAN FOR THE PACIFIC FLYWAY POPULATION OF GREATER WHITE-FRONTED GOOSE

INTRODUCTION

For the purposes of this management plan, the greater white-fronted goose subspecies (*Anser albifrons frontalis*) occurring in the Pacific Flyway is termed the Pacific Flyway Population of Greater White-fronted Goose, or the Pacific white-front. This subspecies is one of two white-fronted goose subspecies that breed in Alaska and winter primarily in California. The other subspecies is the Tule greater white-fronted goose (*A. a. gambelli*), which has a separate Pacific Flyway management plan, and is referenced in this plan as the Tule white-front. Orthmeyer et al. (1995) have described morphological differences among white-fronts. The Mid-continent Population of White-fronted Goose (*A. a. frontalis*), some of which breed in interior and northern Alaska, is treated in a separate management plan adopted by the Central, Mississippi, and Pacific Flyway Councils (1998), and is referenced in this plan as the mid-continent white-front.

Nearly all Pacific white-fronts breed from the Alaska Peninsula north to the Yukon River, with the majority nesting on the Yukon-Kuskokwim Delta (YKD) (Palmer 1976). The primary wintering areas for Pacific white-fronts are the Sacramento Valley and the Sacramento San Joaquin River Delta. These areas receive the majority of fall migrants, beginning in late September and they peak by early to mid-November. A small percentage of Pacific white-fronts, mostly from Bristol Bay, migrate early through the Klamath Basin in September, overfly the Sacramento Valley, and winter in the northern highlands of Mexico (Ely and Takekawa 1996). Distribution and use areas of Pacific white-fronts are presented in Figure 1 and Appendix A.

Fall counts of Pacific white-fronts declined 85% from the reported historical peak population estimates of 480,000 from 1966-68, to a low of 73,100 in coordinated fall surveys of 1979 (O'Neill 1979; Timm and Dau 1979; Raveling 1984). This decline resulted in focused management discussions in 1978 and flywaywide harvest restrictions in 1978. A major conservation program, now known as the YKD Goose Management Plan, was cooperatively implemented in 1984 by the USFWS, ADFG, CDFG, the YKD's Association of Village Council Presidents (AVCP) – Waterfowl Conservation Committee (WCC), California Waterfowl Association, and Waterfowl Habitat Owners Alliance to reverse the declines in four species of Pacific Flyway geese, including the Pacific white-front. This plan, implemented in 1984, specified measures for reducing the Pacific white-front harvest throughout the flyway, as well as a broad range of needed conservation and education efforts (Pamplin 1986). The successful implementation of this plan, and subsequent harvest strategy developed beginning in 1994, resulted in restoration of the population to objective level by 1996. During the late 1990s, population growth slowed, but the recent peak of 433,400 in 2001 is the highest index since 1968.

The purpose of this plan is to establish guidelines for cooperative management of Pacific white-fronts during the planning period 2003-2008, maintaining the population at objective levels through implementation of plan activities and harvest strategies.

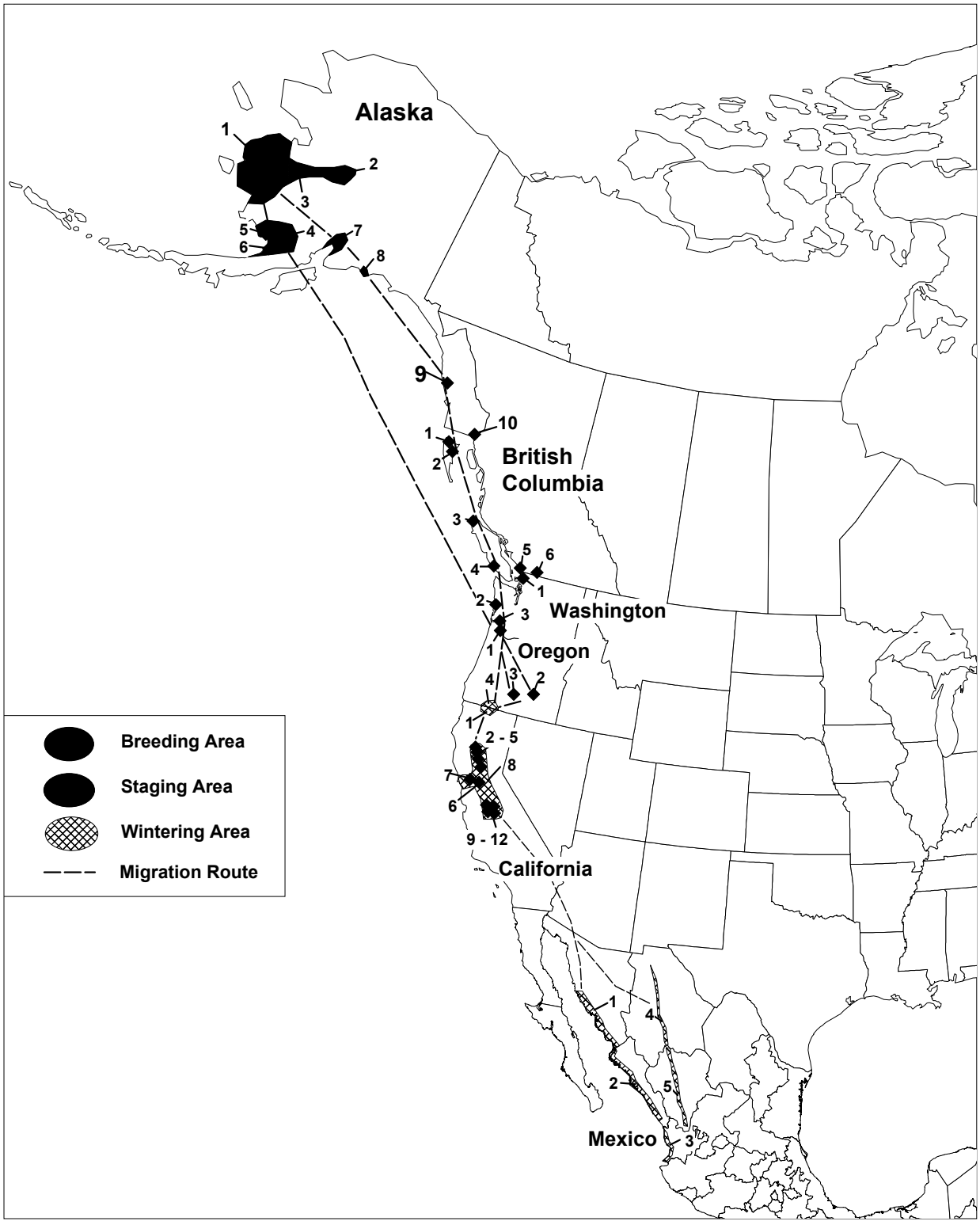

Figure 1. Major use areas for greater Pacific white-fronted geese. Please refer to Appendix A for area names and use descriptions.

GOAL AND OBJECTIVES

The goal of this plan is to identify needs and responsibilities necessary to cooperatively manage numbers and distribution of Pacific white-fronts to maintain population viability and provide for aesthetic, educational, scientific, and hunting uses throughout their range.

Objectives:

A. Maintain a population index of 300,000, as measured by a 3-year average projected fall index derived from indicated total geese on aerial surveys covering the YKD and Bristol Bay areas.

B. Maintain, manage, and enhance nesting, migration and wintering habitats (Figure1; Appendix A) in sufficient quantity and quality to meet the population objective and public use needs.

STATUS

A. Population Trends and Management Indices

Population trends—Peak numbers of Pacific white-fronts in the Klamath Basin totaled 480,000 in 1966-68. The population declined to a low of 73,100 in coordinated fall surveys of 1979. Implementation of management actions, including harvest restrictions, resulted in steady increases in fall indices (Figure 2; Appendix B) and breeding population indices (Figure 3; Appendix C). Between 1985 and 1996, the population grew at an average annual rate of over 10%. The population surpassed the management objective of a 3-year average of 300,000 in 1996 and has continued to increase gradually (Figure 2). The population recently peaked at 433,400 in 2001, the highest estimate since 1968.

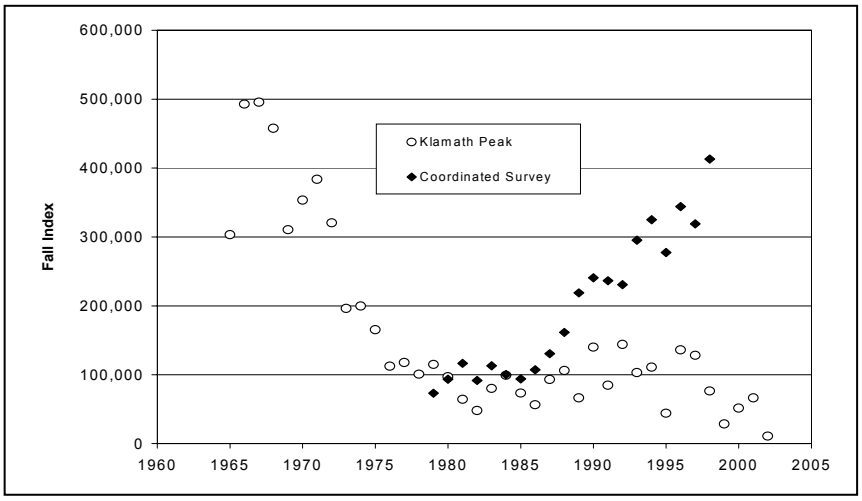

Figure 2 – Fall indices of Pacific white-fronts from peak counts in the Klamath Basin (through 2002) and coordinated fall surveys expanded to include the Sacramento Valley (1979-98).

Management Indices—During the period 1965-1978, the Pacific white-front population was estimated from peak fall counts only in the Klamath Basin (O'Neill 1979). A special November Dark Goose Survey was initiated throughout the Flyway in 1979 to provide more accurate population estimates. Beginning in 1979, coordinated fall surveys included the Sacramento Valley and the Klamath Basin. The expanded survey coverage improved estimates of the population as it began to increase. However, less concentrated use of the Klamath Basin by Pacific white-fronts and operational problems (e.g., extended periods of inclement weather and a wider distribution of geese in the Sacramento Valley) have confounded the ability to obtain reliable fall counts of the population in recent years. Historic fall estimates are presented in Figure 2 and Appendix B.

In 1985, a special aerial transect survey was initiated to quantify the number and distribution of breeding geese in the coastal region of the YKD (Butler and Malecki 1986). The YKD Coastal Zone Survey covers nearly all of the high-density Pacific white-front nesting range and has documented the increase in the population since 1985 (Eldridge and Dau 2002; Figure 3, Appendix C). Survey methods have been continually refined. In addition, Pacific white-fronts are annually surveyed as part of the Alaska-Yukon Waterfowl Breeding Population Survey for the Bristol Bay area (stratum 8) and interior portions of the YKD (stratum 9).

The last year that reliable fall counts of Pacific white-fronts were obtained was 1998. Due to difficulties encountered with the fall inventory, in 2002 the Pacific Flyway Council adopted a new population index for Pacific white-fronts in the form of a projected fall population derived from breeding ground data. Several breeding ground indexing methods were reviewed, similar to the approach adopted for cackling Canada geese (Stehn 1998), and options were summarized in a USFWS report (Eldridge and Dau 2002). Indices of total geese (including groups) were deemed more reliable than indices of breeding geese (singles and paired birds) because the proportion of breeders recorded on surveys varies considerably among years (Eldridge and Dau 2002). The projected fall index is based on a combination of indicated total Pacific white-fronts from the YKD Coastal Zone Goose Survey (Eldridge and Dau 2002) and the Alaska-Yukon Waterfowl Breeding Population Survey for Bristol Bay and the interior portions of the YKD (J. Hodges, USFWS, personal communication). The breeding ground data are expanded to a fall index by applying a factor derived from the historic relationship between two data sets when they were both considered reliable (1985-98; Figure 4). The projected fall index (Figure 5; Appendix D) is now used to guide management actions directed at Pacific white-fronts, and produces benchmarks for the success of this plan and the YKD Goose Management Plan.

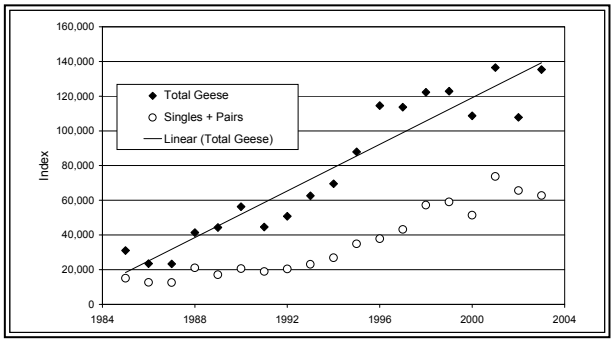

Figure 3 – Indicated breeding geese (2x singles + pairs) and total geese from YKD June aerial surveys 1985-2002.

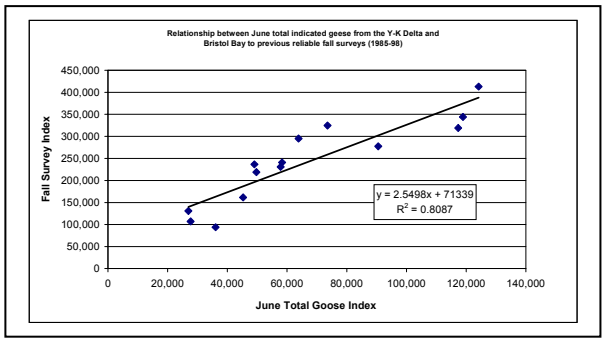

Figure 4 – Relationship between reliable coordinated fall survey indices and total indicated Pacific white-front indices for YKD and Bristol

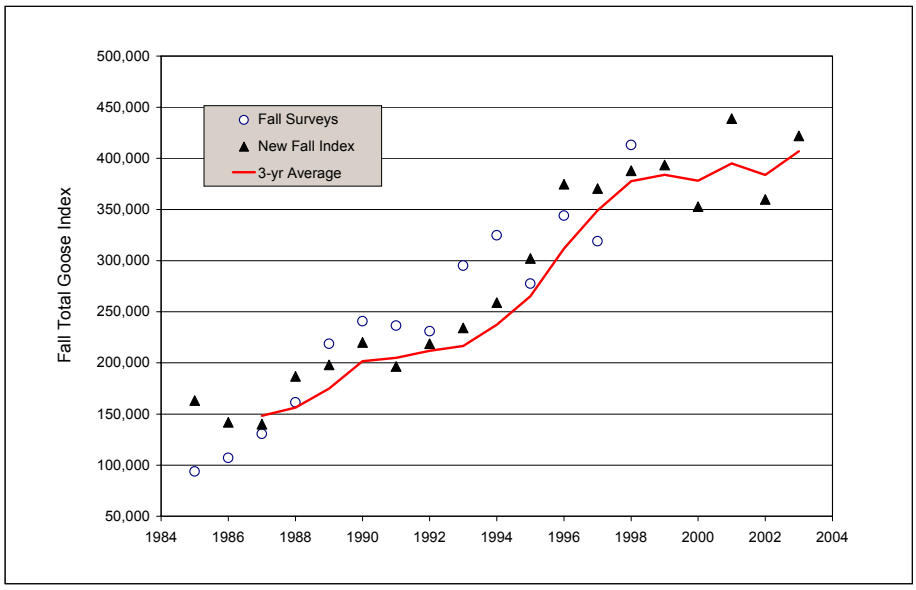

Figure 5 – Projected fall population index and moving 3-year average for Pacific white-fronts from total indicated geese regressed to fall surveys 1985-98.

B. Distribution

Breeding Distribution—Timm and Dau (1979) speculated that over 95% of the Pacific white-front population was endemic to the YKD. June aerial breeding bird surveys indicate that the YKD hosted an average of nearly 97% of Pacific white-fronts over the past 10 years (Eldridge and Dau 2002; Conant and Groves 2002). Three-quarters of the population breeds in the narrow coastal zone of the YKD, and another 22% are dispersed across the delta interior. The remainder of Pacific white-fronts nest in Bristol Bay and the Innoko River Basin. The number of Pacific white-fronts occurring in the Bristol Bay area has declined only slightly since 1985 (Appendix C). In 1985, when the Pacific white-front population was diminished, Bristol Bay birds constituted 15% of the population, but they now amount to only 4% (Conant and Groves 2002; Eldridge and Dau 2002).

Fall Migration— The fall migration of Pacific white-fronts begins in early to mid-August. Unlike cackling Canada geese, Pacific white-fronts do not usually aggregate on a few known staging areas and apparently remain on the YKD until late September (Ely and Dzubin 1994). Some geese remain east of the YKD until late September. Geese migrating along the Alaska Gulf Coast in late August and early September and passing through Cook Inlet and the Copper River Delta before the hunting season opens may be of Bristol Bay origin (Hawkings 1982, Ely and Dzubin 1994); there are only a few band recoveries from Cook Inlet. The Copper River Delta is the last known major use area north of the Klamath Basin (Appendix A). There have been only two band recoveries in Southeast Alaska and one in British Columbia. As the population has increased, more Pacific white-fronts have been observed in western Washington and Oregon during September.

Most Pacific white-fronts appear to move nonstop from the YKD to the mouth of the Columbia River and migrate through central Oregon before stopping at the Klamath Basin and Sacramento

Valley. In recent years, most apparently bypass the traditional Klamath Basin staging area (see Figure 2) and migrate directly to the Central Valley. Recent trends (1998-2002) show significant numbers of Pacific white-fronts arriving in the Sacramento Valley by late September, with 100,000-200,000 present by the first week in October. Although diminished in numbers from past years, the first arrivals in the Klamath Basin are seen about the end of August, and peak numbers occur in mid-October. Historic banding in the Klamath Basin indicated that Pacific white-fronts migrating through the Klamath Basin in September and early October were apt to be recovered in Mexico, whereas geese banded after 15 October were rarely recovered there (C. R. Ely, USGS, personal communication). The early birds are now known to be primarily the Bristol Bay group (Ely and Takekawa 1996).

Winter Distribution— Band recoveries from white-fronts banded on 11 major banding stations in Alaska have shown relationships between breeding and wintering areas (Lensink 1969). Recoveries have indicated that birds from the YKD stage and winter in the Pacific Flyway**.** From the three banding regions on the YKD, 70.0% of the south Delta, 90.5% of the middle Delta and 84.6% of the north Delta band recoveries were from California (PFC 1987). A small proportion (7%) of white-fronts banded in the Innoko River Basin have been recovered in California, and likely represent molt migrants—Pacific white-fronts from the Yukon-Delta and Tule white-fronts from Cook Inlet. During the molt, Innoko hosts a mixture of these and mid-continent white-fronts. The westernmost banding sites in the Innoko have produced the highest proportion of California recoveries (> 20%), which is congruent with the distribution of molting Tule white-fronts in the region.

In recent years, Pacific white-fronts have largely bypassed the Klamath Basin, arriving in California's Sacramento Valley earlier and in larger numbers than in the past. In early fall, these parts are largely concentrated on NWRs on the western side of the Sacramento Valley because other habitats are limited. As fall and winter progress, Pacific white-fronts disperse from the western Sacramento Valley (and the special white-fronted goose harvest management area) into other parts of the Sacramento Valley and the Sacramento-San Joaquin River delta (Appendix A)**.** The Sacramento Valley and to a lesser extent the Sacramento-San Joaquin River Delta and northern San Joaquin Valley (Appendix A) are the major wintering areas for Pacific white-fronts from the YKD (Ely and Takekawa 1996). Small numbers of Pacific white-fronts winter in the Klamath Basin of northeastern California and southeastern Oregon (less than 10,000), as well as several hundred birds in the lower Columbia River of Oregon and Washington.

At least 10,000 and probably many more Pacific Flyway white-fronts winter in Mexico. Winter survey counts in Mexico, done every third year (USFWS 2001), are quite variable, ranging from 10,000 to 20,000 or more. Band recovery data indicate that the propensity of Pacific white-fronts to winter in Mexico is highest in birds from the southern part of the breeding grounds, particularly Bristol Bay. Recoveries in Mexico varied among geese banded on the north YKD (none in Mexico), middle YKD (2.5%), and south YKD (23%). Analyses of historical banding have shown that a small proportion (9-10%) of birds from the primary YKD breeding grounds is recovered in Mexico, primarily from the coastal states of Sinaloa, Nayarit, and Sonora (Lensink 1969, 1986). However, 20-25% of YKD recoveries in Mexico were from the interior highlands of Chihuahua and Durango. In contrast, over 90% of Bristol Bay birds winter in Mexico, primarily in the interior (Ely and Takekawa 1996). Although some Pacific Flyway white-fronts

winter in the interior highlands, they may not be sympatric with mid-continent white-fronts that use areas farther south and east (Ely and Dzubin 1994).

Spring Migration— Pacific white-fronts begin leaving the Central Valley of California in early February. Up to two-thirds of the population uses the Klamath Basin in late March, with some birds remaining until late April (Appendix A). Birds of Bristol Bay origin return from Mexico to use the Sacramento-San Joaquin Delta where they often stay through March before continuing north through the Klamath Basin and eastern Oregon (Ely and Takekawa 1996). Geese probably take both coastal and inland routes to Alaska because observations of migrating geese have been made in both areas.

Upper Cook Inlet is a regular stopover during late April (Timm 1982), but, at most, only a few thousand Pacific white-fronts accumulate during the two-week staging period (Butler and Gill 1987). Historically, over 25,000 Pacific white-fronts have been seen along the north side of the Alaska Peninsula in upper Bristol Bay in early May (Appendix A).

Peak arrival dates on the Y-K Delta have ranged from May 3 to 10 during 1972-78 (Timm and Dau 1979). Ely and Raveling (1984) reported Pacific white-fronts were already present on the nesting grounds near Old Chevak on 5 May 1977, 24 April 1978 and 3 May 1979.

C. Productivity and Survival

From the Alaska-Yukon Waterfowl Breeding Population Survey, a substantial decline in Pacific white-fronts became evident on the breeding grounds by the early 1970s and continued into the 1980s (King and Conant 1983; Conant and Hodges 1986; King and Derksen 1986). The YKD Coastal Zone Goose Survey has shown increases in breeding pairs and total birds for Pacific white-fronts since it was initiated in 1985 (Eldridge and Dau 2002; Appendix C). During the period of most rapid increase (1991-1996) annual increases averaged 11.4% for indicated breeding birds (singles and pairs), and 14% for indicated total geese. Over the entire period of restoration from 1985 to present, average annual growth was 10.7% for indicated breeders and 9.3% for total geese.

Random plot ground surveys on the YKD began in 1986 to gather information on nest densities, distribution, and success for geese and other waterbirds (Stehn 1986). Bowman et al. (2002) summarized data and trends from ground plot surveys. Since 1985, Pacific white-front nest density on plots has increased from 1.4 nests/km^2 to an average of 16.5 nests/km^2 since 1996. Expanded estimates of nests for the entire YKD coastal area increased steadily from 11,200 in 1985 to nearly 105,000 in 2001 (Appendix E). Clutch size has varied little around the average of 4.3 eggs (range 3.73 – 4.70) (Appendix F). Ely and Raveling (1984) found that clutch size was highly correlated with the chronology of nest initiation in all years, with earliest nests containing the largest clutches.

Flooding, predation, and timing of nest initiation can influence productivity. Ely and Raveling (1984) reported flooding as a notable cause of nest losses near Old Chevak in 1978 and 1979. From the early to mid-1980s, the arctic fox (*Alopex lagopus*) population reached a cyclic high and nest predation was significant on the diminished Pacific white-fronts. Greatly reduced numbers of cackling Canada and emperor geese during the same period reduced the level of

buffer prey species for foxes, making nests more vulnerable. Intense fox predation affected the Pacific white-front population less than other goose species because their breeding distribution was more dispersed and extended farther inland. Nesting success for white-fronts is typically 20-40% higher than for cackling geese in years of high fox predation due to their greater abilities to defend against terrestrial predators.

There have been several summaries of post-breeding productivity data (Lynch 1971; Timm and Dau 1979; USFWS 2001). On staging and wintering areas, several methods have been utilized to monitor Pacific white-front production. In the Klamath Basin, average young per family group and percent young are estimated annually from field counts, however, these are currently thought to be primarily Pacific white-fronts from the Bristol Bay lowlands and not necessarily indicative of the larger YKD segment of the population (pers. comm., D. Mauser, Klamath Lake NWR). Similar surveys are conducted in the Sacramento Valley, but only on a portion of the National Wildlife Refuges. Although both types of surveys are subject to significant bias, the most reliable method is percent young in field counts, if enough flocks are observed over an extended period. Separate assessments of productivity may be obtained for Bristol Bay birds (early Klamath) and YKD (Sacramento Valley). An additional measure of productivity comes from age ratios of tail fans in USFWS Cooperative Waterfowl Parts Collection Survey, however this sample is not adjusted for differential vulnerability to harvest (Appendix G).

Survival rates have generally improved for Pacific white-fronts over the past 30 years, reflected in population growth during the late 1980s and early 1990s. Timm and Dau (1979) estimated annual survival at 0.679 from 1967 to 1969. Schmutz and Ely (1999) estimated annual survival of 0.749 during 1979-1982, and 0.85 during 1985-1996. Timm and Dau (1979) showed that immature Pacific white-fronts were particularly vulnerable to hunting; they are 2.8 times as likely to be harvested than adults.

D. Habitat Use and Management

Breeding areas—Pacific white-fronts prefer to nest in the extensive pond and meadow mosaic habitats of the outer YKD. Most nests are established in meadows and slough banks (Mickelson 1975; Ely et al. 1996). Geese are dependent on foods on the breeding grounds before nesting and make extensive use various belowground plant parts and bases of emerging plants (Budeau et al. 1991). During brood rearing, Pacific white-front families use some of the same pond edge communities as do cackling geese consisting of *Carex mackenziei and C. subspathacea*, *Triglochin palustris*, and *Puccinellia phryganodes* (Babcock and Ely 1994). They are more frequently found in areas away from pond complexes than cackling geese, and only occasionally mix with broods of cackling geese and emperor geese. Brood rearing areas are typically slightly farther from water than areas used by cackling geese and typified by taller, coarser vegetation. By mid August, when geese are flighted and berries are ripe, geese on the Yukon Delta move to upland areas to forage on salmon berries (*Rubus chamaemorus*) and crow berries (*Empetrum nigrum*). Most of the primary breeding grounds are on federal lands within the Yukon Delta NWR and are protected. Many Pacific white-fronts are found also on the numerous private inholdings. Additional breeding areas are within Togiak and Alaska Peninsula NWRs.

Migration areas— Pacific white-fronts depend on intertidal coastal marshes of Cook Inlet, and likely other coastal areas of southeast and south-central Alaska, during spring stopover to

develop energy reserves for breeding. Pacific white-fronts often feed in association with other geese on the outer marsh zone, where they likely consume similar types of vegetation such as *Puccinellia* and *Triglochin,* as *well* as *Carex ramenskii* meadows of the inner marsh when they become available. White-fronted geese also occasionally use agricultural fields and urban areas. Nearly all of the primary habitats in Cook Inlet are within protected state wildlife areas, including Palmer Hay Flats, Goose Bay, Susitna Flats, and Trading Bay State Game Refuges, Kenai River Flats, and the Redoubt Bay Critical Habitat Area.

The intertidal marshes and coastal wetlands on the north side of the Alaska Peninsula also are spring and fall staging habitats where white-fronted geese add substantial body mass for migration. Pacific white-fronts feed intensively on pond shorelines with *Puccinellia* and *Triglochin*, as well as tide flats where *Puccinellia* and *Hippuris* dominate. Most of the primary use areas are protected in the Pilot Point State Critical Habitat Area, and portions of white-front habitats are within Cinder River State Critical Habitat Area.

In the Klamath Basin during autumn and spring, Pacific white-fronts make extensive use of pastures and hay fields, small grains and potatoes, as well as seasonal wetlands. Potatoes and grains are used more heavily in autumn, while green vegetation is of greater importance in the diet in spring (Thomson 2001). White-fronts are much more widely distributed during spring than in autumn. Nearly all roost sites in the Klamath basin during autumn are on refuge lands, whereas private lands are much more important in spring. The availability of optimum habitats during spring is critical to achieve increases in body mass necessary for spring migration (Ely and Raveling 1989). On public lands, wetland and agricultural habitats are actively managed for geese and other wildlife.

Wintering areas—In the Central Valley of California, Pacific white-fronts feed primarily in agricultural fields (rice, corn, wheat), alkali/tuberous bulrush marsh, other seasonally flooded wetlands (including vernal pools), and short grass uplands. Rice is the predominant food crop in the Sacramento Valley, while corn sustains most white-fronts on the Sacramento-San Joaquin Delta (C. Ely, USGS, unpublished data). Roosting occurs in shallow wetland habitats on refuges, state wildlife areas, and private agricultural lands. Two-thirds of wetlands in California and the vast majority of agricultural lands are privately owned. Key areas for Pacific white-fronts are shown in Appendix A.

Wildlife refuges and wildlife areas are important wintering areas for Pacific white-fronts. These areas provide considerable undisturbed roosting habitat. Goose habitat management efforts include marsh management, the planting of some agricultural crops, prescribed burning, or livestock grazing on federal (e.g., Sacramento NWR and San Luis NWR complexes) and state-managed areas (e.g., Los Banos). Some specific management practices on private agricultural lands include post-harvest burning and/or flooding of grain fields, maintenance of livestock grazing to provide readily available waste grain and forage. Short-grass habitats, such as annual grasslands, managed pastures, alkali meadows, and vernal pools are maintained through easements on some private ranches.

Sanctuaries on public lands that provide undisturbed feeding and roosting areas are essential for successful goose management and help alleviate depredation on private lands. Sanctuary benefits can be attained through a combination of spatial and temporal closures that are

essentially or totally free from all human disturbances. Disturbance from hunting, vehicle and foot traffic, viewing, and management activities can change habitat use, behavior and food habits of geese.

E. Public Use

Experience over the past 30 years has illustrated that harvest (particularly adult mortality) is the most important factor regulating the size of the Pacific white-front population. Excessive harvest from the 1960s to the 1980s throughout their range caused a serious population decline that necessitated 15 years of restoration effort (Timm and Dau 1979; Raveling 1984; Pamplin 1986). Beginning in 1984, the Pacific Flyway wildlife agencies, Alaska Natives, and other public interest groups have cooperatively developed flyway-wide harvest guidelines and strategies in the YKD Goose Management Plan, which resulted in more restrictive hunting regulations and substantial reductions in harvest. Given the importance of harvest management in regulating the Pacific white-front population, the Council has established harvest guidelines, in cooperation with resource users throughout the flyway (Appendix H). A summary of the history of white-fronted goose harvest regulations in the Pacific Flyway is found in Appendix I.

General Harvest Distribution—Historic major harvest areas for Pacific white-fronts have been the YKD, and Northeastern and Balance-of-State zones in California. Fall and winter harvests of Pacific white-fronts (Figure 6; Appendix J) reached historic highs during 1962-70, averaging nearly 62,000 annually. Harvests averaged over 41,000 during the significant population decline of 1971-78. Harvest restrictions, first implemented in 1978, and farther reduced in the 1980s, produced all-time low harvests averaging less than 10,000 during 1984-91. Recently, with the population growing to over 400,000, fall and winter harvest has increased slightly with moderate changes in regulations. Harvest averaged >25,000 during 1996-2001 and reached 28,600 in 2000.

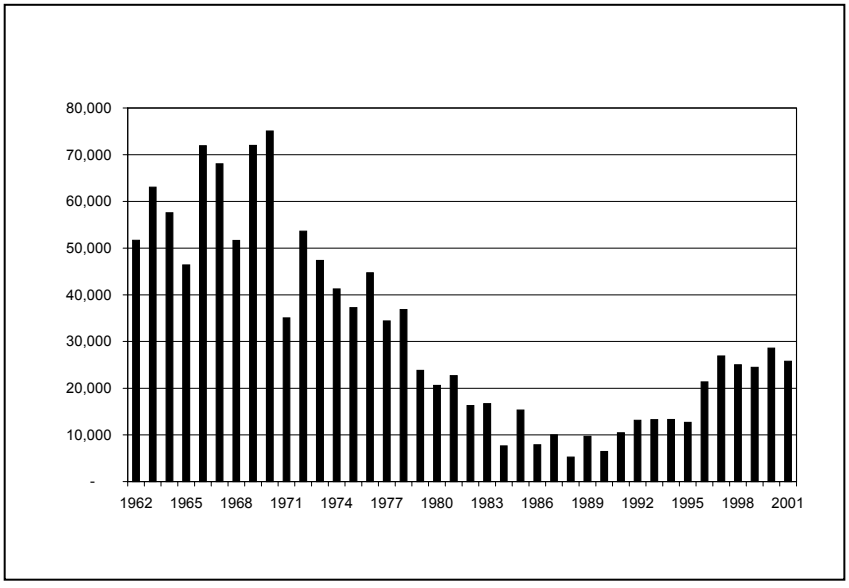

Figure 6 – Fall-winter harvest of Pacific white-fronts in the Pacific Flyway 1962-2001.

Subsistence harvest of Pacific white-fronts in western Alaska was not well documented until cooperative conservation efforts were implemented in the mid-1980s. Although there is insufficient information to accurately assess trends in subsistence harvest prior to 1985, data from a few sources indicates that harvest may have been highest in the 1960s and early 1970s. Klein (1966), in his study of subsistence harvest of waterfowl on the Y-K Delta in 1964, estimated the spring-summer-fall harvest of Pacific white-fronts at 22,600 birds plus an unknown number of eggs. Similar to fall and winter harvests in the south, the major population decline resulted in significantly lower harvests during the 1980s, roughly 4,000-6,000 birds and a negligible number of eggs (Copp and Smith 1981; Copp 1987).

Historically, it seems clear that the lack of coordinated management of subsistence and fall harvest produced excessive harvest rates in the late 1960s and 1970s. In addition, the size of the Pacific white-front population is an important determinant of harvest levels. During the past 15 years, through cooperative efforts in managing all hunting, harvests have been maintained at a relatively low level, with subsistence and fall/winter harvests being nearly equal (Figure 7; Appendix J) but estimated harvests are currently increasing. Overall, the rate of increase in harvest has been less than the rate of increase in population size. During the last decade, the population has grown steadily, with the harvest rate index remaining below 10%.

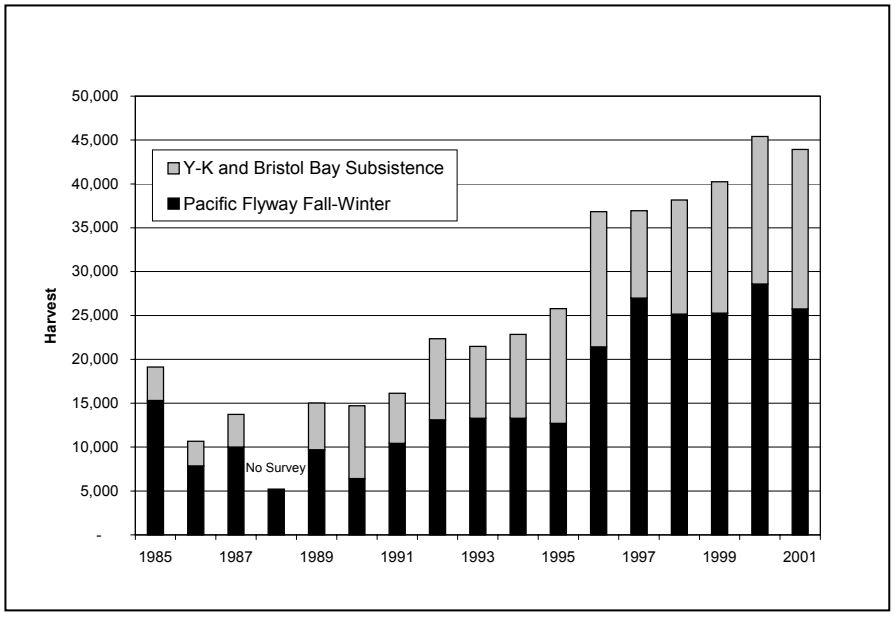

Figure 7 – Pacific white-front harvest: fall-winter harvest and subsistence harvest from the YKD and Bristol Bay, 1985-2001.

Alaska Harvest—Federal harvest data from the mail questionnaire and Waterfowl Parts Collection surveys indicate an average annual fall harvest of less than 900 white-fronts in Alaska since 1966, with harvests of about 1,200 in some years (Appendix J). However, in many years, sample sizes have not been adequate to accurately measure the Alaska harvest; estimates have been highly variable. State mail surveys, with somewhat better sample sizes and lower variation, indicate a 19-year average statewide fall harvest of 873 white-fronts during 1972-1997 (Appendix K). State harvest data indicate that, on long-term average, 59% of Alaska's white-

front harvest is from mid-continent white-front areas in interior and northern regions, and 41% (350 geese) are from Pacific white-front range, primarily taken in the YKD, Alaska Peninsula, and Cook Inlet regions (Appendix K). Regulation frameworks for Pacific white-fronted geese in Alaska were relatively stable, without restrictions until the 1980s. As a result of conservation measures in the mid-1980s, white-front bag limits were reduced to 1 daily / 2 in possession in 1982, and increased to 2/4 for the period 1983-1993. In 1994, white-front restrictions were removed with resumption of aggregate dark goose limits of 4/8.

Subsistence harvest of Pacific white-fronts has been estimated in a consistent manner on the YKD since 1985 (Wentworth and Seim 1996). Household interview surveys in a sample of villages provide data on seasonal harvests of many species. Seasonal distribution of Pacific white-front harvest is greatest in spring (63%), with 22% occurring during summer and 15% in fall (Appendix L). Since 1989, YKD harvest has steadily increased, tracking population size, from about 5,300 to over 18,000 in 2001 (Wentworth 2001; Appendix L). Recently, subsistence harvest surveys have been expanded to Bristol Bay and Alaska Peninsula villages (Wong and Wentworth 1999; C. Wentworth, USFWS, Anchorage, unpublished data, 2000). Up to 1,300 Pacific white-fronts are taken in this region (Appendix M). Harvest surveys now cover all primary subsistence areas, indicating a total subsistence harvest of about 18,000 Pacific white-fronts.

Migration Area Harvest—Combined Pacific white-front harvests in British Columbia and Washington amount to no more than 1,000 geese, mostly taken incidentally by Canada goose hunters during general goose seasons. Oregon is a secondary harvest area in the Pacific Flyway outside of California. In recent years, annual harvest has been about 2,500 geese and occurs mostly in Lake and Klamath Counties. Harvest in other Pacific Flyway states is minimal (Appendix J).

Wintering Area Harvest— Most of the Pacific white-front harvest takes place in California (Appendix J) in both high 1970-71 (95%) and low harvest years 1988-89 (90%). The major harvest areas in California are Modoc and Siskiyou Counties (Klamath Basin); Colusa, Glenn, Butte and Sutter Counties (Sacramento Valley); Contra Costa, San Joaquin, Sacramento and Solano Counties (Sacramento-San Joaquin River Delta); and Merced County (San Joaquin Valley). Together they account for 75 % of the Pacific white-front harvest in California.

Harvests of white-fronted geese on state- and federal-managed public shooting areas in California comprise about 20 percent of the statewide estimated harvest (Appendix N). Until the mid-1980's, the majority of the Pacific white-front public hunting area harvest occurred on the Klamath Basin NWRs (Appendix N). Coincident with fewer geese, more restrictive hunting regulations and an earlier migration to the Sacramento Valley, the distribution of Pacific white-front harvest on managed public hunting areas has changed (Appendix N).

Nonconsumptive Use—Geese are objects of public interest wherever they occur, and Pacific white-fronts are of interest to the public because of their gregarious behavior and local abundance. Non-consumptive use of California State waterfowl areas estimated by Calliga (1983) increased from 53,966 visits in 1973-74 to 149,753 in 1981-82. Total non-consumptive use at Sacramento NWR complex alone was 81,808 visits in 2000 (D. Dachner, Sacramento NWR, personal communication). This is up 29% from 63,316 visits in 1997. Public use of

many other wildlife areas to watch waterfowl is extensive, but visitation data are not routinely compiled. Public access on federal refuges and state wildlife areas varies greatly. The type and level of regulated public use is determined by the compatibility of that activity with the goals and objectives of individual refuges and wildlife areas. Some of the major non-consumptive uses of refuges and wildlife areas include bird watching, hiking, photography, and environmental research and education.

MANAGEMENT ISSUES

A. Hunting restrictions to protect Tule white-fronts have complicated harvest management.

B. Rapid increase in sympatric nesting geese in the YKD coastal area may be creating interspecific competition and degradation of foraging habitat used by Pacific white-fronts that could affect gosling growth rates and ultimately, survival.

C. Habitat conversion, drought or other water shortages, and changes in agricultural practices may adversely affect the quantity and distribution of foraging or roosting habitat, especially in the Sacramento Valley during winter and in the Klamath Basin during spring. In the Sacramento-San Joaquin Delta, substantial conversion from cereal grains to vegetable crops may differentially affect Bristol Bay geese that winter and stage in spring.

D. The continued decline in use of the Klamath Basin as a key autumn and spring staging area by white-fronts and many other waterfowl species is a major cause for concern. The demise of this historic and world-class wetland will place additional stress on other wetlands in the flyway.

E. Increasing human activity on the YKD has potential for significant disturbance during the critical nesting and brood-rearing period. Increasing human disturbance may adversely affect these geese throughout their range.

F. Estimates of subsistence harvest are not obtained annually from some areas, particularly in the Bristol Bay and Alaska Peninsula regions.

G. Estimates of fall harvest in low harvest areas may not be reliable.

H. Existing fall surveys could be improved to document distribution more accurately.

RECOMMENDED MANAGEMENT STRATEGIES

The following management strategies are recommended although the degree and timing of their implementation by the agencies involved will be influenced by fiscal and legislative constraints.

A. Habitat

1. Winter habitat protection: Identify preferred white-fronted goose use areas not currently being protected and determine desirability and feasibility of protecting those

areas through fee title acquisition or easement programs. Priority areas include preservation of Pacific white-front habitats in areas of the Klamath Basin, East Grasslands, and Sacramento-San Joaquin Delta areas of California.

Lead Agency: USFWS, CDFG, ODFW, WDFW
Participating: Central Valley, Pacific Coast, Intermountain West JVs
Priority: 2
Schedule: Ongoing

2. Winter habitat management: Encourage beneficial land use and management practices on public lands and cooperatively managed private lands in wintering areas.

Lead Agency: USFWS, CDFG, ODFW, WDFW
Participating:
Priority: 2
Schedule: Ongoing

B. Population Inventory and Management

1. Population monitoring: Conduct the annual YKD Coastal Zone Survey and Alaska-Yukon Waterfowl Breeding Population Survey for use in calculating the annual projected fall management index for the population.

Lead Agency: USFWS – Region 7
Participating:
Priority: 1
Schedule: Ongoing

2. Breeding ground nest plot survey: Continue the random nest plot survey on the YKD to monitor density and distribution of breeding birds, develop air-ground comparison data, and monitor annual production.

Lead Agency: USFWS
Participating: USGS-BRD
Priority: 2
Schedule: Ongoing

3. Fall and winter surveys: Continue and expand annual coordinated fall surveys for dark geese and the Pacific Flyway midwinter survey to monitor seasonal distribution.

Lead Agency: USFWS
Participating: CDFG, ODFW, WDFW
Priority: 3
Schedule: Ongoing

4. Fall and winter productivity surveys: Continue annual collection of family group size and age ratio data from field surveys in the Klamath Basin and Sacramento Valley.

Lead Agency: USFWS
Participating:
Priority: 3

Schedule: Ongoing

5. Operational banding program: Annually band a sample of 500-1,000 Pacific white-fronts on the YKD or by preseason banding in Klamath Basin.

Lead Agency: USFWS
Participating: USGS-BRD, CDFG
Priority: 3
Schedule: Annual

C. Harvest Management

1. Harvest Strategy: Maintain a rangewide cooperative harvest strategy for Pacific white-fronts (Appendix H). The strategy will be reviewed and revised in coordination with review and revision of the YKD Goose Management Plan. Cooperatively develop and review regulation proposals through the AMBCC, Flyway Council, and integrate with the national harvest management system.

Lead Agency: PFSC, AVCP-WCC
Participating: USFWS, AMBCC
Priority: 1
Schedule: Ongoing

2. Fall/winter Harvest Surveys: Continue operational harvest surveys, parts collection, and state and federal check stations to provide more accurate estimates of the size and distribution of fall harvest.

Lead Agency: USFWS, CDFG, ODFW, WDFW
Participating:
Priority: 1
Schedule: Ongoing

3. Subsistence Harvest Surveys: Continue village harvest surveys on the YKD and improve survey consistency in other areas of Alaska to annually estimate seasonal subsistence harvest on breeding and staging areas.

Lead Agency: USFWS
Participating: ADFG, AMBCC
Priority: 1
Schedule: Ongoing

D. Research and Education

1. Effects of population abundance on breeding and brood rearing habitats: Assess the effects of higher densities of breeding Pacific white-fronts and competition with other geese on quality of pre-nesting, nesting, and brood rearing habitats.

Lead Agency: USGS-BRD
Participating:

Priority: 2
Schedule: 2003

2. Education: Continue efforts to disseminate population information, basic biological concepts on migratory waterfowl, and management programs with sportsmen and Alaska Native groups to foster support and understanding among user groups.

Lead Agency: USFWS
Participating: ADFG, CDFG, ODFW, WDFW
Cooperating: AMBCC
Priority: 1
Schedule: Ongoing

ANNUAL REVIEW

A. Pacific White-fronted 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 Pacific white-fronts.

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:

2001 - Washington
2003 – USFWS R-7
2005 – California
2007 – Alaska
2009 – Oregon

B. Alaska Migratory Bird Comanagement Council

Continued coordination with this Council will benefit Pacific white-fronts 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. Areas known to be used by Pacific white-fronts (refers to Figure 1).

No.	Area	Type of Use	Population Estimate	Habitat Condition and Threats
	ALASKA			
1	YKD	nesting, molting, brood rearing	97% of total population	Partially Yukon Delta NWR; some land in private ownership.
2	Innoko River Valley	molting area for failed and non-breeding adults	several thousand	Majority included in Innoko NWR; some private land. Mixed with mid-continent white-fronts.
3	Paimiut Slough	fall staging	1000+	Private and non-refuge public lands.
4	Bristol Bay Lowlands	nesting	5-6,000	Mix of state, private and Federal lands.
5	Nushagak River Delta	spring-possible fall	unknown	Potential oil contamination if drilling occurs in Bristol Bay.
6	Naknek River, Egegik, Cinder River and Ugashik Tidelands	spring & probable fall migration	Spring 25,000+ fall-unknown	Most areas classified as State Critical Habitats.
7	Upper Cook Inlet	spring & fall migration	spring-3-5,000 fall-unknown	Susitna Flats, Palmer Hay Flats, and Trading Bay State Game Refuges, Kenai NWR. Oil and gas development active; increasing disturbance from aircraft.
8	Copper River Delta, Bering River.	spring & fall migration	few thousand	Managed by USFS, BLM, and state coop. agreement; State Critical Habitat Area. Potential threat from coal mining, logging and related increased road access on East CRD and Bering River.
9	Rocky Pass	spring migration	several thousand	Managed by U.S Forest Service
10	Stikine River Delta	spring migration (D. Rosenberg, ADFG, unpublished data)	500+	Managed by U.S Forest Service
BRITISH COLUMBIA				
1	Massat, Queen Charlotte Island	spring & fall migration	Less than 1,000	Habitat threatened by urbanization

No.	Area	Type of Use	Population Estimate	Habitat Condition and Threats
2	Tell, Queen Charlotte Is.	"	"	``
3	Port Hardy	"	"	``
4	Alberni Lowlands	"	"	``
5	Frazer Delta	"	"	``
6	Sumas Lake	"	"	``
WASHINGTON				
1	Skagit Delta	spring & fall migration	less than 1,000	Habitat threatened by urbanization
2	Grays Harbor	spring & fall migration	less than 1,000	NWR, state wildlife area & private land.
3	Lower Columbia River	spring & fall migration	less than 1,000	NWR, state wildlife area & private land.
OREGON				
1	Sauvie Island	fall migration	total use - 1,000	State management area & private land.
2	Harney Valley	spring & fall migration	total use - 3,100	National Wildlife Refuge & private land.
3	Summer Lake	fall migration	total use - 1,000	State management area.
4	Klamath Basin	See #l - California	total use - 17,000	State management area & private land.
CALIFORNIA				
1	Tule L.-Lower Klamath (Klamath Basin)	fall & spring migration; wintering recent years	Bristol Bay segment in fall; 200,000+ peak population spring; 15,000 wintering	National Wildlife Refuge.
2	Sacramento	early Sept.-early April	Bulk of population in early fall, less through winter	National Wildlife Refuge.
3	Colusa	early Sept.-early April	20,000+ through winter	National Wildlife Refuge.
4	Delevan	early Sept.-early April	Bulk of population in early fall, less through winter	National Wildlife Refuge.
5	Sutter	early Sept.-mid April	20,000+ through winter	National Wildlife Refuge.

No.	Area	Type of Use	Population Estimate	Habitat Condition and Threats
6	Grizzly Island	early Sept.-early April	Few Pacific white-fronts	National Wildlife Refuge and State Wildlife Area..
7	Sacramento-San Joaquin Delta	early Nov.-mid April	10-20 % of population in winter	Private farmland. Threatened by changes in conversion of grain to vegetables.
8	Sacramento Valley			
9	San Luis	early Oct.-mid March	less than 1,000	National Wildlife Refuge
10	Volta	early Oct.-mid March	less than 1,000	State Wildlife Area (leased land)
11	Los Banos	early Oct.-mid March	less than 1,000	State Wildlife Area
12	Merced	early Oct.-mid March	less than 1,000	National Wildlife Refuge
MEXICO				
1	Sonora	"	Less than 10% of YKD birds; few Bristol Bay birds	Coastal wetlands and lowlands threatened by aquaculture, salt extraction, recreational developments.
2	Sinaloa	"		
3	Nayarit	"		
4	Chihuahua	"	>90% of Bristol Bay birds; <5% of YKD birds	Northern interior highlands threatened by drought, water withdrawal; habitat conversion.
5	Durango	"		

Appendix B. Peak fall counts of Pacific white-fronted geese in the Klamath Basin (1965-02) and from coordinated fall flyway surveys (1979-98).

Year	Klamath Basin Fall Peak	Coordinated Fall Survey
1965	303,200	- -
1966	492,900	- -
1967	495,500	- -
1968	457,700	- -
1969	310,600	- -
1970	353,400	- -
1971	383,600	- -
1972	320,600	- -
1973	196,200	- -
1974	199,600	- -
1975	165,300	- -
1976	112,300	- -
1977	117,700	- -
1978	100,700	- -
1979	114,900	73,100
1980	97,000	93,500
1981	64,200	116,500
1982	48,000	91,700
1983	80,100	112,900
1984	99,100	100,200
1985	73,400	93,900
1986	56,500	107,100
1987	93,000	130,600
1988	106,000	161,500
1989	66,300	218,800
1990	140,100	240,800
1991	84,630	236,500
1992	143,800	230,900
1993	102,960	295,300
1994	111,000	325,000
1995	44,100	277,500
1996	136,000	344,100
1997	128,200	319,000
1998	76,400	413,100
1999	28,520	- -
2000	51,400	- -
2001	66,290	- -
2002	10,900	- -

* Surveys believed to be incomplete because of coverage or weather problems.

APPENDIX C. Indices of Pacific white-fronted geese as indicated breeding birds (2 x singles + paired) and indicated total geese from June aerial surveys on the Y-K Delta and Bristol Bay Lowlands (Eldridge 2003; Conant and Groves 2003).

	Y-K Delta		Y-K Interior		Bristol Bay		Y-K Total		All PF W-f	
Year	Singles + Pairs	Total Geese	Singles + Pairs	Total Geese	Singles + Pairs	Total Geese	Singles + Pairs	Total Geese	Singles + Pairs	Total Geese
1985	9,382	18,914	5,698	12,082	1,219	5,050	15,080	30,996	16,299	36,046
1986	6,713	13,400	5,894	10,019	1,915	4,266	12,607	23,419	14,522	27,685
1987	7,819	15,717	4,715	7,564	1,045	3,657	12,534	23,281	13,579	26,938
1988	11,953	27,191	9,037	14,145	522	3,918	20,990	41,336	21,512	45,254
1989	11,982	28,004	5,108	16,307	1,045	5,398	17,090	44,311	18,135	49,709
1990	11,705	37,836	8,841	18,468	871	2,003	20,546	56,304	21,417	58,307
1991	12,584	31,286	6,287	13,262	1,741	4,527	18,871	44,548	20,612	49,075
1992	14,077	34,671	6,287	16,110	522	7,052	20,364	50,781	20,886	57,833
1993	15,010	39,748	8,055	22,790	697	1,306	23,065	62,538	23,762	63,844
1994	20,155	56,513	6,680	12,966	871	4,092	26,835	69,479	27,706	73,571
1995	26,985	77,710	7,859	10,215	1,393	2,612	34,844	87,925	36,237	90,537
1996	21,887	78,032	15,914	36,543	697	4,353	37,801	114,575	38,498	118,928
1997	27,611	83,215	15,521	30,452	871	3,657	43,132	113,667	44,003	117,324
1998	40,872	87,881	16,307	34,381	1,567	1,915	57,179	122,262	58,746	124,177
1999	48,207	95,040	10,806	27,800	1,393	3,483	59,013	122,840	60,406	126,323
2000	42,558	91,911	8,841	16,798	871	1,654	51,399	108,709	52,270	110,363
2001	63,555	113,603	10,806	24,460	348	6,095	73,752	136,461	74,100	142,556
2002	51,381	90,407	14,146	17,387	1,219	5,311	65,527	107,794	66,746	113,105
2003	51,670	117,951	11,002	17,387	522	2,177	62,672	135,338	63,194	137,515

APPENDIX D. Derivation of the annual fall population index for Pacific white-fronted geese from the relationship between June total indicated geese from the Y-K Delta and Bristol Bay to previous reliable fall surveys (1985-98).

Year	Indicated Birds [1]	Fall Survey	New Fall Index[2]	3-Year Average
1985	36,046	93,800	163,249	
1986	27,685	107,100	141,930	
1987	26,938	130,600	140,026	148,402
1988	45,254	161,500	186,728	156,228
1989	49,709	218,800	198,087	174,947
1990	58,307	240,800	220,010	201,608
1991	49,075	236,500	196,470	204,856
1992	57,833	230,900	218,802	211,761
1993	63,844	295,100	234,128	216,467
1994	73,571	324,800	258,930	237,287
1995	90,537	277,500	302,190	265,083
1996	118,928	344,100	374,582	311,901
1997	117,324	319,000	370,492	349,088
1998	124,177	413,100	387,966	377,680
1999	126,323		393,437	383,965
2000	110,363		352,743	378,048
2001	144,158		438,913	395,031
2002	113,105		359,734	383,797
2003	137,515		421,975	406,874

[1] TIB = 2 x (pairs + singles) + group birds Y-K Delta and Bristol Bay

[2] Fall Population Index = (TIB x 2.5498) + 71,339

APPENDIX E. Annual estimates of density and number of Pacific white-fronted goose nests sampled in random plots, and estimates expanded from aerial survey data to the entire Y-K Delta coastal survey area of 12,852 mi^2 (Fischer, Bowman, Stehn, and Walters 2003).

	Ground Plot Samples						Estimated	Expanded to Entire Y-K Coast					
Year	No. Plots	Plot Area	Density Nests/km^2	Total Nests	SE	Aerial Obs Out/In	Nests Outside	Total Nests	SE	Active Nests	SE	Active Eggs	SE
1985	48	1421.6	1.4	2,009	633	4.545	9,131	11,140	3,180	6,138	2,228	21,619	7,836
1986	101	3961.3	1.7	6,697	1,019	0.991	6,638	13,335	1,738	12,045	1,667	52,336	7,561
1987	125	4536.1	2.0	9,115	1,226	0.482	4,397	13,512	1,569	12,887	1,526	58,455	6,824
1988	96	3961.3	1.9	7,695	1,252	0.767	5,903	13,598	1,761	13,027	1,647	56,252	6,859
1989	89	4137.4	2.2	9,308	1,751	0.753	7,007	16,315	2,397	16,197	2,384	71,062	9,738
1990	101	3961.3	3.6	14,270	2,216	0.780	11,128	25,398	3,174	22,771	3,073	104,401	14,651
1991	97	2661.9	6.5	17,394	2,378	1.001	17,414	34,808	3,854	32,539	3,567	156,610	19,495
1992	69	1974.4	7.2	14,300	1,740	1.575	22,521	36,821	4,110	35,626	4,055	162,553	19,439
1993	99	2263.2	5.3	11,974	1,544	1.167	13,973	25,947	2,937	25,082	2,771	109,142	12,066
1994	43	715.7	12.1	8,637	1,066	5.228	45,154	53,791	7,562	52,514	7,364	230,539	32,589
1995	50	715.7	14.0	9,993	1,093	5.074	50,705	60,698	7,143	58,961	6,968	249,724	29,842
1996	54	715.7	18.0	12,849	1,303	4.534	58,260	71,109	8,320	68,663	8,117	308,892	36,740
1997	75	715.7	15.2	10,847	1,127	4.772	51,761	62,608	7,011	61,586	6,997	264,711	30,918
1998	72	856.6	17.0	14,538	1,339	4.931	71,686	86,224	9,089	83,947	8,843	361,604	38,520
1999	59	856.6	13.9	11,881	1,236	5.350	63,567	75,448	8,815	71,390	8,393	298,427	35,270
2000	80	715.7	19.1	13,646	1,258	6.294	85,884	99,530	10,178	97,312	10,076	433,252	45,263
2001	81	715.7	15.9	11,407	935	8.172	93,222	104,629	10,163	97,869	9,848	377,719	39,187
2002	84	715.7	16.8	11,995	1,002	6.825	81,861	93,856	9,993	91,791	9,830	402,850	44,260
2003	83	716.0	15.7	11,265	1,151	5.993	67,506	78,771	9,408	74,121	9,024	314,351	38,626
AVG				11,043		3.644	40,406	51,449		49,182		212,342	

APPENDIX F. Proportion of Pacific white-fronted goose nests active at first plot search, mean clutch size, and predicted mean hatching dates from random plots surveys on the Y-K Delta (Fischer, Bowman, Stehn and Walters 2003).

	Proportion of Nests Active		Clutch size (active nests)		Predicted Hatch Date June 1 = 601 July 1 = 701			
Year	Prop	n	Eggs	n	Avg	min	max	n
1982	0.643	28	3.73	15	704	626	712	14
1983	0.922	51	4.29	38	621	613	719	25
1984	0.903	31	4.57	28	623	616	701	25
1985	0.741	58	4.07	42	630	623	707	42
1986	0.878	123	4.26	104	626	617	712	102
1987	0.944	144	4.70	133	626	619	703	60
1988	0.966	89	4.44	86	622	615	703	32
1989	0.991	112	4.52	111	628	622	704	21
1990	0.936	173	4.60	161	622	611	629	52
1991	0.932	219	4.63	202	621	612	703	138
1992	0.971	209	4.48	202	629	619	724	115
1993	0.970	199	4.31	191	623	617	705	84
1994	0.973	222	4.36	214	619	611	628	129
1995	0.971	315	4.24	306	621	609	701	178
1996	0.966	349	4.50	337	618	607	630	144
1997	0.984	368	4.30	360	618	607	629	184
1998	0.974	392	4.32	380	625	617	706	261
1999	0.947	263	4.18	246	627	619	710	208
2000	0.978	493	4.46	478	625	614	709	334
2001	0.935	418	3.86	390	628	619	707	311
2002	0.978	455	4.39	444	622	614	630	306
2003	0.941	423	4.20	397	619	606	631	272
AVG	0.929	233	4.34	221	627	615	687	138

APPENDIX G. Sample size and age ratios (immatures per adult) of greater white-fronted geese in Pacific Flyway harvests (excluding Alaska) as measured by tail fans in the Waterfowl Parts Collection Survey.

Year	n	Imm/Ad
1962	232	1.95
1963	313	1.25
1964	480	1.33
1965	186	1.05
1966	218	1.52
1967	266	1.24
1968	205	1.5
1969	207	2.06
1970	199	1.05
1971	126	1.44
1972	96	1.58
1973	159	0.88
1974	123	0.63
1975	130	1.21
1976	94	1.84
1977	74	2.68
1978	112	2.14
1979	61	2.12
1980	82	1.59
1981	109	0.96
1982	56	0.83
1983	60	0.9
1984	37	0.8
1985	59	0.41
1986	40	0.56
1987	52	1.03
1988	52	0.89
1989	89	1.53
1990	100	1.34
1991	148	1.46
1992	207	1.64
1993	164	1.61
1994	127	1.23
1995	118	1.02
1996	170	0.52
1997	195	1.38
1998	138	1.85
1999	150	1.54
2000	147	0.8
2001	141	0.73
TOTAL	127	1.29

APPENDIX H.

PACIFIC FLYWAY WHITE-FRONTED GEESE

Harvest Strategy
July 2003

The Pacific Flyway population of greater white-fronted geese is managed under a Pacific Flyway management plan and the Yukon-Kuskokwim Delta Goose Management Plan. Since 1984, care has been taken to ensure that the population objectives and harvest guidelines of both plans are reviewed in concert and made consistent. This strategy recognizes the importance of cooperation among the U.S. Fish and Wildlife Service, Pacific Flyway states, Alaska Migratory Bird Comanagement Council, and affected public interests to conserve and manage these geese.

POPULATION GROWTH: The current approach to harvest management practices for Pacific Flyway white-fronted geese stems, in part, from the restored abundance of the population in the 1990s. The Pacific Flyway population of white-fronted geese never reached the low population levels experienced by cackling Canada geese, nor have they increased quite as fast as cacklers (19.6%) during the last decade. The population surpassed the objective level in 1996 and continued increasing to 433,355 in 2001. Since the coordinated fall survey was begun in 1979, the Pacific Flyway population of white-fronted goose population increased by approximately 9.5% per year. From 1986 through 1996, the rate of increase averaged 13.4%.

TRENDS IN HARVEST: Historically and currently major harvest components have been the YKD subsistence harvest and fall/winter harvest in the Northeastern and Balance-of-State zones in California. Fall and winter harvests of Pacific Flyway white-fronted geese averaged nearly 35,000 until the late 1970s, but declined to less than 10,000 during hunting restrictions applied in the mid-1980s. As the population increased during the 1990s, hunting restrictions were reduced in moderate increments. Pacific Flyway harvest surpassed 20,000 by 1995 and has averaged about 25,000 over the past 5 years.

Subsistence harvest was not accurately measured until 1987, when village surveys indicated a harvest of less than 4,000. Since then, subsistence harvest has increased concurrent with population growth, to over 18,600 in 2001.

During the last decade, harvests have been maintained at a relatively low level, with subsistence and fall/winter harvests being nearly equal. Overall, the rate of increase in harvest has been less than the rate of increase in population size. During the last decade, the population has grown consistently, with the harvest rate index remaining below 10%.

HARVEST STRATEGY

Based on the status and outlook for the Pacific white-fronted goose population, and in recognition that these birds are a shared resource throughout the flyway, the following harvest guidelines will apply:

1. Harvest management should promote maintenance of the population goal: a 3-year average projected fall index of 300,000 geese.

2. When the population is above objective, the harvest rate should not exceed 15% of the most recent 3-year average index (e.g., allowable harvest would be 57,300 for 2003).

3. If the population index drops below the objective level of 300,000, harvest rate should not exceed 10% of the most recent 3-year average projected fall population index.

4. If the 3-year average population index drops below 100,000 geese (1/3 of the objective), all hunting should be suspended throughout the flyway.

5. After a closure and when the population increases above a 3-year average index of 120,000, limited hunting may be considered.

6. The effects of changes in regulations and management programs should be evaluated annually.

7. This harvest strategy must be monitored through continuation of the breeding ground population surveys, state and federal harvest surveys, and subsistence harvest surveys.

8. Implementation of this strategy will include consideration of possible effects on the Pacific Flyway populations of Tule white-fronts and cackling Canada geese.

9. The parties recognize the need to support and maintain a long-term harvest strategy that ensures equitable harvests among users.

Appendix I. State-selected harvest regulations for dark geese* and white-fronted geese* in zones important to whitefronts, 1962-2002

AK	Season Length				Bag limits (daily/possession)				Comments
	Northern Zone		Gulf Coast & SE Zones		Northern Zone		Gulf Coast & SE Zones		
Season	Geese*	WFGO	Geese*	WFGO	Geese*	WFGO	Geese*	WFGO	
1962-63	105	105	105	105	3/6	3/6	3/6	3/6	
1963-64	105	105	105	105	3/6	3/6	3/6	3/6	
1964-65	105	105	105	105	3/6	3/6	3/6	3/6	
1965-66	105	105	105	105	3/6	3/6	3/6	3/6	
1966-67	105	105	105	105	3/6	3/6	3/6	3/6	
1967-68	105	105	105	105	3/6	3/6	3/6	3/6	
1968-69	105	105	105	105	4/8	4/8	4/8	4/8	
1969-70	105	105	105	105	4/8	4/8	4/8	4/8	
1970-71	105	105	105	105	4/8	4/8	4/8	4/8	
1971-72	105	105	105	105	4/8	4/8	4/8	4/8	
1972-73	105	105	105	105	4/8	4/8	4/8	4/8	
1973-74	107	107	107	107	4/8	4/8	4/8	4/8	
1974-75	107	107	107	107	4/8	4/8	4/8	4/8	
1975-76	107	107	107	107	4/8	4/8	4/8	4/8	
1976-77	107	107	107	107	4/8	4/8	4/8	4/8	
1977-78	107	107	107	107	4/8	4/8	4/8	4/8	
1978-79	107	107	107	107	4/8	4/8	4/8	4/8	
1979-80	107	107	107	107	4/8	4/8	4/8	4/8	
1980-81	107	107	107	107	4/8	4/8	4/8	4/8	
1981-82	107	107	107	107	4/8	4/8	4/8	4/8	
1982-83	107	107	107	107	4/8	4/8	1/2	1/2	
1983-84	107	107	107	107	4/8	4/8*	2/4	2/4	Unit 18 Northern Zone 2/4
1984-85	107	107	107	107	4/8	4/8*	2/4	2/4	Unit 18 Northern Zone 2/4
1985-86	107	107	107	107	4/8	4/8*	2/4	2/4	Unit 18 Northern Zone 2/4
1986-87	107	107	107	107	4/8	4/8*	2/4	2/4	Unit 18 Northern Zone 2/4
1987-88	107	107	107	107	4/8	4/8*	2/4	2/4	Unit 18 Northern Zone 2/4
1988-89	107	107	107	107	4/8	4/8*	2/4	2/4	Unit 18 Northern Zone 2/4
1989-90	107	107	107	107	4/8	4/8*	2/4	2/4	Unit 18 Northern Zone 2/4
1990-91	107	107	107	107	4/8	4/8*	2/4	2/4	Unit 18 Northern Zone 2/4
1991-92	107	107	107	107	4/8	4/8*	2/4	2/4	Unit 18 Northern Zone 2/4
1992-93	107	107	107	107	4/8	4/8*	2/4	2/4	Unit 18 Northern Zone 2/4
1993-94	107	107	107	107	4/8	4/8*	2/4	2/4	Unit 18 Northern Zone 2/4
1994-95	107	107	107	107	4/8	4/8	4/8	4/8	
1995-96	107	107	107	107	4/8	4/8	4/8	4/8	
1996-97	107	107	107	107	4/8	4/8	4/8	4/8	
1997-98	107	107	107	107	4/8	4/8	4/8	4/8	
1998-99	107	107	107	107	4/8	4/8	4/8	4/8	
1999-00	107	107	107	107	4/8	4/8	4/8	4/8	
2000-01	107	107	107	107	4/8	4/8	4/8	4/8	
2001-02	107	107	107	107	4/8	4/8	4/8	4/8	
2002-03	107	107	107	107	4/8	4/8	4/8	4/8	

WA	Season Length				Bag limits (daily/possession)				Comments
	Zone 2 (SW)		Remainder of State		Zone 2 (SW)		Remainder of State		
Season	Geese*	WFGO	Geese*	WFGO	Geese*	WFGO	Geese*	WFGO	
1962-63	75	75	75	75	3/6	3/6	3/6	3/6	
1963-64	90	90	90	90	3/6	3/6	3/6	3/6	
1964-65	90	90	90	90	3/6	3/6	3/6	3/6	
1965-66	90	90	90	90	3/6	3/6	3/6	3/6	
1966-67	90	90	90	90	3/6	3/6	3/6	3/6	
1967-68	90	90	90	90	3/6	3/6	3/6	3/6	
1968-69	93	93	93	93	3/6	3/6	3/6	3/6	
1969-70	93	93	93	93	3/6	3/6	3/6	3/6	
1970-71	93	93	93	93	3/6	3/6	3/6	3/6	
1971-72	93	93	93	93	3/6	3/6	3/6	3/6	
1972-73	93	93	93	93	3/6	3/6	3/6	3/6	
1973-74	93	93	93	93	3/6	3/6	3/6	3/6	
1974-75	93	93	93	93	3/6	3/6	3/6	3/6	
1975-76	93	93	93	93	3/6	3/6	3/6	3/6	Zone 1 (NW): 58 days
1976-77	93	93	93	93	3/6	3/6	3/6	3/6	Zone 1 (NW): 58 days, 2/4
1977-78	93	93	93	93	3/6	3/6	3/6	3/6	Zone 1 (NW): 79 days
1978-79	93	93	93	93	3/6	3/6	3/6	3/6	Zone 1 (NW): 79 days
1979-80	93	93	93	93	3/6	3/6	3/6	3/6	Zone 1 (NW): 80 days
1980-81	93	93	93	93	3/6	3/6	3/6	3/6	Zone 1 (NW): 82 days
1981-82	93	93	93	93	3/6	3/6	3/6	3/6	Zone 1 (NW): 86 days
1982-83	93	93	93	93	3/6	3/6	3/6	3/6	Zone 1 (NW): 86 days
1983-84	93	93	93	93	3/6	3/6	3/6	3/6	Zone 1 (NW): 79 days
1984-85	30	30	93	93	3/6	3/6	3/6	3/6	Zone 1 (NW): 79 days
1985-86	43	43	93	93	3/6	3/6	3/6	3/6	Zone 1 (NW): 79 days
1986-87	15	15	93	93	3/6	3/6	3/6	3/6	Zone 1 (NW): 79 days
1987-88	17	17	93	93	3/6	3/6	3/6	3/6	Zone 1 (NW): 79 days
1988-89	16	16	93	93	3/6	3/6	3/6	3/6	Zone 1 (NW): 86 days
1989-90	8	8	93	93	3/6	3/6	3/6	3/6	Zone 1 (NW): 86 days
1990-91	8	8	93	93	3/6	3/6	3/6	3/6	Zone 1 (NW): 79 days
1991-92	15	15	93	93	3/6	3/6	3/6	3/6	Zone 1 (NW): 79 days
1992-93	23	23	93	93	3/6	3/6	3/6	3/6	Zone 1 (NW): 79 days
1993-94	25	25	100	100	4/8	2/4	4/8	2/4	Zone 1 (NW): 79 days
1994-95	24	24	100	100	4/8	2/4	4/8	2/4	Zone 1 (NW): 79 days
1995-96	21	21	100	100	4/8	4/8	4/8	4/8	Zone 1 (NW): 79 days
1996-97	25	25	100	100	4/8	4/8	4/8	4/8	Zone 1 (NW): 79 days
1997-98	25	25	100	100	4/8	4/8	4/8	4/8	Zone 1 (NW): 86 days
1998-99	37	37	100	100	4/8	4/8	4/8	4/8	
1999-00	38	38	100	100	4/8	4/8	4/8	4/8	
2000-01	29	29	100	100	4/8	4/8	4/8	4/8	
2001-02	29	29	100	100	4/8	4/8	4/8	4/8	
2002-03	27	27	100	100	4/8	4/8	4/8	4/8	

Appendix I (continued). State-selected harvest regulations for dark geese* and white-fronted geese* in zones important to whitefronts, 1962-2002

OR	Season Length		Bag limits (daily/possession)		Comments
	Lake / Klamath Area		Lake / Klamath Area		
Season	Geese*	WFGO	Geese*	WFGO	
1962-63	75	75	3/6	3/6	
1963-64	90	90	3/6	3/6	
1964-65	90	90	3/6	3/6	
1965-66	90	90	3/6	3/6	
1966-67	90	90	3/6	3/6	
1967-68	90	90	3/6	3/6	
1968-69	86	86	3/6	3/6	
1969-70	86	86	3/6	3/6	
1970-71	93	93	3/6	3/6	
1971-72	93	93	3/6	3/6	
1972-73	93	93	3/6	3/6	
1973-74	93	93	3/6	3/6	
1974-75	93	93	3/6	3/6	
1975-76	93	93	3/6	3/6	
1976-77	93	93	3/6	3/6	
1977-78	93	93	3/6	3/6	
1978-79	93	93	3/6	3/6	
1979-80	93	93	3/6	3/6	
1980-81	93	93	3/6	3/6	
1981-82	93	93	1/2 & 3/6	1/2 & 3/6	Reduced bag limit for first 14 days of season
1982-83	93	93	1/2 & 3/6	1/2 & 3/6	Reduced bag limit for first 14 days of season
1983-84	93	93	1/2 & 3/6	1/2 & 3/6	Reduced bag limit for first 14 days of season
1984-85	93	74	3/6	3/6	
1985-86	93	79	3/6	3/6	
1986-87	93	79	3/6	3/6	
1987-88	93	79	3/6	3/6	
1988-89	93	76	3/6	3/6	
1989-90	93	75	3/6	3/6	
1990-91	93	80	3/6	3/6	
1991-92	93	79	3/6	3/6	
1992-93	100	86	4/8	2/4	
1993-94	100	86	4/8	2/4	
1994-95	100	90	4/8	2/4	
1995-96	100	100	4/8	2/4	
1996-97	100	100	4/8	2/4	
1997-98	99	99	4/8	2/4	
1998-99	100	100	4/8	2/4	
1999-00	100	100	4/8	2/4	
2000-01	98	98	4/8	2/4	
2001-02	98	98	4/8	2/4	
2002-03	96	96	4/8	2/4	

CA	Season Length				Bag limits (daily/possession)				Comments
	NE Zone		Bal of State Zone		NE Zone		Bal of State Zone		
Season	Geese*	WFGO	Geese*	WFGO	Geese*	WFGO	Geese*	WFGO	
1962-63	84	84	67	67	3/6	3/6	3/3	3/3	
1963-64	90	90	75	75	3/6	3/6	3/3	3/3	
1964-65	90	90	79	79	3/6	3/6	3/3	3/3	
1965-66	90	90	79	79	3/6	3/6	3/3	3/3	
1966-67	90	90	79	79	3/6	3/6	3/3	3/3	
1967-68	90	90	86	86	3/6	3/6	3/3	3/3	
1968-69	86	86	86	86	3/6	3/6	3/3	3/3	
1969-70	86	86	86	86	3/6	3/6	3/3	3/3	
1970-71	93	93	93	93	3/6	3/6	3/3	3/3	
1971-72									
1972-73	93	93	93	93	3/6	3/6	3/3	3/3	
1973-74	93	93	93	93	3/6	3/6	3/3	3/3	
1974-75	93	93	93	93	3/6	3/6	3/3	3/3	
1975-76	93	93	93	93	3/6	3/6	3/3	3/3	
1976-77									
1977-78									
1978-79									
1979-80	79	79	93	93	2/4	2/4	2/2	1/1	WFGO closed until 12/15 Sac V mgmt area
1980-81	93	93	79	79	1/1;3/3	1/1;2/2	4/4	2/2	WFGO closed until 12/15 Sac V mgmt area
	93	93	79	79	1/1;4/4	1/1;2/2	5/5	2/2	1/1 first 14 days in NE
1981-82	93	93	79	79	1/1;4/4	1/1;2/2	5/5	2/2	1/1 first 14 days in NE
1982-83	93	93	79	79	1/1;4/4	1/1;2/2	5/5	2/2	1/1 first 14 days in NE
1983-84	93	23	79	65	3/3	1/2	3/3	1/1	1/1 first 14 days in NE
1984-85	93	23	79	65	3/6	1/2	3/3	1/1	
1985-86	93	23	79	65	3/6	1/2	3/3	1/1	
1986-87	93	23	79	65	3/6	1/2	3/3	1/1	WFGO closed in Sac V sp mgmt area 11/30
1987-88	93	23	79	65	3/6	1/2	3/3	1/1	WFGO closed in Sac V sp mgmt area 11/30
1988-89	93	23	79	65	3/6	1/2	3/3	1/1	WFGO closed in Sac V sp mgmt area 11/30
1989-90	93	23	79	65	3/6	1/2	3/3	1/1	WFGO closed in Sac V sp mgmt area 11/30
1990-91	93	23	79	65	3/6	1/2	3/3	1/1	WFGO closed in Sac V sp mgmt area 11/30
1991-92	93	23	79	65	3/6	2/4	3/3	1/1	WFGO closed in Sac V sp mgmt area 11/30
1992-93	93	23	79	65	3/6	2/4	3/3	1/1	WFGO closed in Sac V sp mgmt area 11/30
1993-94	93	23	79	65	3/6	2/4	3/3	1/1	WFGO closed in Sac V sp mgmt area 11/30
1994-95	93	23	79	65	3/6	2/4	3/3	1/1	WFGO closed in Sac V sp mgmt area 11/30
1995-96	93	23	79	65	3/6	2/4	3/3	1/1	WFGO closed in Sac V sp mgmt area 12/15
1996-97	93	23	79	79	3/6	2/4	3/6	2/4	WFGO closed in Sac V sp mgmt area 12/15
1997-98	93	23	79	79	3/6	2/4	3/6	2/4	WFGO closed in Sac V sp mgmt area 12/15
1998-99	100	44	79	79	3/6	2/4	3/6	2/4	WFGO closed in Sac V sp mgmt area 12/15
1999-00	100	44	79	79	3/6	2/4	3/6	2/4	WFGO closed in Sac V sp mgmt area 12/15
2000-01	100	44	79	79	3/6	2/4	3/6	2/4	WFGO closed in Sac V sp mgmt area 12/15
2001-02	100	100	86	86	3/6	2/4	3/6	2/4	WFGO closed in Sac V sp mgmt area 12/15
2002-03	100	100	86	86	3/6	2/4	3/6	2/4	WFGO closed in Sac V sp mgmt area 12/15

Source: state hunting regulations

*Does not include additional restrictions for cackling or Aleutian Canada geese, brant, white geese

Appendix Ia. Federal frameworks relevant to Pacific white-fronted geese for the Pacific Flyway, 1962-63 to 2002-03.

Year	Location	Days	Dates	Bag/Possession Limits
1962-63	Flyway (~~AK~~)	75	Oct. 6 (Sat.)-Jan. 6 (Sun.)	6/6 (WA 3/6) all geese, no more than 3 dark geese
	AK	105 consecutive days or split into 2 periods not to exceed 95 days	Sep. 1 – Jan. 8	6/12; not more than 3 white-fronted or Canada geese singly or in aggregate
1963-64	Flyway (~~AK~~)	90	Oct. 5 (Sat.)-Jan. 5 (Sun.)	6/6 (WA, ID 3/6) all geese, no more than 3 dark geese
	AK: Pribilof and Aleutian Islands	105 Any length within outside dates	Sep. 1 – Jan. 15 Oct. 15 – Jan. 15	6/12; not more than 3 white-fronted or Canada geese singly or in aggregate
1964-65	Flyway (~~AK~~)	90	Oct. 10 (Sat.)-Jan. 10 (Sun.)	6/6 (WA, ID 3/6) all geese, no more than 3 dark geese
	AK: Pribilof and Aleutian Islands	105 Any length within outside dates	Sep. 1 – Jan. 15 Oct. 15 – Jan. 15	6/12; not more than 3 white-fronted or Canada geese singly or in aggregate
1965-66	Flyway (~~AK~~)	90	Oct. 9 (Sat.) - Jan. 9 (Sun.)	6/6 (WA, ID 3/6) all geese, no more than 3 dark geese
	AK: Pribilof and Aleutian Islands	105 Any length within outside dates	Sep. 1 – Jan. 15 Oct. 15 – Jan. 15	6/12; not more than 3 white-fronted or Canada geese singly or in aggregate
1966-67	Flyway (~~AK~~)	90	Oct. 8 (Sat.) - Jan. 8 (Sun.)	6/6 (WA, ID 3/6) all geese, no more than 3 dark geese
	AK: Pribilof and Aleutian (~~Unimak~~) Islands Remainder & Unimak Island	105	Sep. 1 – Jan. 27 Oct. 15 – Jan. 27 Sep. 1 – Jan. 15	6/12; not more than 3 white-fronted or Canada geese singly or in aggregate
1967-68	Flyway (~~AK~~)	90	Oct. 7 - Jan. 14	6/6 (WA, ID 3/6) all geese, no more than 3 dark geese
	AK: Pribilof and Aleutian (~~Unimak~~) Islands Remainder & Unimak Island	105	Sep. 1 – Jan. 26 Oct. 14 – Jan. 26 Sep. 1 – Jan. 15	6/12; not more than 3 white-fronted or Canada geese singly or in aggregate
1968-69	Flyway (~~AK~~) (except where noted)	93	Oct. 5 - Jan. 12	6/6 (WA, ID 3/6) all geese, no more than 3 dark geese
	WA: Columbia Basin Area	107	Oct. 5 - Jan. 19	
	AK: Pribilof and Aleutian (~~Unimak~~) Islands Remainder & Unimak Island	105	Sep. 1 – Jan. 26 Oct. 14 – Jan. 26 Sep. 1 – Jan. 15	6/12; not more than 4 white-fronted or Canada geese singly or in aggregate, except Unit 6 where it is 2
1969-70	Flyway (~~AK~~) (except where noted)	93	Oct. 4 - Jan. 11	
	WA: Columbia Basin Area	107	Oct. 4 - Jan. 18	
	AK: Pribilof, Kodiak, & Aleutian (~~Unimak~~) Islands Remainder & Unimak Island	105	Sep. 1 – Jan. 26 Oct. 14 – Jan. 26 Sep. 1 – Jan. 15	
1970-71	Flyway (~~AK~~) (except where noted)	93	Oct. 3 - Jan. 17	6/6 (WA, ID 3/6) all geese, no more than 3 dark geese
	OR & WA: Columbia Basin Area	107	Oct. 3 – Jan. 24	
	AK: Pribilof, Kodiak, & Aleutian (~~Unimak~~) Islands Remainder & Unimak Island	105	Sep. 1 – Jan. 26 Oct. 14 – Jan. 26 Sep. 1 – Jan. 15	4/8
1971-72	Flyway (~~AK~~) (except where noted)	93	Oct. 2 – Jan. 16	6/6 (WA, ID 3/6) all geese, no more than 3 dark geese
	OR & WA: Columbia Basin Area	107	Oct. 2 – Jan. 23	
	AK	105	Sep. 1 – Jan. 26	6/12; not more than 4 white-fronted or Canada geese singly or in aggregate
1972-73	Flyway (~~AK~~) (except where noted)	93	Oct. 1 – Jan. 20	6/6 (WA, ID 3/6) all geese, no more than 3 dark geese
	OR & WA: Columbia Basin Area	107		
	AK	105	Sep. 1 – Jan. 26	6/12; not more than 4 white-fronted or Canada geese singly or in aggregate
1973-74	Flyway (~~AK~~) (except where noted)	93	Sep. 29 – Jan. 20	6/6 (WA, ID 3/6) all geese, no more than 3 dark geese
	OR & WA: Columbia Basin Area	100		
	AK	107	Sep. 1 – Jan. 26	6/12; not more than 4 white-fronted or Canada geese singly or in aggregate
1974-75	Flyway (~~AK~~) (except where noted)	93	Sep. 28 – Jan. 19	6/6 (WA, ID 3/6) all geese, no more than 3 dark geese
	OR & WA:			

	Columbia Basin Area	100		
	AK	107	Sep. 1 – Jan. 26	6/12; not more than 4 white-fronted or Canada geese singly or in aggregate
1975-76	Flyway (~~AK~~) (except where noted)	93	Oct. 4 – Jan. 18	6/6 (WA, ID 3/6) all geese, no more than 3 light and 3 dark geese
	OR & WA: Columbia Basin Area	100		
	AK	107	Sep. 1 – Jan. 26	6/12; not more than 4 white-fronted or Canada geese singly or in aggregate
1976-77	Flyway (~~AK~~) (except where noted)	93	Oct. 2 – Jan. 23	6/6 (WA, ID 3/6) all geese, no more than 3 light and 3 dark geese
	OR & WA: Columbia Basin Area	100		
	AK	107	Sep. 1 – Jan. 26	6/12; not more than 4 white-fronted or Canada geese singly or in aggregate
1977-78	Flyway (~~AK~~) (except where noted)	93	Oct. 1 – Jan. 22	6/6 (WA, ID 3/6) all geese, no more than 3 light and 3 dark geese
	OR & WA: Columbia Basin Area	100		
	AK	107	Sep. 1 – Jan. 26	6/12; not more than 4 white-fronted or Canada geese singly or in aggregate
1978-79	Flyway (~~AK~~) (except where noted)	93	Sep. 30 – Jan. 21	6/6 (WA, ID 3/6) all geese, no more than 3 light and 3 dark geese
	OR & WA: Columbia Basin Area	100		
	AK	107	Sep. 1 – Jan. 26	6/12; not more than 4 white-fronted or Canada geese singly or in aggregate
1979-80	Flyway (~~AK~~) (except where noted)	93	Sep. 29 – Jan. 20	6/6 (WA, ID 3/6) all geese, no more than 3 light and 3 dark geese
	CA: Northeastern Del Norte & Humboldt Counties Sacramento Valley San Joaquin Valley Balance-of-State	 Closed for dark geese Closed until Dec. 15 Must close on Nov. 23		Must select 1 from 7 options of season length and bag/poss. limits constrained by general Flyway frameworks Must select 1 from 7 options of season length and bag/poss. limits constrained by general Flyway frameworks
	OR: Lake and Klamath Counties			Must select 1 from 7 options of season length and bag/poss. limits constrained by general Flyway frameworks
	OR & WA: Columbia Basin Area	100		
	AK	107	Sep. 1 – Jan. 26	6/12; not more than 4 white-fronted or Canada geese singly or in aggregate
1980-81	Flyway (~~AK~~) (except where noted)	93	Oct. 4 – Jan. 18	6/6 (WA, ID 3/6) all geese, no more than 3 light and 3 dark geese
	CA: Northeastern Del Norte & Humboldt Counties Sacramento Valley San Joaquin Valley Balance-of-State	 Closed for dark geese Closed until Dec. 15 Must close on Nov. 23		Must select 1 from 5 options of season length and bag/poss. limits constrained by general Flyway frameworks Must select 1 from 4 options of season length and bag/poss. limits constrained by general Flyway frameworks
	OR: Lake and Klamath Counties			Must select 1 from 5 options of season length and bag/poss. limits constrained by general Flyway frameworks
	OR & WA: Columbia Basin Area	100		
	AK	107	Sep. 1 – Jan. 26	6/12; not more than 4 white-fronted or Canada geese singly or in aggregate
1981-82	Flyway (~~AK~~) (except where noted)	93	Oct. 3 – Jan. 17	6/6 (WA, ID 3/6) all geese, no more than 3 light and 3 dark geese
	CA: Northeastern Balance-of-State	 79		1 dark or 1 white with 2 in possession through Oct. 30; after may be 4/4 with no more than 2 dark or 3 white geese 5/5 with no more than 2 dark or 3 white geese
	OR: Lake and Klamath Counties			2/4 through Oct. 30 with no more than 1/2 dark geese; after returns to Flyway bag/poss. levels
	OR & WA: Columbia Basin Area	100		
	AK	107	Sep. 1 – Jan. 26	6/12; not more than 4 white-fronted or Canada geese singly or in aggregate
1982-83	Flyway (~~AK~~) (except where noted)	93	Oct. 2 – Jan. 23	6/6 (WA, ID 3/6) all geese, no more than 3 light and 3 dark geese
	CA: Northeastern			1 dark or 1 white with 2 in possession through Oct. 29; after may be 4/4 with no more than 2 dark or 3 white geese

	Balance-of-State	79		5/5 with no more than 2 dark or 3 white geese
	OR: Lake and Klamath Counties			2/4 through Oct. 29 with no more than 1/2 dark geese; after returns to Flyway bag/poss. levels
	OR & WA: Columbia Basin Area	100		
	AK	107	Sep. 1 – Jan. 26	6/12; not more than 4 white-fronted or Canada geese singly or in aggregate
1983-84	Flyway (~~AK~~) (except where noted)	93	Oct. 1 – Jan. 22	6/6 (WA, ID 3/6) all geese, no more than 3 light and 3 dark geese
	CA: Northeastern Balance-of-State	 79		1 dark or 1 white with 2 in possession through Oct. 28; after may be 4/4 with no more than 2 dark or 3 white geese 5/5 with no more than 2 dark or 3 white geese
	OR: Lake and Klamath Counties			2/4 through Oct. 28 with no more than 1/2 dark geese; after returns to Flyway bag/poss. levels
	OR & WA: Columbia Basin Area	100		
	AK	107	Sep. 1 – Jan. 26	6/12; not more than 4 white-fronted or Canada geese singly or in aggregate
1984-85	Flyway (~~AK~~) (except where noted)	93	Sep. 29 – Jan. 20	6/6 (WA, ID 3/6) all geese, no more than 3 light and 3 dark geese
	CA: Northeastern Balance-of-State	 First 23 days of goose season First 65 days of goose season, which is 79 days		3/6 all geese, no more than 1 white-fronted goose or 2 Canada geese 3/3 all geese, not more than 1 dark goose. May be 2 dark geese if they are Canada geese
	OR: Lake and Klamath Counties	Dark geese cannot open until 2 weeks post white goose opener and must be 2 weeks less than white goose season		
	OR & WA: Columbia Basin Area	100		
	AK	107	Sep. 1 – Jan. 26	6/12; not more than 4 white-fronted or Canada geese singly or in aggregate
1985-86	Flyway (~~AK~~) (except where noted)	93	Sep. 28 – Jan. 19	6/6 (WA, ID 3/6) all geese, no more than 3 light and 3 dark geese
	CA: Northeastern Balance-of-State	 First 23 days of goose season First 65 days of goose season, which is 79 days		3/6 all geese, no more than 1 white-fronted goose or 2 Canada geese 3/3 all geese, not more than 1 dark goose. May be 2 dark geese if they are Canada geese
	OR: Lake and Klamath Counties	No white-front harvest until 2 weeks post regular goose season opener		
	OR & WA: Columbia Basin Area	100		
	AK	107	Sep. 1 – Jan. 26	6/12; not more than 4 white-fronted or Canada geese singly or in aggregate
1986-87	Flyway (~~AK~~) (except where noted)	93	Oct. 4 – Jan. 18	6/6 (WA, ID 3/6) all geese, no more than 3 light and 3 dark geese
	CA: Northeastern Balance-of-State: Sacramento Valley Area	 First 23 days of goose season First 65 days of goose season, which is 79 days Must end on or before Nov. 30 for white-fronts		3/6 all geese, no more than 1 white-fronted goose or 2 Canada geese 3/3 all geese, not more than 1 dark goose. May be 2 dark geese if they are Canada geese
	OR: Lake and Klamath Counties	No white-front harvest until 2 weeks post regular goose season opener		
	OR & WA: Columbia Basin Area	100		
	AK	107	Sep. 1 – Jan. 26	6/12; not more than 4 white-fronted or Canada geese singly or in aggregate
1987-88	Flyway (~~AK~~) (except where noted)	93	Oct. 1 – Jan. 22	6/6 (WA, ID 3/6) all geese, no more than 3 light and 3 dark geese
	CA: Northeastern Balance-of-State: Sacramento Valley Area	 First 23 days of goose season First 65 days of goose season, which is 79 days Must end on or before Nov. 30 for white-fronts		3/6 all geese, no more than 1 white-fronted goose or 2 Canada geese 3/3 all geese, not more than 1 dark goose. May be 2 dark geese if they are Canada geese
	OR: Lake and Klamath Counties	No white-front harvest until 2 weeks post regular goose season opener		
	OR & WA: Columbia Basin Area	100		
	AK	107	Sep. 1 – Jan. 26	6/12; not more than 4 white-fronted or Canada geese singly or in aggregate
1988-89	Flyway (~~AK~~) (except where noted)	93	Oct. 1 – Jan. 22	6/6 (WA, ID 3/6) all geese, no more than 3 light and 3 dark geese
	CA: Northeastern Balance-of-State:	 First 23 days of goose season First 65 days of goose season, which is 79 days		3/6 all geese, no more than 1 white-fronted goose or 2 Canada geese 3/3 all geese, not more than 1 dark goose. May be 2 dark geese if they are Canada geese

	Sacramento Valley Area	Must end on or before Nov. 30 for white-fronts		
	OR: Lake and Klamath Counties	No white-front harvest before Nov. 1		
	OR & WA: Columbia Basin Area	100		
	AK	107	Sep. 1 – Jan. 26	6/12; not more than 4 white-fronted or Canada geese singly or in aggregate
1989-90		93	Sep. 30 – Jan. 21	6/6 (WA, ID 3/6) all geese, no more than 3 light and 3 dark geese
	CA: Northeastern Balance-of-State: Sacramento Valley Area	 First 23 days of goose season First 65 days of goose season, which is 79 days Must end on or before Nov. 30 for white-fronts		 3/6 all geese, no more than 1 white-fronted goose or 2 Canada geese 3/3 all geese, not more than 1 dark goose. May be 2 dark geese if they are Canada geese
	OR: Lake and Klamath Counties	No white-front harvest before Nov. 1		
	OR & WA: Columbia Basin Area	100		
	AK	107	Sep. 1 – Jan. 26	6/12; not more than 4 white-fronted or Canada geese singly or in aggregate
1990-91	Flyway (~~AK~~) (except where noted)	93	Saturday nearest Oct. 1 (Sep. 29 – Sunday nearest Jan. 20 (Jan. 20)	6/6 all geese, no more than 3 light and 3 dark geese
	CA: Northeastern Balance-of-State: Sacramento Valley Area	 First 23 days of goose season First 65 days of goose season, which is 79 days Must end on or before Nov. 30 for white-fronts		 3/6 all geese, no more than 1 white-fronted goose or 2 Canada geese 3/3 all geese, not more than 1 dark goose. May be 2 dark geese if they are Canada geese
	OR: Lake and Klamath Counties	No white-front harvest before Nov. 1		
	OR & WA: Columbia Basin Area	100		
	AK	107	Sep. 1 – Jan. 26	6/12; not more than 4 white-fronted or Canada geese singly or in aggregate
1991-92	Flyway (~~AK~~) (except where noted)	93	Saturday nearest Oct. 1 (Sep. 28 – Sunday nearest Jan. 20 (Jan. 19)	6/6 all geese, no more than 3 light and 3 dark geese
	CA: Northeastern Southern San Joaquin Valley and Balance-of-State: Sacramento Valley Area	 First 23 days of goose season First 65 days of goose season, which is 79 days Must end on or before Nov. 30 for white-fronts		 3/6 all geese, no more than 1 white-fronted goose or 2 Canada geese, but not 1 of each 3/3 all geese, not more than 1 dark goose. May be 2 dark geese if they are Canada geese
	OR: Lake and Klamath Counties	No white-front harvest before Nov. 1		
	OR & WA: Columbia Basin Area	100		
	AK	107	Sep. 1 – Jan. 26	6/12; not more than 4 white-fronted or Canada geese singly or in aggregate
1992-93	Flyway (~~AK~~) (except where noted)	93	Saturday nearest Oct. 1 (Oct. 3) – Sunday nearest Jan. 20 (Jan. 17)	6/6 all geese, no more than 3 light and 3 dark geese
	CA: Northeastern Balance-of-State: Sacramento Valley Area	 First 23 days of goose season First 65 days of goose season, which is 79 days Must end on or before Nov. 30 for white-fronts		 3/6 all geese, no more than 2 white-fronted or 2 Canada geese 3/3 all geese, not more than 1 dark goose. May be 2 dark geese if they are Canada geese
	OR: Malheur County Lake, Klamath, & Harney Counties	 Must end on or before first Sunday in Jan. (Jan. 2) 100; No white-front harvest before Oct. 24		 4/8 dark geese, including not more than 2 white-fronted geese
	OR & WA: Columbia Basin Area	100		
	AK	107	Sep. 1 – Jan. 26	6/12; not more than 4 white-fronted or Canada geese singly or in aggregate
1993-94	Flyway (~~AK~~) (except where noted)	100	Saturday nearest Oct. 1 (Oct. 2) – Sunday nearest Jan. 20 (Jan. 23)	3/6 dark geese, including no more than 2 white-fronted geese
	CA: Northeastern Southern Balance-of-State:	 First 23 days of goose season First 65 days of goose season, which is 79 days		 3/6 all geese, no more than 2 white-fronted or 2 Canada geese 2/2 dark geese 3/3 all geese, not more than 1 dark goose. May be 2 dark geese if they are Canada geese

	Sacramento Valley Area	Must end on or before Nov. 30 for white-fronts		
	ID: Northern Southwest Southeastern	 Must end on or before first Sunday in Jan. (Jan. 2)		 4/8 dark geese, including not more than 2 white-fronted geese 3/6 all geese, including not more than 2 dark geese 3/6 all geese, including not more than 2 white-fronted geese
	MT: West of Divide			 4/8 dark geese, including not more than 2 white-fronted geese
	OR: Malheur County Lake, Klamath, & Harney Counties	 Must end on or before first Sunday in Jan. (Jan. 2) No white-front harvest before Oct. 17		4/8 dark geese, including not more than 2 white-fronted geese
	WA			4/8 dark geese, including not more than 2 white-fronted geese
	AK	107	Sep. 1 – Jan. 26	6/12; not more than 4 white-fronted or Canada geese singly or in aggregate
1994-95	Flyway (~~AK~~) (except where noted)	100	Saturday nearest Oct. 1 (Oct. 1) – Sunday nearest Jan. 20 (Jan. 22)	3/6 dark geese, including no more than 2 white-fronted geese
	CA: Northeastern Southern Balance-of-State: Sacramento Valley Area	 First 23 days of goose season First 65 days of goose season, which is 79 days Must end on or before Nov. 30		 3/6 all geese, no more than 2 dark geese (not more than 1 cackling Canada goose) 2/2 dark geese 3/3 all geese, not more than 1 dark goose. May be 2 dark geese if they are Canada geese but not cackling (daily limit of 1)
	ID: Northern Southwest Southeastern			 4/8 dark geese, including not more than 2 white-fronted geese 4/8 dark geese, including not more than 2 white-fronted geese 3/6 dark geese, including not more than 2 white-fronted geese
	MT: West of Divide			 4/8 dark geese, including not more than 2 white-fronted geese
	OR: Harney, Lake, Klamath, & Malheur Counties	 No white-front harvest before Oct. 17		4/8 dark geese, including not more than 2 white-fronted geese
	WA			4/8 dark geese, including not more than 2 white-fronted geese
	AK	107	Sep. 1 – Jan. 26	6/12; not more than 4 white-fronted or Canada geese singly or in aggregate 1/2; Units 9(E) and 18
1995-96	Flyway (~~AK~~) (except where noted)	100	Saturday nearest Oct. 1 (Oct. 1) – Sunday nearest Jan. 20 (Jan. 21)	3/6
	CA: Northeastern Southern Balance-of-State: Sacramento Valley Area	 First 23 days of goose season First 65 days of goose season, which is 79 days Must end on or before Dec. 14		 3/6 all geese, no more than 2 dark geese (not more than 1 cackling Canada goose) 2/2 dark geese 3/3 all geese, not more than 1 dark goose. May be 2 dark geese if they are Canada geese but not cackling (daily limit of 1)
	OR: Harney, Lake, Klamath, & Malheur Counties			 4/8 dark geese, including not more than 2 white-fronted geese and 1 cackling Canada goose
	AK	107	Sep. 1 – Jan. 26	6/12; not more than 4 white-fronted or Canada geese singly or in aggregate 1/2; Units 9(E) and 18
1996-97	Flyway (~~AK~~) (except where noted)	100	Saturday nearest Oct. 1 (Sep. 28) – Sunday nearest Jan. 20 (Jan. 19)	4/8
	CA: Northeastern Southern Balance-of-State: Sacramento Valley Area	 First 23 days of goose season First 65 days of goose season, which is 79 days Must end on or before Dec. 14		 3/6 all geese, no more than 2 dark geese (not more than 1 cackling Canada goose) 2/2 dark geese, including not more than 1 cackling Canada goose 3/3 all geese, not more than 1 dark goose. May be 2 dark geese if they are Canada geese but not cackling (daily limit of 1)
	OR: Harney, Lake, Klamath, & Malheur Counties			 4/8 dark geese, including not more than 2 white-fronted geese and 1 cackling Canada goose
	AK	107	Sep. 1 – Jan. 26	4/8 1/2; Units 9(E) and 18
1997-98	Flyway (~~AK~~) (except where noted)	100	Saturday nearest Oct. 1 (Oct. 4) – Sunday nearest Jan. 20 (Jan. 18)	4/8
	CA: Northeastern	 First 23 days of goose season		 3/6 all geese, no more than 2 dark geese (not more than 1 cackling Canada goose)

	Southern Balance-of-State: Sacramento Valley Area	 79 Must end on or before Dec. 14		2/2 dark geese, including not more than 1 cackling Canada goose 3/6 all geese, not more than 2/4 white-fronted geese and 1/2 cackling Canada geese
	OR: Harney, Lake, Klamath, & Malheur Counties			4/8 dark geese, including not more than 2 white-fronted geese and 1 cackling Canada goose
	AK	107	Sep. 1 – Jan. 26	4/8 6/12; Unit 9(D), Unimak Island portion Unit 10 1/2; Units 9(E) and 18
1998-99	Flyway (~~AK~~) (except where noted)	100	Saturday nearest Oct. 1 (Oct. 3) – Sunday nearest Jan. 20 (Jan. 17)	4/8
	CA: Northeastern Southern Balance-of-State: Sacramento Valley Area	 First 23 days of goose season 79 Must end on or before Dec. 14		 3/6 all geese, no more than 2 dark geese (not more than 1 cackling Canada goose) 2/4 dark geese, including not more than 1 cackling Canada goose 3/6 all geese, not more than 2/4 white-fronted geese and 1/2 cackling Canada geese
	OR: Harney, Lake, Klamath, & Malheur Counties			4/8 dark geese, including not more than 2 white-fronted geese and 1 cackling Canada goose
	AK	107	Sep. 1 – Jan. 26	4/8 6/12; Unit 9(D), Unimak Island portion Unit 10
1999- 2000	Flyway (~~AK~~) (except where noted)	100	Saturday nearest Oct. 1 (Oct. 2) – Sunday nearest Jan. 20 (Jan. 23)	4/8
	CA: Northeastern Southern Balance-of-State: Sacramento Valley Area	 First 44 days of goose season 79 Must end on or before Dec. 14		 3/6 all geese, no more than 2 dark geese (not more than 1 cackling Canada goose) 3/6 dark geese, including not more than 1 cackling Canada goose 3/6 all geese, not more than 2/4 white-fronted geese and 1/2 cackling Canada geese
	OR: Lake County			4/8 dark geese, including not more than 2 white-fronted geese and 1 cackling Canada goose
	AK	107	Sep. 1 – Jan. 26	4/8 6/12; Unit 9(D), Unimak Island portion Unit 10
2000-01	Flyway (~~AK~~) (except where noted)	100	Saturday nearest Oct. 1 (Sep. 30) – Sunday nearest Jan. 20 (Jan. 21)	4/8
	CA: Northeastern Southern Balance-of-State: Sacramento Valley Area	 First 44 days of goose season 79 Must end on or before Dec. 14		 3/6 all geese, no more than 2 dark geese (not more than 1 cackling Canada goose) 3/6 dark geese 3/6 all geese, not more than 2/4 white-fronted geese and 1/2 cackling Canada geese
	OR: Lake County			4/8 dark geese, including not more than 2 white-fronted geese and 1 cackling Canada goose
	AK	107	Sep. 1 – Jan. 26	4/8 6/12; Unit 9(D), Unimak Island portion Unit 10
2001-02	Flyway (~~AK~~) (except where noted)	100	Saturday nearest Oct. 1 (Sep. 29) – Sunday nearest Jan. 20 (Jan. 20)	4/8
	CA: Northeastern Balance-of-State: Sacramento Valley Area	 First 44 days of goose season 79 Must end on or before Dec. 14		 3/6 all geese, no more than 2 dark geese (not more than 1 cackling or Aleutian Canada goose) 3/6 all geese, not more than 2/4 white-fronted geese and 1/2 cackling Canada geese
	OR: Lake County			4/8 dark geese, including not more than 2 white-fronted geese and 1 cackling Canada goose
	AK	107	Sep. 1 – Jan. 26	4/8 6/12; Unit 9(D), Unimak Island portion Unit 10
2002-03	CA, OR, & WA	100	Saturday nearest Oct. 1 (Sep. 28) – last Sunday in Jan. (Jan. 26)	4/8
	CA: Northeastern			3/6 all geese, no more than 2 dark geese (not more than 1 cackling or Aleutian Canada goose)

	Balance-of-State: Sacramento Valley Area	86 Must end on or before Dec. 14		3/6 all geese, not more than 2 white-fronted geese and 1 cackling or Aleutian Canada goose
	OR: Lake County			4/8 dark geese, including not more than 2 white-fronted geese
	Interior States	107	Saturday nearest Sep. 24 (Sep. 21) – last Sunday in Jan. (Jan. 26)	4/8
	AK	107	Sep. 1 – Jan. 26	4/8 6/12; Unit 9(D), Unimak Island portion Unit 10

APPENDIX J. Estimates of GREATER WHITE-FRONTED GOOSE harvests in the Pacific Flyway (federal / subsistence surveys)

Year	WA	OR	ID	MT	WY	CA	NV	UT	CO	AZ	NM	PF Tot.	AK	Subsist.	Total
1962	300	1,267	0	0	0	50,088	0	0	0	0	0	51,655			
1963	64	6,140	0	0	0	56,694	147	0	0	0	0	63,045			
1964	140	4,710	0	0	0	51,735	982	0	0	0	0	57,567			
1965	531	3,251	248	0	0	42,211	94	55	0	0	0	46,390			
1966	368	6,015	161	0	21	65,321	0	0	0	38	0	71,924	75		
1967	0	5,141	0	0	0	62,819	0	84	0	0	0	68,044	699		
1968	438	3,723	112	0	0	47,345	0	0	0	0	0	51,618	856		
1969	1,464	2,080	0	0	0	68,443	0	0	0	0	0	71,987	1,204		
1970	862	2,516	215	110	0	70,639	304	142	30	255	0	75,073	1,267		
1971	0	484	0	0	0	34,216	298	0	0	52	0	35,050	2,815		
1972	203	1,304	289	0	0	51,813	0	0	0	0	0	53,609	716		
1973	0	963	0	0	0	44,615	1640	126	0	0	0	47,344	754		
1974	321	251	0	0	0	40,682	0	0	0	0	0	41,254	338		
1975	2,167	4,574	0	249	0	30,193	0	0	0	85	0	37,268	1,217		
1976	0	678	0	0	0	44,044	0	0	0	0	0	44,722	1,288		
1977	289	0	0	0	0	33,572	0	364	0	150	0	34,375	1,191		
1978	658	1,474	0	0	0	34,719	0	0	0	0	0	36,851	1,170		
1979	592	1,390	78	73	0	21,399	94	0	0	170	0	23,796	599		
1980	584	1,304	0	0	0	18,693	0	0	0	0	0	20,581	293		
1981	0	645	58	0	0	21,781	222	0	0	0	0	22,706	145		
1982	991	204	0	0	0	15,004	68	0	0	0	0	16,267	505		
1983	115	267	0	78	0	16,157	73	0	0	0	0	16,690	446		
1984	481	468	0	0	0	6,686	0	0	0	0	0	7,635	671		
1985	170	0	0	0	0	15,157	0	0	0	0	0	15,327	343	3803	19130
1986	149	0	110	0	0	7,542	0	0	0	67	0	7,868	968	2808	10676
1987	135	93	0	0	0	9,634	84	0	56	0	0	10,002	960	3721	13723
1988	103	367	0	0	0	4,707	0	0	0	49	0	5,226	1,129		5226
1989	91	94	0	0	0	9,519	0	0	0	0	0	9,704	1,776	5323	15027
1990	172	354	75	30	0	5,795	0	0	0	0	0	6,426	649	8288	14714
1991	0	547	0	0	0	9,826	56	0	0	0	0	10,429	1,230	5709	16138
1992	260	1,111	41	0	0	11,706	0	0	0	0	0	13,118	1,101	9,237	22,355
1993	56	800	0	49	0	12,311	65	0	0	0	0	13,281	558	8,206	21,487
1994	268	209	92	0	0	12,599	122	0	0	0	0	13,290	841	9,570	22,860
1995	0	882	0	0	0	11,671	0	0	116	0	0	12,669	752	13,079	25,779
1996	683	4,170	0	0	0	16,442	35	0	0	0	0	21,330	822	15,417	36,836

Year	WA	OR	ID	MT	WY	CA	NV	UT	CO	AZ	NM	PF Tot.	AK	Subsist.	Total
1997	686	3,895	0	0	0	22,301	0	0	0	0	0	26,882	223	9,961	36,943
1998	972	1,522	309	0	0	21,850	0	0	0	351	0	25,004	134	13,002	38,164
1999	241	986	108	0	0	23,066	63	0	0	0	0	24,464	1,789	14,982	40,248
2000	2,433	4,389	0	330	0	21,184	27	0	0	0	0	28,593	1,014	16,797	45,390
2001	0	1,800	0	0	0	23,764	0	0	0	189	0	25,753	507	18,183	43,936
Averages:															
1962-80	473	2,488	58	23	1	45,750	187	41	2	39	0	49,061	965		
1981-90	241	249	24	11	0	11,198	45	0	6	12	0	11,785	759	4,789	13,083
1991-00	509	1,846	50	34	0	16,975	33	0	11	49	0	19,528	816	12,195	31,831
All years	425	1,752	47	23	1	29,199	109	19	5	35	0	31,620	862	9,880	25,214
% Flyway Harvest:															
1962-80	1%	5%	0%	0%	0%	93%	0%	0%	0%	0%	0%				
1981-90	2%	2%	0%	0%	0%	95%	0%	0%	0%	0%	0%				
1991-00	3%	9%	0%	0%	0%	87%	0%	0%	0%	0%	0%				
All years	1%	6%	0%	0%	0%	92%	0%	0%	0%	0%	0%				

Alaska data include harvest from Pacific and midcontinent populations.

2001 data are preliminary.

APPENDIX K. Estimates of Pacific and mid-continent white-fronted goose harvests in Alaska from state mail questionnaire surveys 1972-97. The state survey was replaced by HIP in 1998.

Region	1972	1973	1974	1975	1976	1982	1983	1984	1985	1987	1988	1989	1990	1992	1993	1994	1995	1996	1997	AVG
North Slope	0	146	0	0	0	0	81	0	0	0	52	0	0	0	0	0	50	0	20	18
Seward Peninsula	16	0	0	122	0	118	54	188	0	4	0	0	0	0	25	8	0	0	0	28
Yukon Valley	96	146	366	168	67	165	81	52	0	19	0	0	45	108	25	8	50	123	50	83
Central	286	291	152	108	281	187	566	1030	254	186	588	833	537	910	262	200	243	254	343	395
MID-CONTINENT	398	583	518	398	348	470	782	1270	254	209	640	833	582	1018	312	216	343	377	413	524
% M-C	62%	51%	69%	43%	40%	43%	67%	63%	52%	55%	70%	77%	75%	87%	62%	32%	55%	54%	59%	59%
Yukon Delta	64	0	0	168	117	281	81	147	18	30	0	9	22	58	0	240	109	0	20	72
Cook Inlet	144	218	168	199	183	293	148	133	127	97	237	227	101	75	148	168	134	146	242	168
Gulf Coast	0	0	0	91	117	12	27	26	0	15	10	0	11	17	0	0	0	46	0	20
Southeast	0	146	15	77	0	0	0	67	18	11	0	0	56	8	33	8	17	38	0	26
Kodiak	0	0	0	0	0	0	14	0	0	0	0	19	0	0	0	0	17	0	0	3
Alaska Peninsula	32	194	46	0	99	35	108	372	73	15	21	0	0	0	8	48	0	92	20	61
Aleutian Is.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
PACIFIC	240	558	229	535	516	621	378	745	236	168	268	255	190	158	189	464	277	322	282	349
% Pacific	38%	49%	31%	57%	60%	57%	33%	37%	48%	45%	30%	23%	25%	13%	38%	68%	45%	46%	41%	41%
STATE TOTAL	638	1141	747	933	864	1091	1160	2015	490	377	908	1088	772	1176	501	680	620	699	695	873

APPENDIX L. Seasonal and annual subsistence harvest of Pacific white-fronted geese on the Y-K Delta, Alaska from village household surveys. From Wentworth and Seim (1996); Wentworth (2001).

Year	Spring	Early Summer	Mid Summer	Late Summer	Fall	Total
1985	2,582	818	11	92	300	3,803
1986	1,865	560	81	99	203	2,808
1987	2,640	221	0	272	588	3,721
1988						
1989	3,431	1,034	239	215	404	5,323
1990	3,620	741	497	1,229	2,201	8,288
1991	4,661	376	85	194	393	5,709
1992	7,223	740	134	583	557	9,237
1993	4,773	442	52	346	2,593	8,206
1994	5,294	623	281	1,313	2,059	9,570
1995	5,921	2,216	645	926	1,680	11,388
1996	8,587	1,005	193	1,511	3,289	14,585
1997	5,537	1,039	200	906	848	8,530
1998	7,536	1,184	356	1,420	1,863	12,359
1999	9,614	1,910	626	518	652	13,320
2000						15,438
2001						18,183
Avg 1985-99	5,235	922	243	687	1,259	8,346
Season Prop	62.7%	11.0%	2.9%	8.2%	15.1%	100.0%

No survey in 1988

Average subsistence harvest in the Bristol Bay region during 1995-98 is 1,550 white-fronts.

APPENDIX M. Subsistence harvest of Pacific white-fronted geese on the Y-K Delta and Bristol Bay regions of Alaska from village surveys. Wentworth and Seim (1996); Wong and Wentworth (1999); Wentworth (2001).

Year	Y-K Delta	Togiak NWR	Bristol Bay	AK Peninsula	Total
1985	3,803				3,803
1986	2,808				2,808
1987	3,721				3,721
1988					
1989	5,323				5,323
1990	8,288				8,288
1991	5,709				5,709
1992	9,237				9,237
1993	8,206				8,206
1994	9,570				9,570
1995	11,388	553	980	158	13,079
1996	14,585	669		163	15,417
1997	8,530	664	644	123	9,961
1998	12,359	526		117	13,002
1999	13,320	889	647	126	14,982
2000	15,438	1,135		224	16,797
2001	18,183				18,183

Appendix N. White-fronted goose harvest on State and Federal managed public hunting areas in California.

						Percent of public area harvest					Percent of total statewide harvest				
	Northeastern CA		Central	S.	total	Northeastern CA		Central	Southern						total
Season	KB NWR	State WA	Valley	Zones	public	KB NWR	State WA	Valley	Zones	State	KB	NE	CV	S	public
1961-62		0	2,908	54											
1962-63	7,400	6	2,620	35	10,061	74%	0%	26%		50,088	14.8%	0.0%	5.2%	0.1%	20.1%
1963-64	11,150	19	1,416	49	12,634	88%	0%	11%		56,694	19.7%	0.0%	2.5%	0.1%	22.3%
1964-65	5,740	11	2,867	27	8,645	66%	0%	33%		51,735	11.1%	0.0%	5.5%	0.1%	16.7%
1965-66	11,360	4	2,407	35	13,806	82%	0%	17%		42,211	26.9%	0.0%	5.7%	0.1%	32.7%
1966-67	10,800	6	2,172	56	13,034	83%	0%	17%		65,321	16.5%	0.0%	3.3%	0.1%	20.0%
1967-68	9,080	2	2,635	49	11,766	77%	0%	22%		62,819	14.5%	0.0%	4.2%	0.1%	18.7%
1968-69	17,830	17	1,665	7	19,519	91%	0%	9%		47,345	37.7%	0.0%	3.5%	0.0%	41.2%
1969-70	19,100	11	1,862	7	20,980	91%	0%	9%		68,443	27.9%	0.0%	2.7%	0.0%	30.7%
1970-71	14,930	8	886	9	15,833	94%	0%	6%		70,639	21.1%	0.0%	1.3%	0.0%	22.4%
1971-72		4	1,844	13	1,861		0%			34,216	0.0%	0.0%	5.4%	0.0%	5.4%
1972-73	9,740	14	1,392	9	11,155	87%	0%	12%		51,813	18.8%	0.0%	2.7%	0.0%	21.5%
1973-74	9,500	24	1,453	4	10,981	87%	0%	13%		44,615	21.3%	0.1%	3.3%	0.0%	24.6%
1974-75	7,330	4	1,609	2	8,945	82%	0%	18%		40,682	18.0%	0.0%	4.0%	0.0%	22.0%
1975-76	9,700	8	1,121	11	10,840	89%	0%	10%		30,193	32.1%	0.0%	3.7%	0.0%	35.9%
1976-77	11,550	4	2,005	7	13,566	85%	0%	15%		44,044	26.2%	0.0%	4.6%	0.0%	30.8%
1977-78	8,410	18	543	0	8,971	94%	0%	6%		33,572	25.1%	0.1%	1.6%	0.0%	26.7%
1978-79	7,270	13	903	2	8,188	89%	0%	11%		34,719	20.9%	0.0%	2.6%	0.0%	23.6%
1979-80	2,990	9	621	2	3,622	83%	0%	17%		21,399	14.0%	0.0%	2.9%	0.0%	16.9%
1980-81	4,520	6	311	5	4,842	93%	0%	6%		18,693	24.2%	0.0%	1.7%	0.0%	25.9%
1981-82	3,700	0	761	10	4,471	83%	0%	17%		21,781	17.0%	0.0%	3.5%	0.0%	20.5%
1982-83	2,188	0	793	3	2,984	73%	0%	27%		15,004	14.6%	0.0%	5.3%	0.0%	19.9%
1983-84	2,734	21	580	3	3,338	82%	1%	17%		16,157	16.9%	0.1%	3.6%	0.0%	20.7%
1984-85	1,150	12	393	1	1,556	74%	1%	25%		6,686	17.2%	0.2%	5.9%	0.0%	23.3%
1985-86	580	3	608	0	1,191	49%	0%	51%		15,157	3.8%	0.0%	4.0%	0.0%	7.9%
1986-87	900	14	200	0	1,114	81%	1%	18%		7,542	11.9%	0.2%	2.7%	0.0%	14.8%
1987-88	1,130	1	175	0	1,306	87%	0%	13%		9,634	11.7%	0.0%	1.8%	0.0%	13.6%
1988-89	1,439	9	138	5	1,591	90%	1%	9%		4,707	30.6%	0.2%	2.9%	0.1%	33.8%
1989-90	1,151	9	622	5	1,787	64%	1%	35%		9,519	12.1%	0.1%	6.5%	0.1%	18.8%
1990-91	793	6	505	7	1,311	60%	0%	39%		5,795	13.7%	0.1%	8.7%	0.1%	22.6%
1991-92	1,200	23	757	3	1,983	61%	1%	38%		9,826	12.2%	0.2%	7.7%	0.0%	20.2%
1992-93	1,651	14	560	13	2,238	74%	1%	25%		11,706	14.1%	0.1%	4.8%	0.1%	19.1%

Appendix N. White-fronted goose harvest on State and Federal managed public hunting areas in California.

						Percent of public area harvest					Percent of total statewide harvest				
	Northeastern CA		Central	S.	total	Northeastern CA		Central	Southern						total
Season	KB NWR	State WA	Valley	Zones	public	KB NWR	State WA	Valley	Zones	State	KB	NE	CV	S	public
1993-94	1,145	16	482	2	1,645	70%	1%	29%		12,311	9.3%	0.1%	3.9%	0.0%	13.4%
1994-95	2,387	21	459	10	2,877	83%	1%	16%		12,599	18.9%	0.2%	3.6%	0.1%	22.8%
1995-96	677	5	511	3	1,196	57%	0%	43%		11,671	5.8%	0.0%	4.4%	0.0%	10.2%
1996-97	596	49	541	3	1,189	50%	4%	46%		16,442	3.6%	0.3%	3.3%	0.0%	7.2%
1997-98	1,977	66	830	11	2,884	69%	2%	29%		22,301	8.9%	0.3%	3.7%	0.0%	12.9%
1998-99	2,549	92	1,030	1	3,672	69%	3%	28%		21,850	11.7%	0.4%	4.7%	0.0%	16.8%
1999-00	1,099	3	1,252	27	2,381	46%	0%	53%		23,066	4.8%	0.0%	5.4%	0.1%	10.3%
2000-01	2,053	83	1,336	2	3,474	59%	2%	38%		21,184	9.7%	0.4%	6.3%	0.0%	16.4%
2001-02	1,679	48	1,543	11	3,281	51%	1%	47%		23,764	7.1%	0.2%	6.5%	0.0%	13.8%