ACTION PLAN

FOR

PACIFIC COMMON EIDER

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Migratory Bird Management Division
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EXECUTIVE SUMMARY

Pacific common eider (*Somateria mollissima v-nigra*) was selected as a focal species as part of the U.S. Fish and Wildlife Service, Migratory Bird Program's Focal Species Strategy (USFWS 2005). For the purposes of this Action Plan, the target population includes all populations within Alaska and western Canadian Arctic as well as those North American breeders that winter in Russia. This Plan reviews the natural history, population status, and known limiting factors, and identifies management actions for consideration as means to improve the status of this species.

Although the distribution of common eiders is generally known, reliable information on abundance and trend is either nonexistent or available only for a few specific areas within the species range. Limiting factors are poorly known. High priority management actions include:

1. A comprehensive inventory and assessment of the species status, which will form the basis for establishing population goals and monitoring population status.
2. An assessment of links among breeding, wintering, staging, and molting areas throughout the species range.
3. Predator control in appropriate areas.
4. Better estimates of geographic, temporal, and age-specific variation in vital rates necessary for population models.

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INTRODUCTION

Development of this Action Plan was stimulated by the U.S. Fish and Wildlife Service (USFWS) Migratory Bird Program's (MBP) Focal Species Strategy (USFWS 2005; Appendix 4). The Strategy was initiated to better measure the MBP's success in achieving its bird conservation priorities and mandates. The ability of the MBP to accomplish this goal will be critically assessed by the Office of Management and Budget to evaluate the performance of the MBP. The Strategy involves campaigns for selected migratory bird species to provide explicit, strategic, and adaptive sets of conservation actions required to increase the percent of migratory birds that are at healthy and sustainable levels. The MBP has a specific goal of achieving a net positive change in the status of at least five migratory bird species that are currently not in "desired condition" by 2007, and double that number of species over the next 10 years.

The Pacific subspecies of common eider was chosen as a focal species largely because of conservation need. Available information on population size indicates a downward trend in parts of its range, coincident with other species of sea ducks sharing similar life histories and habitat needs. Significant research gaps and inadequate monitoring preclude effective management throughout its range. The wide range of this species offers the potential to stimulate partnerships across programs and jurisdictions at the state, national, and international scale.

The purpose of this action plan is to identify a biological road map for steps/actions that need to occur to improve the condition of the Pacific subspecies of common eider. Currently, neither the State of Alaska nor the Canadian government has in place a conservation plan for Pacific common eider.

The objectives of the Action Plan are to:

1. Review the current state of knowledge of the species status, natural history, and possible limiting factors.
2. Define what actions need to be taken to increase our knowledge of the species and overcome limiting factors.
3. Prioritize and set a timeline for actions needed to achieve the goals of improving the species status.
4. Identify programs or entities to address the management actions identified in Plan.

USFWS MBP, Alaska Region (7), is taking the lead role in development of the Action Plan. Other partners include national wildlife refuges where common eiders occur, the Canadian Wildlife Service (CWS), Alaska Department of Fish and Game (ADFG), and North Slope Borough. Their roles are to engage in development of the Action Plan and participate in identifying and implementing recommended management actions. An effective action plan will enable all partners to better meet the conservation needs of the species.

The target audience for this Action Plan includes, but is not limited to, Refuge Managers, USFWS MBM Chiefs, ARDs, Regional Directors, Director, CWS Regional Directors, ADFG, Office of Management and Budget (OMB), Alaska Migratory Bird Co-management Council (AMBCC), Sea Duck Joint Venture (SDJV), and Pacific Coast Joint Venture (PCJV).

Because the conservation and management of any species is an iterative process, we consider this Action Plan to be a "living" document. It will be updated accordingly as new information on the species status or limiting factors is acquired through research and monitoring and species needs are addressed. This current version has not yet been thoroughly reviewed by all of the partners identified above; further iterations will reflect more thorough review collaborators. Updated versions will be posted at [WEB SITE TO BE DETERMINED].

ACKNOWLEDGMENTS

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DESCRIPTION OF TARGET POPULATION

The Pacific common eider is the most distinct, morphologically and genetically, of the 4 to 7 subspecies of common eiders recognized world-wide (four are recognized in North America), and has been recommended for separate species status based upon its unique physical characteristics and relative geographic separation from others in the common eider complex (Livezey 1995).

The Pacific subspecies of common eider (*Somateria mollissima v-nigra*) breeds primarily along the coastal fringe of Alaska, western Canada, and far eastern Russia (Fig. 1). The subspecies winters in ice-free marine waters of eastern Russia, southwestern Alaska, throughout the Aleutian Islands, and south as far as Kodiak Island (Fig. 1). This Action Plan pertains to those Pacific common eiders that breed and winter in North America and includes those North American breeders that winter in Russia. It does not include Pacific common eiders that breed in Russia.

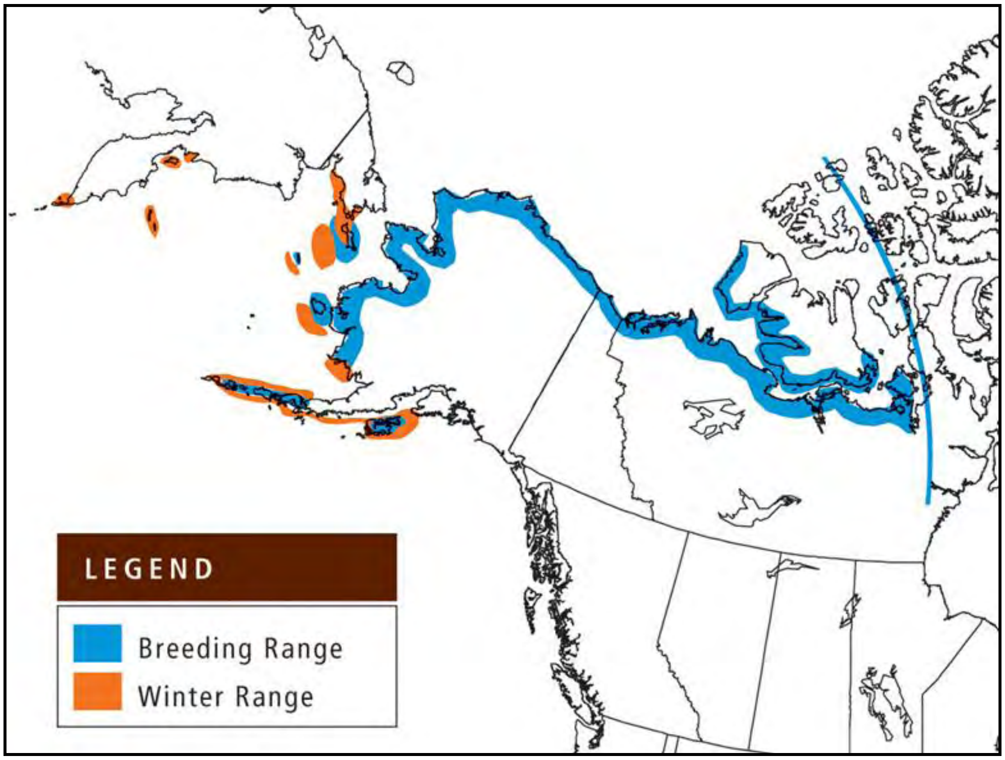

Figure 1. Distribution of Pacific common eider

Within this subspecies, there is some evidence of structuring among birds from different breeding areas, which appear geographically distinct based on almost complete segregation of winter and summer ranges (Petersen and Flint 2002). For example, satellite telemetry has demonstrated that nearly all common eiders breeding in western Canada and the Alaska Arctic coastal plain (ACP) of Alaska spend the winter in Russia and migrate past Point Barrow during both spring and fall migrations (Dickson et al. 2005, Petersen and Flint 2002), whereas common eiders breeding on the Yukon-Kuskokwim Delta appear largely non-migratory, moving south during winter into ice-free waters of Bristol Bay and vicinity (Petersen and Flint 2002). Common eiders breeding in the Aleutians are believed to winter within the Aleutians (Gibson and Byrd in press), although ongoing and additional research will be necessary to clarify these linkages and assess possible structuring at finer scales within the Aleutian population. Winter affinities of common eiders breeding on the Seward Peninsula and Kotzebue Sound are currently unknown.

Legal Status

In the U.S., common eiders are included on the list of Birds of Management Concern (BMC) (http://www.fws.gov/migratorybirds/mbstratplan/GPRAMBSpecies.pdf), a subset of the species protected by the Migratory Bird Treaty Act, which pose special management challenges because of a variety of factors (e.g., too few, too many, conflicts with human interests, societal demands). Within the BMC list, Pacific common eider is considered a “game bird below desired condition”, which means the species has a population that is below long-term average or management goals, or exhibits declining population trends (USFWS 2006).

Audubon Alaska lists the Pacific common eider on their 2005 WatchList, which highlights declining and vulnerable bird populations in Alaska (Stenhouse and Senner 2005).

Although the WatchList does not carry any legal protections, it does identify species that deserve focused monitoring and research, if not special management and protection.

Common eiders are afforded no similar recognition in Canada or Russia. However, common eider is listed as a Category III species in Yakutia, Russia, where it is relatively rare. The criteria for listing, however, are not well defined. We have been unable to ascertain the status of common eider in Chutkoka, where the bulk of the Russia population resides.

Of the four subspecies of common eider in Canada, a management plan has been drafted for only the Quebec population of the American common eider (*Somateria mollissima dresseri*) (The Joint Working Group on the Management of the Common Eider 2004).

Common eiders may be legally harvested during the migratory bird hunting seasons subject to federal and state harvest regulations in the U.S. and Canada. Common eiders are an important subsistence species in northern areas, where meat, down, and eggs have been harvested by local people for centuries (CAFF 1997). Pacific common eiders and their eggs may also be harvested in certain areas of Alaska and Canada for subsistence purposes during spring and summer as authorized by 1997 amendments to the Migratory Birds Convention, which became effective in 1999. These amendments formally recognized traditional spring and summer subsistence harvest, and established the AMBCC in the U.S. to ensure effective management of migratory birds. In Canada, the amendments formally ensured the accommodation of traditional harvest by Aboriginal peoples having the Aboriginal or treaty rights to harvest migratory birds and provided the means for their participation in the cooperative management and sustainable use of migratory birds (Canadian Wildlife Service Waterfowl Committee 2000).

In Russia, subsistence harvest occurs year-round. Some birds are netted (possibly molters) as well as shot. Guns are tightly controlled and ammunition is expensive in Russia, thus the harvest level is probably low. Wildlife protection laws are generally not enforced.

Rational for selection as a focal species

Available survey data indicate that Pacific common eider has declined substantially over the past several decades. Spring migration counts at Point Barrow, Alaska, which sampled both Alaska Arctic coastal plain (ACP) and western Canadian Arctic common eider populations, indicated a decline of more than 50% between 19576and 1996 (Woodby and Divoky 1982, Suydam et al. 2000). Eiders (common and spectacled combined) declined by >90% on the Yukon-Kuskokwim Delta over roughly the same period (Hodges et al. 1996). No long-term trend data exist for other parts of this species range. Additionally, information on the natural history and limiting factors of this subspecies is entirely lacking for some areas or is based on studies at specific breeding sites.

Pacific common eider was chosen as a focal species to encourage a more complete inventory of their populations, expand and improve monitoring surveys, and increase knowledge of natural history and limiting factors; information essential to improving the status of the species. The species-wide range offers the potential to stimulate partnerships across programs and jurisdictions at the state, national, and international scale.

Few management actions have specifically targeted Pacific common eider. Pacific common eiders in Alaska have benefited from land protection afforded by the National Wildlife Refuge System, most notably Alaska Maritime, Yukon Delta, and Arctic National Wildlife Refuges. The species has certainly benefited from island restoration (i.e., predator removal) on the Aleutian Islands, and has likely benefited from management actions directed toward threatened spectacled eiders on the Yukon-Kuskokwim Delta (YKD).

Other sea ducks and marine birds will likely respond positively to some of the management actions listed below. Common eiders share many of the life history characteristics of Steller's and spectacled eiders, both of which declined precipitously over the past 40-50 years and as a result were listed as Threatened under the U.S. Endangered Species Act (Federal Register 1993, 1997). Management actions targeting spectacled and Steller's eiders might also benefit common eiders and other species. For example, efforts to control predators (e.g. foxes, rats) will benefit many species of ground nesting birds. Additionally, efforts to eliminate the use of lead shot will benefit several species of waterfowl in coastal areas.

NATURAL HISTORY

Life History Overview

Common eiders are large bodied, long-lived (>20 yrs) sea ducks, widely distributed throughout circumpolar Arctic and sub-Arctic regions. They are the most marine of all ducks and spend most of the annual cycle at sea; females return to land only during the month-long egg-laying and incubation period, then return to the sea during brood-rearing.

Common eiders have high, relatively invariant adult survival, delayed sexual maturity, and generally low, highly variable reproduction and recruitment (Coulson 1984). Adult common eiders may live 20 years, and have high annual survival rates (80–95%; Goudie et al. 2000, Wilson et al. 2006*a*, Wilson et al. 2006*b*, Appendix 1). Some females may breed in their second year of life, but males and most females do not breed until they are three years old. Because population growth appears most sensitive to changes in adult survival (Wilson et al. 2006*d*), mortality pressures on adults, such as over-hunting and marine pollution, are expected to have larger relative impacts on population dynamics than similar changes in reproductive parameters (Goudie et al. 2000, Wilson 2006). However, increased variability in reproduction and resulting reductions in recruitment to the breeding population could also significantly affect population growth rates (Gaillard et al. 1998, Morris and Doak 2002).

Breeding

Common eiders often breed and nest in colonies along marine coasts, mostly on peninsulas, islands, and islets and occasionally on islands in freshwater. Nesting starts in May or June (dates are progressively later as one proceeds north). Females typically return to their natal areas to nest and often reuse the same nest sites. In general, common eiders exhibit strong philopatry to natal and breeding areas (~95-98%; Coulson 1984, Swennen 1990, Bustnes and Erikstad 1993). Satellite telemetry from the western Canadian Arctic, Alaska ACP, and YKD, as well as banding studies at various areas show similarly high breeding-site fidelity for female Pacific common eiders (up to 100%; Petersen and Flint 2002, Dickson et al. 2005, H. Wilson personal communication). Common eiders may establish long-term pair bonds (Spurr and Milne 1976), as seen in other sea ducks (Savard, J-P. L. 1985, Smith et al. 2000), although most males likely re-pair each winter. For example, Dickson et al. (2005) noted that no male Pacific common eiders marked with satellite transmitters on Canadian nesting grounds returned to the same colony in subsequent years whereas females returned to the same colony.

Nests are scrapes on the ground lined with a thick layer of down plucked from the female's breast. The female lays an average of 4-6 eggs and begins incubation after laying the second or third egg. Incubation lasts 24–26 days. The female eider feeds very little during incubation and lives on fat reserves, losing up to 40% of her body weight (Korshgen 1977).

Ducklings leave the nest shortly after hatching and are able to fly at 60–65 days. Most are lost, however, to predators (e.g., gulls, foxes), exposure, or starvation during their first two weeks of life. Only one estimate of duckling survival (hatch to 30 days) currently exists for the Pacific common eider (19%; Flint et al. 1998), but rates likely vary considerably across years and geographic locations. Common eiders often form crèches (large aggregations of ducklings and hens), which may improve survival of ducklings (Munro and Bedard 1977).

Pacific common eiders occupy a wide range of nesting habitats and appear flexible in their choice of nesting locations. Generally, nesting habitat requirements include proximity to both salt and fresh water and availability of some kind of cover. Nesting habitats for Pacific common eiders range from sandy beaches littered with driftwood or among established human structures (e.g., north slope barrier islands), to grass-sedge meadows. Eiders in the Aleutian Islands nested in the Elymus-umbel coastal plant community (Byrd 1992); in 1990 and 1992, about ¾ of all Aleutian nests were discovered in coastal lands <200m of mean high tide on Nizki and Alaid island (Thompson and Staudt 2004).

Nesting females are vulnerable to disturbance, especially early in incubation, and nesting success is generally higher and less variable in areas free from mammalian predators. Nest site selection appears to focus on predator avoidance; females often select small islands within ponds that restrict access by mammalian predators (Goudie et al. 2000). Other reproductive behaviors such as extreme incubation constancy (including fasting during incubation) and crèching of broods likely also evolved to minimize avian and mammalian predation on eggs and ducklings.

In some areas like the YKD, ACP, and Seward Peninsula, common eiders nest individually or colonially within glaucous gull (*Larus hyperboreus*) and black brant (*Branta bernicla nigricans*) colonies (H. Wilson, C. Dau personal communication). Schamel (1977) found that Pacific common eiders nesting 50-100 m of a glaucous gull nest evidently benefited from the protection afforded by the gulls chasing off avian predators.

Because females are easy to capture and monitor during the nesting season, most demographic studies have focused on the breeding season. However, studies of Pacific common eiders have been conducted at only a few select field-sites, and thus estimates of reproductive parameters (e.g., clutch size, nesting success, and hatching success) may not incorporate the level of geographic variation that would be representative of larger populations (Appendices 1 and 2). For instance, the Aleutian Islands may harbor the largest breeding population of Pacific common eider, but only limited data from a few select islands currently characterizes the breeding biology for that region.

Clutch size information is available from very few studies and most previous research was incidental to other studies.   We compiled data on clutch size for those studies taking place during the first week of June or later.

Duckling survival to fledging (50-60 days of age) has been less well studied than components of nesting in common eiders. Only one estimate of 19% survival to 30 days of age (± 10% CI), generated in a single year on the YKD, exists for the Pacific common eider (Flint et al. 1998). Limited data on common eider breeding propensity, sub-adult (<3 yr. old) survival, and recruitment to the breeding population come from a single long-term study in Europe (Coulson 1984), and no estimates of these parameters have been generated for the Pacific subspecies (see Appendix 1). Additionally, because most studies have been conducted at a single site, information on rates of juvenile dispersal, immigration and emigration, metapopulation dynamics, and variation in most population parameters are unavailable. Finally, no estimates exist for adult male survival or age at last breeding for any common eider population.

Common eiders generally rear their broods in protected saltwater areas near breeding grounds. In some populations breeding and rearing habitats can be widely separated. Access to freshwater appears critical in the first week of life, as ducklings develop salt glands necessary for the marine environment (DeVink et al. 2005). Also, avian predation on younger ducklings can be extremely high, thus ideal rearing habitat may be at some distance from gull colonies. Little is known about specific brood-rearing requirements in the Pacific subspecies although, generally, shallow coastal shorelines with an abundance of invertebrates, especially *Gammerus*, may be preferable for common eider brood-rearing (Goudie et al. 2000).

Post-nesting dispersal, molt, and migration

In summer, many adult males, immatures, and nonbreeders migrate to molting sites. During the molt, when ducks shed and re-grow new flight feathers, they are unable to fly for three to four weeks. Limited data from satellite telemetry studies suggest that common eiders return to the same molting areas in subsequent years (Dickson et al. 2003, 2005).

Based on satellite telemetry studies, male common eiders that breed in western Arctic Canada depart the first half of July and disperse widely to molting areas as far west as Russia's Chukotsk Peninsula (Dickson et al. 2005). In contrast, most females from Canada, Alaska North Slope, and YKD molted in the vicinity (20-50 km) of nesting areas (Petersen and Flint 2002, Dickson et al. 2005) from July into September.

Little is known about migration patterns for common eiders in the Aleutians. However, satellite transmitters were deployed in a sample of females in the western Aleutians during spring 2006 by Margaret Petersen (USGS) and these will soon provide information on temporal and geographic distribution of breeding birds from that area.

After molt, common eiders migrate to wintering areas where pairing occurs for the subsequent breeding season. Satellite telemetry has indicated that nearly all common eiders from western Canada and the Alaska ACP winter along Russia's Chukotsk Peninsula arriving at those wintering areas by late November (Petersen and Flint 2002, Dickson et al. 2005). A small proportion of western Canada and Alaska ACP breeding birds winter near St. Lawrence Island, and a few Alaska ACP winter along the coast of western Alaska (Petersen and Flint 2002, Dickson et al. 2005). Satellite telemetry of common eiders breeding on the YKD indicated that females are largely nonmigratory, moving a minimal distance during fall and winter to remain in ice-free waters off the coast of the YKD and in northwest Bristol Bay (Petersen and Flint 2002).

In spring, most eiders that have wintered in Russia begin an eastward migration through the Chukchi and Beaufort seas during April and arrive on breeding grounds in northern Alaska and Canada in mid- to late June. Spring staging areas for these birds include coastal areas off the Chukotka Peninsula, Ledyard Bay in Northwestern Alaska, the polynya off Cape Bathurst in the southeastern Beaufort Sea, and Lambert Channel at the western end of Coronation Gulf (Alexander et al. 1997, Petersen and Flint 2002, Dickson et al. 2005). Many of these spring migrants from Russia pass close by Point Barrow, Alaska and can be counted by land-based observers (Suydam et al. 1997, 2000).

Common eiders that have wintered in Bristol Bay or off the coast of the Yukon-Kuskokwim Delta (and possibly some from other areas in the Gulf of Alaska or Aleutians) migrate up the coast of western and northwestern Alaska (Fig 2)(Petersen and Flint 2002).

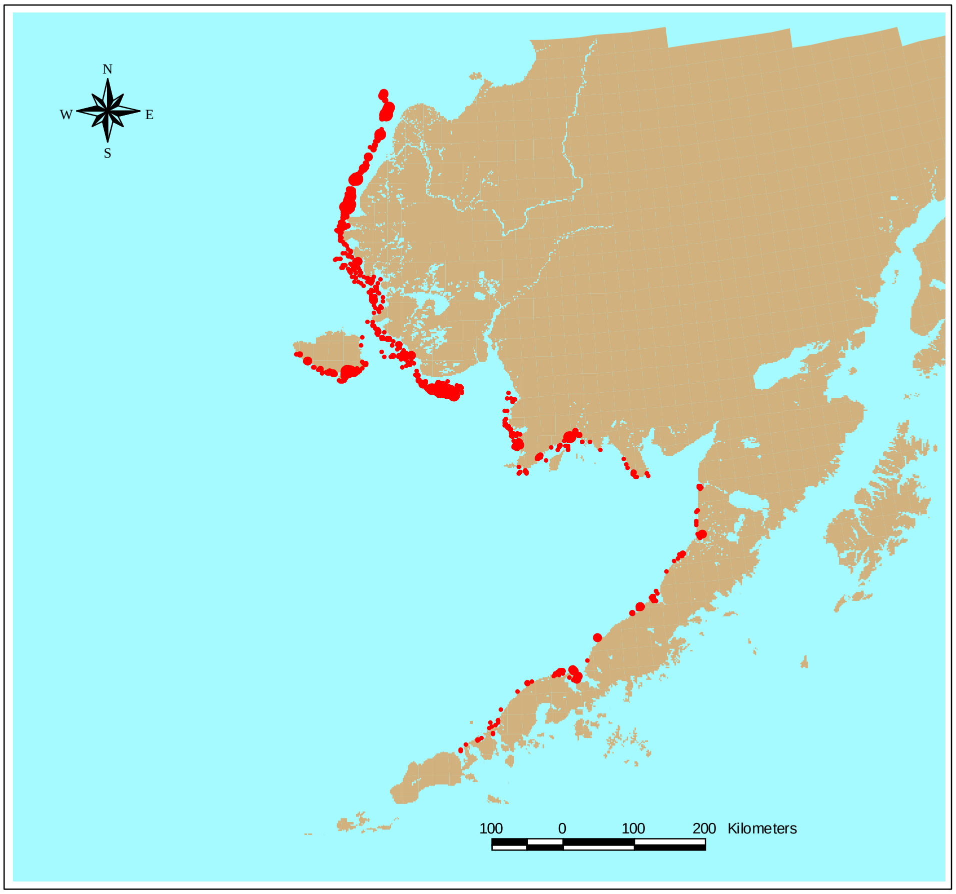

Figure 2. Composite distribution of Pacific common eiders seen during spring aerial surveys, 1992-2005.

Wintering ecology and habitats

Common eiders primarily occupy coastal areas during winter, where they dive to depths of 3-20 m (10-65 ft) to feed on benthic invertebrates, including mussels, clams, scallops, sea urchins, starfish, crabs, and snails, which are swallowed whole and crushed in their large and muscular gizzards (Goudie et al. 2000). Little is known about molt or winter ecology.

POPULATION STATUS

Distribution

Pacific common eiders nest on islands throughout the western and central Canadian Arctic (Fig. 1). Within Alaska, the largest breeding aggregations of Pacific common eiders have been found along the coastlines of the Aleutian Islands, Yukon-Kuskokwim Delta, and barrier islands of the Chukchi and Beaufort seas (Fig. 3). Smaller aggregations exist on Kodiak Island, Nunivak Island, St. Lawrence Island, and the northern Seward Peninsula/Kotzebue Sound region (Gabrielson and Lincoln 1959), and historical records note dispersed nesters along Cook Inlet and as far south as Southeast Alaska.

In the western Canadian Arctic, Pacific common eiders breed from the Yukon coast to Queen Maud Gulf and north to include Victoria and Banks Islands. Largest breeding aggregations occur in Dolphin and Union Strait, outer Bathurst Inlet (east side of Coronation Gulf), and islands in central Queen Maud Gulf (Dickson, unpubl. data). A few eiders also nest on small islands off Banks Island, western Victoria Island and Cape Dalhousie. (Cornish and Dickson 1997).

Little is known of important breeding areas in Russia, but historical records note Pacific common eiders occurring from northeastern Siberia south to Kamchatka and the Komandorskie Islands (Gabrielson and Lincoln 1959). Hodges and Eldridge (2001) counted 15,000 (not corrected for incomplete detectibility) common eiders in eastern Russia, primarily from Chaun Bay eastward.

Arctic and subarctic breeding Pacific common eiders appear largely allopatric based on data from satellite telemetry studies. Most Arctic breeding common eiders in Alaska and Canada migrate to eastern Russia where they spend the winter, while southern breeding populations (e.g., YKD) appear to be year-round residents, tending to winter locally, within 100-400 km of breeding areas (Petersen and Flint 2002, Dickson et al. 2005).

Abundance and Trends

By combining estimates from various areas, we estimate the North American population of the Pacific subspecies to be 115,000-170,000 birds (Fig. 3). There has been no systematic effort to census the entire population. Available data indicate sharp declines from the 1950's to the 1990's on the northern Alaska, western Alaska, and Canadian breeding grounds (Hodges et al. 1996, Suydam et al. 2002). Long-term trends are largely unknown for other areas of the Pacific subspecies' range. See below for discussion on specific regions.

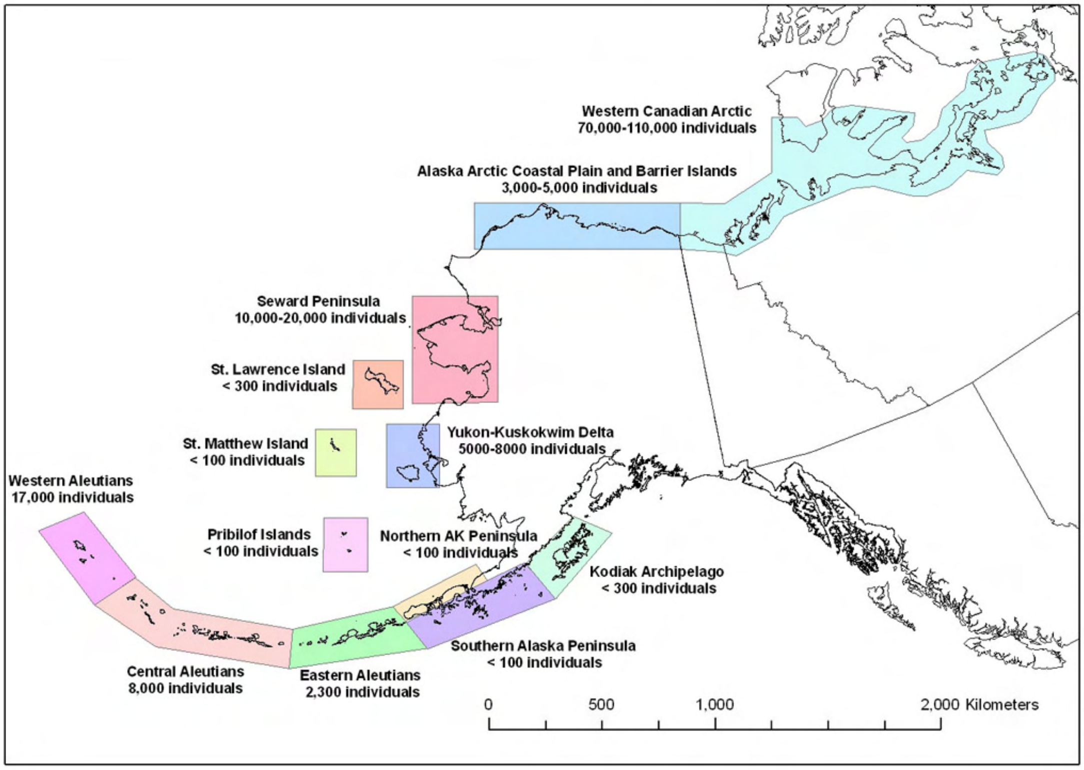

Figure 3. Estimates of Pacific common eider abundance during breeding season in North America.

Aleutian Islands

Common eiders are the most common breeding sea duck in the Aleutians and occur there year round (Gibson and Byrd in press). Populations are highest in the western Aleutians and diminish toward the east (eastern Aleutians and Alaska Peninsula) and north (Bering Sea Islands)(Fig. 4).

Small boat surveys of near-shore habitats were conducted for most islands in the Aleutians and south of the Alaska Peninsula between 1977 and 1983 (Bailey and Trapp 1986, Day et al. 1978, 1979; Early et al. 1980, 1981; Dragoo and Deines 1982; Nysewander et al. 1982). Although these surveys provide indices of the size of the breeding populations, they should be considered minimum population estimates, given the short time-span of the counts and limitations of the methodology. For example, these surveys were not specifically designed for eiders; all birds and marine mammals were counted to describe biodiversity rather than provide precise estimates of population size. Maximum count, summed for the most recent survey for all islands, was about 27,000 for the Aleutians (Appendix 3, Fig. 4).

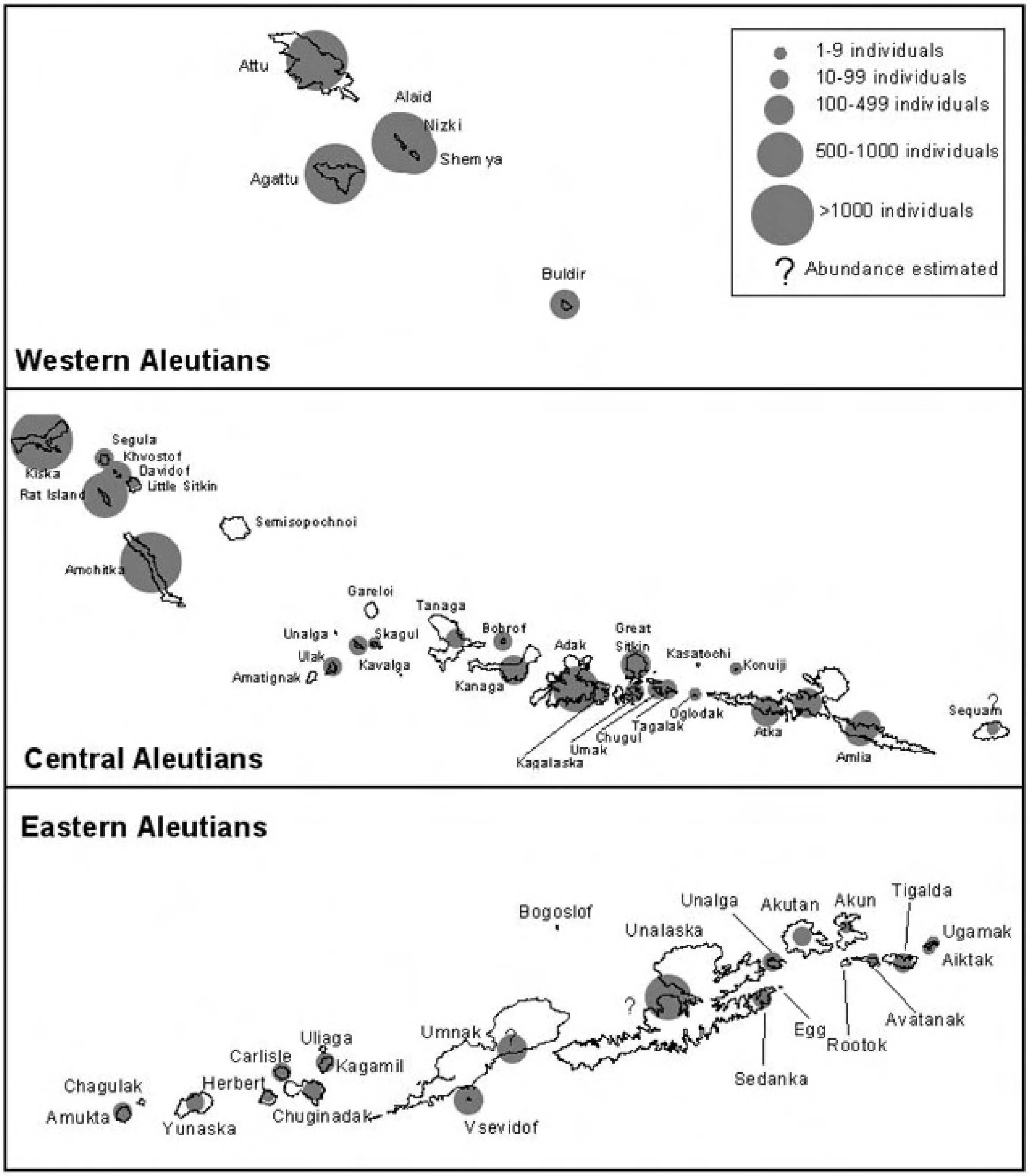

Figure 4. Distribution and estimated abundance of Pacific common eiders in the Aleutian Islands.

Reliable or long term trend data are nearly nonexistent for most of the Aleutians. The best data were obtained at Nizki and Alaid Islands following removal of introduced foxes in

1975-76. There, breeding populations increased three- to four-fold up to 1984, when the last survey was conducted (Byrd et al. 1994) (Fig. 5).

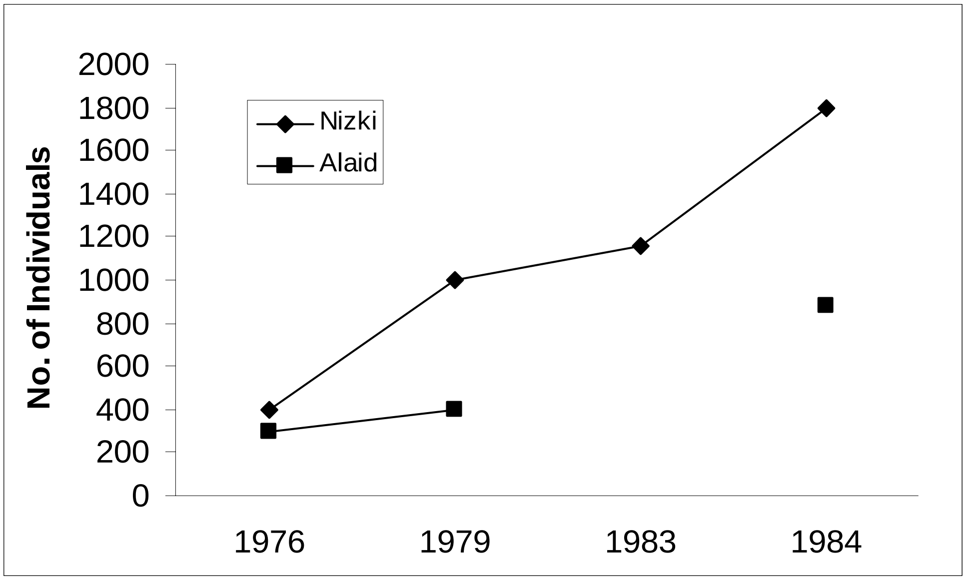

Figure 5. Pacific common eider population size on Nizki and Alaid Islands, Alaska following removal of foxes in 1975 and 1976.

Similarly, numbers of breeding eiders in the Rat Islands increased dramatically following removal of foxes, from 11 birds in the late 1970s and early 1980s to 3551 birds in 2004 (Byrd et al. 2004).

There is some evidence suggesting negative correlation between numbers of sea otters and common eiders, possibly resulting from competition for similar prey, particularly sea urchins (Byrd 1992, Byrd et al. 2004). Nesting colonies of common eiders on Adak, Attu, and Amchitka islands have declined or disappeared as otter populatons have increased (Byrd 1992), although a cause and effect has not been established.

Common eiders wintering at Adak declined substantially after the mid-1960s based on Christmas Bird Counts (Fig. 6) and there are no comparable data during the early part of this period from elsewhere to evaluate the geographic extent of this pattern.

Shore-based winter surveys at Shemya Island provide the best time-series other than Christmas Bird Counts and indicate an increase between the late 1980s and mid-1990s followed by a slight decline (Fig. 7).

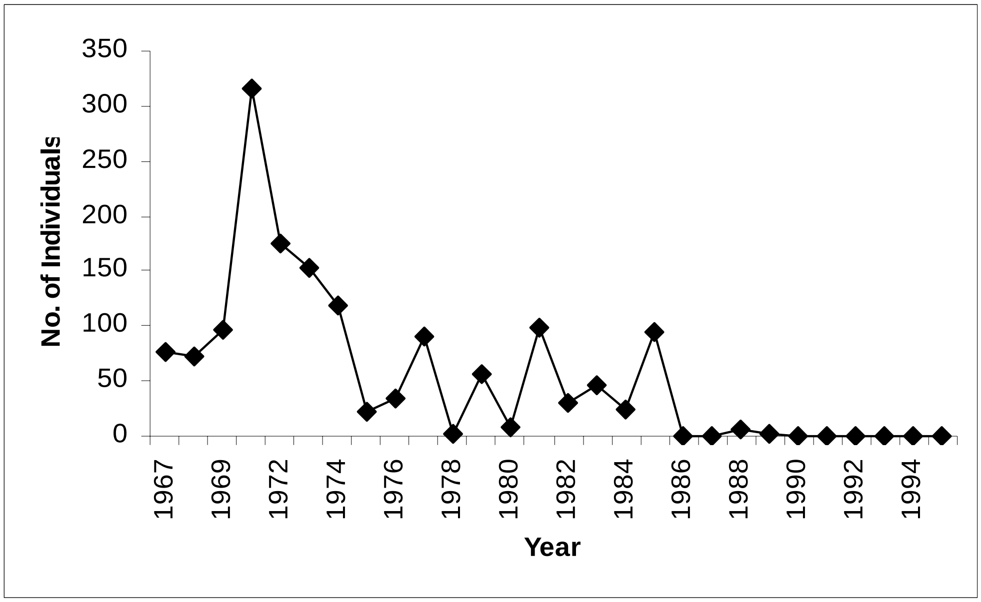

Figure 6. Common eiders counted during Christmas bird counts, Adak Island, Alaska, 1967-1997

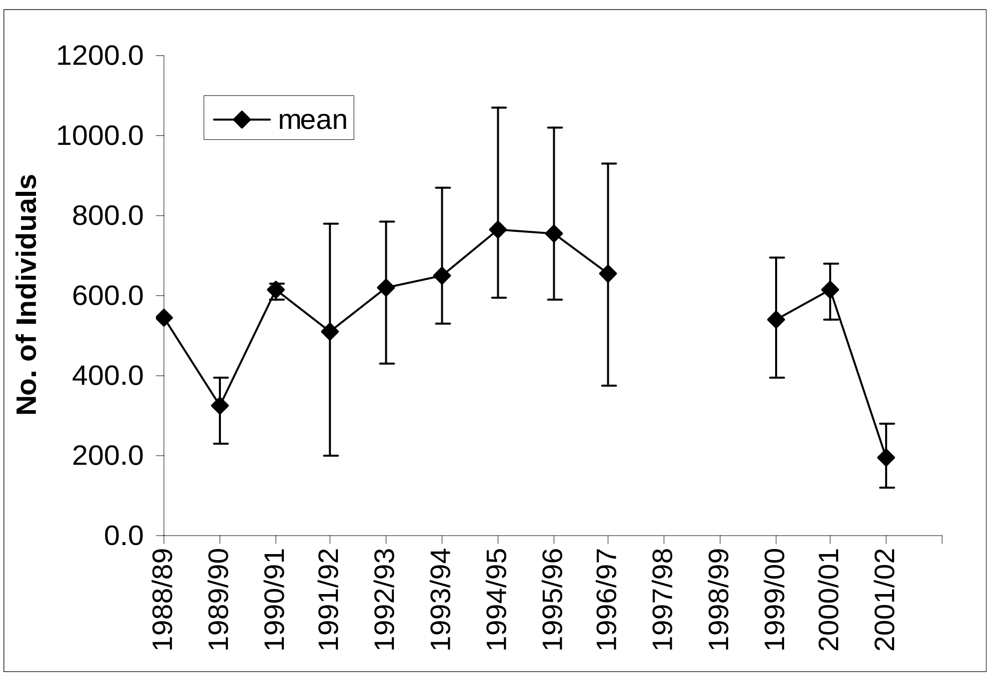

Figure 7. Number of wintering common eiders at Shemya Island, Alaska, 1988 to 2002.

Alaska Peninsula

Information on distribution, abundance, and trends of common eiders along the Alaska Peninsula are scarce or nonexistent. Small boat surveys of near-shore habitats were conducted for most islands on the south of the Alaska Peninsula between 1977 and 1983 (Bailey and Faust

1981); these provide indices of the size of the breeding populations. However, these are minimum population estimates, given the short time-span of the counts and limitations of the methodology. Maximum counts, summed for the most recent survey for all islands, totaled <100 common eiders for the Alaska Peninsula. No significant breeding populations have been noted by Alaska Maritime NWR staff from the late 1970's to recent years.

A shoreline-based aerial survey conducted from Umnak Island east to Wide Bay on the Alaska Peninsula, including Sanak and Shumagin Islands, during February and March 2000 recorded <400 common eiders, most of which were around Umnak and Unalaska Islands (Larned 2000).

Nelson Lagoon was reported to have more than 4000 breeding common eiders in the late 1950s (McKinney 1959), but less than 200 in the late 1970s (Gill et al. 1981). There are no reliable contemporary data on population size.

Kodiak archipelago

Few common eiders are believed to nest in the Kodiak archipelago, although comprehensive surveys have never been conducted. There are small flocks (<100 birds total) seen around Mary's Island (Women's Bay) and Village Islands (Uganik Bay); a few broods have been seen around these areas in August. A few pairs nest on small islands on the north side of Afognak and Shuyak Islands and pairs are sometimes seen around the islands near Ahkiok on the south end of Kodiak Island (D. Zwiefelhofer, personal communication).

Fewer than 200 common eiders winter in the Kodiak archipelago. Numbers in May and during winter are similar and it is conceivable that this is a resident population (D. Zwiefelhofer, personal communication). The counts of common eiders during late winter aerial surveys along the east coast of Kodiak in 1964, 2001, and 2002 were 64, 13, and 71 eiders, respectively (Larned and Zweifelhofer 1994, 2001, 2002)

Bering Sea Islands

Reliable or long-term trend data are nearly nonexistent for most of the Bering Sea islands. The Saint Lawrence Island breeding population of common eiders was estimated at about 3500 birds in 1961 (Fay 1961). During the 1961 survey, Fay noted highest nesting concentrations on Kooozata Lagoon islets, and many nonbreeders during summer in lagoons on the south and east coasts. The next and most recent survey was flown 13 July 1984 (King and Derksen 1986), during which 1188 common eiders were counted, most in Sekinak Lagoon.

A few (probably <100) common eiders reside at St. Matthew Island (Renner and Sowls 2005). Few if any nest at St. George and St. Paul Islands in the Bering Sea (Kent Sundseth, personal communication).

Information on numbers of breeding common eiders at Nunivak Island is limited and not comprehensive, collected opportunistically during surveys of other birds. The most recent observations include 65 nests on one island in Duchikthluk Bay in 2001 (Bowman and Balogh 2001).

Lower Cook Inlet and Kachemak Bay

Common eiders were reported to historically breed on Augustine Island (R. Baxter, Alaska Dept. Fish and Game, pers. comm.), and on Chisik and nearby Duck Island in 1977 (<100; Margaret Petersen, USGS, pers. comm.). However, no recent breeding data exists for Lower Cook Inlet.

Agler et al. (1995) estimated 4,547 (95% CI = 4,876) common eiders during winter in this area using a combination of ship and aerial surveys in 1994. Larned (2006) estimated an average of 583 (± 87.4 SE, range: 219-1118) Pacific common eiders wintering in the near-shore waters of lower Cook Inlet in 2003-2005 (Fig 8). However, these surveys did not include much potential common eider habitat further offshore.

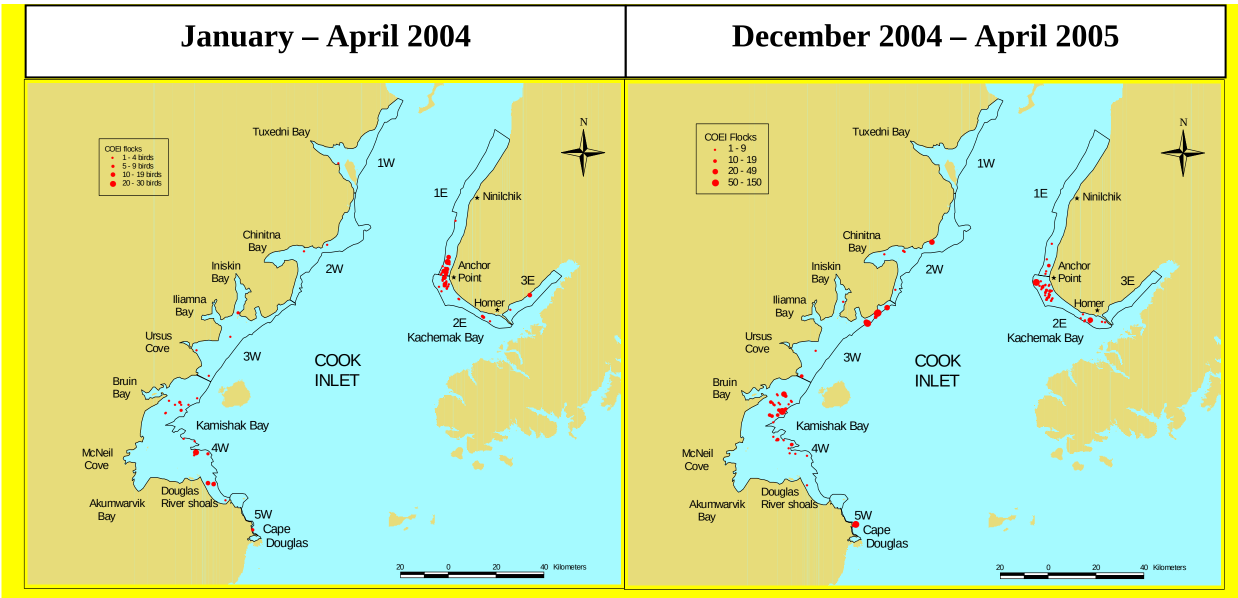

Figure 8. Distribution and relative flock sizes of common eiders observed during monthly Steller's eider aerial surveys, Cook Inlet, Alaska

Yukon-Kuskokwim Delta (YKD)

Aerial survey data from the Waterfowl Breeding Population and Habitat Survey (WBPHS) indicate a >90% local decline in breeding eiders on the YKD over the last 40 years (Hodges et al. 1996) (Fig. 9). Historically, eiders were not differentiated to species during this survey so there is some uncertainty about the relative magnitude of declines among the three eider species that nest there (common, spectacled, and Steller's), although it is certain that all populations have declined substantially. The proportion of Pacific common eiders may have ranged from 12 to 49% (depending on actual species composition; Stehn et al. 1993). However, if common eiders represented only 12% of historical counts, their estimated decline from early surveys to the present would still average >85%.

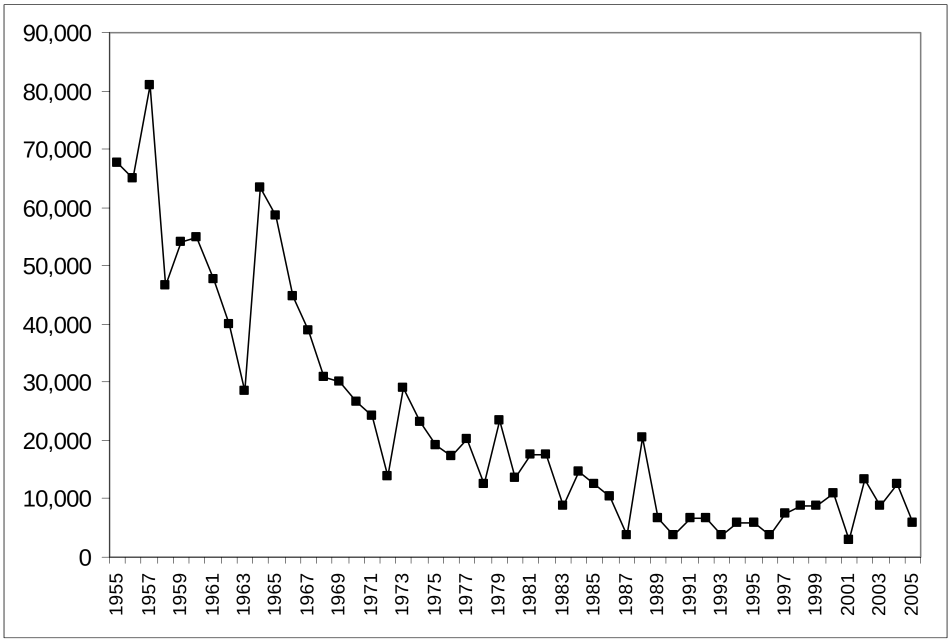

Figure 9. Index of eider abundance (species not differentiated) on the Yukon-Kuskokwim Delta, Alaska, 1957-2005 from Waterfowl Habitat and Breeding Population Survey flown in late May to early June.

Nest surveys have been conducted by ground crews on the YKD since 1985 (Fischer et al. 2005). This survey occurs in the coastal central zone of the YKD and samples the highest density common eider habitat on the YKD. Estimates of nests from this survey are expanded to the entire YKD coast based on the proportion of breeding pairs seen outside the ground-sampled area during the concurrent aerial survey. Approximately 2000-3000 common eiders (after correcting for undetected nests; Bowman and Stehn, unpublished data) nest on the YKD. Considering that not all common eiders attempt to nest, this translates to a *minimum* breeding population of 4000-6000 birds. The long term trend is relatively flat to slightly increasing (average annual growth rate of 2.5%) (Fig. 10).

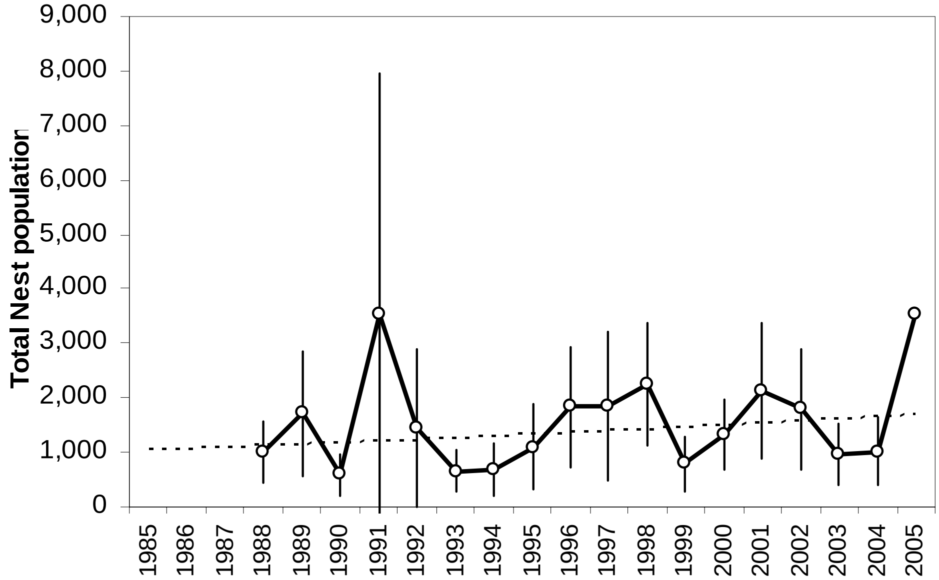

Figure 10. Estimates of common eider nest abundance on the coastal zone of the Yukon-Kuskokwim Delta, Alaska, 1985-2005, not adjusted for incomplete nest detection.

Common eiders have been recorded during an aerial survey of the coastal zone of the YKD since 1988 (Platte and Stehn 2005). This survey has yielded an index of 1600 birds, although this represents a minimum because not all birds are seen. The long-term increase in trend is about 4% (Fig. 11), although this is likely overestimated due to changes in timing of the aerial survey relative to nesting chronology (i.e., more males seen in earlier surveys in recent years). If the resulting bias in trend is similar to that observed for spectacled eiders in the same area, then the long term trend for common eiders is likely similar to that estimated by the nest plot survey.

The largest concentration observed during spring in this area was an estimated 19,975 common eiders in the shallow waters near the mouth of the southernmost channel of the Yukon River, on April 26, 1997 (Larned 1997).

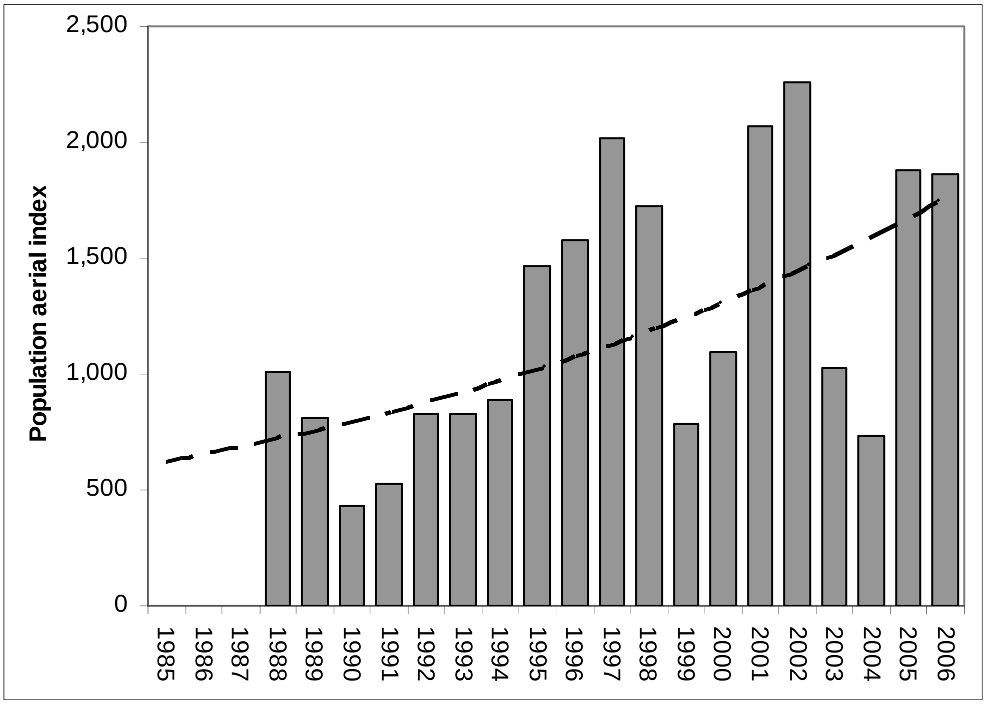

Figure 11. Population trend for Common Eiders (*Somateria mollissima*) observed by the right-rear-seat observer on aerial transects sampling 12,832 km^2 of the coastal Yukon-Kuskokwim Delta in western Alaska. The indicated total birds population index is the sum of birds observed as singles, an equal number of unseen single birds, birds in pairs, and all birds in flocks.

Seward Peninsula / Kotzebue Sound

King and Lensink (1971), using data from aerial surveys 1957-1970, estimated that 4900 eiders (species undifferentiated) breed on the Seward Peninsula. The greatest density of breeding birds occurred in 1973 colonies have been found in the Cape Espenberg area (Kessel 1989). Larned et al. (1992) estimated a breeding population of 24,459 (95% CI = 4387 - 44,532), but some of these birds may have been staging or non-breeding birds, thus inflating estimates of actual breeding birds associated with the area.

Nothing is known about the winter affinities of common eiders breeding on the Seward Peninsula

Alaska North Slope and Barrier Islands

Johnson and Herter (1989) estimated that 2000-3000 birds nest along the Alaskan Beaufort Sea coast. Recent aerial surveys (1999-2006) specifically targeting common eider in near shore waters and along barrier islands of the Arctic Coastal Plain indicated an average total of 2766 common eiders (range: 1353-4449 total birds), including an average of 937 pairs (range: 572-1340) (Fig. 12) (Dau and Larned 2006). Annual estimates of total birds from this survey are highly variable, possibly related to annual variability in ice conditions. Estimates of number of breeding pairs are less variable, indicating that the variability is driven by annual differences in the number of non-breeders. A ground search of barrier islands within the Arctic National

Wildlife Refuge, from Brownlow Point to Demarcation Point, was last done in 2003 and 2004, with 341 common eider nests counted (Kendall 2005).

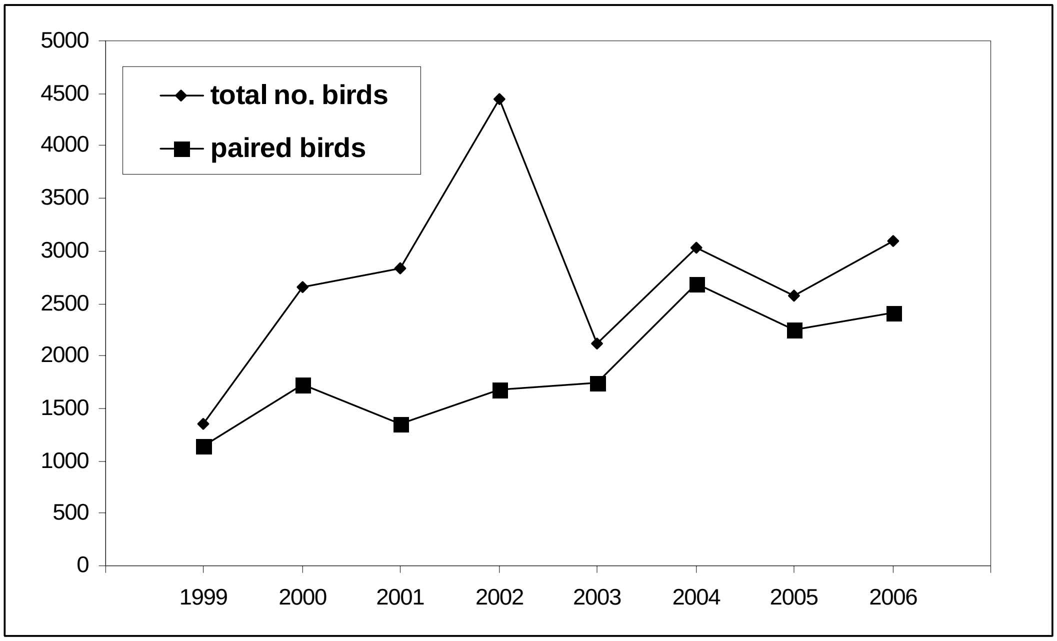

Figure 12. Number of paired and total number (paired plus flocked) of common eiders counted in near-shore waters and barrier islands of the Arctic Coastal Plain of Alaska, 1999-2006.

Common eiders are also counted during two other USFWS surveys – the Arctic Coastal Plain breeding pairs survey, and the North Slope Eider survey. Neither of these surveys includes the barrier islands off the coast, nor the coastal lagoons where most of the Alaska ACP birds nest. Both surveys (Figs 13 and 14) annual count an average of fewer than 200 common eiders.

Western Canadian Arctic

There is a paucity of information on breeding distribution and numbers of Pacific common eider in the western Canadian Arctic. Barry (1986) estimated a total of 81,500 breeders. Spring migration data from 1993 suggested a total Canadian population in excess of 100,000 birds (Alexander et al. 1997). This is consistent with estimates of spring migrants passing Point Barrow (Suydam et al. 2000; also see Fig. 15), which are composed largely of birds heading to Canada. That said, a summary of historical data on nesting in western arctic Canada, plus results of two years of surveys (breeding pair survey in 1995 and nest counts in 1996) in central arctic Canada (Coronation and Queen Maud gulfs) suggest there are much fewer (about 40,000) Pacific Common Eiders nesting in arctic Canada (Cornish and Dickson 1997, Dickson, unpubl. data). Presumably, most of the western Canadian population nests in areas that have not yet been surveyed, including the Coronation and Queen Maud gulfs. A 3-yr survey of eider nesting colonies in Bathurst Inlet (within Coronation Gulf) was begun in summer 2006.

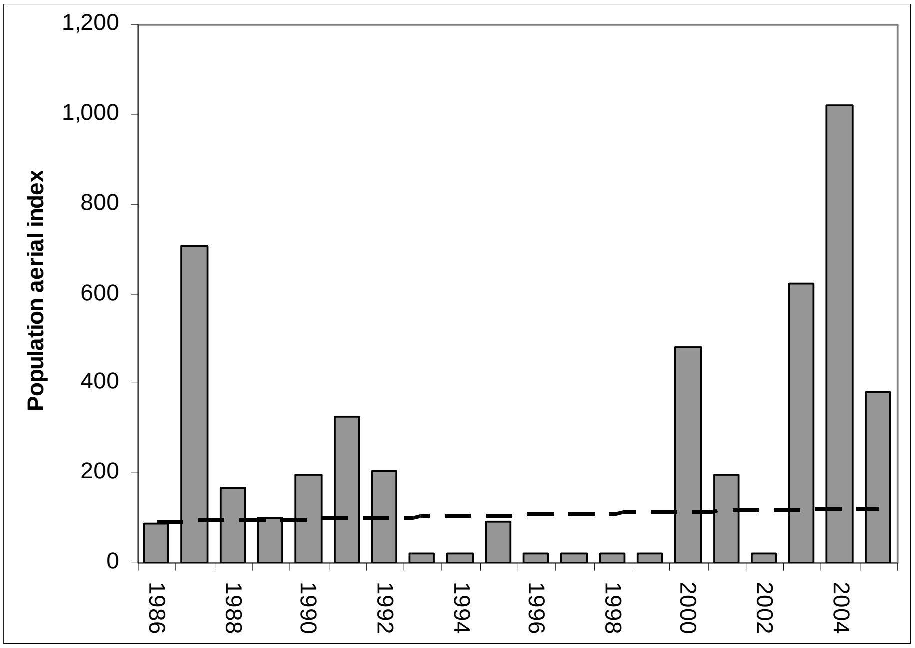

Figure 13. Population trend for Common Eiders (*Somateria mollissima*) observed on aerial transects flown in late June sampling 61,645 km^2 of the Arctic Coastal Plain in northern Alaska (aka ACP survey). The indicated total birds population index is the sum of birds observed as singles, an equal number of unseen single birds, birds in pairs, and all birds in flocks.

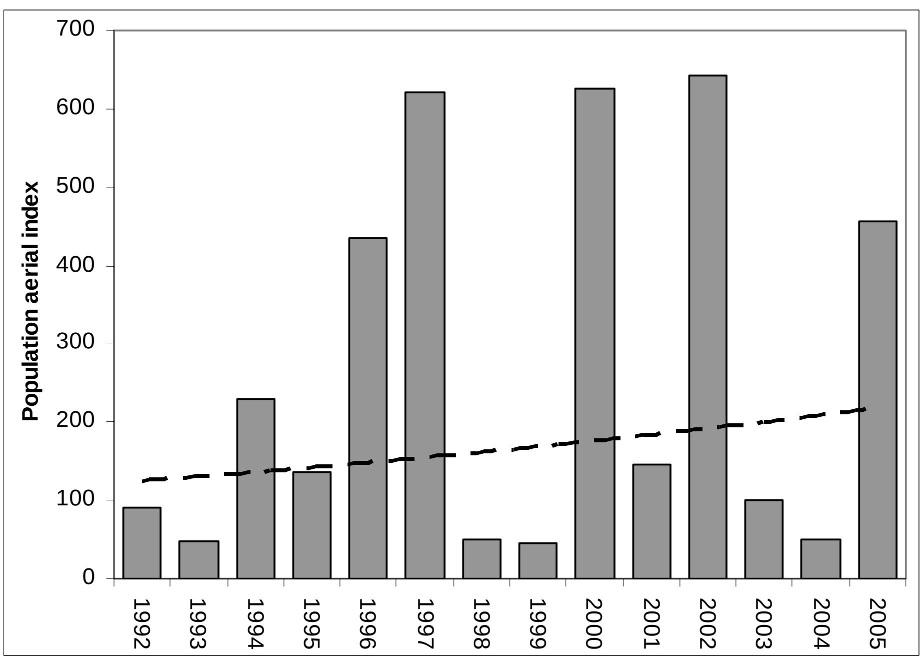

Figure 14. Population trend for Common Eiders (*Somateria mollissima*) observed on aerial transects flown in early June sampling 30,755 km^2 of the coastal portion of the North Slope in Alaska (aka North Slope eider survey). The indicated total birds population index is the sum of birds observed as singles, an equal number of unseen single birds, birds in pairs, and all birds in flocks.

Spring migration counts at Point Barrow, Alaska, which sample both Alaska ACP and western Canadian Arctic common eiders, indicate a decline of more than 50% between 1976 and 1996, from about 150,000 to 70,000 birds (Woodby and Divoky 1982, Suydam et al. 2000). A similar spring survey in 2003 (Robert Suydam, pers. comm..) estimated 119,809 (95% CI +/- 26,668) common eiders, suggesting that the Canadian Arctic and/or Alaska ACP populations have increased since the mid-1990s. The causes for declines are unknown and may occur outside the species breeding areas.

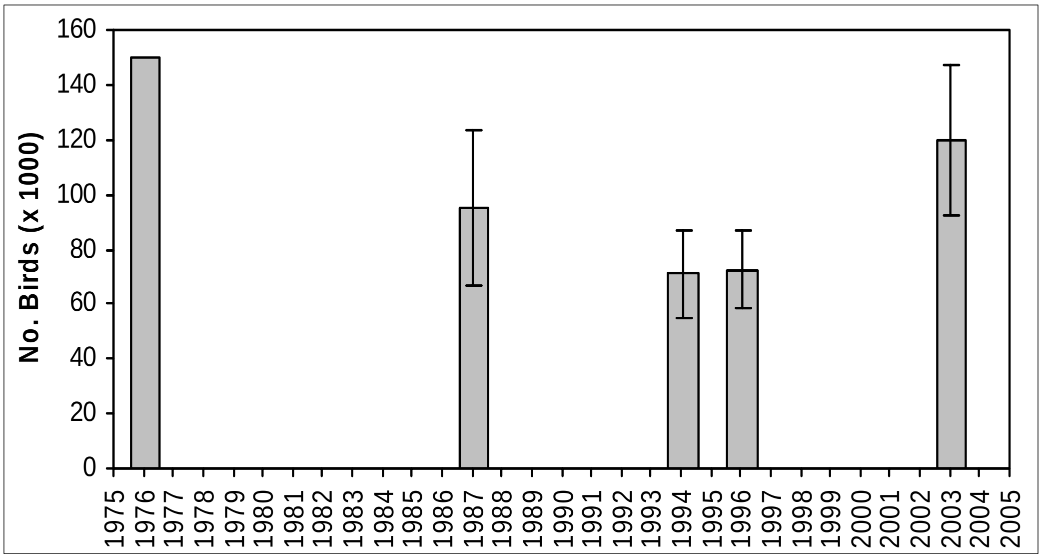

Figure 15. Numbers of Pacific common eider estimated passing Point Barrow, Alaska, during spring migration. (2003 data from Robert Suydam, pers. comm.)

Russia

Andreev (1997) estimated about 100,000 common eiders in Russia based on aerial surveys in the 1970s. More recently, Hodges and Eldridge (2001) estimated roughly 16,000 common eiders in eastern Russia (not adjusted for incomplete detection, which may well more than double that number). Most of the Russian Pacific common eiders inhabit Chukotka. Goudie et al. (2004) estimated that at least 20,000 Pacific common eiders inhabit Russia during summer.

LIMITING FACTORS

Potential or real limiting factors for Pacific common eider are numerous, including predation, subsistence and sport hunting, food limitations, competition with other species of birds or marine mammals, habitat degradation or loss, disturbance at breeding areas, lead and other contaminants, oil pollution, fishing by-catch, periodic extreme ice conditions, and effects of climate change. However, the relative importance of limiting factors is unknown. Like other

K-selected species, changes in adult survival of common eiders have the greatest potential to alter population growth rate.

Common eiders have a long generation time (time required for a given population to double in size; ~14 years), thus their population will respond slowly to positive natural and anthropogenic changes to the environment. However, a recent study of Pacific common eiders breeding on the YKD concluded that adult survival was high and spatially and temporally invariant, suggesting viable management strategies to increase current survival rates would be limited for this population (Wilson et al. 2006*a*). Wilson et al. (2006) also found no single mortality factor (including predation on breeding grounds, physiologic costs of reproduction, and wintering conditions) definitely explained variation in adult survival of YKD breeders. Nevertheless, hunting mortality (via subsistence, sport, and commercial harvest) is an important factor affecting common eider populations in many parts of their distribution (Goudie 2000), and likely results in additive mortality, it could have large effects on population dynamics.

Current data regarding Pacific common eider subsistence harvests (YKD only; Wentworth 2004) do not offer sufficient accuracy or precision to be useful in modeling effects of this harvest on variation in adult survival in resident common eiders. Because most subsistence hunting on the YKD takes place during spring migration, and the ultimate destination of those harvested birds is unknown, it is difficult to definitively show an effect of this hunting on the local nesting population. For example, migrating king eiders comprise a substantial portion of the local spring subsistence harvest (Wentworth 2004), yet there is no recorded nesting population of king eiders on the YKD. Similarly, an unknown portion of the harvested common eiders likely originate from other breeding populations. Further, it is possible that subsistence harvest of common eiders at other specific areas on the YKD may be elevated relative to our study sites, and this localized harvest mortality could introduce a source of geographic variation to adult survival rates. Without more information on the specifics of harvested individuals (i.e. age, sex, breeding population), or variation in localized hunting pressure, the true impact of subsistence harvest cannot be evaluated. Given the high annual survival rate of common eiders, spring subsistence harvest is likely to be additive mortality, and as such, likely has some currently inestimable negative effect on population dynamics.

Although proportionate changes in adult survival may have a much greater influence on population change than reproductive parameters, variation in reproduction may be responsible for year-to-year changes in population growth. (Hoekman et al. 2002, Wilson et al. 2006*d*). Thus, low and highly variable productivity components (particularly duckling survival) may represent the bottleneck to population growth. Increases to annual variability in reproduction could lead to decreases in the overall population size in a stochastic environment, just as reductions to adult survival will reduce growth. Population parameters of greatest concern are adult survival and duckling survival. Other important parameters include subadult survival and recruitment and age-specific fecundity rates,

Predation has been a major limiting factor for common eiders in the Aleutian Islands where foxes, introduced to most islands by the 1920s to establish a fur industry, preyed on adults and eggs and presumably drastically reduced eider and other seabird populations. Rats were also inadvertently introduced on some islands because of shipwrecks and importation of goods from ships, particularly during World War II. Removal of foxes from some islands (see Fig. 5) has demonstrated the potential rebound effect on population size. The effects of rats have not been quantified, but rat predation on eider nests has been documented (J.C. Williams, personal communication).

Results from initial population modeling of Pacific common eiders based on demographic data collected across 29 site-years on the YKD (Wilson et al. 2006*d*), suggests the stable age distribution for Pacific common eiders weighs heavily on experienced adult females (5+ years of age) and the YKD population appears to be stable to slightly increasing (population growth rate = 1.0002). The population appears as if it would respond most dramatically to changes in adult female survival, as the relative influence of adult survival was 13 times that of productivity (in terms of relative changes to population growth; (0.93 and 0.07 respectively). However, fluctuation in population growth was primarily explained by variation in reproductive parameters (78%); particularly nest success (64%). Thus, initial modeling results suggest that although proportional changes in survival may have a much greater influence on population change than reproductive parameters, variation in nest success may be responsible for year to year fluctuations in population growth (Wilson et al. 2006*d*).

Wilson et al. (2006*d*) suggest that in order to increase population growth rate, managers might focus on increasing mean adult survival and decreasing variability in annual nest success. However, despite high sensitivity of population growth rate to adult female survival, intensive management to increase adult survival would likely be difficult due to minimal local hunting pressure on eiders, logistical difficulties of managing wintering habitat, and low variation in adult survival. This suggests that management actions aimed at increasing nest success, or both nest success and survival (e.g., predator control), may be more practical.

In a more general preliminary Pacific common eider population model using composite data from all published common eider studies around the globe, Grand et al. (2006) also concluded that population growth rate was most sensitive to changes in adult survival and concluded that the long-term population growth rate of Alaska ACP Pacific common eiders was 0.865; indicative of a rapidly declining population. However, they caution that their projected growth rate did not actually have meaning, as the data did not come from an actual population, but were composite data from multiple populations. Finally, they encouraged future work examining 1) how vital rates vary over space and time and 2) periodicity in reproductive success in relation to environmental conditions (Grand et al. 2006).

The vulnerability and threats from oil contamination are increasing in parts of the range for Pacific common eider. Increased offshore oil and gas development on the Alaska ACP and MacKenzie River Delta have occurred and will likely increase again in the near future. Studies are underway in those areas to identify migration corridors, evaluate habitat use patterns, and assess the risk to eiders from oil spills or collisions with offshore structures (Petersen and Flint 2002, Dickson et al. 2003, 2005, Day et al. 2005). Oil pollution in the southern Beaufort Sea during spring migration could be devastating to common eiders (Alexander et al. 1997). Oil and gas leases in other parts of its range (e.g., Bristol Bay) may eventually put some populations at increased risk during certain periods of the year.

Studies of eiders throughout Alaska and the circumpolar region have indicated that exposure to contaminants, particularly hydrocarbons and heavy metals, could be a major threat to eider survival (Grand et al. 1998, Cochrane and Trust 1996, Elliot 1997, Flint et al. 1997). Sea ducks may be more susceptible to toxic accumulation of contaminants through their dependence on filter-feeding benthic invertebrates, use of industrialized marine areas, and exposure to lead and other anthropogenic inputs on terrestrial breeding grounds (Rainbow 1996, Henny et al 1995). Chronic oil contamination is a persistent threat to Pacific common eiders occupying marine shipping lanes and areas of off-shore oil development.

Lead (Pb) and selenium (Se) appear to be the most prevalent trace elements found in Pacific common eiders (Franson et al. 1995, Flint et al. 1997, Mallory et al. 2005). Lead poisoning has been identified as a threat to the survival of spectacled eiders in Alaska and has caused direct mortality of both Pacific common and spectacled eiders in Alaska (Franson et al. 1995, Flint et al. 1997). However, Pacific common eiders may be protected from high Pb exposure through their strategy of fasting during incubation and raising broods at sea, away from areas with accessible Pb shot (Flint et al. 1997, Wilson et al. 2006*b*). Pacific common eiders in Alaska appear to have elevated blood Se concentrations. Wilson et al. (2006*b*) found that all individuals sampled in their YKD study had detectable concentrations of Se (n = 383); most (81%) at concentrations associated with death in captive waterfowl. Further, apparent survival of adult females and probability of a nest containing ≥ 1 nonviable egg, were both positively related to blood Se concentrations in adult females (Wilson et al. 2006*b*).

There is considerable uncertainty in the relationships between populations and habitats. Most of the habitats used by common eiders outside the breeding season have not been adequately evaluated or quantified. For example, basic information about benthic communities and prey resources on wintering areas are lacking.

Potential effects of climate change are speculative at best. The low, somewhat transitory barrier islands used for nesting on the Alaska ACP and other low-lying coastal areas, such at the YKD, could be vulnerable to increased erosion caused by rising sea levels and an increase in the frequency and magnitude of storm events. With increased salt water intrusion changes to vegetation communities resulting in reduced critical habitat for coastal dwelling species, decreases to overall biodiversity may be expected (Baldwin and Mendelssohn 1998). Although increased flooding and changes to coastal wetlands could significantly alter critical staging, nesting, and brood-rearing habitats for Pacific common eiders, the importance of fresh water as a reproductive requirement remains largely unknown. Elevated salinity has been shown to adversely affect growth, development, and survival of common eider offspring (DeVink et al. 2005), but it may also affect nest site selection and overland movements of brood-rearing females (Dzus and Clark 1997, Stahl et al. 2002) thus having large scale effects on overall recruitment.

To understand the effects of climate change on coastal ecosystems and their inhabitants, long-term monitoring of important habitat variables will be necessary. Also, in addition to increased coastal flooding, a decrease in ice coverage in coastal lagoons could inhibit access to these islands by predators and result in increased breeding success and productivity. As climate change decreases ice cover in the Arctic, the increasing potential for the Beaufort Sea as a commercial shipping route will pose added risk to migrating and breeding eiders via oil spills and other contamination.

In addition to contaminants and habitat-change, over-harvesting by humans could be a significant factor in population declines. Common eiders are one of the few colonially nesting sea ducks, often nesting close to river and ocean shorelines where they are especially vulnerable to egg harvesting and hunting by humans. Pacific common eiders are harvested primarily in the spring by Aboriginal and Native people of northern communities, and to a small extent by sport hunters. In addition to birds, some eggs of common eider are also taken (Wentworth 2004). Pacific common eiders comprise an important part of the subsistence diet for native peoples in both Alaska and Canada and estimates suggest approximately 2500 individuals (about 4% of the population) are taken annually, with harvest split about equally between Alaska and Canada (Elliot 1997, Wentworth 2004, Fabijan et al. 1997). The degree of exploitation that common eider populations can withstand is unknown, however, based on estimates from the mid-1970s and mid-1990s, it appears that the harvest in the western Arctic (U.S. and Canada) is <5% of the population and is well below sustainable limits (Fabijan et al. 1997). The harvest of Pacific common eiders in eastern Russia probably numbers in the low thousands (Syroechkovski and Klokov 2005), and this harvest undoubtedly represents a mix of North American and Russian breeding birds that spend the winter there.

CONSERVATION STRATEGY

Population Objectives

Population objectives based on indices of abundance can not be established for Pacific common eider until an assessment of distribution and relative abundance is completed and appropriate management units are defined. Consequently, the highest priority actions should address these two information needs. Some progress has already been made in delineating possible populations or population segments, and reasonably reliable estimates of abundance and trend are available for two breeding areas in Alaska, namely the Yukon-Kuskokwim Delta and Arctic coastal plain.

Because of the wide geographic breeding range of Pacific common eider and the different environmental and biological influences on each population, the potential for increase in population size will undoubtedly vary among breeding areas due to both biological potential and to the feasibility of management actions in environments that are typically remote and pose unique logistical challenges.

Management Actions (actions necessary to attain population and/or information quality objectives –most of these descriptions require greater detail and will be prioritized later by a working group)

A. Definition of Populations

Justification: Satellite telemetry studies of Pacific common eider suggest geographic structuring within the population. Specifically, those breeding in the western Canadian Arctic and Alaska ACP seem similar in regard to wintering areas and habitats used. Common eiders marked on the YKD exhibited different migratory patterns and used different wintering areas. Although the Aleutian birds are presumed to be resident, there is currently no scientific support for that. Further, the Aleutians represent an immense area that, for management purposes, may contain subpopulations of common eiders. Information about temporal and geographic use throughout the species range is essential for appropriate design and interpretation of monitoring programs and management plans.

Specific actions:

A1. Identify links among breeding, molting, wintering, and staging areas of common eiders breeding on the Seward Peninsula

a. **Relative priority:** High
b. **Timeline:** FY07 and FY08
c. **Estimated costs:** $130,000
d. **Responsible parties:** USFWS MBM, SDJV, USGS

e. Programs available and/or needed to address issue: SDJV, USGS Science Support Program, logistical support from National Park Service (Bering Land Bridge) and/or Selawik NWR.

f. Feedback pathways to future strategy iterations: Information from satellite telemetry studies will identify wintering affiliations and seasonal habitat use for this population of breeding common eiders and help determine the geographic scale of management.

A2. Identify links among breeding, molting, wintering, and staging areas of common eiders breeding in the Aleutian Islands

a. Relative priority: High

b. Timeline: FY06 (efforts currently underway in western Aleutians), FY07, and FY08

c. Estimated costs: $200,000

d. Responsible parties: USFWS, USGS

e. Programs available and/or needed to address issue: Sea Duck Joint Venture, USFWS MBP Focal Species Strategy, USGS Science Support Program, logistical support from Alaska Maritime NWR.

f. Feedback pathways to future strategy iterations: Information from satellite telemetry studies will identify wintering affiliations and seasonal habitat use for this population of breeding common eiders and help determine the geographic scale of management.

B. Monitoring Abundance and Population Trends

Justification: Estimates of abundance and trend for Pacific common eiders are limited to a few populations or areas within the species range. Further, the quality of data, where they exist, is often questionable or the methods may involve untested assumptions. Consequently, population goals based on abundance or trend cannot be established until baseline information is obtained. Metrics used to evaluate population change will likely vary among regions or populations because of different survey platforms and methods applied throughout the species range. Given the immense range of the species and the logistical difficulties involved in working in these areas, monitoring will undoubtedly require different approaches that are logistically feasible and cost effective. In any case, estimates of population size provide not only reference points for future monitoring, but also a means of comparing similar counts done in the past.

Specific actions:

B1. Conduct periodic migration counts at Point Barrow

a. Relative priority: High

b. Timeline: Every 3-4 years

c. Estimated costs: $40,000 – 70,000 / year

d. Responsible parties: North Slope Borough, potential partnerships with Minerals Management Service, U.S. Fish and Wildlife Service, Canadian Wildlife Service, University of Alaska Fairbanks, Sea Duck Joint Venture, and oil and gas industry

e. Programs available and/or needed to address issue: North Slope Borough Wildlife Management Program, other funding from partners noted above.

f. Feedback pathways to future strategy iterations: This survey has been done several times since the 1970s and provides the only long term data on abundance for the largest component of the Pacific common eider population. It is a cost effective survey.

B2. Use of radar to improve population estimates of king and common eiders during migration past Point Barrow

a. **Relative priority:** High

b. **Timeline:** assuming surveys at 4-5-yr intervals, the next survey would be scheduled for spring 2008.

c. **Estimated costs:** $50-70,000/year in conjunction with migration counts (action B1)

d. **Responsible parties:** North Slope Borough, with possible funding and partnerships through USFWS, Minerals Management Service, Canadian Wildlife Service, Sea Duck Joint Venture, University of Alaska Fairbanks, and oil and gas industry

e. **Programs available and/or needed to address issue:** North Slope Borough Wildlife Management Program, other funding from partners noted above.

f. **Feedback pathways to future strategy iterations:** This survey has been done several times since the 1970s and provides the only long term data on abundance for the largest component of the Pacific common eider population. Although it is a cost effective survey, there is some uncertainty about the number of birds that go undetected due to environmental variables or because they migrate outside the observable area. Estimates of the potential bias would help strengthen this survey as a monitoring tool.

B3. Design and implement a new survey to evaluate status of common eiders on the Seward Peninsula with more precision than previous estimates

a. **Relative priority:** High

b. **Timeline:** Pilot survey attempted FY06, continue FY07 and FY08, repeat at least every few years.

c. **Estimated costs:** $14,000-18,000 / year

d. **Responsible parties:** USFWS Alaska Migratory Bird Management

e. **Programs available and/or needed to address issue:** USFWS Focal species strategy, with potential funding or other support from BLM, NPS, and oil and gas industry.

f. **Feedback pathways to future strategy iterations:** This survey would fill a void in distribution and abundance information and, when combined with other ongoing USFWS surveys, provide continuous survey coverage between the Canadian border and the YKD. It would provide a baseline for abundance and trends that could be used to help establish population objectives.

B4. Develop long-term monitoring plan for Aleutian Islands

a. **Relative priority:** High

b. **Timeline:** 2008-2012

c. **Estimated costs:** Unknown at this time. Alaska Maritime NWR could devise a plan in collaboration with Migratory Bird Management, testing it in the field as well as collecting baseline data in FY08. Costs would depend on the results. Approaches include near-shore boat or aerial surveys the spring before the birds start to lay or another estimating nesting pairs with land based surveys after incubation is underway.

d. **Responsible parties:** USFWS Alaska Maritime NWR, Region 7 Migratory Bird Management

e. **Programs available and/or needed to address issue:** USFWS Focal species strategy, with potential funding or other support from Alaska Maritime NWR, Region 7 Migratory

Bird Management, Sea Duck Joint Venture, or settlements from environmental damages funds.

f. Feedback pathways to future strategy iterations: There are no comprehensive or contemporary estimates for common eiders in the Aleutians. An Aleutian survey would provide a baseline for abundance and trend that could be used to help establish population objectives.

B5. Continue aerial and nest surveys on the Yukon-Kuskokwim Delta, Alaska

a. Relative priority: High

b. Timeline: annually

c. Estimated costs: $60-80K / year

d. Responsible parties: USFWS Alaska Migratory Bird Management, Yukon Delta NWR, USGS

e. Programs available and/or needed to address issue: USFWS Region 7 survey program, cooperation from research camps,

f. Feedback pathways to future strategy iterations: These surveys are linked and have provided indices of breeding and nest populations since 1988 and 1985, respectively. Although imprecise, they provide the best indication of population size and trend on the YKD and their continuation is critical to monitoring an important component of the Pacific common eider population.

B6. Continue breeding bird aerial survey of Alaska Arctic coastal plain barrier islands

a. Relative priority: High

b. Timeline: currently conducted annually

c. Estimated costs: $15,000 / year

d. Responsible parties: USFWS

e. Programs available and/or needed to address issue: USFWS Region 7 survey program, support from Refuges

f. Feedback pathways to future strategy iterations: This survey will help estimate the proportion of Alaska ACP common eiders in the Point Barrow eider migration count. Currently, the ACP barrier island survey estimates trend in indicated breeding pairs within the Alaska ACP population. Trends in total numbers of common eider are more variable probably due to annual variation in extent of sea ice which may short-stop Canadian Arctic birds in some years. Ground-based surveys by Arctic NWR may help evaluate how well aerial survey estimates correlate with actual breeding effort.

B7. Develop a long-tern monitoring survey for breeding areas in western arctic Canada

a. Relative priority: High

b. Timeline: Initial 3-yr survey by helicopter of one of the core breeding areas for Pacific common eiders was funded via SDJV in FY06 and will be repeated in FY07 and FY08; recommend surveys in 3 or every 6 years, but will depend on funding

c. Estimated costs: $85,000 / year ($100,000 including in-kind salaries)

d. Responsible parties: CWS, with potential funding or other support from Sea Duck Joint Venture, USFWS, Polar Continental Shelf Project

e. Programs available and/or needed to address issue: USFWS Focal species strategy, Sea Duck Joint Venture, with potential support from partners noted above

f. Feedback pathways to future strategy iterations: Aerial breeding pair surveys in 1995, followed by nest counts in 1996 were conducted in much of what is currently thought to be the breeding range in Canada. Based on results of these earlier surveys, a core breeding area was selected for long-term monitoring. Although annual surveys would be ideal, the logistical challenges and high cost of surveying in arctic Canada will likely result in less frequent surveys

C. Develop Population Model

Justification: Population growth is dependent upon rates of productivity and survival and the variation in these rates; especially in regards to age or stage classes (e.g., subadults, adults) within the population. Population models provide a tool for understanding the relationship between vital rates and their relative influence on population change, or their contribution to fluctuations in population growth. Moreover, models can identify critical data gaps, provide recommended areas of future study, and allow examination of potential effects of management or other perturbation.

Specific actions:

C1. Develop a generic population model for Pacific common eiders

- **a. Relative priority:** High
- **b. Timeline:** Fall 2006
- **c. Estimated costs:** $0 (this is nearly completed via Heather Wilson's dissertation)
- **d. Responsible parties:** USGS, USFWS, UAF, Barry Grand (Auburn University)
- **e. Programs available and/or needed to address issue**: UAF Ph.D. Dissertation
- **f. Feedback pathways to future strategy iterations:** Population model currently under development for YKD common eiders (Wilson et al. 2006 – Dissertation) which can be used as a general outline for breeding common eiders. This model can then be modified for use with other Alaskan populations as their specific demographic rates become available.

C2. Estimate missing population model parameters for YKD population: age-specific vital rates, duckling survival, and recruitment to the breeding population.

- **a. Relative priority:** High
- **b. Timeline:** 3-5 years
- **c. Estimated costs:** $50-100,000 / year
- **d. Responsible parties:** USFWS MBM, Yukon Delta NWR, ASC
- **e. Programs available and/or needed to address issue:** Use established long-term monitoring sites (Kigigak Island and Tutakoke River, Yukon Delta NWR) to continue duckling banding, mark-recapture of adult females, and multi-year duckling survival (to 30-days of age) work, to obtain estimates of variation in duckling and adult female survival, age-specific vital rates, as well as breeding propensity, and recruitment to the breeding population.
- **f. Feedback pathways to future strategy iterations:** Once all parameters in the Pacific common eider population model have been filled (preferentially with age-specific estimates), the potential effects of management and other perturbations can be examined.

C3. Estimate population model parameters for other populations of Pacific common eiders (e.g., Aleutians, Alaska north slope, western Canada):

- **a. Relative priority:** High

b. Timeline: FY08 and beyond

c. Estimated costs: $50-150,000 /site/ year

d. Responsible parties: USGS, CWS, USFWS, Arctic NWR

e. Programs available and/or needed to address issue: Cooperative Research Units, Sea Duck Joint Venture, Alaska national wildlife refuge biological inventories

f. Feedback pathways to future strategy iterations: Once all parameters in the Pacific common eider population model have been filled (preferentially with age-specific estimates), the potential effects of management and other perturbations can be examined.

D. Enhance production and survival during breeding season

Justification: Although proportionate changes in survival may have a much greater influence on population change than reproductive parameters, variation in reproduction may be responsible for year to year changes in population growth. Thus, low and highly variable productivity components (particularly duckling survival) may represent the bottleneck to population growth. Adult female survival during the breeding season is likely lower than during the remainder of the year (Milne 1963, Flint et al. 1998).

D1. Deployment of artificial nest structures in appropriate locations (e.g., free of mammalian predators, brood-rearing habitat not limiting)

a. Relative priority: Low

b. Timeline: unknown

c. Estimated costs: $2000-5000 initial investment, additional maintenance and monitoring costs in subsequent years

d. Responsible parties: USFWS MBM and Refuges, potential involvement of local communities (e.g., Kachemak Bay)

e. Programs available and/or needed to address issue: Challenge Grants, Sea Duck Joint Venture, restoration funds from environmental damage settlements

f. Feedback pathways to future strategy iterations: Construction, maintenance, and monitoring of artificial nest structures will help evaluate the potential for increase in nesting populations and an assessment of whether nesting habitat is limiting.

D2. Continue fox removal and monitoring on selected Aleutian islands

a. Relative priority: High

b. Timeline: ongoing

c. Estimated costs: $10,000 / year

d. Responsible parties: USFWS Alaska Maritime NWR

e. Programs available and/or needed to address issue: Challenge Grants, Sea Duck Joint Venture, restoration funds from environmental damage settlements

f. Feedback pathways to future strategy iterations: Fox removal may hold the greatest potential for direct management of common eiders and for increasing breeding populations. Fox removal efforts are mostly done, so monitoring response is currently more important.

D3. Remove rats from eider nesting islands where appropriate

a. Relative priority: Medium

b. Timeline: ongoing

c. Estimated costs: $millions / year

d. Responsible parties: USFWS Alaska Maritime NWR

e. Programs available and/or needed to address issue: Challenge Grants, Sea Duck Joint Venture, restoration funds from environmental damage settlements

f. Feedback pathways to future strategy iterations: Rats are predators of nesting common eiders and their eggs, although the extent of predation is not well quantified. Removal of rats from selected islands would likely increase breeding populations.

D4. Prevention of rat infestations on rat-free islands used by common eiders

a. Relative priority: High

b. Timeline: ongoing

c. Estimated costs: $35,000 / year to maintain current shipwreck response program; more if there is actually a response.

d. Responsible parties: USFWS Alaska Maritime NWR

e. Programs available and/or needed to address issue: Challenge Grants, Sea Duck Joint Venture, restoration funds from environmental damage settlements

f. Feedback pathways to future strategy iterations: Rats are predators of nesting common eiders and their eggs. Prevention of rat infestations would protect remaining rat-free habitats and help to ensure healthy populations.

D5. Control foxes and avian predators on the Yukon-Kuskokwim Delta

a. Relative priority: Medium

b. Timeline: FY06 to FY10 (current timeline for evaluation projects targeting brant and spectacled eiders)

c. Estimated costs: $50,000 - 80,000 / year for ongoing evaluation studies on brant and spectacled eiders; perhaps $100,000 -150,000 / year for actual implementation depending on study design

d. Responsible parties: USFWS, USGS, Yukon Delta NWR

e. Programs available and/or needed to address issue: Yukon Delta NWR, USGS Science Support Program

f. Feedback pathways to future strategy iterations: This action requires a carefully designed study plan to enable an evaluation of effectiveness. There are ongoing studies to evaluate the effectiveness of predator control on brant and spectacled eiders on the YKD. Potential for increasing common eiders is not known but it is assumed there would be some benefit to common eiders if predator control is shown to benefit spectacled eiders.

E. Harvest Estimation and Management

Justification: Information on hunting mortality is usually derived from harvest surveys and band recoveries. However, few Pacific common eiders have been banded and alternative methods have been necessary to estimate harvest. Further, current national and regional harvest surveys do not provide reliable estimates of sea duck harvest. Most hunting of Pacific common eider is subsistence harvest. Estimates of subsistence harvest have been derived by periodic, directed studies in specific locales and by more systematically sampling rural communities (Wentworth 2004). Typically, estimates of subsistence harvest in most areas are either old, biased, imprecise, or lacking for some areas.

E1. Improve estimates of eider harvest in Russia

a. Relative priority: Low
b. Timeline: None yet
c. Estimated costs: Unknown
d. Responsible parties: USFWS, probably in cooperation with Russia universities, conservation organizations, or contractors.
e. Programs available and/or needed to address issue: USFWS international programs, CAFF, Sea Duck Joint Venture
f. Feedback pathways to future strategy iterations: More accurate estimates of eider harvest in Russia will help evaluate the relative importance of limiting factors for the Alaska north slope and western Canadian breeding populations that winter in Russia.

E2. Improve estimates of subsistence harvest in Alaska and western Canada

a. Relative priority: Low
b. Timeline: unknown
c. Estimated costs: unknown
d. Responsible parties: AMBCC, ADFG subsistence division, CWS and Inuvialuit Wildlife Management Advisory Council, regional organizations
e. Programs available and/or needed to address issue: AMBCC and ADFG sponsored subsistence harvest surveys
f. Feedback pathways to future strategy iterations: Better estimates of the size and harvest and characterization of harvest will help evaluate whether management of subsistence harvest is a desired management option to increase common eider populations in these areas

E3. Reduce harvest of common eider breeding population on Alaska Arctic coastal plain and Yukon-Kuskokwim Delta

a. Relative priority: Low
b. Timeline: unknown
c. Estimated costs: unknown
d. Responsible parties: USFWS, AMBCC, ADFG, Association of Village Council Presidents
e. Programs available and/or needed to address issue: Develop harvest restrictions in cooperation with AMBCC and regional partners
f. Feedback pathways to future strategy iterations: Conditional on outcome of action E2 (above). If warranted by results of E2, this action has the potential to directly improve survival of breeding birds from specific areas.

F. Contaminants and Disease

Justification: There is general concern about contamination of benthic foods in northern areas. Contaminants, including lead, cadmium, selenium, and mercury (Henny et al. 1995), may cause lethal or sublethal effects that result in poor survival or reproductive success.

F1. Reduce exposure to lead / Promote and enforce use of lead shot in coastal areas

a. Relative priority: Medium
b. Timeline: annually for 10+ years
c. Estimated costs: highly variable, depending on techniques - $5,000-100,000 /year

d. Responsible parties: USFWS
e. Programs available and/or needed to address issue: Refuge RITs, Steel shot clinics, Outreach education, support of lead-shot related law enforcement, Endangered species program, specifically spectacled eider recovery plan and associated recovery tasks.
f. Feedback pathways to future strategy iterations: Annually evaluate: (1) Number of lead-shot tickets/infractions, (2) Number participants in steel-shot clinics, (3) Number of classroom and community outreach presentations and approximate attendance.

F2. Examine exposure to avian cholera, avian influenza, and other communicable diseases.
a. Relative priority: Low
b. Timeline: 1-5 years
c. Estimated costs: unknown at this time
d. Responsible parties: State & Federal Wildlife Agencies, University researchers, Private businesses, Alaska Sea Life Center
e. Programs available and/or needed to address issue: Avian Influenza sampling, disease monitoring programs NWHC and ASLC, University disease research programs
f. Feedback pathways to future strategy iterations: Evaluate prevalence of diseases in Pacific common eiders as a whole, as well as in specific populations. Assess potential impacts on population dynamics and overall status.

F3. Determine physiological effects of selenium on common eiders
a. Relative priority: Low
b. Timeline: 1-2 years
c. Estimated costs: $50,000 – 100,000 / year
d. Responsible parties: NWHC, USGS, USFWS, ASLC, University researchers
e. Programs available and/or needed to address issue: NWHC and USGS have established field and laboratory research examining selenium in eiders.
f. Feedback pathways to future strategy iterations: Lethal and sublethal effects of selenium, particularly when combined with other trace elements (e.g., mercury) are not well understood for common eiders or other sea ducks. Dosing studies on captive birds would yield insight into these effects and enable better interpretation of selenium levels observed in wild common eiders and other sea ducks.

F4. Determine sources of selenium exposure
a. Relative priority: Low
b. Timeline: 1-2 years
c. Estimated costs: $25,000 / year
d. Responsible parties: NWHC, USGS, USFWS, ASLC, University researchers
e. Programs available and/or needed to address issue: NWHC and USGS have established field and laboratory research examining Selenium in eiders, but sources should be determined using field sampling of potential prey items and sediment from known feeding areas.
f. Feedback pathways to future strategy iterations: Determine prevalence of naturally available Selenium and model potential effects on populations.

F5. Determine prevalence and effects of acanthacephalan (and other) parasite loads

- **a. Relative priority:** Low
- **b. Timeline:** 1-2 years
- **c. Estimated costs:** $25,000 / year
- **d. Responsible parties:** NWHC, USGS, USFWS, ASLC, University researchers
- **e. Programs available and/or needed to address issue:** ASLC, NWHC
- **f. Feedback pathways to future strategy iterations:** The larval form of many parasites are often found in lower quality prey items (including non-native species), and evidence of prey-switching, or reliance on lower quality foods may indicate a larger ecological problem. Evaluate prevalence and effects on reproduction and survival (especially duckling survival).

F6. Examine interaction between selenium, lead, and fasting in laboratory common eiders

- **a. Relative priority:** Low
- **b. Timeline:** 1-2 years
- **c. Estimated costs:** $10,000-35,000 / year
- **d. Responsible parties:** NWHC, USGS-ASC, USFWS, ASLC, University researchers
- **e. Programs available and/or needed to address issue:** captive laboratories equipped with dive tanks, etc. as at the ASLC and NWHC.
- **f. Feedback pathways to future strategy iterations:** Determine tolerances and toxicity thresholds and interactions between elements in live birds and use effect-estimates to model potential impacts on reproduction and survival.

G. Habitat Evaluation and Management

Justification: Habitats used by common eiders seasonally have not been adequately described and the threats to many of their habitats are unknown.

G1. Characterize and quantify benthic communities in seasonally important use areas

- **a. Relative priority:** Medium
- **b. Timeline:** unknown
- **c. Estimated costs:** $80,000-200,000 ?
- **d. Responsible parties:** USFWS, USGS, universities
- **e. Programs available and/or needed to address issue:** NPRB studies, endangered species program
- **f. Feedback pathways to future strategy iterations:** No data currently exist on the quality or quantity of benthic communities upon which common eiders rely, but we do know that certain areas are seasonally more important than others to common eiders. An assessment of trends in habitat quality and food resources cannot be made without such baseline information.

G2. Further investigate possible correlation between sea otter and eider abundance in the Aleutians

- **a. Relative priority:** Low
- **b. Timeline:** unknown
- **c. Estimated costs:** unknown
- **d. Responsible parties:** USFWS Alaska Maritime NWR, USGS,
- **e. Programs available and/or needed to address issue:** National Science Foundation

f. **Feedback pathways to future strategy iterations:**

G3. Examine changes in barrier island nesting habitat: erosion, succession of vegetation, water chemistry, invertebrate communities

a. **Relative priority:** Low
b. **Timeline:** 3-10 years
c. **Estimated costs:** $10,000-500,000 / year
d. **Responsible parties:** USGS, USFWS, University researchers, Arctic NWR
e. **Programs available and/or needed to address issue:** Research related to avian population response to ecological change along the Arctic Coastal Plain is currently being conducted by USGS-ASC focusing on the molting geese in the Teshekpuk lake area. Other related projects might involve analysis of remote sensing data and time-series of physical landscape data. Arctic NWR ground-based surveys will help characterize nesting habitat on barrier islands and evaluate vulnerability of nesting habitat to coastal erosion.
f. **Feedback pathways to future strategy iterations:** Model potential impacts of habitat change on nesting, brood-rearing, molting, and staging habitats and subsequent changes in distribution and abundance of common eiders.

G4. Build predictive model of potential impacts to nesting and wintering habitats due to climate change.

a. **Relative priority:** Low
b. **Timeline:** 3-10 years
c. **Estimated costs:** $10,000-500,000 / year
d. **Responsible parties:** USGS, USFWS, University researchers
e. **Programs available and/or needed to address issue:** Research related to avian population response to ecological change along the Arctic Coastal Plain is currently being conducted by USGS-ASC focusing on the molting geese in the Teshekpuk lake area. Other related projects might involve analysis of remote sensing data and time-series of physical landscape data.
f. **Feedback pathways to future strategy iterations:** Model potential impacts of habitat change on nesting, brood-rearing, molting, and staging habitats and subsequent changes in distribution and abundance of common eiders.

G5. Near-shore wetland salinity changes (due to increased tidal flooding) and effects on duckling growth and survival.

a. **Relative priority:** Low
b. **Timeline:** 5-15 years
c. **Estimated costs:** $200 - $5000 / year
d. **Responsible parties:** USFWS–MBM, USGS-ASC
e. **Programs available and/or needed to address issue:** USFWS-MBM is currently conducting salinity monitoring on the YK Delta. Both field and laboratory studies of effects of salinity on reproductive habitat use and duckling growth and survival would be necessary. Possible field sites include Kigigak Island, Hock Slough, and Tutatkoke River field camps, while the ASLC and NWHC could provide facilities for captive studies.
f. **Feedback pathways to future strategy iterations:** Incorporate estimated changes and effects of salinity into predictive population and climate-change models.

G6. Evaluate risk to oil exposure in high use areas in the marine environment

- **a. Relative priority:** Low
- **b. Timeline:** Unknown at this time
- **c. Estimated costs:** Unknown at this time
- **d. Responsible parties:** USFWS Ecological Services, Migratory Bird Management, and Contaminant programs, oil and gas industry
- **e. Programs available and/or needed to address issue:** Unknown at this time
- **f. Feedback pathways to future strategy iterations:** A few site-specific studies have been done to evaluate risk to oil spills, but not necessarily in high use areas for common eider. USFWS survey data has been used to evaluate risk to marine birds in near-shore and offshore waters off Alaska's arctic coastal plain. Satellite telemetry has provided information on temporal use of near-shore marine areas.

H. Land Ownership and Protection

Justification: Much of the land where common eiders breed in the Aleutian Islands and YKD is currently under the jurisdiction of the U.S. Fish and Wildlife Service as Refuge lands and thus is relatively well protected. Some areas of the ACP are within the Arctic National Wildlife Refuge. Opportunities for additional protection may include the acquisition of or conservation measures on native-owned lands, consideration of eider values in land swap deals, and conservation designations on terrestrial or marine areas of significance to eiders. Further education of land managers about common eiders will result in better informed land-use decisions.

H2. Reduce habitat destruction and disturbance through education on effects of ATVs on eider breeding habitats on YKD and ACP

- **a. Relative priority:** Medium
- **b. Timeline:** FY07 and beyond
- **c. Estimated costs:** unknown
- **d. Responsible parties:** Yukon Delta NWR, AVCP, Arctic NWR
- **e. Programs available and/or needed to address issue:** Unknown at this time
- **f. Feedback pathways to future strategy iterations:** Unknown at this time

EVALUATING ACCOMPLISHMENTS

Projects initiated under this Action Plan will be tracked in the USFWS Migratory Bird Program project database. This database captures actions initiated by non-USFWS partners as well.

The North American Waterfowl Management Plan established the Sea Duck Joint Venture (SDJV) with a goal of reversing the declines observed in many sea duck species, including Pacific common eider. The SDJV provides opportunities for research and funding. Projects funded or endorsed by the SDJV are tracked to evaluate accomplishments and progress toward improving the status of sea duck species. Annual progress reports on studies are posted at seaduckjv.org.

This Action Plan will be continually revised as new information becomes available and as more thorough reviews of the Plan are completed.

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APPENDICES

Appendix 1. Summary of Pacific common eider demographic parameters.

Demographic parameter	Summary Estimates[a]	Source	Location
Age at first breeding	2-3 years old	Goudie et al. 2000	Across world-range
Age at last breeding	?	Unknown	-
Non-breeding probability	0.22*	Coulson 1984	Scotland
Clutch size	4.3 – 7.2	Schamel 1977, Seguin 1981, Byrd 1992, Wilson et al. 2006*c*	Alaska
Nesting success	0 – 0.99	Schamel 1977, Seguin 1981, Wilson et al. 2006*c*	Alaska
Egg Hatchability	0.9 – 0.97*	Robertson and Cook 1993	Hudson Bay, Canada
Duckling survival	0.19	Flint et al. 1998	YKD, Alaska
Fledging success	?	Unknown	-
Recruitment	0.14 - 0.18*	Coulson 1984 Christensen 1999	Scotland Denmark
Adult female survival	0.89	Wilson et al. 2006*a*	Alaska
Adult male survival	?	Unknown	-
Subadult survival	0.73 – 0.90*	Coulson 1984 Christensen 1999	Scotland Denmark
Immigration	?	Unknown	-
Emmigration	?	Unknown	-

* = unknown for Pacific common eiders, location of estimates indicated in source information.

Appendix 2. Summary of Pacific common eider clutch size estimates and associated standard errors.

Location	Clutch size	SE	Source
Barrier Islands, Alaska arctic coastal plain	4.9 – 5.6	1.1	Schamel 1974
	?	?	Noel et al. 2002
	?	?	Flint et al. 2003
	3.5	0.13	Kendall 2005
Cape Espenberg, Alaska	4.3 – 7.2	0.25	Seguin 1981
Yukon Kuskokwim Delta, Alaska	4.40 - 6.14	0.03	Wilson et al. 2006*c*
Aleutian Islands, Alaska	4.6	0.05	Various refuge unpublished reports
Canada??	?	?	Lynn Dickson ??

Appendix 3. Estimates of common eider breeding abundance in the Aleutian Islands, Alaska Peninsula, and Bering Sea islands. Counts are for adult birds of either sex and and were made during the breeding season.

Island Name	Region[1]	Survey Type[2]	Most Recent Count	Population Estimate	Reference
Adak	C	a	1980	625	AMNWR 81/02
Amatignak	C	a	1977	0	AMNWR 78/11
Amchitka	C	b,d	1973	1500	R212
Amlia	C	a	1982	372	Bailey, E.P. and J.L. Trapp field notes
Amtagis	C	a	1982	0	Bailey, E.P. and J.L. Trapp field notes
Anagaksik	C	a	1980	2	AMNWR 81/02
Asuksak	C	a	1980	25	AMNWR 81/02
Atka	C	a	1982	245	Bailey, E.P. and J.L. Trapp field notes
Aziak	C	a	1980	30	AMNWR 81/02
Bobrof	C	a	1977	15	AMNWR 78/11
Box	C	a	1980	0	AMNWR 81/02
Castle	C	a	1977	3	AMNWR 78/11
Chugul	C	a	1980	35	AMNWR 81/02
Davidof	C	a	2004	149	AMNWR 04/06
Dinkum Rocks	C	a	1977	0	AMNWR 78/11
Egg-Atka	C	a	1982	0	Bailey, E.P. and J.L. Trapp field notes
Fenimore Rock	C	a	1980	0	AMNWR 81/02
Gareloi	C	a	1977	0	AMNWR 78/11
Great Sitkin	C	a	1980	220	AMNWR 81/02
Igitkin	C	a	1980	86	AMNWR 81/02
Ikiginak	C	a	1980	0	AMNWR 81/02
Ilak	C	a	1977	0	AMNWR 78/11
Kagalaska	C	a	1980	75	AMNWR 81/02
Kanaga	C	a	1977	120	AMNWR 78/11
Kanu	C	a	1980	25	AMNWR 81/02
Kasatochi	C	a	1982	0	Bailey, E.P. and J.L. Trapp field notes
Kavalga	C	a	1977	50	AMNWR 78/11
Khvostof	C	a	2004	34	AMNWR 04/06
Kiska	C	a	1978	19	AMNWR 79/02
Kiska	C	a	2004	2382	AMNWR 04/06

Appendix 3 (cont'd). Estimates of common eider breeding abundance in the Aleutian Islands, Alaska Peninsula, and Bering Sea islands. Counts are for adult birds of either sex and were made during the breeding season.

Island Name	Region[1]	Survey Type[2]	Most Recent Count	Population Estimate	Reference
Koniuji	C	a	1982	8	Bailey, E.P. and J.L. Trapp field notes
Little Kiska	C	a	2004	166	AMNWR 04/06
Little Sitkin	C	a	2004	7	AMNWR 04/06
Little Tanaga	C	a	1980	100	AMNWR 81/02
Ogliuga	C	a	1977	150	AMNWR 78/11
Oglodak	C	a	1980	8	AMNWR 81/02
Pyramid	C	a	2004	22	AMNWR 04/06
Rat	C	a	2004	765	AMNWR 04/06
Sadatanak	C	a	1982	32	Bailey, E.P. and J.L. Trapp field notes
Sagchudak	C	a	1982	45	Bailey, E.P. and J.L. Trapp field notes
Seguam	C	b	1982	0	Bailey, E.P. and J.L. Trapp field notes
Segula	C	a	2004	26	AMNWR 04/06
Semisopochnoi	C	a	1977	0	AMNWR 78/11
Skagul	C	a	1977	15	AMNWR 78/11
Tag	C	a	1977	0	AMNWR 78/11
Tagadak	C	a	1980	35	AMNWR 81/02
Tagalak	C	a	1980	40	AMNWR 81/02
Tanadak - Amlia	C	a	1982	5	Bailey, E.P. and J.L. Trapp field notes
Tanadak- Delarof	C	a	1977	1	AMNWR 78/11
Tanadak-Rat	C	a	1978	2	AMNWR 79/02
Tanaga	C	a	1982	67	AMNWR 83/20
Tanaklak	C	a	1980	30	AMNWR 81/02
Tidgituk	C	a	1982	12	AMNWR 83/20
Twin	C	a	1977	0	AMNWR 78/11
Ugidak	C	a	1977	0	AMNWR 78/11
Ulak-Delarof	C	a	1977	30	AMNWR 78/11
Ulak-Great Sitkin	C	a	1980	25	AMNWR 81/02
Umak	C	a	1980	250	Pers. Com. Jeff Williams 2006
Unalga	C	a	1977	0	AMNWR 78/11
Whip	C	a	1982	26	AMNWR 83/20
Adugak	E	a	1980	0	AMNWR 82/17
Aiktak	E	a	1980	2	AMNWR 82/17

Appendix 3 (cont'd). Estimates of common eider breeding abundance in the Aleutian Islands, Alaska Peninsula, and Bering Sea islands. Counts are for adult birds of either sex and were made during the breeding season.

Island Name	Region[1]	Survey Type[2]	Most Recent Count	Population Estimate	Reference
Akun	E	a	1980	2	AMNWR 82/17
Akutan	E	a	1980	35	AMNWR 82/17
Amukta	E	a	1982	21	Bailey, E.P. and J.L. Trapp field notes
Ananiuliak	E	a	1980	143	AMNWR 82/17
Avatanak	E	a	1980	1	AMNWR 82/17
Baby- Adokt	E	a	1980	25	AMNWR 82/17
Baby- Auklet	E	a	1980	0	AMNWR 82/17
Baby- Excelsior	E	a	1980	500	AMNWR 82/17
Baby- Koschekt	E	a	1980	0	AMNWR 82/17
Baby- Tangagm	E	a	1980	3	AMNWR 82/17
Black Cape Islets - Umnak	E	a	1980	0	AMNWR 82/17
Bogoslof	E	d	2005	5	Pers. Com. Jeff Williams 2006
Breadloaf	E	a	1980	0	AMNWR 82/17
Cape Izigan	E	a	1981	4	AMNWR 82/17
Cape Morgan Islet	E	a	1980	0	AMNWR 82/17
Carlisle	E	a	1982	11	Bailey, E.P. and J.L. Trapp field notes
Chagulak	E	a	1982	0	Bailey, E.P. and J.L. Trapp field notes
Chuginadak	E	a	1982	67	Bailey, E.P. and J.L. Trapp field notes
Derbin	E	a	1980	0	AMNWR 82/17
Derbin Islets	E	a	1980	6	AMNWR 82/17
Dushkot	E	a	1980	0	AMNWR 82/17
Egg - Fox Islands	E	a	1980	0	AMNWR 82/17
Emerald	E	a	1981	147	AMNWR 82/17
Herbert	E	a	1982	1	Bailey, E.P. and J.L. Trapp field notes
Hog Island/Captain's Bay	E	a	1980	0	AMNWR 82/17
Huddle Rocks	E	a	1981	29	AMNWR 82/17
Kagamil	E	a	1982	63	Bailey, E.P. and J.L. Trapp field notes
Kaligagan	E	a	1980	1	AMNWR 82/17
Kaligagan Islets	E	a	1980	0	AMNWR 82/17
Kigul	E	a	1980	21	AMNWR 82/17
Kigul Islets	E	a	1980	112	AMNWR 82/17
Kisselen/Erskine Bay Islets	E	a	1981	0	AMNWR 82/17

Appendix 3 (cont'd). Estimates of common eider breeding abundance in the Aleutian Islands, Alaska Peninsula, and Bering Sea islands. Counts are for adult birds of either sex and were made during the breeding season.

Island Name	Region[1]	Survey Type[2]	Most Recent Count	Population Estimate	Reference
North Island - Akun Strait	E	a	1980	0	AMNWR 82/17
Ogangen	E	a	1981	29	AMNWR 82/17
Ogchul	E	a	1980	0	AMNWR 82/17
Pancake Rocks - Umnak	E	a	1980	26	AMNWR 82/17
Peter	E	a	1981	0	AMNWR 82/17
Poa	E	a	1980	0	AMNWR 82/17
Puffin - Trident Bay	E	a	1980	0	AMNWR 82/17
Pustoi	E	a	1980	36	AMNWR 82/17
Rootok	E	a	1980	0	AMNWR 82/17
Round - Ugamak	E	a	1980	0	AMNWR 82/17
Round - Unalaska	E	a	1980	0	AMNWR 82/17
Sedanka	E	a	1981	49	AMNWR 82/17
Tanaskan	E	a	1980	0	AMNWR 82/17
Tangik	E	a	1980	0	AMNWR 82/17
Tanginak	E	a	1980	0	AMNWR 82/17
The Pillars - Umnak	E	a	1980	0	AMNWR 82/17
Three Is. Bay Islets-Unalaska	E	a	1981	0	AMNWR 82/17
Tigalda	E	a	1980	10	AMNWR 82/17
Ugamak	E	a	1980	1	AMNWR 82/17
Uliaga	E	a	1982	0	Bailey, E.P. and J.L. Trapp field notes
Unalaska	E	d	2005	750	Pers. Com. Jeff Williams 2006
Unalga	E	a	1980	50	AMNWR 82/17
Vsevidof	E	a	1980	148	AMNWR 82/17
Wislow	E	a	1981	0	AMNWR 82/17
Yunaska	E	a	1982	10	Bailey, E.P. and J.L. Trapp field notes
Anguvik	P	a	1979	0	R84
Atkins-Shumagin	P	a	2001	0	AMNWR 01/06
Atkulik Island	P	a	1979	0	R84
Big Koniuji-Shumigan	P	a	2001	0	AMNWR 01/06
Big Koniuji-Shumigan	P	a	1976	6	AMNWR 93/24
Bird-Shumagin	P	a	2001	0	AMNWR 01/06

Appendix 3 (cont'd). Estimates of common eider breeding abundance in the Aleutian Islands, Alaska Peninsula, and Bering Sea islands. Counts are for adult birds of either sex and were made during the breeding season.

Island Name	Region[1]	Survey Type[2]	Most Recent Count	Population Estimate	Reference
Brother Island	P	a	1979	0	R84
Cape Ikti	P	a	1979	0	R84
Castle Rock-Shumigan	P	a	2001	0	AMNWR 01/06
Chankliut Island	P	a	1979	0	R84
Chernabura-Shumagin	P	a	2001	0	AMNWR 01/06
Dora-Sanak	P	a	1983	0	AMNWR 83/03
Gull Island	P	a	1979	0	R84
Gunboat-Sanak	P	a	1983	0	AMNWR 83/03
Haystack Rock-Sanak	P	a	1983	0	AMNWR 83/03
Herendeen-Shumagin	P	a	2001	0	AMNWR 01/06
Inner Iliasik-Pavlofs	P	a	1983	0	AMNWR 83/03
Kak Island	P	a	1979	0	R84
Kumlik Island	P	a	1979	0	R84
Lida-Sanak	P	a	1983	0	AMNWR 83/03
Little Koniuji-Shumigan	P	a	1993	0	AMNWR 93/24
Mary-Sanak	P	a	1983	0	AMNWR 83/03
Mitrofania Island	P	a	1979	0	R84
Murie-Shumagin	P	a	2001	0	AMNWR 01/06
Nakchamik Island	P	a	1979	0	R84
Pauloff Harbor-Sanak	P	a	1983	0	AMNWR 83/03
Petersen-Sanak	P	a	1983	0	AMNWR 83/03
Poperechnoi-Pavlofs	P	a	1983	2	AMNWR 83/03
Poperechnoi-Pavlos	P	a	1990	0	AMNWR 01/06
Sandman Reef Islands	P	a	1978	0	R67
Seal Cape	P	a	1979	0	R84
Simeonof-Shumagin	P	a	2001	0	AMNWR 01/06
Simeonof-Shumagin	P	a	1960	2	AMNWR 93/24
Sisters-Sanak	P	a	1983	0	AMNWR 83/03
Spitz Island	P	a	1979	0	R84
Sutwik Island	P	a	1979	0	R84
Telemitz-Sanak	P	a	1983	0	AMNWR 83/03
Ukolnoi-Pavlofs	P	a	1983	0	AMNWR 83/03

Appendix 3 (cont'd). Estimates of common eider breeding abundance in the Aleutian Islands, Alaska Peninsula, and Bering Sea islands. Counts are for adult birds of either sex and were made during the breeding season.

Island Name	Region[1]	Survey Type[2]	Most Recent Count	Population Estimate	Reference
Ulma-Sanak	P	a	1983	0	AMNWR 83/03
Unavikshak Islands	P	a	1979	0	R84
Wosnesenski-Pavlofs	P	a	1983	0	AMNWR 83/03
Agattu	W	a	1979	2500	AMNWR 80/16
Alaid	W	a,c	1984	878	AMNWR 86/09
Attu	W	a	1979	11000	AMNWR 80/16
Buldir	W	a	1979	100	AMNWR 80/16
Hammerhead	W	a	1979	50	AMNWR 80/16
July	W	a	1979	10	AMNWR 80/16
Lie	W	a	1979	0	AMNWR 80/16
Lotus	W	a	1979	50	AMNWR 80/16
Nizki	W	a,c	1984	1800	AMNWR 86/09
Shemya	W	a	1979	500	AMNWR 80/16
St. Matthew	NB	b,d	1977	75	R173
St. George	NB	d		5	Pers. Com. Kent Sundseth
St. Paul	NB	d		5	Pers. Com. Kent Sundseth

[1]Region – W=Western Aleutians, C=Central Aleutians, E=Eastern Aleutians; P=Alaska Peninsula, and NB = northern Bering Sea

[2]Survey Type- a. Water - Complete Circumnavigation b. Water - Incomplete Circumnavigation c. Land - Island wide d. Land - Island portion

Appendix 4. U.S. Fish and Wildlife Service's focal species strategy for migratory birds – fact sheet.

The U.S. Fish and Wildlife Service's Focal Species Strategy for Migratory Birds

Measuring success in bird conservation

Beginning in 2005, the Migratory Bird Program of the U.S. Fish and Wildlife Service (Service) is initiating a new strategy to better measure its success in achieving its bird conservation priorities and mandates. The Service remains committed to landscape-scale, integrated bird conservation for the full array of species of management concern, and has developed the focal species strategy to provide the increased accountability required from all federal agencies. The focal species strategy involves campaigns for selected species to provide explicit, strategic, and adaptive sets of conservation actions required to return the species to healthy and sustainable levels.

Background
The USFWS's Migratory Bird Program Strategic Plan 2004-2014 "A Blueprint for the Future of Migratory Birds" (Strategic Plan) describes the mandates, mission, vision, and operating principles which are the foundation of the Service's bird conservation activities. In 2004, the Office of Management and Budget (OMB) evaluated the Program using the Program Assessment Rating tool (PART) and recommended that the Program develop stronger performance measures to evaluate its activities. In response, the Program developed a goal of increasing the percent of species of migratory birds that are at healthy and sustainable levels.

The emphasis on performance (changing the status of bird species) requires specific accounting of Program actions. The strategy accepted by OMB was for the Service to focus on a small set of species already identified as being of management concern in order to document and demonstrate the depth and breadth of management challenges faced by the Service and its conservation partners. Although the focal species strategy targets particular species, the Service must work to ensure that the status of other species does not decline. Since the performance goal for the Service is a net increase in the percent of migratory bird species at healthy and sustainable levels, the Service will maintain existing commitments while using the focal species strategy to more tightly link Service activities to measurable outcomes.

Selection of Focal Species
The list of Birds of Management Concern (BMC) described in the Strategic Plan is a subset of the species protected by the Migratory Bird Treaty Act that pose special management challenges due to a variety of factors. The Service will place priority emphasis on these birds during the next ten years. The BMC list consists of 412 species, subspecies, or populations out of a total of over 900 bird species found in North America. [See http://migratorybirds.fws.gov/mbstratplan/GPRAMBSpecies.pdf] This list reflects the results of extensive consultations with partners and processes and criteria established over many years. It is dynamic and will be revised as new informatin concerning species status is available.

From the Birds of Management Concern, a team of representatives from across the Program identified species that meet at least one of the following five characteristics: 1) high conservation need, 2) representative of a broader group of species sharing the same or similar conservation needs, 3) high level of current Program effort, 4) potential to stimulate partnerships, and 5) high likelihood that factors affecting status can realistically be addressed. Considering a combination of characteristics possessed by the species, status of management planning, and expert opinion, and with due consideration to external factors that might affect, either positively or negatively, the Service's ability to enhance migratory bird populations, the team identified 139 focal species to receive heightened attention over the short term, with recommendations on the order that they be addressed.

Fiscal Year 2005/2006 Focal Species
The Service has launched campaigns for the Pacific population of Common Eider (*Somateria mollissima*), the Laysan Albatross (*Diomedea immutabilis),* Black-footed Albatross (*Diomedea nigripes),* King Rail (*Rallus elegans),* Snowy Plover (*Charadrius alexandrinus;* excluding the Endangered Pacific coast populations), Long-billed Curlew (*Numenius americanus*), American Woodcock (*Scolopax minor*), Cerulean Warbler (*Dendroica cerulea),* and Painted Bunting (*Passerina ciris*). Focal species campaigns will entail compilation or identification of comprehensive management/conservation documents into an action plan (a species-specific mix of monitoring, research, assessment, habitat and population management, and outreach) necessary to accomplish desired status; a clear statement of the responsibilities for actions within and outside the Program; a focus of Service resources on implementing those actions; and communications to solicit support and cooperation from partners inside and outside the Service.

Partner Support
The engagement of partners and stakeholders is essential for creation and implementation of action plans and for existing work in support of maintaining or increasing the number of species of migratory birds at healthy and sustainable levels. Contact the Regional Migratory Bird Offices or the Division of Migratory Bird Management for more information on the focal species strategy and the focal species campaigns now underway.

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November 2005

RECOMMENDED USFWS MIGRATORY BIRD PROGRAM FOCAL SPECIES[1] -- AUGUST 2005

Greater White-fronted Goose (Tule)
Emperor Goose
Snow Goose (Wrangel Island)
Snow Goose (Lesser)
Brant (Atlantic)
Brant (Black)
Canada Goose (Southern James Bay)
Canada Goose (N. Atlantic population)
Canada Goose (Resident populations)
Cackling Goose (Cackling)
Canada Goose (Dusky)
Trumpeter Swan (Interior)
Trumpeter Swan (Rocky Mountain)
Wood Duck
American Wigeon
American Black Duck
Mallard
Mottled Duck
Northern Pintail
Greater Scaup
Lesser Scaup
Steller's Eider
Spectacled Eider
Common Eider (Pacific)
Common Eider (Atlantic)
Surf Scoter
White-winged Scoter
Black Scoter
Long-tailed Duck
Red-throated Loon
Yellow-billed Loon
Laysan Albatross
Black-footed Albatross
Short-tailed Albatross
Herald Petrel

Black-capped Petrel
Hawaiian Petrel
Christmas Shearwater
Townsend's Shearwater (Newell's)
Audubon's Shearwater
Ashy Storm-Petrel
Band-rumped Storm-Petrel
Tristram's Storm-Petrel
Brown Pelican
Double-crested Cormorant
Red-faced Cormorant
Lesser Frigatebird
Reddish Egret
Swallow-tailed Kite
Ferruginous Hawk
Peregrine Falcon
Yellow Rail
Black Rail
Clapper Rail
King Rail
Sandhill Crane
Whooping Crane
American Golden-Plover
Snowy Plover[2]
Wilson's Plover
Piping Plover
Mountain Plover
American Oystercatcher
Black Oystercatcher
Black-necked Stilt (Hawaiian)
Upland Sandpiper
Bristle-thighed Curlew
Long-billed Curlew
Hudsonian Godwit
Bar-tailed Godwit

Marbled Godwit
Red Knot (Atlantic)
Dunlin (Arctic)
Buff-breasted Sandpiper
American Woodcock
Wilson's Phalarope
Red-legged Kittiwake
Gull-billed Tern
Caspian Tern
Elegant Tern
Common Tern
Arctic Tern
Least Tern (Interior)
Least Tern (California)
Aleutian Tern
Black Tern
Blue-gray Noddy
Marbled Murrelet
Kittlitz's Murrelet
Xantus's Murrelet
Cassin's Auklet
Least Auklet
Whiskered Auklet
White-crowned Pigeon
Band-tailed Pigeon
Mourning Dove
Black-billed Cuckoo
Yellow-billed Cuckoo
Ferruginous Pygmy-Owl
Burrowing Owl
Short-eared Owl
Northern Saw-whet Owl
Red-headed Woodpecker
Yellow-bellied Sapsucker
Red-cockaded Woodpecker

Gilded Flicker
Olive-sided Flycatcher
Buff-breasted Flycatcher
Loggerhead Shrike
Gray Vireo
Florida Scrub-Jay
Brown-headed Nuthatch
Sedge Wren
Bicknell's Thrush
Wood Thrush
Bendire's Thrasher
Sprague's Pipit
Golden-winged Warbler
Blackpoll Warbler
Cerulean Warbler
Elfin-woods Warbler
Prothonotary Warbler
Swainson's Warbler
Bachman's Sparrow
Grasshopper Sparrow
Baird's Sparrow
Henslow's Sparrow
Le Conte's Sparrow
Saltmarsh Sharp-tailed Sparrow
Seaside Sparrow
Smith's Longspur
Chestnut-collared Longspur
McKay's Bunting
Painted Bunting
Bobolink
Tricolored Blackbird
Eastern Meadowlark
Rusty Blackbird
Audubon's Oriole

[1] This list includes 139 species (and subspecies and managed populations) of birds that fall into one or more of the following five categories of concern: 1) Endangered or Threatened under the Endangered Species Act; 2) non-game birds that have been determined to be of conservation concern due to declining populations and other factors (as published in Birds of Conservation Concern 2002 -- see http://migratorybirds.fws.gov/reports/BCC02/BCC2002.pdf); 3) game-birds that are below desired condition; 4) game-birds that are at or above desired condition; and 5) birds that are considered superabundant in part or all of their range and thus potentially damaging to natural ecosystems or human interests. Species in shaded cells have been selected for the initial campaigns under the strategy to satisfying PART Long-term Goal 1 (i.e., action plans in place by end of FY06).

[2] except Pacific Coast populations (Listed under ESA).