Kittlitz's Murrelet
(*Brachyramphus brevirostris*)
Conservation Action Plan

U.S. Fish and Wildlife Service
Migratory Bird Management
Nongame Program
Anchorage, Alaska

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A draft for review by the Kittlitz's Murrelet Technical Committee

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EXECUTIVE SUMMARY

Kittlitz's murrelet (*Brachyramphus brevirostris*) is a small, diving seabird in the Alcid family. This species is very rare. It breeds only in certain coastal areas of Alaska and in lower numbers in northeastern Siberia and on the Kurile Islands in the Russian Far East. Populations of this non-colonial seabird are geographically clustered and currently small in size. In Alaska, Kittlitz's murrelet primarily occurs in four regions: the northern fjords of Southeast Alaska, coastal areas of Southcentral Alaska, Aleutian Islands, and Alaska Peninsula. However, smaller unmonitored populations exist in northwest Alaska and the Kittlitz's murrelet occurs in all waters of Alaska at some time during the year, including the Beaufort and Chukchi seas.

The world population of Kittlitz's murrelet was recently estimated to be 16,694 birds, ranging between 8,114 and 28,179. In Alaska, recent surveys have indicated severe population declines (75-90%) at several locations since the 1980s. Long-term monitoring surveys have been concentrated in Prince William Sound, Kenai Fjords and Glacier Bay, with more recent monitoring surveys (since 2001) occurring in Kachemak Bay, the Aleutian Islands, and Icy Bay. The first survey in Icy Bay was conducted in 1992.

In response to documented declines, the U.S. Fish and Wildlife Service implemented the following actions: placed the species on the USFWS, Birds of Conservation Concern List in 2002; listed the Kittlitz's murrelet as a candidate species under the Endangered Species Act in 2004 with a Listing Priority Number of 5 (69 FR 24875); selected the species as a USFWS, Focal Species in 2005; upgraded the Endangered Species Listing Priority Number from 5 to 2 in 2008, stating that the threats to the species remained high in magnitude and had increased from non-imminent to imminent (72 FR 69038).

The Kittlitz's Murrelet Conservation Action Plan was developed as part of the U.S. Fish and Wildlife Service, Migratory Bird Program's Focal Species Strategy (Appendix 1). This strategy was initiated to focus on a small number of bird species, already identified as being of management concern by the Service, to more tightly link Service activities to measurable outcomes.

For the purposes of this Action Plan, the target population includes only Kittlitz's murrelet populations within Alaska. This Plan reviews the natural history, population status and trends, legal and priority status, known and suspected limiting factors, and identifies preliminary management actions for consideration to improve the status of this species.

In 2009 a Kittlitz's Murrelet Technical Committee (KMTC) was formed under the Pacific Seabird Group (PSG). The committee will revise and prioritize monitoring and conservation actions, beginning with meetings to occur in December, 2009 and at the PSG meeting in February of 2010. In addition, PSG and the KMTC will be sponsoring a symposium on the 'Population Status and Trends of Kittlitz's Murrelet' at the February, 2010 meeting, and the proceedings will be published in the journal 'Marine Ornithology' in winter of 2010/2011. It is anticipated that the symposium and working groups will influence the final activities and priorities outlined in this action plan.

Preliminary management actions include:

1. Expand survey coverage throughout Alaska to determine the full range and population size of Kittlitz's murrelets.

2. Increase surveys and research (i.e., using remote tracking devices) to determine seasonal movements and identify areas and habitats important to murrelets in the non-breeding season.

3. Continue monitoring efforts of key populations, and expand monitoring to other important areas as determined necessary. Because of extensive overlaps in range, habitat use, and life history, monitoring efforts should include the closely related marbled murrelet.

4. Collaboration with Alaska Department of Fish and Game, National Oceanic and Atmospheric Administration (NOAA), and fishers to test gillnet fishing gear or methods to reduce bycatch mortality of Kittlitz's murrelet.

5. Work with and educate the tourist industry and recreational boaters on the need to minimize speed and reduce disturbance to Kittlitz's murrelet in fjords with tidewater glaciers in Alaska, or fjords with known populations of Kittlitz's murrelets.

6. Work with Alaska Department of Environmental Conservation and their project partners to initiate consideration of oil spill risks to Kittlitz's murrelet when developing new, and reviewing old, Oil Spill Response Strategies.

7. Collaborate with universities, and State and Federal agencies to fill data gaps in Kittlitz's murrelet biology, particularly reproductive success, adult survival, habitat selection at sea and on land, and feeding ecology.

8. Work with the international community to assess the potential risk to Kittlitz's murrelets from pelagic driftnet fisheries in the northwest Pacific beyond the 200 nautical mile limit.

9. Protect known foraging areas and prey from direct or indirect detrimental effects on habitats and prey populations, including impacts from commercial fishing and oil and gas exploration or transport.

10. Work with climate change studies to incorporate Kittlitz's murrelet data into models of climate change impacts and mitigation effects.

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INTRODUCTION

Legal and Priority Status

Kittlitz's murrelet (Kittlitz's) obtained candidate status for listing under the federal Endangered Species Act (69 FR 24875) on May 4, 2004. Originally, this species was listed as a candidate with a Listing Priority Number of 5. In 2007, new survey information supported and strengthened the negative population trend estimates that had been previously reported (USFWS 2005). Based on this observed population trajectory and the severity of threats, U.S. Fish and Wildlife Service now considers the threats to this species to be not only high in magnitude, but imminent. This change in the Kittlitz's status necessitated a modification in the listing priority number from 5 to 2. A Listing Priority Number 5 reflects threats to a species that are high in magnitude, but not imminent; whereas a Listing Priority Number 2 indicates threats that are high in magnitude and imminent. In December 2008, the Service reviewed the Kittlitz's murrelet candidate status (Federal Register /Vol. 73, No. 238/December 10, 2008) and decided to retain the candidate listing, but not to list the species as threatened or endangered.

The International Union for Conservation of Nature and Natural Resources (IUCN) considers Kittlitz's murrelets critically endangered (BirdLife International 2005). NatureServe categorizes Kittlitz's murrelets as Globally Imperiled (G2; NatureServe 2005) and the National Audubon Society has listed Kittlitz's murrelet as one of "the top ten most endangered birds in the country."

Alaska Department of Fish and Game received a petition from the Center for Biological Diversity (CBD) on March 10, 2009 to list the Kittlitz's murrelet as an Endangered Species under Alaska Endangered Species Statutes (AS 16.20.180-16.20.210). In April of 2009, the State of Alaska denied listing Kittlitz's murrelet as endangered, stating that "there is insufficient information to determine that the range-wide numbers of Kittlitz's murrelets have decreased to such an extent as to indicate that its continued existence is threatened at this time, as would be required to list a species under Alaska statutes."

Rationale for Selection as a USFWS Focal Species

Limited Distribution, Low Numbers, and Population Declines

A large percentage of Kittlitz's murrelet's range is restricted to Alaska. Historically, this species has never been considered abundant, although accounts from the 1970s suggest that it was the most abundant seabird in some areas of the northern Gulf of Alaska (Islieb and Kessel 1973). Considering the current low global population estimate, any decline in numbers should be cause for concern. Available information indicates population declines in Alaska of up to 18% per year over much of its range (Kuletz et al. 2003b). The population estimate for Alaska is approximately 18,000 birds, having declined 74-90% during the past 10-20 years (Kissling et al. 2005, Kuletz et al. 2003b, Robards et al. 2003, Speckman et al. 2005, Van Pelt and Piatt 2003, Drew and Piatt 2008).

Threats

Threats to Kittlitz's murrelet are global, ongoing, and increasing. Climate change impacts are more pronounced and altering marine habitats more at a faster rate in Alaska and other northern regions compared to southern regions. Specifically for Kittlitz's murrelets, warming climates are accelerating glacial retreat, which may cause detrimental habitat changes for Kittlitz's murrelets. Population declines occurring in areas relatively free of direct anthropogenic disturbance suggest these populations are being driven downward by oceanographic and climatological phenomena. Documented ongoing threats to Kittlitz's murrelets include oil spills and incidental take in commercial fisheries. Furthermore, tour boat traffic probably disturbs Kittlitz's murrelets while the birds forage during the nesting season (Agness 2006, Agness et al. 2008).

To determine the reasons for population declines, we will need more information about nesting behavior, nesting and foraging habitat, food availability, foraging behavior, winter habitat, and anthropogenic disturbance.

Spatial Extent of Action Plan

The Kittlitz's Murrelet Conservation Action Plan covers Alaska only. The Plan addresses the four regions in Alaska where Kittlitz's murrelets primarily occur: 1) Southeast Alaska, 2) Southcentral Alaska, 3) the Aleutian Islands, and 4) the Alaska Peninsula. It also includes recent information from Barrow, Kodiak Island, and Alaska's pelagic waters.

Action Plan Objectives

The Kittlitz's Murrelet Conservation Action Plan has five primary objectives:
1). Synthesize the current state of knowledge about Kittlitz's murrelet.
2). Identify important sites for Kittlitz's murrelet conservation throughout their annual cycle.
3). Identify known and potential threats to develop conservation actions needed to address them.
4). Identify information needs critical to strategic conservation.
5). Facilitate collaboration among organizations and agencies addressing Kittlitz's murrelet conservation.

DESCRIPTION OF TARGET POPULATION

Species Description

Kittlitz's murrelet (*Brachyramphus brevirostris*; Vigors 1829) is a diving seabird and is among the smaller members of the Alcid family, which includes murres, puffins, auklets, murrelets, and guillemots. Adults average 25 cm in body length, have a wingspan about two thirds their length, a wing length of 13.6-14.5 cm and weigh between 190-260 grams (Day et al. 1999). Male and females are similar in both size and coloration. The breeding plumage is mostly grey with irregular edges of sandy or rufous-gold coloring and off-white or buff underparts (Day et al. 1999). This cryptic plumage makes it difficult to spot birds when they are on their nests. It can also make it difficult to detect birds on the water in the ice-choked or silty waters they typically occupy during the breeding season.

The congeneric marbled murrelet (*Brachyramphus marmoratus*), is similar in appearance to the Kittlitz's murrelet, but morphometrically they are significantly different (Day et al. 1999, Pitocchelli et al. 1995). Kittlitz's maintains heavier body mass, has a larger head, and smaller bill than the marbled murrelet (Pitocchelli et al. 1995). Vocalizations of the two species are also dissimilar (Day et al. 1999). Kittlitz's are less vocal than marbled murrelets during nesting (Van Pelt et al. 1998). However, recent work has shown more vocalizations, including at nesting areas at dawn (Unpublished data from B. Day, R. Kaler, M. Kissling, J. Piatt).

Taxonomy

Careful review of the available taxonomic information for Kittlitz's murrelet indicates that it is a monotypic valid taxon (AOU 1957, 2005). In addition to morphological and vocal distinctions Kittlitz's and marbled murrelets are genetically distinct (Pitocchelli et al. 1995, Friesen et al. 1996). Nucleotide sequencing of the mtDNA cytochrome b gene clearly distinguishes Kittlitz's murrelet genotypes from other murrelet genotypes (Friesen et al. 1996). Analysis of allozymes further strengthens the evidence that these two murrelets are separate species (Friesen et al. 1996) and nuclear introns and cytochrome b gene sequencing showed no evidence of hybridization between the two species (Pacheco et al. 2002).

Intra-specific Variation

Results of intra-specific analyses of genetic information suggest very low rates of immigration and emigration between Kittlitz's murrelets in the western Aleutian Islands and mainland birds from Kachemak Bay on the Kenai Peninsula (Friesen et al. 1996, MacKinnon 2005). These analyses of allozymes, and cytochrome b gene, and the control region of mtDNA revealed genetically differentiated Kittlitz's murrelet populations in Alaska. This genetic variation may be at a level that justifies alternative taxonomic classification within this species (J. F. Piatt in litt., as cited in Day et al. 1999; MacKinnon 2005). However, other factors such as limited nuclear markers, isolation by distance, and small sample sizes causing Type II error may also explain these results.

NATURAL HISTORY OVERVIEW

Life History Overview

Cryptic breeding plumage, non-colonial and secretive behavior, and a tendency to nest far from the ocean in remote areas make Kittlitz's murrelet difficult to observe and thus they are poorly understood (Day et al. 1999). Little is known about their migratory behavior, and demographic data (e.g., lifespan and survivorship) are currently unavailable (Day et al. 1999). Many questions regarding the natural history of Kittlitz's murrelet remain unanswered.

Breeding

Kittlitz's murrelet nests solitarily on the ground in very remote areas (Day 1995, Day et al. 1999). Its single egg is colored olive-green and blue-green with brown mottling (Day et al. 1983, Piatt et al. 1994). The egg is typically laid on bare or nearly bare ground at moderate to high elevations (Day et al. 1983, 1999; Naslund et al. 1994; Piatt et al. 1994, 1999). The median elevation of nests sites summarized by Day et al. (1999) was 335 m (range 230-430 m, n = 6), but these were records of nests found opportunistically and primarily in low coastal areas. More recently discovered nests were recorded with mean elevations of 458 m on Agattu Island in the Aleutian Archipelago (Kaler et al. 2008) and 901 m on Kodiak Island (Stenhouse et al. 2008).

The timing of egg laying appears to be asynchronous (Kissling 2007). Egg laying initiates approximately 18 May through 29 June (Agness 2006, Kissling 2007). Duration of incubation is 30 days and both adults alternate incubating. Chicks are well camouflaged and are left alone at the nest one to two days after hatching (Day et al. 1999, Kaler et al. 2008, Kissling 2007).

The chick is fed for approximately 24 days post hatch (Nalsund et al. 1994, Day et al. 1999, Kissling 2007). Both adults feed the chick throughout the day (Naslund et al. 1994, Kissling 2007). In Kachemak Bay, Naslund et al. (1994) reported that adults carried fish to the nest mostly between dusk and dawn, although Kittlitz's murrelets have been observed flying with fish in their bills in midday (Kuletz, USFWS, pers. comm.), and in Glacier Bay, deliveries were most often made in the middle of the day (Kissling 2007).

Chicks completely shed their down just prior to fledging (Naslund et al. 1994, Kissling 2007). When chicks leave the nest, they are approximately 40 to 60% of adult mass (Day et al. 1999, Kaler et al. 2008). They complete their development at sea without further attendance by either parent (Day et al. 1999, Kaler et al. 2008).

A recent study in Icy Bay, Alaska used radio telemetry to locate individuals throughout the breeding season, and provided the first data on reproductive success. Fecundity of Kittlitz's murrelet females in Icy Bay was roughly 90% in 2007, yet only 13% of the adult birds that were captured actually nested. Of four nests that were monitored throughout the nesting season in 2007, 1 fledged successfully, 1 failed, and 2 were of unknown fate (Kissling 2007). It is unknown if the radio tagging affected nesting behavior.

Kittlitz's murrelet nests are reused (Naslund et al. 1994, Piatt et al. 1999), which suggests that, like most alcids, this species exhibits nest site fidelity (Piatt et al. 1994, 1999). Piatt et al. (1999) speculated that a predictable snow-free habitat in appropriate high elevation areas may be the most the critical factor determining whether nest sites can be re-used year after year.

Juvenile Survival and Recruitment

Little is known about juvenile survival and recruitment. Juvenile Kittlitz's murrelets are difficult to identify, occur at low densities, and possibly disperse soon after fledging, making them difficult to monitor (Kuletz, USFWS, pers. comm.). Although Day (2004) suggested that Kittlitz's murrelets have not been breeding successfully in Prince William Sound, several Kittlitz's murrelet juveniles have been captured or photographed between 2003-2009 in the Sound (Kuletz, pers. comm.). In Kachemak Bay, Kittlitz's juvenile densities were low, but the juvenile:adult ratio was equal to or greater than that for marbled murrelets, suggesting that Kittlitz's that were breeding in the Bay were successfully raising chicks (Kuletz et al. 2008a).

Post-nesting Migration and Dispersal

The shift between summer and winter distribution appears to be rapid and asynchronous across its entire range (Day et al. 1999). However, Kittlitz's murrelets within a fjord or meso-scale region (such as Prince William Sound) may be more synchronous in post-breeding dispersal, and are distinctly more synchronized than marbled murrelets (Kuletz et al. 2008a, and unpubl. data). During the non-breeding season, the marine distribution of Kittlitz's murrelets is farther offshore. In the northern Gulf of Alaska from fall through spring, Kittlitz's murrelets prefer the Alaska Coastal Current and mid-shelf regions, avoid the shelf-break front and Alaska Stream (Day and Prichard 2001, Day 2006), and occurred regularly at low densities (0.08 – 0.20; Day 2006). In the Bering Sea, Kittlitz's in basic plumage have been located in open leads within the ice pack from March through May, particularly along the eastern polynya south of St. Lawrence Island, and northwest of Nunivak Island (Kuletz et al. 2008b). Relatively high numbers of Kittlitz's have also been observed offshore of Barrow in the Chukchi Sea in September indicating that the area may be an important post-breeding or migratory fall route (Kuletz et al. 2008b).

RANGE AND DISTRIBUTION

Historical Range and Distribution

Historically, Kittlitz's murrelets inhabited Alaskan coastal waters discontinuously from Point Lay on the northwest coast, south to northern portions of Southeast Alaska. Prior to the 1970's, in the northern Gulf of Alaska, Kittlitz's murrelets were estimated to number in the hundreds of thousands; in several Prince William Sound fjords and waters near the Malaspina-Bering Icefields, Kittlitz's murrelets were reported to "outnumber all other alcids" (Isleib and Kessel 1973). Large numbers of Kittlitz's murrelets were also observed along the Lisburne Peninsula during the early 1970's (Day et al. 1999; Piatt, USGS, pers. comm. 2002), which suggested that notable numbers of birds occurred in the Chukchi Sea at that time.

Current Breeding Range and Distribution

Kittlitz's murrelets have a highly restricted breeding range and patchy distribution (Figure 1). All of the North American and most of the known world population of Kittlitz's murrelets breed, molt, and winter in Alaska (Day et al. 1999). Kittlitz's murrelets in Alaska primarily occur in four regions: 1) Southeast Alaska (48%), 2) Southcentral Alaska (22%), 3) the Aleutian Islands (16%), and 4) the Alaska Peninsula (14%) (Table 1).

An estimated 10%, of the world population breeds in the Russian Far East from the Okhotsk Sea to the Chukchi Sea (Day et al. 1999), but in the late 1990's large numbers of Kittlitz's murrelets were reported off the Kamchatka Peninsula (Vyatkin 1999).

Current Winter Range

The winter range of the Kittlitz's murrelet is not well known, but appears to be pelagic (Day et al. 1999, Kuletz et al. 2008b). Few Kittlitz's occur in the protected waters of Prince William Sound, Kenai Fjords, Kachemak Bay, Kodiak Island and Sitka Sound (Kendall and Agler 1998, Day et al. 1999, Stenhouse et al. 2007). Occasional winter sightings in western and Southeast Alaska have also been recorded and there have been locally common sightings in a few Southcoastal Alaska locations (Kendall and Agler 1998, Day et al. 1999). Kittlitz's murrelets are also reported during winter in the mid-shelf regions of the northern Gulf of Alaska (Day and Prichard 2001) and in open leads of the Bering Sea ice pack south of St. Lawrence Island (Kuletz et al. 2008b and unpubl. data). A few birds have been observed during winter in the Sireniki polynya of southern Chukotka in Russia (Konyukhov 1990 as cited in Day et al. 1999).

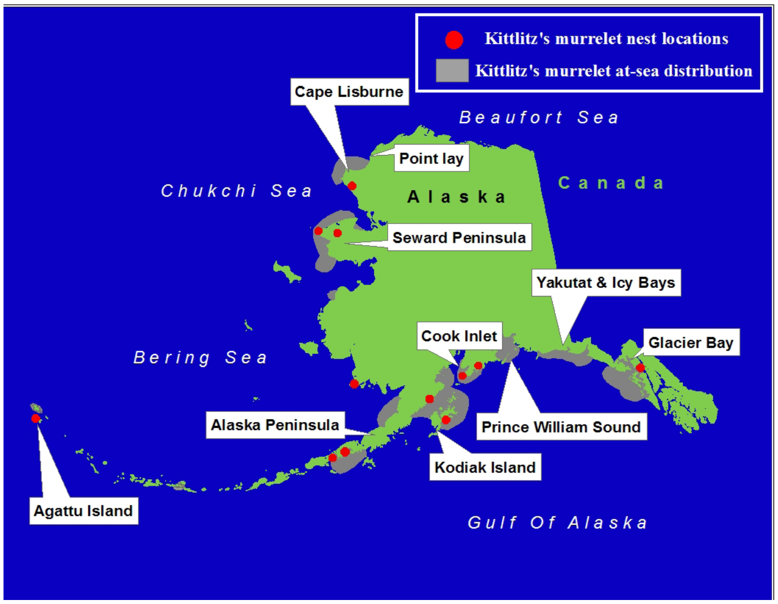

Figure 1. Distribution of Kittlitz's murrelets at sea and known nest Sites. At-sea data from the North Pacific Pelagic Seabird Database (NPPSD)

HABITATS

Nesting Habitat

Although fewer than 40 nests have ever been found in Alaska, Kittlitz's murrelets appear to select unvegetated scree-fields, coastal cliffs, barren ground, rock ledges, and talus above timberline in coastal mountains. Generally nests have been located in areas with large present-day glaciers, remnant glaciers, and in areas with recent de-glaciation. Nests have been found from Cape Lisbourne in the north, to the Aleutian Islands in the west, and to Glacier Bay in the south (Day et al. 1983, Day 1995, Day et al. 1999, Piatt et al. 1999, Kuletz et al. 2003, Kissling 2007, Stenhouse et al. 2008, Kaler et al. 2008).

Brachyramphus murrelets are the only alcids with cryptic breeding plumage. They are also the only alcids that are non-colonial breeders, do not breed on predator-free islands, and breed inland away from the sea (Day et al. 1999, Piatt et al. 1999). Choice of nesting habitat may partially reflect a choice of a predator-free environment (Piatt et al. 1999). Nests have been located as far inland as 80 km, but most are much closer to the sea (Day et al. 1999). Bare spots in snow-fields or near glaciers, where some nests have been located, may have been chosen because they melt off earlier than surrounding areas (Day 1995) or are snow-free earlier in spring (Piatt et al. 1999). Wind-scour may also affect nest site selection because scoured sites are snow-free earlier in the year (Piatt et al. 1999).

Foraging Habitat

High energy forage fishes are preferred by Kittlitz's during the nesting season (Day et al. 2003, Arimitsu et al. 2007). Schooling fishes such as Pacific capelin (*Mallotus villosus*), Pacific sand lance (*Ammodytes hexapterus*), Pacific herring (*Clupea pallasi*), and walleye pollock (*Theragra chalcoramma*) are important prey species (Piatt et al. 1994, Day and Nigro 2000, Agness 2006, Kissling 2007, Kuletz et al. 2008a). Availability of these high energy foods in close proximity to the nests of Kittlitz's allows for provisioning rates that are conducive to fledging young. During the breeding season, in most areas of its range, Kittlitz's murrelets prefer foraging habitat near tidewater glaciers or in shallow, turbid, glacial fed waters (Day et al. 1999, Day and Nigro 1999, Kuletz et al. 2003a, 2003b, 2008a).

The eye morphology of Kittlitz's may reflect an adaptation for a specialized feeding strategy in turbid glacial waters (Day et al. 2003). Kittlitz's murrelets pursue prey by diving and capturing prey underwater (Day and Nigro 2000). Their preference for glacially fed marine waters may be related to higher primary productivity in these areas. Although studies have not been done in Alaskan fjords, the siltier, less saline fjords with receding glaciers are known to have low primary productivity, zooplankton, and forage fish (Hegseth et al. 1995, Weslawski et al. 1995). The distribution of high energy forage fishes is dependent on physical parameters such as bathymetry, topography, salinity and temperature (Abookire and Piatt 2005, Arimitsu et al. 2007). For example, Pacific capelin, Pacific sand lance, and walleye pollock are associated with shallow sills and strong currents (Arimitsu et al. 2007). Day et al. (2000) concluded that Kittlitz's murrelets appear to favor waters < 200 m from shore during the breeding season. Oceanic topography, rather than distance to shoreline, may be a more biologically meaningful parameter. In surveys that included more pelagic waters in their design, Kittlitz's murrelets had higher densities in water > 200 m offshore (Kissling et al. 2005, Stenhouse et al. 2008, Kuletz et al. 2008b).

Because the energy density of available forage fishes varies seasonally (Montevecchi and Piatt 1987, Litzow 2004), Kittlitz's murrelets may switch prey species at various times of the year (Ostrand et al. 2004). Recent studies in Prince William Sound found Kittlitz's murrelets strongly associated with underwater sills at certain tidal phases, where they appeared to be feeding on euphausiids (Allyn et al. 2009). Indeed, studies of diets based on stable isotope ratios of muscle tissue suggest that a substantial proportion of Kittlitz's murrelet diet (ca. 30%) is comprised of euphausiids during summer (Hobsen et al. 1994).

Kittlitz's murrelets can also be found during the breeding season along coasts where waters are influenced by glacial outwash, such as the Malaspina Forelands, where glacial runoff seeps across miles of exposed coast before entering the ocean (Kozie 1993). Kittlitz's murrelets are found in waters with little or no glacial influence, including the Kodiak Archipelago, the Alaska Peninsula, Bristol Bay, the Aleutian Islands, and the Seward and Lisburne peninsulas (Van Vliet and Piatt 1994, Day et al. 1999, Vyatkin 1999, Kaler et al. 2006, 2008, Kissling et al. 2007, Stenhouse et al. 2008). However, approximately 60% of Kittlitz's sightings in Alaska have occurred in glacially influenced waters (Robards et al. 2003; Kuletz et al. 2003b; Van Pelt and Piatt 2003; Kissling et al. 2005; Piatt et al. 2005; Speckman et al. 2005; Van Pelt and Piatt 2005; Kissling, USFWS, unpublished data, 2006; Piatt and Romano 2005). The observed distribution outside of current glacial influence may represent remnant populations of previously glaciated habitat (Piatt et al. 1999).

POPULATION STATUS AND TRENDS

Population Status

Based on information from various locations from 1999 to 2005, the Alaska population estimate of the Kittlitz's murrelet is 16,000 birds (95%CI = 7,769 – 26,962). Previously, Kendall and

Agler (1998) estimated the population for Southeast Alaska, Cook Inlet, and Prince William Sound at 12,000 birds (range = 3,818 – 20,448) and in 2004, USFWS estimated it at 17,000 (range = 9,505 – 26,767) (USFWS 2004). More recent surveys will be analyzed and integrated for the published proceedings of the Kittlitz's symposium in 2010, and will enable us to make a more accurate, current population estimate.

There may be as many as 5,000 birds along the north-eastern coast of Kamchatka (Vyatkin 1999); however, data from Russia are scarce.

Table 1. Summary of Estimates of Kittlitz's Murrelets in Alaska, by Geographic Area.

Area	Population Estimate N (Range)	Year(s) of Survey	Source or Responsible Agency
Total population of South East Alaska outside of Glacier Bay	5,049 (2,380-8,097)	2002-2005	Kissling et al. 2005, Kissling, unpubl. data
Glacier Bay (South East Alaska)	2,265 (1,349-3,181)	1999-2000	Robards et al. 2003
Kenai Fjords	509 (126-2,050)	2002	Van Pelt and Piatt 2003
Prince William Sound	2,022 (919-3,125)	2001	Kuletz et al. 2003b
Lower Cook Inlet	1,181 (241-2,121)	2004	Speckman et al. 2005
Southern Alaska Peninsula	2,265 (1,165-4,405)	2003	Van Pelt and Piatt 2005
Aleutian Islands	2,622 (1,589-3,983)	2003, 2004, 2005	Piatt et al. 2005, Piatt and Romano, USGS, unpubl. data
Kachemak Bay, Cook Inlet	1,937 (SD = 1075)	2005-2007	Kuletz et al. 2008
TOTAL	**Mid-point = 17,850**		

Population Trends

Few accurate historical data exist for Kittlitz's murrelet, making it difficult to establish population trends for this species (Day *et al.* 1999). Based on a long-term data set from Prince William Sound, Kittlitz's murrelets in this core area of Alaska have declined at a rate of up to 18% per year from 1989-2000 (Kuletz et al. 2003b, USFWS 2004). These data further indicate that the Kittlitz's murrelet population has declined 84% over the 11 survey years, and possibly over 90% since the first survey in 1973 (which used a different study design). The 1989-2000 decline reveals a significantly ($p = 0.038$) negative slope. This declining trend has been substantiated by subsequent field data gathered from selected fjords in Prince William Sound and model predictions (McKnight et al. 2003, USFWS 2004). If this decline is linear and remains constant, extirpation of Kittlitz's murrelets in Prince William Sound is predicted to occur in approximately 30 years (Kuletz et al. 2005). However, a 2007 survey in PWS generated a population estimate roughly equivalent to that in 2005, so the decline may not be linear.

Other documented declines of Kittlitz's murrelets in Southcentral Alaska include an estimated 74% decline along the coast of the Kenai Fjords (Van Pelt and Piatt 2003), although more recent counts suggest a high degree of annual variability in murrelet numbers along this exposed outer coast (Arimtsu et al. in prep.). Data indicate that Kittlitz's murrelets in Kenai Fjords declined significantly from 1986-2002 (~ 8.7% per year). In Kachemak Bay, the June population declined 32% between 1993-2005 (~2.7% per year), and Kittlitz's murrelet densities in August declined 43% (~ 18% per year; Kuletz et al. 2008a). Kittlitz's murrelets in Lower Cook Inlet, Southcentral Alaska, declined 13% per year from 1984-2004 (Speckman et al. 2005), although this trend estimate is not significant.

Surveys conducted in 1991 and then again in 1999 and 2000 in Glacier Bay, Southeast Alaska, indicate the Kittlitz's murrelet population has declined by 83% between 1991 and 1999-2000 (Drew and Piatt 2008). Likewise, Kittlitz's murrelets from the Malaspina Forelands declined as much as 75% over 20 years, from 1992-2002 (Kissling et al. 2005), and perhaps 59% over a 3-year period in Icy Bay from 2002 to 2005 (Kissling, USFWS, unpublished data, 2006).

LIMITING FACTORS

<u>Present or Threatened Destruction, Modification, or Curtailment of Habitat or Range</u>

Glacial Retreat

Glacial retreat has been occurring since the end of the Little Ice Age (around 1850), but during recent decades, glaciers are melting at rates that cannot be explained by historical trends (Brown et al. 1982, Dyurgerov and Meier 2000). The loss of glacial volume is a phenomenon currently occurring on a global scale (Dyurgerov and Meier 2000, IPCC 2007).

Global surface temperature increased 0.74 ± 0.18 °C (1.33 ± 0.32 °F) during the last century (IPCC 2007). It is highly likely that the increase in average yearly temperatures over the past 50 years is primarily due to the global rise in anthropogenic greenhouse gasses (Crowley 2000, IPCC 2001, Karl and Trenberth 2003, Stott 2003, IPCC 2007). Correlations between warm mean surface temperatures and concomitant glacial melting events (Dickey et al. 2002) suggest that glaciers, particularly the maritime glaciers of Alaska, are sensitive to warming trends (Calkin 1994, Arendt et al. 2002).

Glacial retreat is accelerated when ice thickness decreases (Van der Veen 1996) and the retreat rate of tidewater glaciers is related to water depth; the deeper the water, the more rapidly they retreat (Adaldeirsdottir et al. 1998). The widespread decrease in glaciers and ice caps has contributed to sea level rise, creating a feedback mechanism which increases the rate of retreat for tidewater glaciers in particular (IPCC 2007).

Projected climate change over the next century will further affect the rate at which glaciers melt. The best estimates for average surface air warming ranges from 1.1° C to 6.4° C. Even with an average temperature rise of 1° C, glaciers will continue to retreat in the next century (Oerlemans et al. 1998).

The especially rapid retreat of Alaska's glaciers represents about half the loss in mass of glacial ice worldwide (Hassol 2004). As glaciers recede and the physical parameters of marine habitats are modified, the distribution and availability of high energy forage fishes (needed by Kittlitz's murrelets to feed young during the nesting season) may change. Declines in forage fish abundance and quality are known to cause food-related stress in seabirds (Piatt and Anderson 1996, Lau and Weng 1999, Kitaysky et al. 2006). These food-limited related stressors are further exacerbated by indirect and direct mortality from commercial fishing and pollutants in the marine environment.

Climate warming may also be causing glaciers to release increasingly contaminated melt water to receiving water bodies (Blais et al. 2001). A substantial percentage of current glacial melt originated from ice that was deposited from 1950-1970, when organochlorines were more concentrated in the atmosphere than they are now, or were before 1950 (Blaise et al. 2001). Organochlorines that were deposited during that time were also deposited more heavily in colder locations, such as ice fields.

Sedimentation
Sedimentation can change the suitability of marine habitats for forage fish and accelerated melting and calving of tidewater glaciers is conducive to high rates of sedimentation (Koppes and Hallet 2002). Fjords are efficient traps for sediment produced by tidewater glaciers, with little opportunity for removal due to the fjord's long, steep topography, deep bathymetry and tidal-current interactions. In extreme cases, sedimentation, glacial retreat and glacial rebound may combine to transform marine feeding habitat into glacial rivers draining onshore cirque and valley glaciers (Plassen and Vorren 2003).

Climate Regime Shift
The ocean climate in the Gulf of Alaska cycles between warm and cold regimes on a multi-decadal time scale (Francis et al. 1998, McGowan et al. 1998). These climate changes in the marine environment play a significant role in the population regulation of phytoplankton, zooplankton, and fish, and can disturb the balance in predator-prey relationships (Hunt and Stabeno 2002). Long-term changes in the food supply may be part of a natural ecosystem response to a change in the ocean's climate (Kitaysky et al. 2007).

The marine climate regime shift that occurred in 1976-1977 triggered a reorganization of the community structure in the Gulf of Alaska ecosystem (Anderson and Piatt 1999), and is hypothesized as being partially responsible for the decline in Kittlitz's murrelets (Van Vleit 1993, Day et al. 1999). Other piscivorous marine bird species in the Gulf of Alaska have declined over the past few decades (Piatt and Anderson 1996, Agler et al. 1999), apparently influenced by wide-spread changes in ocean climate and forage fish abundance (Piatt and Anderson 1996, Anderson and Piatt 1999, Hare and Mantua 2000, Hollowed et al. 2001). Marbled murrelets, which may have a high degree of dietary overlap with Kittlitz's murrelets (Day et al. 2003), have also declined in some areas in the Gulf (Stephensen et al. 2001, Piatt et al. 2006, Kuletz et al. 2008a), lending support to the hypothesis that broader ecological changes have affected Kittlitz's murrelets.

Hydrocarbon Contamination
Petroleum hydrocarbons in marine waters are considered among the most potentially harmful contaminants to organisms (Martin and Richardson 1991). Petroleum products released into the marine environment can remain for years (Hayes and Michel 1999), with documented adverse effects on marine birds (Custer et al. 2000, Esler et al. 2000, Trust et al. 2000, Yamato et al. 1996) and their prey (Glegg et al. 1999). Chronic exposure to hydrocarbons is associated with risks of cancer, reproductive anomalies, and endocrine dysfunction (Irwin et al. 1997). The pathway to exposure is either direct or indirect via ingestion of contaminated prey.

Based on body size, diving behavior, tendency to cluster in nearshore waters, restricted distribution, and low productivity, the Kittlitz's murrelet is vulnerable to direct mortality from oil pollution (King and Sanger 1979). In 1989, the *T/V Exxon Valdez* spilled nearly 11 million gallons of heavy Alaska crude oil into Prince William Sound, eventually contaminating approximately 30,000 km^2 of coastal and offshore waters (Piatt et al. 1990). Estimates of direct mortality of Kittlitz's murrelets from the spill, range from approximately 500 (Kuletz 1996) to over 1,000 birds (Van Vleit and McAllister 1994). A notable portion of the Prince William Sound Kittlitz's population (perhaps 7-15%) was lost. The proportion of the estimated total population of resident Kittlitz's murrelets lost in this oil spill exceeded that of all other species affected by the spill (Van Vliet and McAllister 1994).

In December 2004, the *Selandang Ayu* spilled approximately 504,000 gallons of fuel oils into the nearshore waters off Unalaska, Aleutian Islands, leaving approximately 35 km of shoreline oiled (Alaska Department of Environmental Conservation, unpublished data, 2005, Unified Command 2005). Few *Brachyramphus* murrelet carcasses were recovered immediately after the oil spill (USFWS, unpublished data). However, about one-third of all the Kittlitz's murrelet observations made around Unalaska were from Makushin Bay (Romano et al. 2005) an area heavily oiled from this spill, and murrelets were observed in oiled waters (Stehn, USGS, unpublished data, 2005). Information is not yet available regarding the number and species of oiled birds retrieved from the affected beaches.

Small oil spills frequently occur in marine habitats within the range of Kittlitz's murrelets. From 1995-2005, at least 1,923 small fuel spills from vessels resulted in the release of more than 271,700 gallons of petroleum hydrocarbons in Alaska waters (Alaska Department of Environmental Conservation, unpublished data, 2005). Ninety percent of those spills occurred within the range of Kittlitz's murrelets. Cruise ships and recreational boating activity is increasing in glaciated fjords within Glacier Bay and Prince William Sound, in prime Kittlitz's murrelet habitat (Day et al. 1999, Murphy et al. 2004). Vessel traffic for the Aleutian Islands, another Kittlitz's breeding area, is also expected to increase (Transportation Research Board 2008). Approximately sixteen-percent of Alaska's Kittlitz's murrelets breed and forage in this high risk region. As vessel traffic increases, so does the threat of petroleum contamination from both accidental spills and routine vessel operation. The chronic introduction of contaminants into the marine environment increases the risk that prey of Kittlitz's murrelet will become contaminated.

Overutilization by Human Activities

Commercial Fisheries

The National Oceanic and Atmospheric Administration (NOAA) has studied gillnet bycatch in Alaska fisheries to determine incidental take of marine mammals, and has in the process collected data on marine bird bycatch in these fisheries. In Prince William Sound, salmon gillnet fisheries occur each summer in or near Kittlitz's murrelets' habitat and Kittlitz's have been taken as bycatch. During 1990 and 1991, Kittlitz's murrelets represented 5% and 30% of murrelet bycatch in gillnets, respectively (Wynne et al. 1991, 1992). Based on population sizes of the two species of *Brachyramphus* murrelets, Kittlitz's appear to be caught in fisheries at a disproportionately higher rate than marbled murrelets (Wynne et al. 1992, Agler et al. 1998, Day et al. 1999). Impact from gillnet fisheries may be localized, possibly as a result of the patchy distribution of Kittlitz's. In 1999 and 2000, a similar bycatch study in lower Cook Inlet recorded no take of Kittlitz's murrelets, although marbled murrelets were taken (Manly et al. 2003). Because only 1.7% of the actual fishing effort had observer coverage, whereas 5-7% would be the needed coverage for statistical purposes, Manly cautioned that the level of observer coverage in this study was not adequate to get a reasonably good estimate of the annual injury and mortality of less common species (Manly et al. 2003). In July 2005, a juvenile Kittlitz's murrelet was killed in a salmon setnet gillnet fishery off Kodiak Island, with an extrapolated annual bycatch of 17 (SE = 16.8) Kittlitz's murrelets in that fishery (Manly et al. 2006). A NOAA study in 2007 and 2008 documented Kittlitz's murrelet bycatch in the Yakutat setnet gillnet fishery, but extrapolated annual take and a final report are not yet available (NOAA, Juneau, Alaska, unpubl. data).

The degree of overlap between Kittlitz's murrelets and gillnet fisheries is not well known. Although most marine bird surveys (conducted in daytime) indicate that Kittlitz's use water in the upper fjords, radio-tagged Kittlitz's murrelets in Prince William Sound were found to be moving from daytime foraging grounds in upper fjords to nighttime occupation of less protected waters in 2009 (Allyn, USFWS, unpublished data). Similarly, preliminary satellite telemetry data show that Kittlitz's murrelets in Icy Bay often move from the inner to outer bay at night (Kissling and Piatt, unpubl. data). Thus, Kittlitz's could potentially overlap with fishery areas at night, and our knowledge of Kittlitz's distribution relative to fishing activity is insufficient without knowledge of activity patterns during crepuscular and nighttime hours. Because alcid bycatch rates in gillnets are higher during non-daylight hours (Melvin et al. 1999, Carter et al. 1995), the distinction could be important to Kittlitz's conservation efforts. Furthermore, there are anecdotal reports and opportunistic observations of both *Brachyramphus* species being taken in gillnet fisheries in other areas of Southcentral and Southeast Alaska (Kuletz, USFWS, pers. comm.). Studies on the effects of gillnet fisheries on murrelet species (Carter et al. 1995) strongly suggest that gillnet fishery bycatch is a conservation concern for Kittlitz's murrelets. However, we have insufficient data to determine whether bycatch contributes substantially to the observed decline in Kittlitz's murrelets in recent years.

It is unknown if Kittlitz's murrelets are caught in high-seas driftnets during winter, but because little is known about the winter distribution of Kittlitz's murrelets, significant mortality from high-seas fisheries cannot be discounted. Also, preliminary satellite telemetry data suggest that some Kittlitz's may move between glacially influenced coastal areas after breeding (e.g., from Icy Bay to Cook Inlet) and so while populations could be safe from bycatch in one area and time (e.g., within Glacier Bay during summer where driftnetting is not allowed) they may be at risk in other coastal areas before or after breeding. A significant proportion of the Japanese murrelet (*Synthliboramphus wumizusume*) population was reportedly killed in high-seas driftnet fisheries in the North Pacific (Piatt and Gould 1994).

Recreational Activities

Kittlitz's murrelet is rarely sought out by tour boat operators; however, the scenic tidewater glacier habitat with which it is associated (Day et al. 1999) is a major destination for many recreational and commercial tour boats (Murphy et al. 2004). The number of cruise ships allowed into Glacier Bay has increased 30% since 1985, while smaller charter boats and private boats have increased 8% and 15%, respectively. Mid-sized tour boat traffic has remained stable. (Glacier Bay National Park, unpublished data). Agness (2006) found that Kittlitz's murrelets were temporarily disturbed by vessel activity nearshore, but concluded that vessel activity at currently observed levels does not constitute a loss of suitable habitat in Glacier Bay (Agness et al. 2008). However, Agness (2006) also concluded that under high vessel traffic scenarios, the amount of extra flight activity caused by disturbance would require birds to compensate with increased foraging effort. The biological impact of this extra demand is unknown.

Excessive boat disturbance has been implicated in the decline of Kittlitz's murrelets in Prince William Sound (Day et al. 2003). Most human use in the Sound is concentrated in the northwestern part of the Sound, and in central mainland fjords with tidewater glaciers, the same areas favored by murrelets (Murphy et al. 2004). In Prince William Sound and Kenai Fjords, peak vessel activity occurs in June and July (Conner, NPS, pers. comm., Murphy et al. 2004), a time when Kittlitz's murrelets face intense energetic requirements to complete chick-rearing, and when new fledglings first enter marine waters and must quickly learn to forage on their own. Disturbance can disrupt feeding birds, and persistent boat traffic may prevent murrelets from using high quality foraging areas (Agness et al. 2008).

Among all Kittlitz's murrelet population strongholds, Southeast Alaska's Icy Bay is the only fjord that remains relatively free of tourist traffic and commercial fishing. This is also the only location where Kittlitz's murrelets still outnumber all other alcids. The importance of Icy Bay to the survival of the species may increase as anthropogenic disturbances increase throughout other portions of the species' range.

Logging Activities

Previously, it was believed that logging operations near the entrance to Icy Bay did not overlap with Kittlitz's murrelet distribution in the Bay. However, new telemetry data indicates that Kittlitz's murrelets utilize the entrance of the Bay as well as the upper portions (Kissling 2007). The extent to which logging operations such as low flights and boat activities affect Kittlitz's murrelet is unknown.

Scientific Research

The Kittlitz's murrelet does not appear to be at risk due to overutilization for scientific purposes, although Kittlitz's mortality of captured and tagged birds by avian predation may have been related to the tagging in Southeast Alaska (Kissling 2007).

Disease

Except for one record of a tapeworm (*Alcataenia spp.*) in a Kittlitz's murrelet from Kodiak Island (Hoberg 1984), there is no information available on disease or parasites in this species (Day et al. 1999).

Predation

In the Gulf of Alaska and Aleutian Islands, bald eagles (*Haliaeetus leucocephalus*) and peregrine falcons (*Falco peregrinus*) commonly take marbled murrelets, which are similar in size and appearance to Kittlitz's murrelets (JH Hughes in litt.; RJ Ritchie, ABR Inc., pers. comm.; PF Schempf in litt.; CM White in litt. as cited in Day et al. 1999). Marbled murrelet eggs and chicks are also depredated by corvids (Nelson 1997). Predation is believed to be a significant factor affecting nesting success of marbled murrelets (McShane et al. 2004, Piatt et al. 2006). This may also be the case with Kittlitz's murrelets (Day et al. 1999). Circumstantial evidence suggests that predation from corvids may be increasing with glacial retreat and increases in avian predator populations (Romano, USGS, pers. comm.). However, Kittlitz's murrelet use of high-elevation nesting habitat probably results in a lower rate of nest depredation compared to forest-nesting marbled murrelets (Day et al. 1999, Piatt et al. 1999).

In Icy Bay during summers of 2006 and 2007, both peregrine falcons and bald eagles predated 28% and 13% (respectively) of the radio-tagged Kittlitz's murrelets (Kissling, USFWS, pers. comm.). There is some possibility of a causal relationship between the radio-telemetry research and the predation rate. However, during summer of 2007, approximately 35 Kittlitz's murrelet remains were found in the territories (e.g., eyries and plucking posts) of 3 peregrine falcon pairs in Icy Bay (Kissling, USFWS, pers. comm.). It is unknown at this time what proportion of the prey remains were adult Kittlitz's murrelets versus young of the year. The current number of nesting peregrine falcons in Icy Bay may represent a recent increase in the peregrine falcon population (Kissling, USFWS, pers. comm.); nesting peregrine falcons were not observed during a bird survey in 1993 (Kozie 1993). This new information suggests that peregrine falcons may play a significant role in the population decline of Kittlitz's murrelets in Icy Bay.

Inadequacy of Existing Regulatory Mechanisms

Gillnet fisheries in Alaska generally occur within State territorial waters, within the undisputed regulatory jurisdiction of the Migratory Bird Treaty Act (MBTA), and fisheries managed by the State of Alaska. Although the MBTA has no provision to allow for incidental take of any migratory bird, as noted above, Kittlitz's murrelets are taken as bycatch in Alaskan gillnet fisheries. Furthermore, Melvin et al. (1999) reported on gear types and fishing methods that reduce such bycatch, but regulations requiring the use of bycatch reduction techniques for gillnet fisheries are not in place in Alaska.

Kittlitz's murrelet was selected as a featured species in Alaska's Comprehensive Wildlife Conservation Strategy based on: 1) its classification by NatureServe as imperiled; 2) the noticeable decline in abundance; 3) its rarity; 4) USFWS identification of the species as a candidate for listing under the Endangered Species Act; 5) its endemism; 6) its seasonally restricted local range; 7) its sensitivity to environmental disturbance; and 8) its disjunct distribution (ADFG 2006). The issues and concerns identified for Kittlitz's murrelets include habitat loss (i.e., receding glaciers), gillnet mortality, vessel disturbance, mining, climate change, and climate regime shifts. The State's Comprehensive Wildlife Conservation Strategy does not provide state-level regulatory protection for the species.

FOCAL SPECIES POPULATION OBJECTIVES

Population objectives for Kittlitz's murrelets will remain difficult to establish until accurate population estimates can be derived throughout the range. Additionally, maintaining regional populations at current levels will require a better understanding of limiting factors. The data gaps addressed in the Additional Research and Monitoring section of this plan must therefore be filled before the final population objectives can be established for this focal species. However, several key population centers have been identified and population trends are known to be declining significantly in those areas, and some threats have been identified in these areas. Therefore, this document provides a preliminary list of population objectives and conservation strategies for regions with known population trends and threats. A final list of objectives and strategies will be developed by the Kittlitz's Murrelet Technical Committee (KMTC, a conservation committee under the Pacific Seabird Group), beginning with a meeting to occur in winter of 2009/2010. The preliminary objectives and strategies outlined below were based on previous workshops and assessments, and will form a basis to begin discussions and assist development of conservation actions by the full KMTC.

Population Objectives and Associated Rangewide Preliminary Actions:

1. Fill gaps in our knowledge of Kittlitz's murrelet abundance, distribution, and breeding biology throughout Alaska.
    - Survey areas that have not been sufficiently covered
    - Use satellite and telemetry tracking to discover and document areas of distribution during the non-breeding season
    - Determine key areas of use and important habitats within those areas
    - Increase survey efforts in key habitats during non-breeding season
    - Assess population genetics using samples obtained from throughout their range.
    - Gather basic information on breeding biology, including detailed measures of nest habitat selection, chick feeding (rate, prey composition), chick growth and reproductive success

2. Monitor populations (or sub-populations) to better understand status and trends in abundance.
    - Develop a Kittlitz's murrelet range-wide monitoring plan
    - Define 'populations' for purposes of monitoring and trends analysis
    - Obtain support for long-term, consistent monitoring of selected populations
    - Increase the number of monitoring sites
    - Develop a best-practices protocol for different types of monitoring objectives
    - Determine the causes of mortality and other factors creating negative population trends

3. Reduce anthropogenic sources of mortality and disturbance
    - Study impacts of tourism and other vessel disturbance on Kittlitz's
    - Study impacts of gillnet mortality on Kittlitz's
    - Investigate impacts of upland activity and development on Kittlitz's nesting
    - Investigate predation levels and whether potential predator increases are linked to human activities, including causes of climate change

4. Educate user groups about Kittlitz's and the need to avoid disturbance, injury or mortality of Kittlitz's murrelet

5. Mitigate the impact of climate change on Kittlitz's populations
    - Investigate mechanisms linking climate change to Kittlitz's foraging habitats and prey
    - Integrate Kittlitz's research with cross-discipline studies on Kittlitz's prey and ocean conditions
    - Join local and global efforts to better track and understand impacts of climate change
    - Support efforts at reduction of greenhouse emissions
    - Assist climate change outreach efforts
    - Investigate landscape-scale effects of climate change on Kittlitz's nesting habitats, including changes in the plant and animal communities

Region-specific actions or issues of particular concern:
Southeast:
- Vessel disturbance in foraging habitat from tourism, recreation, and ferry traffic
- Incidental take in commercial gillnet fisheries
- Increased predation from increasing populations of birds of prey and from improved travel corridors for land mammals as a result of glacial recession
- Vegetation succession following deglaciation and subsequent ecological changes

Southcentral:
Oil and gas exploration, development, and transport
Vessel disturbance in foraging habitat from tourism, recreation and ferry traffic
Incidental take in commercial gillnet fisheries

Aleutian Islands/Alaska Peninsula:
Shipping safety regulation and monitoring of large cargo vessels
Introduced predators on Aleutian islands
Incidental take in commercial gillnet fisheries

Northern/Northwest Alaska:
Oil and gas exploration, development, and transport
Development activities for mining operations near upland nesting areas

CONSERVATION STRATEGY

No conservation agreements are known to exist. Because of limited historical knowledge of this species, no conservation measures have been implemented to date. Before effective conservation measures can be met for this rare species, data gaps must be filled.

Limiting Factors and Conservation Actions

Information gaps in population status and trends

Research Actions

Coordinate and continue population abundance and trend monitoring efforts. This may require temporally coordinated, simultaneous surveying of key population centers, if research suggests that large-scale movement is occurring.

Assess sampling needs for genetic studies, collect specimens (tissue or blood), and assess the population genetics of the species throughout its range.

Research and monitoring efforts should include the closely related marbled murrelets where possible, because of overlap in habitat use, foraging ecology, and threats. Expand training to reduce the problem of identification of species at sea, but the more abundant marbled murrelet may serve as a proxy in some analyses.

Investigate winter distribution and seasonal movements

Glacial Retreat

Research Action

Work with glaciologists and climatologists to model the relationship between Kittlitz's population changes and glacial retreat. Investigate the possible reasons that glacial retreat would be having an immediate negative impact on Kittlitz's murrelet populations, e.g., loss or reduction in quality of foraging habitat, loss or reduction in productivity of glacially influenced marine waters, loss or reduction by succession of terrestrial breeding habitat, etc.

Hydrocarbon Contamination

Policy Actions

Work with Alaska Department of Environmental Conservation and their project partners to initiate consideration of oil spill risk to Kittlitz's murrelets when developing new, and reviewing old Geographic Response Strategies.

Continue collaborative work with Department of the Interior and U. S. Coast Guard in oil spill contingency planning.

Work with U. S. Coast Guard to minimize Trans-Pacific vessel traffic through passes in the Aleutian Islands and to station emergency assistance vessels at strategic locations to prevent vessel groundings, especially within the National Wildlife Refuge system.

Recreational Use

Research Action

Conduct nesting studies on state and federal land and determine the overlap with recreational activities.

Study the effects of disturbance to Kittlitz's murrelets from low flights and boat activity where Kittlitz's murrelets concentrate. Use telemetry to assess the effect of disturbance on activity time budgets of individual birds, and assess the corresponding energetic costs of disturbance.

Outreach and Education Action

Work with/educate the tourist industry and recreational boaters on the need to minimize speed and reduce disturbance to Kittlitz's murrelets in upper fjords with tidewater glaciers.
Develop guidelines for tour boats and recreational boaters that will minimize disturbance to murrelets.

Policy Action

Regulate vessel traffic in certain waters heavily used by Kittlitz's murrelets. Cooperate with NPS to develop guidelines for National Parks.

Commercial and Subsistence Fisheries

Research Actions

Work with state-managed commercial gillnet and setnet fisheries to quantify and, if warranted, reduce bycatch of Kittlitz's murrelets in gear.

Work with state and federally managed subsistence gillnet fishers to quantify, and if warranted, reduce bycatch of Kittlitz's murrelets in gear.

Develop gear and techniques for commercial gillnet and setnet fishermen that will reduce the likelihood of murrelet entanglement with their gear.

Outreach and Education Actions
Collaborate with fishermen and subsistence fishers to implement bycatch-reduction methods and incorporate appropriate gear into the fisheries.

Develop outreach and education tools to explain to fishermen and subsistence fishers how to catch fewer seabirds and why catching fewer seabirds is desirable.

Policy/Enforcement Actions
Collaborate with the State and National Oceanic and Atmospheric Administration in increasing the monitoring of gillnet fisheries in areas used by Kittlitz's murrelets.

Increase enforcement of Migratory Bird Treaty Act within 12 nautical miles of shore, especially in areas where Kittlitz's murrelets have been taken in gillnets.

Cooperate with other government agencies to distribute seabird deterrent devices to fishers, and promulgate and enforce regulations requiring the use of seabird avoidance techniques and deterrent devices.

Work with the International community (e.g., Russia and Japan) and NOAA to assess the potential risk to Kittlitz's murrelets from at-sea driftnet fisheries.

Disease or Predation
Research Actions
Use new and existing data and modeling to determine the impact of predation, inland and on the water, on Kittlitz's populations.

Study the impacts of climate change on predator abundance and distribution.

Develop methods to discourage predation of Kittlitz's murrelets by falcons and eagles.

Investigate increased predation risk of Kittlitz's as a result of disturbance from marine traffic.

Policy/Enforcement Action
Enforce speed limits and/or reduce or eliminate marine traffic in high density Kittlitz's areas.

Enforce no-feeding laws and proper waste management practices to reduce artificial increases in local eagle and corvid populations.

Inadequacy of Existing Regulatory Mechanisms
Policy/Legislative Actions
Work with U.S. Coast Guard to minimize Trans-Pacific vessel traffic through passes in the Aleutian Islands and to station emergency assistance vessels at strategic locations to prevent vessel groundings, especially within the National Wildlife Refuge system.

Encourage additional monitoring and enforcement in fisheries that may take Kittlitz's murrelets when there is a Federal nexus.

Increase enforcement (through USFWS Law Enforcement Program) of the Migratory Bird Treaty Act within coastal waters inhabited by Kittlitz's murrelets.

Climate Regime Shift
Research Actions
Analyze literature and available datasets that might help to resolve the impact of climate regime shifts on Kittlitz's prey.

Conduct retrospective analysis (i.e., using museum specimens) on changes in murrelet trophic levels, which might include comparisons with its congener, the marbled murrelet.

Population Ecology
Research Actions
Collaborate among universities, State, and Federal agencies to fill needed data gaps in Kittlitz's murrelet biology that include: demographics, diet, fledging dispersal, contaminant load in their environment, and distribution/abundance in areas not well surveyed.

Investigate reasons for unsustainably low recruitment rates.

Coordinate studies on diet, nesting success and habitat use on state and federal lands

Outreach and Education
Prepare and distribute Kittlitz's murrelet adult/juvenile identification training materials to at-sea observers so that more may be learned about juvenile dispersal.

ADDITIONAL RESEARCH AND MONITORING NEEDED TO ESTABLISH POPULATION OBJECTIVES AND A CONSERVATION STRATEGY

Research and monitoring actions still needed to establish population objectives and a conservation strategy. The conservation strategies presented in this Plan will be reviewed and final recommendations will be made in late 2010, following the working groups and symposium to occur in 2010. A summary of the completed research and monitoring projects, and proposed projects, is presented in Tables 2 and 3. The following section includes a brief synopsis of some of the completed research and monitoring actions occurring in Alaska that include Kittlitz's murrelets, and their results. This is not a complete list of all activities.

COMPLETED RESEARCH AND MONITORING PROJECTS FOR KITTLITZ'S MURRELETS

<u>Population Trends of Kittlitz's Murrelets</u>
Glacier Bay
Drew and Piatt (2008) compared surveys for seabirds in Glacier Bay, Alaska, during 1991, 1999, and 2000, to identify trends in the local Kittlitz's Murrelet population. The Kittlitz's

murrelet population in Glacier Bay declined by 83% between 1991 and 1999–2000. Another survey was conducted in 2008, and these data are being analyzed for trends.

Icy Bay
USFWS in Juneau has completed four years (2002-2004) of study of Kittlitz's murrelets in Icy Bay, Southeast Alaska (Kissling et al. 2007b and Lukacs et al., in review). This study examines population trends and habitat use using radio-telemetry and at-sea surveys. Between 2002 and 2007, Kittlitz's murrelets in Icy Bay have declined 53 %, at a rate of -18 % per annum.

Kachemak Bay
The Kachemak Bay Murrelet Project (2004-2007) examined long-term population trends (1988-2007) of *Brachyramphus* murrelets in Kachemak Bay, Alaska (Kuletz et al. 2008a). Between the two decadal periods (1988-1999 and 2004-2007), Kittlitz's murrelet densities declined significantly. For the entire bay, Kittlitz's densities declined by 43 % and in the inner bay 20 % between decadal periods.

Kenai Fjords
Other documented declines of Kittlitz's murrelets in Southcentral Alaska include an estimated 74% decline along the coast of the Kenai Fjords (Van Pelt and Piatt 2003). Data indicate that Kittlitz's murrelets in Kenai Fjords declined significantly between 1986-2002 (~8.7% per year). More recent data (2006-2008) are being analyzed to examine trends.

Lower Cook Inlet
Kittlitz's murrelets in Lower Cook Inlet, Southcentral Alaska, declined 13% per year from 1984-2004 (Speckman *et al*. 2005), although this trend estimate is not significant.

Southeast Alaska
Survey results for *Brachyramphus* murrelets along the outer coast of Southeast Alaska and select northern fjords of that region, indicate declines since 1991 in that region (Kissling et al. 2007a).

<u>Marine Habitat use of Kittlitz's Murrelets</u>
Kachemak Bay
Boat-based surveys and replicated historic transects (where possible) were used to determine population trends and current population size and distribution within Kachemak Bay. Based on the average of point estimates from 2005, 2006 and 2007, the July population for Kittlitz's murrelets was 1,937 (SD ± 1075). August surveys indicated that between 1988-1999 and 2004-2007, densities of Kittlitz's murrelets declined significantly in the inner bay and for the entire bay by 43 %, or -18 % per annum (Kuletz et al. 2008a). For all three July surveys combined, approximately 98% of all Kittlitz's murrelets were found within these two 'hot spots'. The hot spot in the south inner bay was approximately 75km^2, and included the deeper waters of the inner bay, which were <20-60 m deep.

Kenai Fjords
A graduate student, Yumi Arimitsu, conducting a study in Kenai Fjords, recorded Kittlitz's murrelet densities were 30% higher in 2008 compared to 2007. Primary productivity (measured by chlorophyll) was also higher in 2008 compared to 2007. The Kittlitz's population in Kenai Fjords was estimated to be 500 birds, ranging between 200-1200 birds, and one juvenile was observed

Icy Bay

Kissling et al. (2007b) used at-sea surveys and birds fitted with radio transmitters to define marine habitat use. Although a few consistent foraging sites were identified, radio tagged murrelets foraged throughout the entire bay including the adjacent fjords. The Kittlitz's in Icy Bay have been declining since 2002, and studies there suggest one potential source of mortality is a high incidence of avian predation.

Prince William Sound

A study of marine habitat use by Kittlitz's murrelets in Prince William Sound was initiated by a graduate student, Andrew Allyn, in 2008, and is supported by a National Wildlife Federation grant from 2009-2010. Kittlitz's fitted with telemetry were found to leave the upper reaches of Harriman Fjord and spend the night in the outer waters of Port Wells and near the Ester Island fishery. The night time distribution of murrelets may put them at risk to gillnet mortality. Data from 2008-2009 are being analyzed, and surveys are planned for 2010 that will replicate the 2001 Kittlitz's survey in PWS.

Pelagic Distribution of Kittlitz's Murrelets

The North Pacific Seabird Observer Program has been placing observers on research vessels in Alaskan waters since 2006. Relatively high densities of Kittlitz's were found off of Barrow in the fall. Kittlitz's were also observed in March-May in open leads of the pack ice in the Bering Sea, particularly the southeastern edge of the polynia south of St. Lawrence Island and to the NW of Nunivak Island. Low densities of Kittlitz's have been observed in other areas of Alaska's offshore waters (Kuletz, USFWS, unpublished data).

Breeding Ecology and Nesting Habitat of Kittlitz's Murrelets

Agattu Island

In 2008, a comprehensive 4-year monitoring project was initiated at Agattu Island in the Aleutian Island Archipelago. Preliminary data were collected on Agattu in 2006 and 11 nests were located. During 2008, 17 Kittlitz's murrelet nests were located and monitored (Kaler et al. 2008).

Kodiak Island

In 2006, the first confirmed case of Kittlitz's Murrelet breeding on Kodiak Island was recorded (Stenhouse et al. 2008). Ten additional nests were located and followed in 2008 and 2009 (Bill Pyle, USFWS, unpubl. data).

Southeast Alaska

In 2007, 30 Kittlitz's murrelets were radio tagged to locate them during the breeding season. Four birds were located at inland locations in suitable nesting habitat. Of four nests that were monitored throughout the nesting season in Icy Bay in 2007, 1 fledged successfully, 1 failed, and 2 were of unknown fate (Kissling et al. 2007).

Tin City and Capes Lisburne, Romanzof, Newenham

Four remote Air Force sites in western and northwestern Alaska were surveyed for the presence of nesting and/or brooding Kittlitz's murrelets in 1995 (Tin City, Capes Lisburne, Romanzof, Newenham). Ground-based surveys were conducted between 5 and 20 July. One adult with a nest and chick was found at Tin City and a Kittlitz's was seen flying from an inland nest at Cape Lisburne. Capes Newenham and Romanzof were unsuitable nesting habitat for Kittlitz's murrelets.

Effects of Human Disturbance on Kittlitz's Murrelets in Glacier Bay

A study to assess the effects of vessel activity on Kittlitz's murrelets in Glacier Bay discovered that the major effects were behavioral in nature. Vessel passage caused a 30-fold increase in flight behavior from 0-30 % of Kittlitz's murrelets when vessels were passing. Kittlitz's flight response was related to vessel speed, size, approach distance, and whether or not the bird was holding a fish in its bill. Analyses revealed that energy costs associated with vessel traffic were not large enough to burden individual fish holders beyond the stress of chick-rearing (Agness et al. 2008, Agness 2006)

ADDITIONAL MONITORING AND RESEARCH NEEDED TO ESTABLISH POPULATION OBJECTIVES AND A CONSERVATION STRATEGY

Limited knowledge of the ecology of Kittlitz's murrelet hampers conservation efforts (Day and Nigro 2004). Data gaps include, but are not limited to population status and trends, knowledge about nesting habitat, mortality factors, demographic vital rates, and diets. Additional monitoring and research needed to establish population objectives and a conservation strategy for Kittlitz's murrelets in Alaska are presented in this section.

Monitoring

Aleutian Islands

There are still areas where Kittlitz's murrelets are known to occur that have not been surveyed (e.g., Unimak Island), or surveys have not been replicated so that trends can be assessed (e.g. Atka Island, Attu Island, Adak Island). A survey of Unimak Island should be prioritized for future work because it represents the largest unsurveyed Aleutian Island containing protected bays, alpine nesting habitat, and remnant glaciers on the slopes of Shishaldin Volcano. Adak Island should be surveyed in detail, and some limited surveys that were conducted about 10 years ago should be repeated to see if any trends are apparent. Atka, Attu, and the Semichi Islands have been surveyed, but replicate surveys are also needed in the future to determine trends in these populations (Piatt et al. 2005).

Kachemak Bay

Based on results of monitoring in Kachemak Bay (2004-2007), monitoring of the south inner bay for Kittlitz's murrelets would be a reliable area to monitor at-sea populations, including the distribution and habitat use of juvenile Kittlitz's murrelets. The relative ease of accessibility would insure that monitoring could be conducted over a long time frame with limited resources. In addition, the area would be a candidate for upland nest searches such as have been conducted on Agattu Island and Kodiak Island.

Research

Additional genetic study is needed to identify populations and determine the amount of gene flow throughout the range of the Kittlitz's murrelet.

Table 2. COMPLETED and On-Going Research and Monitoring Projects for Kittlitz's Murrelets.

Region	Area	Years	Months	Principal Investigators / Collaborators	Primary Agency	Funding	Project	Main Objectives	Secondary Objectives	Products / Prospects / Notes
South Central Alaska	Prince William Sound	1989-2007	March & July	Irons (with McKnight, Kuletz)	USFWS	EVOS Trustees USFWS	At-sea surveys of random transects (25ft. whalers)	Obtain population estimates	Monitor trends (2-3 year schedule); distribution in PWS	Final reports & publications (Irons et al. 2000, Lance et al. 2001, Kendall and Agler 1998)
South Central Alaska	Kachemak Bay	2004-2007	June-Aug	Kuletz (with Labunski, Speckman)	USFWS	USFWS & ADFG	At-sea surveys of random (June) and systematic (July-Aug) transects	Population est & trends (compare to historic data)	Juv. densities & Juv./Adult ratios; distribution & marine habitat (w/CTD)	Final report (Kuletz et al. 2008)
South Central Alaska	Prince William Sound /17 Fjords	2001	June-Aug	Kuletz (with Labunski, McKnight, Irons)	USFWS	USFWS	At-sea surveys targeting KIMU, using systematic transects	Population estimate & distribution	habitat use; seasonal changes in abundance & distribution	Final report (Kuletz et al. 2003a) & publ (Kuletz et al.2003b
South Central Alaska	PWS / Harriman & College Fjords	2003	June-Aug	Kuletz (with Labunski, McKnight)	USFWS	USFWS	Surveying *Brachyramphus* from fast tour boat, with sm boat comparison	Feasibility of survey platform, abundance & distribution	Seasonal changes, foraging habitat & behavior	Final reports (Labunski et al. 2003, McKnight et al. 2003)
South Central Alaska	PWS / Harriman & College Fjords	2004	June-Aug	Stephensen (with Irons)	USFWS	USFWS	At-sea surveys of systematic transects & CTDs	Habitat use & comparison to Mamu	Seasonal changes, detailed marine habitat use	Stephensen 2009 Master's Thesis
Southeast Alaska	Icy Bay to Leconte Bay, 'Lost Coast	2002-2004	July	Kissling (with Kuletz, Brockmann)	USFWS	USFWS	At-sea surveys (shoreline, pelagic) of outer SEAK coast	Monitor trends for Malaspina area (compare to 1992)	Abundance & distribution, habitat. Establish more baseline	Final Report (Kissling et al. 2005)
Arctic, Bering Sea, GOA	Offshore / Pelagic	2006-2010	Feb-Nov	Kuletz (with Labunski, Renner)	USFWS / NOAA	NPRB & USFWS	At-sea surveys on NOAA research vessels	Abundance & distribution relative to prey	Seasonal and habitat changes throughout year	2006-March 2008 Final Report (Kuletz et al. 2008) and data in NPPSD; On-going.
South Central Alaska	Icy Bay, Kachemak Bay	2009-2013	Aug – on-going	Piatt, Kissling, Kuletz, Byrd	USGS/US FWS	USGS & USFWS	Experimental satellite attachment & tracking	Post-breeding movements, migration	Winter habitat use	Tagged 7 birds; followed through Sept. 2009

ABR, Inc. = Alaska Biological Research, **ADFG** = Alaska Department of Fish and Game, **AUD** = Audubon, **CTDs** = Water Conductivity, Temperature, Turbidity, and Depth**, EVOS** = *Exxon Valdez* Oil Spill, **KIMU** = Kittlitz's murrelet, **MAMU** = Marbled murrelet, **MBM** = Migratory Bird Management**, NFWF** =National Fish and Wildlife Federation, **NOAA** = National Oceanic and Atomospheric Administration, **NPPSD** = North Pacific Pelagic Seabird Database**, NPS** = National Park Service, **NPRB** = North Pacific Research Board, **PIs** = Principal Investigators, **USGS** = U.S. Geological Survey, **USFWS** = U.S. Fish and Wildlife Service.

Table 2. COMPLETED and On-Going Research and Monitoring Projects for Kittlitz's Murrelets (CONT'D).

Region	Area	Years	Months	Principal Investigators/ Collaborators	Primary Agency	Funding	Project	Main Objectives	Secondary Objectives	Products/ Prospects/ Notes
South Central Alaska	PWS / Heather Bay	2006-2008	June-Aug	Allyn (with McKnight, Sullivan, Irons)	USFWS	USFWS, Earthwatch Institute	At-sea surveys, CTD's, behavioral observations	Marine habitat use & foraging patterns	Daily & seasonal foraging activity over a shallow sill; seasonal changes in abundance	Draft report. On-going & expanded through NFWF grant
Southeast Alaska	Glacier Bay	2007	July	Kirchhoff	ADFG	ADFG	Survey Methods for *Brachyramphus* species	Evaluate how alternative sampling designs & methods affect precision and accuracy of surveys.	Fine scale distribution of Murrelets relative to shoreline, bathymetry, and season	Progress report
Bering Strait	Tin City, Seward Penisula	2008	July	Rojek	USFWS	USFWS	Nest Search	Determine if historical KIMU nesting sites in NW AK still active	Monitor productivity, if any nests were found	Trip report
South Cental Alaska	Kenai Fjords	2005-2008	May-Aug	Arimitsu, Piatt, Hall	USGS, NPS	USGS	At-sea surveys, oceanography, plankton, fish	Identify critical habitat, assess abundance	Seasonal changes, fjord ecology	Arimitsu et al. 2009, Arimitsu 2009
Southeast Alaska	Lost Coast	2008	July	Kissling, Gende, Lukacs	USFWS	USFWS	At-sea surveys	Estimate population size and distribution		Progress reports
Southeast Alaska	Icy Bay	2008	July-August	Kissling, Gende, Lukacs	USFWS, NPS	USFWS	Post-breeding dispersal	Identify post-breeding locations	Describe timing of post-breeding dispersal	Progress reports
Southeast Alaska	Glacier Bay	2008	June	Piatt, Arimitsu, Madison	USGS	USGS	At sea surveys for abundance	Add to trend data, last survey in 2003		Report for KIMU symposium in 2010
Aleutians	Near Islands	2009	July	Piatt, Nelson, Williams, Kaler	USGS	USGS, USFWS	At sea surveys for abundance	Resurvey of Attu, Agattu, for trend		Mss. In prep.
Gulf of Alaska	Kodiak	2008-2013	May-August	Lawonn, Pyle, Piatt, Madison, Burkett	USFWS	USFWS, USGS	Breeding biology	Study of nesting biology and habitat use	Assess behavior and attendance with AV and Radar counts	Burkett et al. 2009, Lawonn et al., in prep.

Table 2. COMPLETED and On-Going Research and Monitoring Projects for Kittlitz's Murrelets (CONT'D).

Region	Region	Region	Region	Region	Region	Region	Region	Region	Region	Region
Aleutians	Agattu Island	2008-2013	May-August	Kaler, Kenney, Byrd, Piatt	USFWS	USFWS, USGS	Breeding biology	Study of nesting biology and habitat use	Chick diets	Kaler et al. 2009
Gulf of Alaska	Kodiak	2009	July	Madison, Piatt, Lance, Corcoran	USGS	USGS, USFWS	At-sea surveys of abundance	Survey for abundance and trends around Kodiak Island		Report in prep.
Southeast Alaska	Entire Region	2006	NA	Day and Kissling	ABR, Inc.	USFWS	Plumage variation in Kittlitz's Murrelets - Phase I	Describe plumage variation of museum specimens	Relate plumage to known characteristics	Data collected; Phase II will analyze and report data (See proposed projects)

ABR, Inc. = Alaska Biological Research, **ADFG** = Alaska Department of Fish and Game, **AUD** = Audubon, **CTDs** = Water Conductivity, Temperature, Turbidity, and Depth**, EVOS** = *Exxon Valdez* Oil Spill, **KIMU** = Kittlitz's murrelet, **MAMU** = Marbled murrelet, **MBM** = Migratory Bird Management**, NFWF** =National Fish and Wildlife Federation, **NOAA** = National Oceanic and Atomospheric Administration, **NPPSD** = North Pacific Pelagic Seabird Database**, NPS** = National Park Service, **NPRB** = North Pacific Research Board, **PIs** = Principal Investigators, **USGS** = U.S. Geological Survey, **USFWS** = U.S. Fish and Wildlife Service.

Table 3. PROPOSED Kittlitz's Murrelet Research and Monitoring Activities.

Region	Area	Years	Months	PIs & Collaborators	Primary Agency	Funding	Project	Main Objectives	Secondary Objectives	Prospects / Notes
South Central Alaska	Kachemak Bay	2010 to on-going	June-Aug	Kuletz (with Labunski)	USFWS	USFWS	At-sea surveys of random (June) and systematic (July-Aug.) transects	Population estimate & trends (compare to historic data)	Juv. densities & juv./adult ratios; distribution & marine habitat, prey	Submit proposals within MBM/USFWS (Anchorage)
South Central Alaska	Kachemak Bay	2010	June-Aug	Kohler, Piatt, Kuletz	USFWS / USGS	??	Ground search for nests in mountains of Kachemak Bay	Locate nests, describe habitat	Distance from forage areas, nesting success. management applications	In discussion
Gulf Of Alaska	Offshore / Pelagic	2010-2012	Feb-Oct	Slater (with NOAA PIs)	USFWS / NOAA	NPRB & USFWS	At-sea surveys on NOAA research vessels	Abundance & distribution relative to prey	Seasonal and habitat changes throughout year	Grant awarded as part of GOA-IERP. Surveys start in 2012
South Central Alaska	Prince William Sound	2010	March, July	Irons (with Kuletz)	USFWS	EVOS Trustees, USFWS	At-sea surveys of random transects (25ft. whalers)	Obtain population estimates & trends (compare to historic since 1989)	Monitor on 2-3 year schedule. Distribution in PWS	Funded for 2010; will submit proposals to continue surveys.
South Central Alaska	PWS /5 fjords; focus on Heather Bay	2009-2010	June-Aug	Allyn (with McKnight, Irons, Kuletz, Piatt)	USFWS	NFWF & USGS	At-sea surveys, CTD's, prey sampling, radio telemetry	Detailed marine habitat use & prey use. Foraging ranges.	Compare abundance & distribution to historic data in 5 fjords	2009 completed, interim report in progress. Allyn's Master's Thesis
Southeast Alaska	Glacier Bay	2009-2010	July	Kirchhoff, Wright	Audubon	ADFG/AUD	Comparative feeding ecology of KIMU and MAMU	Prey-capture performance by species, habitat, time and tide	ID and disposition of held prey	Report in progress
Southeast Alaska	Glacier Bay	2010-2012	June - Aug	Kirchhoff	Audubon	??	Kittlitz's and marbled murrelet studies	Abundance & distribution relative to habitat features	Monitoring trends in Kimu & Mamu	Seeking funding
Southeast Alaska	Entire Region	2006 - until finished	NA	Day and Kissling	ABR	USFWS	Plumage variation in Kittlitz's Murrelets - Phase II	Describe plumage variation of museum specimens	Relate plumage to known characteristics	Most data collected; Phase II is analysis and writing
Arctic	Beaufort & Chukchi Seas & NW Inland areas of AK	2009-2010??	NA	Day & Gall	ABR	USFWS	At-sea surveys, historic records, museum studies	Describe nesting habitat & distribution at sea	??	2009 surveys completed

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OTHER ACCOMPLISHMENTS

Databases

The North Pacific Pelagic Seabird Database (NPPSD) includes historic (1970s-2000s) and recent (2006-2008) data on the distribution of Kittlitz's murrelets in pelagic waters of Alaska (Drew and Piatt, in prep.). Version 2.0 of the NPPSD has been completed, and will be available for distribution in winter of 2009-2010. The USFWS has continued to conduct pelagic surveys on research ships of opportunity, via the Alaska Pelagic Seabird Observer Program with support from the North Pacific Research Board. Surveys were conducted in 2008-2009, and will continue through 2010.

Working Groups and Committees

The inaugural meeting of the Kittlitz's Murrelet Technical Committee, under the Pacific Seabird Group, convened on February 22, 2009. Earlier working groups convened to discuss research and monitoring needs in 2004 and 2007.

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Appendix 1. USFWS FOCAL SPECIES STRATEGY FOR MIGRATORY BIRDS

U.S. Fish & Wildlife Service

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.

U.S. Fish and Wildlife Service
Division of Migratory Bird Management
4401 N. Fairfax Drive, Arlington, VA 22203
703 358 1714
http://birds.fws.gov

November 2005

Appendix 1. USFWS FOCAL SPECIES STRATEGY FOR MIGRATORY BIRDS (CONT'D)

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

Greater White-fronted Goose (Tule)	Black-capped Petrel	Marbled Godwit	Gilded Flicker
Emperor Goose	Hawaiian Petrel	Red Knot (Atlantic)	Olive-sided Flycatcher
Snow Goose (Wrangel Island)	Christmas Shearwater	Dunlin (Arctic)	Buff-breasted Flycatcher
Snow Goose (Lesser)	Townsend's Shearwater (Newell's)	Buff-breasted Sandpiper	Loggerhead Shrike
Brant (Atlantic)	Audubon's Shearwater	American Woodcock	Gray Vireo
Brant (Black)	Ashy Storm-Petrel	Wilson's Phalarope	Florida Scrub-Jay
Canada Goose (Southern James Bay)	Band-rumped Storm-Petrel	Red-legged Kittiwake	Brown-headed Nuthatch
Canada Goose (N. Atlantic population)	Tristram's Storm-Petrel	Gull-billed Tern	Sedge Wren
Canada Goose (Resident populations)	Brown Pelican	Caspian Tern	Bicknell's Thrush
Cackling Goose (Cackling)	Double-crested Cormorant	Elegant Tern	Wood Thrush
Canada Goose (Dusky)	Red-faced Cormorant	Common Tern	Bendire's Thrasher
Trumpeter Swan (Interior)	Lesser Frigatebird	Arctic Tern	Sprague's Pipit
Trumpeter Swan (Rocky Mountain)	Reddish Egret	Least Tern (Interior)	Golden-winged Warbler
Wood Duck	Swallow-tailed Kite	Least Tern (California)	Blackpoll Warbler
American Wigeon	Ferruginous Hawk	Aleutian Tern	Cerulean Warbler
American Black Duck	Peregrine Falcon	Black Tern	Elfin-woods Warbler
Mallard	Yellow Rail	Blue-gray Noddy	Prothonotary Warbler
Mottled Duck	Black Rail	Marbled Murrelet	Swainson's Warbler
Northern Pintail	Clapper Rail	Kittlitz's Murrelet	Bachman's Sparrow
Greater Scaup	King Rail	Xantus's Murrelet	Grasshopper Sparrow
Lesser Scaup	Sandhill Crane	Cassin's Auklet	Baird's Sparrow
Steller's Eider	Whooping Crane	Least Auklet	Henslow's Sparrow
Spectacled Eider	American Golden-Plover	Whiskered Auklet	Le Conte's Sparrow
Common Eider (Pacific)	Snowy Plover[2]	White-crowned Pigeon	Saltmarsh Sharp-tailed Sparrow
Common Eider (Atlantic)	Wilson's Plover	Band-tailed Pigeon	Seaside Sparrow
Surf Scoter	Piping Plover	Mourning Dove	Smith's Longspur
White-winged Scoter	Mountain Plover	Black-billed Cuckoo	Chestnut-collared Longspur
Black Scoter	American Oystercatcher	Yellow-billed Cuckoo	McKay's Bunting
Long-tailed Duck	Black Oystercatcher	Ferruginous Pygmy-Owl	Painted Bunting
Red-throated Loon	Black-necked Stilt (Hawaiian)	Burrowing Owl	Bobolink
Yellow-billed Loon	Upland Sandpiper	Short-eared Owl	Tricolored Blackbird
Laysan Albatross	Bristle-thighed Curlew	Northern Saw-whet Owl	Eastern Meadowlark
Black-footed Albatross	Long-billed Curlew	Red-headed Woodpecker	Rusty Blackbird
Short-tailed Albatross	Hudsonian Godwit	Yellow-bellied Sapsucker	Audubon's Oriole
Herald Petrel	Bar-tailed Godwit	Red-cockaded Woodpecker	

[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).

Appendix 2. COLLABORATORS INVOLVED IN RESEARCH, CONSERVATION, AND MANAGEMENT OF KITTLITZ'S MURRELET

ABR, Inc.
Alaska Department of Fish and Game
Alaska Maritime National Wildlife Refuge
Audubon Alaska
Exxon Valdez Oil Spill Trustee Council
(IPCC) Intergovernmental Panel on Climate Change
Kodiak National Wildlife Refuge
National Audubon Society
National Marine Fisheries Service, Juneau, Alaska
National Park Service, Wrangell-St. Elias National Park and Preserve
National Park Service, Glacier Bay National Park
North Pacific Research Board
Pacific Seabird Group
Saltwater Inc.
University of Alaska Sea Grant Program
University of Washington, Seattle, WA
United States Air Force, Elmendorf Air Force Base, AK
U.S. Department of Agriculture, Forest Service, Chugach National Forest
U.S. Fish and Wildlife Service Anchorage Field Office, Endangered Species Program
U.S. Fish and Wildlife Service, Juneau Field Office
U.S. Geological Survey, Alaska Science Center
Western EcoSystems Technology, Inc.