ACTION PLAN

FOR

WHITE-WINGED SCOTER

Prepared by:
Lynn Denlinger
U.S. Fish and Wildlife Service
Migratory Bird Management Division
Anchorage, Alaska

28 October, 2011

Suggested Citation: USFWS. 2011. Action plan for white-winged scoter. U.S. Fish and Wildlife Service, Anchorage, Alaska. Unpublished Report. 43 pp. + appendices.

EXECUTIVE SUMMARY

The Waterfowl Breeding Population and Habitat Survey (WBPHS) indicates long-term numerical declines in North American breeding populations of all three scoter species combined [black (*Melanitta americana*), surf (*Melanitta perspicillata*), and white-winged (*Melanitta fusca*)]. Because of a declining numerical trend and lack of information about vital rates of the white-winged scoter, it was chosen as a focal species as part of the U.S. Fish and Wildlife Service, Migratory Bird Program's Focal Species Strategy. For purposes of this Action Plan, the target population includes only white-winged scoters that winter in the Pacific Flyway and their associated molting, staging, and breeding areas.

Significant research gaps and inadequate monitoring have made effective management of this species difficult. Better population information and an increased understanding of the factors influencing population dynamics are needed to effectively manage white-winged scoters. High priority USFWS management actions identified in this Action Plan are:

1. Continue to identify links among breeding, molting, and staging areas of white-winged scoters that winter in the Pacific Flyway;
2. Determine migration corridors and timing of migration between breeding, molting, and staging areas of white-winged scoters that winter in the Pacific Flyway;
3. Develop a population estimate and monitoring survey for white-winged scoters that winter in the Pacific Flyway;
4. Develop a population estimate and monitoring survey for winged scoters breeding in Alaska and the western Canadian boreal forest; and
5. Develop population objectives for white-winged scoters at continental and regional scales.

Photo by Donna Dewhurst

TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

LIST OF APPENDICES

INTRODUCTION

This Action Plan was developed as part of the U.S. Fish and Wildlife Service's (USFWS) Focal Species Strategy (USFWS 2005; Appendix 1). The Strategy was developed in 2005 to further USFWS goals in achieving bird conservation priorities and mandates. It involves a course of conservation actions designed to return selected species to healthy and sustainable levels. Success in achieving this conservation goal is evaluated by the U.S. Office of Management and Budget.

Initial focus of the Focal Species Strategy has been a small subset of species already identified by USFWS as "birds of management concern" (USFWS 2005; Appendix 1). The white-winged scoter was chosen as a focal species by the USFWS Alaska Region primarily because of a probable declining population trend, northward retraction of the breeding range, and environmental and anthropogenic threats on breeding and wintering areas. It also was chosen because its wide range is likely to stimulate partnerships across programs and jurisdictions.

The white-winged scoter has the most extensive breeding range of the three species of scoters found in North America. It nests across northern boreal forests and winters on both the Atlantic and Pacific coasts.

Insufficient data have hampered effective management throughout the white-winged scoter's range. This Action Plan addresses white-winged scoters that winter in the Pacific Flyway and their molting, staging, and breeding areas. The scope of the Plan was limited to assure measurable outcomes of management activities conducted by the USFWS Alaska Region. The Action Plan may be modified as new information becomes available or further conservation needs arise.

The goal of this Plan is to identify and implement conservation actions required to ensure long term sustainability of white-winged scoters that winter in the Pacific Flyway. Similar endeavors have been undertaken by the Sea Duck Joint Venture (SDJV) (SDJV Management Board 2008, SDJV 2010) and Kehoe (2002; Status of white-winged scoter *Melanitta fusca deglandi* in Alberta).

Objectives of this Action Plan are:

1. Review the current state of knowledge of the species status, natural history, and possible limiting factors;
2. Define what actions need to be taken to increase our knowledge of the species and overcome limiting factors;
3. Prioritize and set a timeline for actions needed to achieve the goals of improving the status of white-winged scoters that winter in the Pacific Flyway; and
4. Identify appropriate programs or organizations to address the management actions identified in this Plan.

The USFWS Alaska Region developed this Action Plan. Other partners who contributed data and are involved in conservation actions include: the Sea Duck Joint Venture; National Wildlife Refuges (NWR); the Canadian Wildlife Service (CWS); Alaska Department of Fish and Game (ADFG); Washington Department of Fish and Wildlife (WDFW); U.S. Geological Survey (USGS), Alaska and Western Ecological Research Centers; Simon Fraser University, British Columbia; and, University of Alaska, Fairbanks.

The target audience for this Plan includes USFWS, CWS, ADFG, Office of Management and Budget, SDJV, and Pacific Coast Joint Venture. This plan is posted at: http://alaska.fws.gov/mbsp/mbm/waterfowl/reports.htm, and also at: http://www.nbii.gov/portal/server.pt/community/usfws_focal_species/760.

ACKNOWLEDGEMENTS

The following individuals commented on this Plan: Tim Bowman (USFWS, SDJV); Robin Corcoran (USFWS, Kodiak NWR); Dan Esler (Simon Fraser University, BC, Canada); Joe Evenson (WDFW); Mike Petrula (ADFG); David Safine (USFWS, Fisheries and Ecological Services, Fairbanks Field Office); and Eric Taylor (USFWS, MBM-R7).

DESCRIPTION OF TARGET POPULATION

Worldwide, three subspecies of white-winged scoters are recognized by Johnsgard (1978) and others: the European white-winged or velvet scoter (*Melanitta fusca fusca*) of Europe and Asia (west of the Yenisey Basin); Asiatic white-winged scoter (*Melanitta fusca stejnegeri*) of eastern Asia; and the Pacific white-winged scoter (*Melanitta fusca deglandi*) of North America (Brown and Frederickson 1997). Variation in the appearance of males between the three major geographical regions includes; body size, bill shape and color, flank color, and size of the white crescent below the eye (Cramp and Simmons 1977). The three subspecies are divided into two groups: North American-east Asian group (*deglandii*) and the European group (*fusca*), that are sometimes considered distinct species based on structural differences of male trachea and bill (Hellmayr and Conover 1948, Livezey 1995). Among the three species of scoters, white-winged and surf scoters (*Melanitta perspicillata*) are considered more closely related to each other than to black scoters (*Melanitta nigra*), and are sometimes classified as sister groups in the subgenera *Melanitta* and *Oidemia*, respectively (Livezey 1995).

Distribution and Range

Breeding

The Pacific white-winged scoter nests in the boreal forest from northeast Alaska through western Canada (Gabrielson and Lincoln 1959, Godfrey 1986; Fig. 1). The breeding range also extends eastward in Canada to Hudson's Bay and south into the prairie-parklands. Nesting densities in Canada are the highest in the Northwest Territories (NWT) between Great Slave Lake and the Arctic Ocean (Palmer 1976, Bellrose 1980). Breeding is more dispersed on the prairies of Manitoba, Saskatchewan, and Alberta (Brown and Fredrickson 1997). Smaller numbers also occur on river deltas in arctic Canada. Within Alaska, the largest breeding aggregations occur on Yukon Flats NWR in northeast Alaska (Palmer 1976, Bellrose 1980). Numbers of white-winged scoters surveyed during the Arctic Coastal Plain Waterfowl Breeding Population Survey were substantially higher in 2011 (18,862 total indicated birds) and 2010 (16,444 total indicated birds) than in previous years (2009; 2,950 total indicated birds); (2008; 4,792 total indicated birds); (2007; 4,021 total indicated birds; Larned 2008, 2009, 2010, numbers for 2010 and 2011 *in prep.*). Scattered numbers also exist in the Porcupine River drainage, north to Anaktuvuk Pass, south to Minto Lakes (Petrula 1994), and west to Innoko Flats and Koyukuk area (Gabrielson and Lincoln 1959). Preferred nesting areas are near permanent lakes (Brown and Brown 1981).

Historically, white-winged scoters bred on the prairies of North Dakota and southern Manitoba (Rawls 1949, Duebbert 1961, Stewart 1975). Breeding populations are no longer present in these areas (Brown and Frederickson 1997). Reasons for this decline and for the range reduction are unclear.

Wintering

White-winged scoters winter in large marine bays and estuaries on the Atlantic and Pacific coasts of North America (Palmer 1976, Bellrose 1980), and in the lower Great Lakes

(Bellrose 1980, Robbins 1991; Fig. 1). Along the Pacific coast, they can be found in ice-free marine waters from eastern Kamchatka to Japan, and from the Aleutian Islands through the Gulf of Alaska; east to Southeast Alaska; south along the Pacific coast of British Columbia, Washington, Oregon, and California to the northern Baja Peninsula and northern Gulf of California (Jewett et al. 1953, Gabrielson and Lincoln 1959, Bellrose 1980, Campbell et al. 1990, Gilligan et al. 1994, Small 1994, Howell and Webb 1995; Fig. 1).

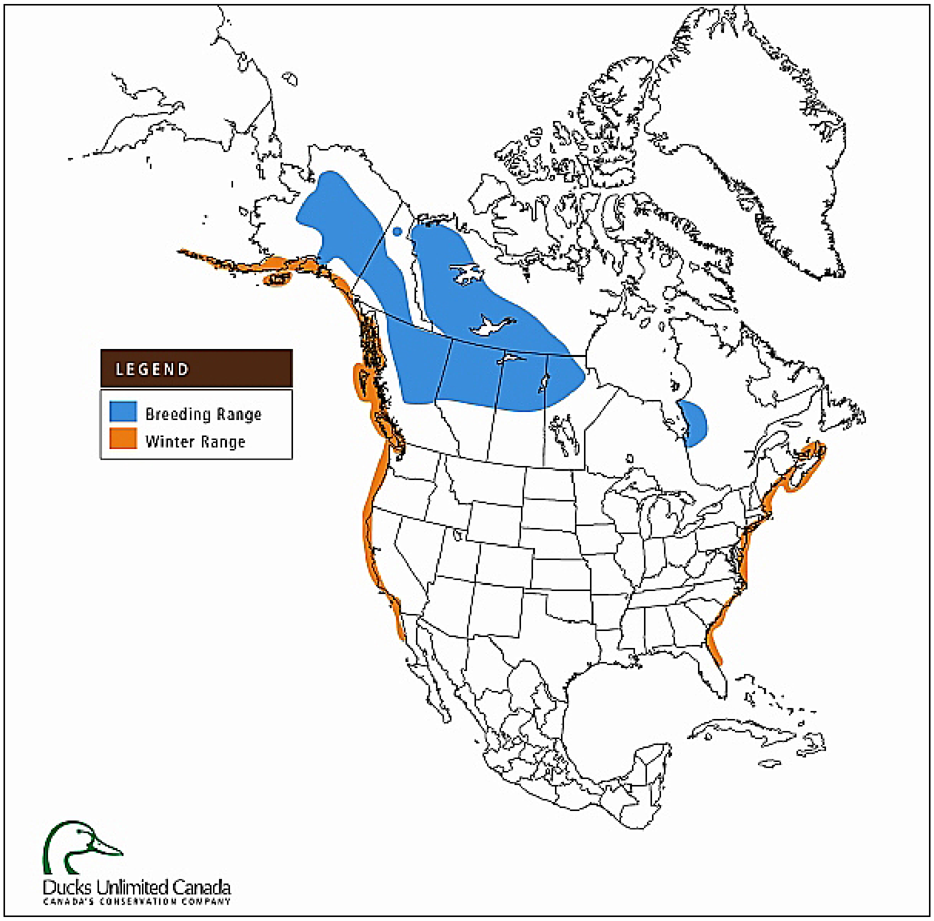


Figure 1. Distribution of white-winged scoters in North America.

White-winged scoters wintering along the Atlantic coast are found from the Gulf of St. Lawrence, south to northern Florida and along the Gulf of Mexico (Fig. 1). Approximately 70% of white-winged scoters wintering along the Atlantic coast frequent the area between Long Island Sound and Chesapeake Bay on the east coast of the U.S. Small numbers of white-winged scoters winter in the lower Great Lakes, primarily in Lake Erie and Lake Ontario (Brown and Frederickson 1997).

Although the migratory habits of white-winged scoters are poorly known, recent satellite telemetry, stable isotope, and mark-recapture studies illustrate affiliations between breeding, molting, and wintering areas (Rosenberg et al. 2006, Swoboda 2007, Lok et al. 2008, Evenson et al. 2010). However, further study is needed to draw conclusions about population structuring at both small and large spatial scales, particularly in eastern North America. The Sea Duck Joint Venture (SDJV) has recently embarked on a large scale sea duck satellite telemetry study in eastern North America that includes marking of white-winged scoters (see URL: http://seaduckjv.org/atlantic_migration_study/atlantic_sea_duck_general_outreach_feb2011.pdf).

Legal and Conservation Status

The white-winged scoter is considered a game bird under both U.S. and Canadian Federal Migratory Bird Regulations. It may be legally harvested during migratory bird hunting seasons, subject to federal and state/provincial harvest regulations. In some areas of Alaska and Canada, white-winged scoters and their eggs also may be taken legally during subsistence harvests. They are an important food source for Native people of both countries (Wolfe et al. 1990, Haszard 2001).

White-winged scoters are not protected through a species-specific status in either country. In the U.S., the National Wildlife Refuge System, particularly Yukon Flats, Arctic, Koyukuk, Nowitna, Innoko, and Selawik NWRs provide protection of breeding wetlands.

The global heritage conservation rank of white-winged scoter is G5 or "secure" (NatureServe 2009). According to "Wild Species 2005: The General Status of Species in Canada", white-winged scoter is also considered "secure" in Saskatchewan, British Columbia, Quebec, New Brunswick, Nova Scotia, Prince Edward Island, Newfoundland/Labrador, and Ontario. It is considered "sensitive" in Alberta, Yukon, and Northwest Territories, and "undetermined" in Nunavut (Canadian Endangered Species Conservation Council, CESCC 2006).

The SDJV was formed in 2005 under the North American Waterfowl Management Plan (see URL: http://www.nawmp.ca/%20) to address the conservation needs of sea ducks in North America. White-winged scoter has been identified as a research and conservation priority by the SDJV (Sea Duck Joint Venture 2008, 2010).

Rationale for Selection as a Focal Species

Data from the annual North American Waterfowl Breeding Population and Habitat Survey (WBPHS) suggest a substantial, long-term population decline of scoters on their continental breeding grounds (CWS 2009). Population estimates from 1954-2009 indicate a decline from 2.3 million to 1.2 million scoters (± 1 SE; Fig. 3; CWS 2009). Because scoters are difficult to identify during aerial surveys, the WBPHS provides a scoter index combining the three North American scoter species. White-winged and surf scoters are boreal forest nesting sea ducks. Since the 1970s, WBPHS data suggest up to 75% declines of both species. The declines have been greatest in northern Alberta, British Columbia, and the Northwest Territories of Canada (CWS 2000). The majority of white-winged and surf scoters breed in this region, particularly between Great Slave Lake and the Arctic Ocean, causing considerable concern (Bellrose 1980). Data from the Alaska portion of the 2010 WBPHS, indicated scoter populations were 289,300 birds (Mallek and Groves 2010). This estimate is down 18% from the previous 10-year mean (1999-2008) and down 23% from the long-term mean (1957-2010).

Understanding the cause of a potential decline in white-winged scoters is impeded by several factors: traditional monitoring surveys are not timed appropriately (i.e., they are too early) to monitor scoters on the northern breeding grounds; general information about the life history, demography, ecology, and distribution of this species is still lacking; and additional data on the timing of movements and range affiliations between the breeding, molting, and wintering grounds are needed.

The white-winged scoter was chosen as a focal species to advance knowledge of its natural history and limiting factors; expand and improve monitoring surveys; increase the understanding of seasonal movements and range affiliations throughout the annual life cycle; and develop conservation strategies to effectively manage birds wintering in the Pacific Flyway.

NATURAL HISTORY

Life History Overview

White-winged scoters are heavy-bodied sea ducks that inhabit holarctic waters. They are the largest of the three species of scoters found globally, and the third largest sea duck. Only common eiders (*Somateria mollissima*) and common mergansers (*Mergus merganser*) are larger than white-winged scoters. Band recoveries have shown that white-winged scoters may live 18 years or more (Kehoe et al. 1989). Nesting commonly occurs in northern boreal forests and prairie-parkland habitats. In addition to nesting locations on islands in large freshwater lakes, nests can be found hundreds of meters from water in areas with dense nesting cover (Safine 2005, Safine and Lindberg 2008). White-winged scoters winter on both the Atlantic and Pacific coasts, with some individuals wintering on the lower Great Lakes (Palmer 1976, Houston and Brown 1983).

The white-winged scoter is serially monogamous and some females appear to form pair bonds prior to or just after arrival on breeding areas (Brown and Frederickson 1989). However, recent satellite telemetry data conducted in Washington State indicated that some pair bonding may occur on winter or spring staging grounds (Joe Evenson, WDFW, pers. comm.). It is among the latest waterfowl to arrive on nesting grounds and initiate nesting (Hochbaum 1944). A late breeding season, coupled with a short span of nest initiation, limits any significant degree of renesting (Hochbaum 1946).

Age at first breeding for females is two to three years of age (Palmer 1976, Brown and Houston 1982). Not all adults breed annually. Non-breeders may also be found on the breeding grounds (Safine 2005; Slattery, see URL: http://seaduckjv.org/studies/pro3/pr20.pdf) or gathered on large lakes and marshes during the breeding season (Brown and Frederickson 1997). The sex ratio is skewed toward males (Sorensen et al. 1974, Brown and Brown 1981, Brown and Fredrickson 1989). Survival of young white-winged scoters is low, with most ducklings dying within the first few weeks of life (Traylor et al. 2004a, Safine 2005).

White-winged scoters share many of the typical life history traits of other sea ducks, including low recruitment rates (Brown and Brown 1981, Kehoe et al. 1994) and high annual adult survival rates (Kehoe et al. 1989). They have a relatively low breeding propensity (Safine 2005), low renesting propensity (Brown 1981, Traylor et al. 2004a), and high variation in duckling survival (Traylor et al. 2004a, Safine 2005). Too little is known about life history strategies and limiting factors to determine causes responsible for a trend of declining abundance in white-winged scoters.

In recent years, studies have focused on survival of nests (Traylor 2003, Traylor et al. 2004a, Safine 2005), ducklings (Traylor 2003, Traylor et al. 2004a, Traylor and Alisauskas 2006, Safine 2005), and adult breeding females (Traylor et al. 2004a, Safine 2005, Swoboda 2007) within the species primary breeding range. Additional research on vital rates for white-winged scoters may yield insights into factors affecting population status and trends. Currently, estimates of molt and winter survival are being generated by graduate students at Simon Fraser University, BC, Canada.

Breeding

The breeding range of white-winged scoters is the most extensive of all three scoter species found in North America. The primary breeding habitat is large freshwater or brackish lakes and river deltas in boreal forest zones. Nesting also occurs on alkaline prairie lakes on the Saskatchewan River Delta, Canada. This species is also known to nest up to several hundred meters from water (Bellrose 1980, Brown and Brown 1981, Traylor 2004a, Safine 2005, Safine and Lindberg 2008). Rarely, nesting occurs on open tundra (Brown and Frederickson 1997).

White-winged scoters are some of the last migrants to arrive to the northern nesting grounds (Gabrielson and Lincoln 1958, Irving 1960, Murdy 1964, Lensink 1965, Littlefield and Pakulak 1969). At some locations, birds have been recorded arriving as late as the second week of June (Rosenberg et al. 2006).

Females exhibit high site fidelity to natal areas (Brown and Fredrickson 1989). Nesting usually occurs in solitary pairs, but loose congregations are also formed (Rawls 1949, Brown and Frederickson 1989). Nests are often found in association with gull or tern colonies (Hildén 1964; Vermeer 1968, 1969; Brown and Brown 1981). If flushed from the nest during egg-laying or early incubation, females may abandon their nest (Brown and Brown 1981).

The nest is a shallow depression on the ground, generally well-concealed in dense, often thorny vegetation (Brown and Brown 1981, Brown and Frederickson 1989, Traylor et al. 2004a, Safine 2005, Safine and Lindberg 2008). Obscure nest sites and those on islands may make them more difficult for mammalian predators to find, hence increasing productivity (Brown and Frederickson 1989, Paton 1994). Dense nesting cover could also make it difficult for a large bird like the white-winged scoter to escape predators, and females could be trading productivity for their own survival (Safine 2005, Safine and Lindberg 2008). Well-concealed nests also make them harder for researchers to find, resulting in few studies describing the breeding ecology for this species (Traylor et al. 2004a, Slattery, see URL: http://seaduckjv.org/studies/pro3/pr20.pdf).

Generally, females lay an average clutch of 8-9 eggs, which hatch in about 28 days (Vermeer 1969, Brown 1977, Brown and Brown 1981, Brown and Frederickson 1989). However, on the lower Mackenzie watershed in the Northwest Territories, average standard clutch size was 6.7 eggs (n=6 nests; Slattery, see URL: http://seaduckjv.org/studies/pro3/pr20.pdf). Only females incubate eggs. During egg-laying at Redberry Lake in Canada, Brown and Fredrickson (1987a) found little change in body weight or use of lipid reserves by hens. Long nest recesses, combined with the time females spent feeding during incubation, indicated reliance on exogenous local food resources to meet some of the energetic demand (Brown and Frederickson 1987b). Nonetheless, during incubation, females lost lipids at a rate of 3.43 g/day, and by the end of incubation lost about 25% of their maximum body weight (Brown and Fredrickson 1987a). On Yukon Flats NWR, females lost on average 31% (470 ± 36 g) of their body weight during the laying and incubation periods (Safine 2005).

Ducklings are typically brooded at the nest for 12-24 hours before the female leads them to water where they may swim long distances to brooding areas (Brown 1977, Brown 1981). Some females leave ducklings from 1-3 weeks of age, but ducklings stay together for another 1-3 weeks (Brown and Brown 1981, Brown and Frederickson 1989). Other females stay with their ducklings for most of the brood rearing period (Safine 2005). Hens often abandon their ducklings to crèches; one female may tend up to 60 or more ducklings from many different broods (Traylor et al. 2004b). Larger groups may increase the survival probability of individual ducklings by reducing the likelihood of being taken by a predator (Kehoe 1986).

White-winged scoter ducklings are very large at hatch (average 54.5 g). They grow most rapidly in the first four weeks of age and reach ~ 800 g or 60–70% of adult mass at fledging. Ducklings fledge at 70-80 days old (Brown and Frederickson 1983). Development of white-winged scoter ducklings is slower than for any other North American duck species (Hochbaum 1944, Weller 1957).

Mortality rates for white-winged scoters are highest during the first week of life (Brown 1981, Brown and Frederickson 1989). Ducklings suffer high predation rates by gulls, with most predation occurring within the first few days after hatching (Brown and Brown 1981).

Post-nesting Dispersal, Molt, and Migration

White-winged scoters breeding in northern Canada and Alaska generally migrate to the coasts before molting their wing feathers. Surveys have shown that at least 185,000 white-winged and surf scoters undergo wing molt in SE Alaska (Hodges et al. 2008).

On Yukon Flats NWR, breeding males depart the nesting grounds shortly after incubation begins (D. Safine, USFWS, pers. comm). Some non-breeding females and those that lose nests or broods early also move to molting sites before the end of the nesting season (Brown and Frederickson 1989). Recent telemetry and stable isotope work confirmed movement of white-winged scoters (particularly males) from breeding grounds to marine areas before beginning remigial molt (Evenson et al. 2010, Dickson et al. 2011, Uher-Koch et. al 2011). These studies also indicated that many females undergo molt on inland freshwater lakes; the choice of molting habitat may be influenced by reproductive success; some males are on molting areas for months; the flightless period is around 5-6 weeks; energetic costs of molt are easily met on coastal areas; and molt survival is very high (Dickson et al. 2011, Uher-Koch et. al 2011).

White-winged scoters exhibit a high degree of site fidelity to particular winter regions (Ewins and Houston 1992, Robertson and Cooke 1999). Band recoveries suggest that white-winged scoters breeding from the central through eastern boreal forests of Canada migrate to the Atlantic Coast to winter. Those breeding in the northwestern boreal forests of Canada and Alaska winter on the Pacific Coast.

Redberry Lake, in the aspen parklands of west-central Saskatchewan (52° 0’N, 107° 10’W) is the only breeding area known to have white-winged scoters that winter on the Atlantic and Pacific coasts breeding sympatrically. It also represents the dividing line for birds traveling east or west to winter (Houston and Brown 1983). Approximately half of the band recoveries from Redberry Lake have occurred on each coast. However, stable isotope data collected from white-winged scoters at Redberry Lake, indicate that the breeding population is comprised of approximately 75% Pacific and 25% Atlantic wintering birds (Swoboda 2007). Differential hunting pressure or band reporting rates between areas may explain the difference between band recovery data and isotope data (Ewins and Houston 1992, Krementz et al. 1997, Savard et al. 1998, Robertson and Cooke 1999). In the stable isotope study at Redberry Lake, nesting scoters were assigned to Atlantic and Pacific coasts with a high degree of certainty (> .90; Swoboda 2007). However, wintering groups delineated to the Atlantic and Pacific coasts are likely composed of many local wintering groups. Individual birds may have wintered in different locations along the coasts, followed different migration routes, or staged on different areas (Swoboda 2007). Those local wintering groups would have been exposed to different factors that could influence individual fitness and dynamics (Robertson and Cooke 1999).

The Great Lakes may be an example of how the use of different habitats throughout the life cycle can have significant consequences on a population. Since the early 1990s, tens of thousands of white-winged scoters began using the Great Lakes during migration and winter (Wormington and Leach 1992, Hamilton and Ankney 1994). This probably occurred in response to an abundance of zebra mussels (*Dreissena polymorpha*) in the Great Lakes (Wormington and Leach 1992, Mitchell and Carlson 1993, Petrie and Knapton 1999, Mitchell et al. 2000). Scoters also stage for a longer time period at the Great Lakes, possibly due to warmer winter temperatures and reduced ice cover (Petrie and Schummer 2002). Zebra mussels bioaccumulate contaminants at higher concentrations than native clam species (Brieger and Hunter 1993) and waterfowl that feed on zebra mussels have significantly higher contaminant loads (Mazak et al. 1997). Linking wintering areas to breeding areas may provide insight into the continental declines of white-winged scoters, and help determine if specific wintering grounds influence reproductive success, survival, and recruitment on breeding areas (Swoboda 2007).

Recent mark-recapture and satellite telemetry studies (Rosenberg et al. 2006, Swoboda 2007, Lok et al. 2008, Evenson et al. 2010) support some degree of fidelity to breeding, molting, and wintering areas. Satellite telemetry of white-winged scoters marked on breeding grounds at Canvasback Lake, Yukon Flats, Alaska in 2002 indicated that birds moved to fall molting areas between 29 June and 1 August. Six birds (4 males, 2 females) molted in the Bering Sea (Kuskokwim Bay) and one male molted in lower Cook Inlet. Two males flew to the Beaufort Sea before going to Kuskokwim Bay to molt (Appendix 2; Rosenberg, see URL: http://seaduckjv.org/studies/pro3/pr1b.pdf). One bird wintered on Kodiak Island, while the rest wintered along the Alaska Peninsula (Appendix 2).

A recent telemetry study in Washington State (2003–2006) documented that some white-winged scoters returned to their wintering areas to molt; some molted near breeding areas; and most spent the majority of the year in the wintering area (80% of ATY white-winged scoters spent eight months of the year near their wintering area) with only small localized movements (Evenson et al. 2010). The authors found that nocturnal and diurnal locations often differed at wintering areas; large flocks of wintering white-winged and surf scoters congregated together during the night; and the majority of birds with PTT transmissions during migratory flights migrated mostly at night (Evenson et al. 2010).

Prince William Sound (PWS) in the Gulf of Alaska has been identified as an important winter and spring staging area for white-winged scoters. In April and May (1999, 2000) Rosenberg et al. (2006) equipped white-winged scoters (13 females, 9 males) in PWS with satellite transmitters. Most of these birds bred and/or molted in the Northwest Territories (Appendices 3 and 4). Coastal molting areas were broadly distributed in the Beaufort Sea, NWT, Gulf of Alaska, and Bering Sea (Appendix 4). Eighty-two percent of the eleven breeding birds monitored into the following winter returned to PWS. Some females molted on breeding areas, but others migrated nearly 2,000 km to discreet molting sites.

Southeast Alaska is also important to wintering white-winged scoters. Fifteen white-winged scoters (8 females, 7 males) were implanted with satellite transmitters near Juneau, Alaska in early February, 2001 (Rosenberg, see URL: http://seaduckjv.org/studies/pro3/pr1b.pdf). Only two scoters (1 male, 1 female) survived more than 60 days after release. Increased energetic demands in late-winter at northerly latitudes (58^{o}N) combined with an abundance of predators, primarily bald eagles (*Haliaeetus leucocephalus*), may have been a primary factor affecting post-surgical survival. Both transmitted birds traveled to Canada to breed and returned to Southeast Alaska in late summer/early fall (Appendix 5; Rosenberg, see URL: http://seaduckjv.org/studies/pro3/pr1a.pdf).

Large numbers of white-winged scoters also winter in coastal waters of British Columbia where telemetry studies have been used to indicate migration routes (Boyd and Esler, see URL: http://seaduckjv.org/studies/pro3/pr26.pdf). During winter, 2002-2005 in Baynes Sound, British Columbia, most transmitted white-winged scoters migrated directly inland to breeding areas in boreal Canada and returned to wintering areas using the same general route (Appendices 8, 9, 10). The nearshore area around Rose Spit off the northeast tip of the Queen Charlotte Islands, British Columbia, appears to be an important staging area for white-winged scoters. Great Slave and Great Bear lakes, NWT appear to be particularly important breeding areas and Southeast Alaska appears to be the most important area for molting (Boyd and Esler, see URL: http://seaduckjv.org/studies/pro3/pr26.pdf).

Twenty-six white-winged scoters also were equipped with satellite transmitters in Puget Sound, Washington during late winters 2003-2006 (Evenson et al., see URL: http://seaduckjv.org/studies/pro3/pr28.pdf). Most of the nineteen scoters that provided data about nesting sites migrated directly inland toward interior Canada nesting grounds (Appendix 9). The southernmost nesting site was located near the western Alberta border with British Columbia and the northernmost sites were in the area surrounding Great Bear Lake. Seven of the ten marked females molted near or at their respective nesting areas (Appendix 10) (Evenson et al., see URL: http://seaduckjv.org/studies/pro3/pr28.pdf).

From wintering grounds, birds migrate to spring staging sites or to breeding areas. Important spring staging areas along the southwest coast of Alaska include Port Moller, Ugashik Bay, Egegik Bay and Etolin Strait (USFWS 1999).

Winter Ecology and Habitats

White-winged scoters winter primarily in shallow coastal waters. Estuaries and inlets with sand or gravel bottoms or large mussel-beds are preferred (Yocum 1951, Grosz and Yocum 1972, Stott and Olson 1973, Sanger and Jones 1981). In Southeast Alaska, scoters are found in areas with islets and are rarely found in areas with exposed shoreline during winter (Gunn 2009).

It has often been assumed that in coastal environments both white-winged and surf scoters fed mainly on bivalves, and that foraging niches were similar for the two species. Recent studies suggest that the importance of soft-bodied prey has been underestimated for both species and; the complex of foraging habitats and strategies needed to meet seasonal energy demands of each species may not be similar (Anderson et al. 2008, 2011; Anderson and Lovvorn 2011; Tschaekofske et al. 2011). Smaller bivalves are preferred by both species of scoters, but white-winged scoters eat larger bivalves and have a higher and less variable fraction of bivalve prey in their diet (Anderson et al. 2008). White-winged scoters also have less variability in energy status, foraging effort, and distributions throughout winter. This suggests that they are better able to regulate energy balance regardless of changing foraging conditions (Anderson et al. 2011; Anderson and Lovvorn 2011). The smaller body size of surf scoters (> 50% smaller than white-winged scoters) may contribute to their reliance on a greater diversity of marine foods and foraging habitats than white-winged scoters (Anderson et al. 2008, 2011; Anderson and Lovvorn 2011). Correspondingly, there is a shift in diet in late winter and early spring, more so for surf scoters than white-wings, when Pacific herring (*Clupea pallasi*) spawn in intertidal and shallow subtidal waters (Lewis et al. 2007; Anderson et al. 2008, 2009; Lok et al. 2008; Anderson and Lovvorn 2011). Herring eggs constitute a readily available food source (Haegle and Schweigert 1985) and are a high energy, lipid-rich food (Paul and Paul 1999). Scoters may also benefit from herring eggs through reduced foraging times, as suggested by Lewis et al. (2007). White-winged scoters also feed on herring spawn (Lewis et al. 2007; Anderson et al. 2008, 2009; Lok et al. 2008, Anderson and Lovvorn 2011). However, they exhibit lower use of this prey and move smaller distances to obtain it than surf scoters, suggesting they probably do not rely on herring for energy reserves as is the case in some years for surf scoters (Lok et al. 2008, Anderson et al. 2009, Anderson and Lovvorn 2011).

A telemetry study (2001–2010) was conducted over nearly the entire Pacific range of white-winged and surf scoters to identify spatial and seasonal variation in survival rates during the non-breeding cycle (Uher-Koch et al. 2011). Results of this study indicated: survival of molting scoters was high across species, cohorts, and sites; survival of white-winged scoters was greater for adults than for hatch-year individuals in the core of their wintering range in British Columbia; survival of surf scoters was lower at range peripheries (SE Alaska and Baja California) than at the wintering range core, and in SE Alaska survival was markedly lower for hatch year birds than for adults; the period of remigial molt is a relatively safe time in the annual cycle of scoters; and winter survival is lower and varies markedly by location and cohort (Uher-Koch et al. 2011).

POPULATION STATUS AND TRENDS

Available data suggest there has been a long-term, widespread decline in scoter numbers throughout their North American breeding range. Data collected by USFWS and CWS during annual Waterfowl Breeding Population and Habitat Surveys (WBPHS; Fig. 2) provide the best information on status and trends (Fig. 3). However, this survey does not differentiate among the species of scoters. Additionally, the survey is not well designed to estimate scoters, so the data need to be interpreted with caution (Savard et al. 1998). Numbers for scoter species combined for the entire survey area indicate long-term declines from about 2 million total birds in the 1950s to about 1.2 million from 1989-2009 (± 1 SE; Fig. 3; CWS 2009). According to the Sea Duck Joint Venture, the North American population of white-winged scoters has declined by more than 50% across their breeding range to a current breeding population of about 400,000 birds (SDJV 2007).

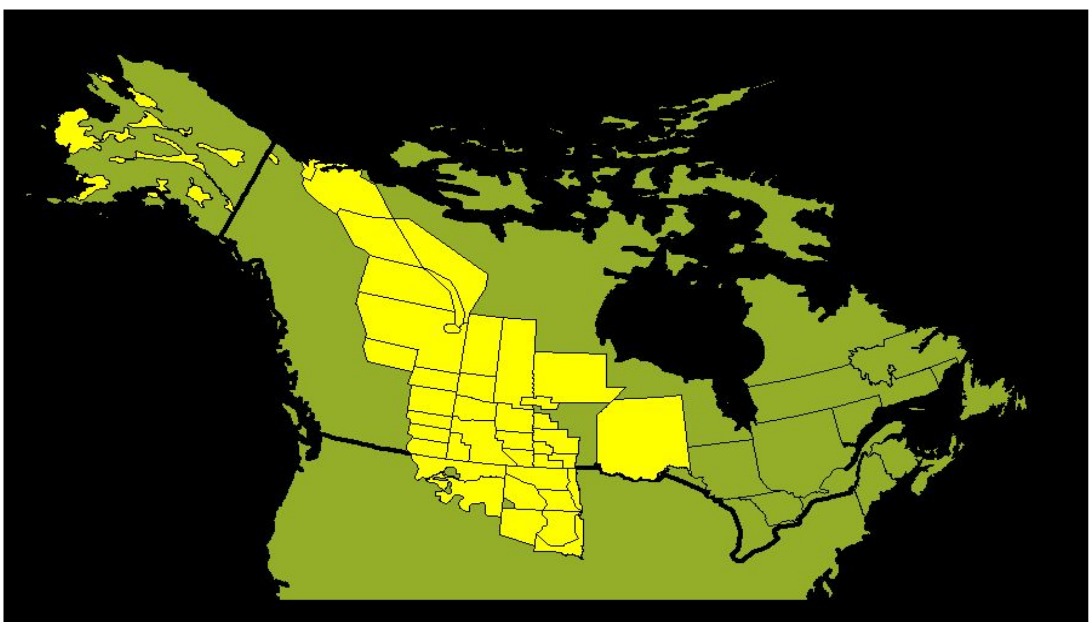


Figure 2. Waterfowl Breeding Population and Habitat Survey traditional survey areas. Survey areas are shaded yellow.

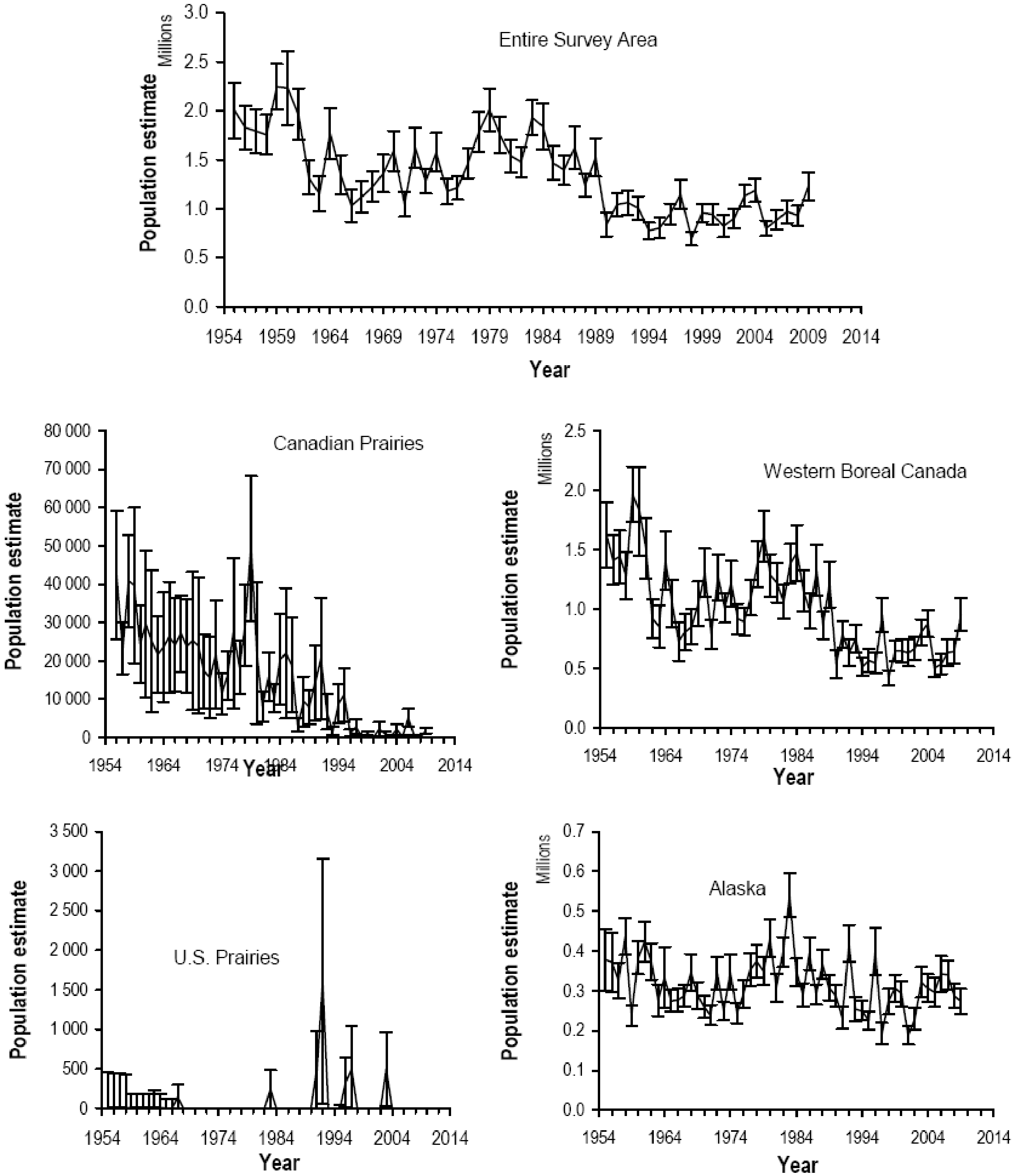


Figure 3. Breeding population estimates of scoters (spp.) in traditional survey areas of North American Waterfowl Breeding Population and Habitat Survey, 1954-2009. Data shown are population estimates (± 1 SE; CWS 2009).

Information on Abundance and Trends by Regions

Bering Sea and Aleutian Islands

White-winged scoters were also counted on spring aerial surveys for Steller's eiders. The surveys were conducted most years from 1992-2009 along the southwest coast of Alaska (Larned, USFWS, unpubl. data; Appendix 11). Because this survey was designed to correspond to the specific distribution of Steller's eiders during the spring staging period, it is not necessarily optimally timed to produce high-confidence estimates for other species. However, data on non-target sea ducks help characterize general staging patterns and relative abundance over the long term. There has been a persistent pattern of habitat use by staging white-winged scoters from the Yukon-Kuskokwim Delta to the west end of the Alaska Peninsula from 1992−2008 (Larned and Bollinger 2009).

Christmas bird counts were conducted in 1999 and 2001 on the Pribilof Islands. Fifty-four white-winged scoters were observed on St. George Island in 1999 and four in 2001 (National Audubon 2002).

White-winged scoters occur during summer in the Aleutian Islands, but are more common from September to early June. Gibson and Byrd (2007) reported that during fall, winter, and spring, white-winged scoters were fairly common or common in the eastern Aleutian Islands; uncommon or fairly common in the central Aleutians; and uncommon or rare in the western Aleutians. There was a great deal of interannual variation in numbers. Most white-winged scoters were observed in nearshore (e.g., lagoons) and inshore waters.

Maximum winter counts in the eastern Aleutians (east to west) were: 225 at Unimak (1979); 218 and 150+ birds at Tigalda and off Unalaska, respectively (1974); "abundant" at Unalaska (1943-46). Lower numbers of birds were observed in the central Aleutians, where high counts at Adak included 32 (1945), 62 (1967), 71 (1973), 72 (1974), 87 (1969), and 131 (1968). The fewest birds recorded were in the western Aleutians, where most counts were less than ten birds (Gibson and Byrd 2007).

Christmas bird counts of white-winged scoters at Unalaska in the Aleutian Islands from 1993-2009, ranged from a low of 36 birds (2000) to a high of 451 (2004). At Adak Island from 1968-1995, counts ranged from 0 (1978, 1984, 1990) to a high of 130 white-winged scoters (1969). At Amchitka Island, six Christmas bird counts were conducted from 1977-1994, and white-winged scoters were observed on only three of those counts: 11 birds (1977), 1 (1978), and 1 (1994). Three counts were conducted at Shemya Island from 2007-2009 with 2 white-winged scoters recorded in 2007. In 1980, 225 white-winged scoters were counted during the Christmas Bird Count at Cape Sarichef on the east side of Unimak Pass (National Audubon 2002).

Kodiak Archipelago

Since 1979, Zwiefelhofer et al. (2008) conducted winter boat-based monitoring surveys in select coastal bays and straits around Kodiak Island. Based on frequency of occurrence and consistency in abundance during surveys between 1979-1985, fifteen waterbird species or species groups, were chosen for long-term monitoring at a subset of survey sites (Uyak Bay, Uganik Bay, Eastern Sitkalidak Strait and Western Sitkalidak Strait; Fig. 4). White-winged scoters were the fourth most abundant waterfowl species encountered on transects and were most common at east Sitkalidik (Zwiefelhofer et al. 2008). Numbers of white-winged scoters were likely in the low hundreds to the low thousands. Some variation in survey trends may have been weather related. Greater numbers of white-winged scoters fed in offshore shoals outside the survey areas during good weather conditions and moved inshore when conditions deteriorated. In contrast, black and surf scoters generally remained near shorelines (Zwiefelhofer et al. 2008).

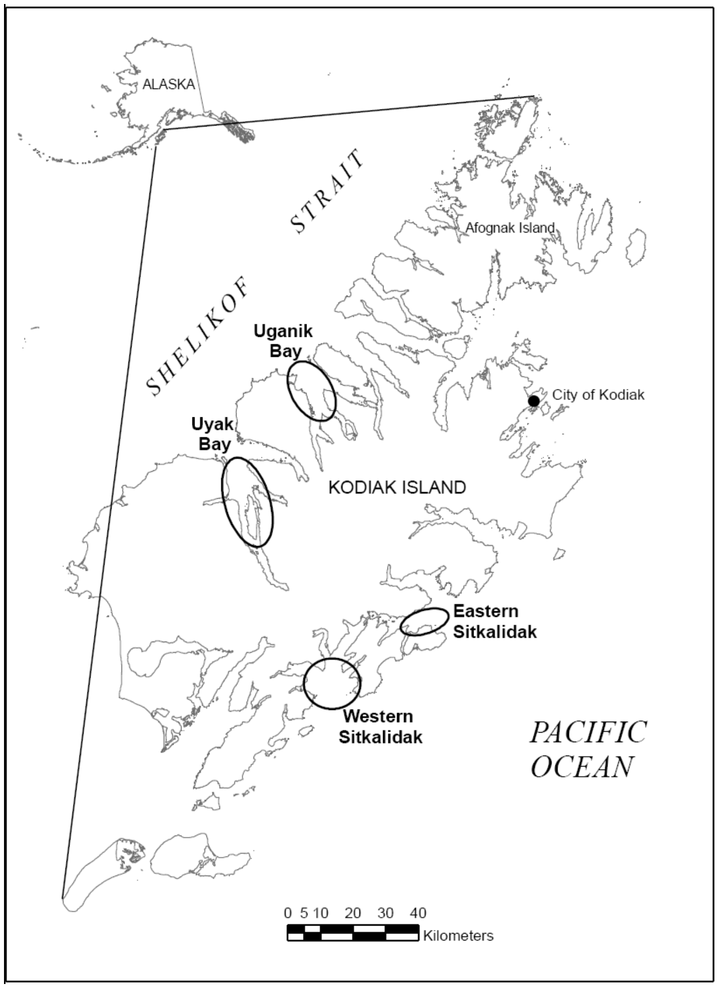


Figure 4. Kodiak Island and zones selected for boat-based and aerial monitoring surveys (Larned and Zwiefelhofer 2002, Zwiefelhofer et al. 2008).

Apparent declines in Steller's eiders (Kertell 1991) and other sea duck populations prompted Kodiak NWR to conduct an annual winter aerial survey for waterfowl and marine mammals. Surveys were flown 1992-94, 2001-02, and 2010 for four survey zones; Uyak Bay, Uganik Bay, W. Sitkalidak, and E. Sitkalidak (Zwiefelhofer 1992; Fig. 4). Numbers of white-winged scoters numbered from tens to the low thousands for each survey. Due to incomplete coverage and high variability of surveys, white-winged scoter numbers are considered minimums (Larned and Zwiefelhofer 2002). In 2002, total numbers of white-winged scoters sharply increased from previous years. Reasons for the increase are not understood (Larned and Zwiefelhofer 2002).

Cook Inlet

Petrula et al. (2006) conducted small boat and aerial surveys in Kachemak Bay during winters from 1999-2003. Scoters were the most abundant species group in the bay and white-winged scoters were the most abundant duck in the offshore stratum (Figure 5). Overall estimates for white-winged scoters in Kachemak Bay ranged from 1,753-2,812. No significant trend in white-winged scoter abundance was detected during the 5-year period. A previous 1994 winter small boat and aerial survey in Kachemak Bay estimated total numbers of white-winged scoters at 23,424 ± 95% CI (Confidence Interval; Agler et al. 1995). Petrula et al. (2006) suggest that although differences in methodology existed that complicated direct comparison of population estimates between the two surveys, such a large difference suggests that white-winged scoters have declined in the bay since 1994.

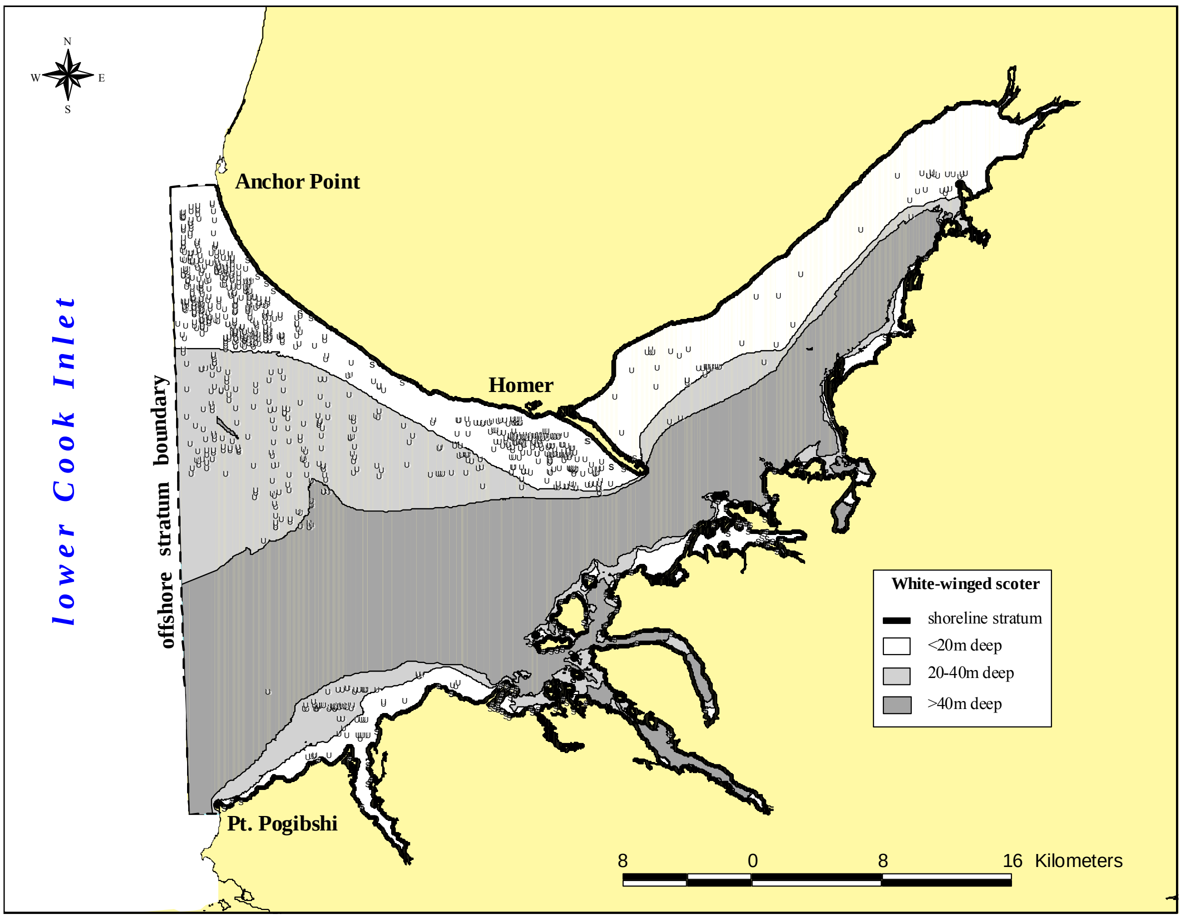


Figure 5. Locations of white-winged scoters during aerial and boat surveys of Kachemak Bay, Alaska in winter 1999-2003.

An aerial survey flown by USFWS in September 2005 in Cook Inlet to count molting Steller's eiders also counted scoters. White-winged and surf scoters were the second and third most common sea duck observed on the survey (Fig. 6). These two species were found primarily in bays and along the shoreline from Chinitna Bay to Ursus Cove (Fig. 6). A few scoters were also observed further south near Douglas River (Fig. 6). A total of 2,876 white-winged scoters was counted (Larned 2005).

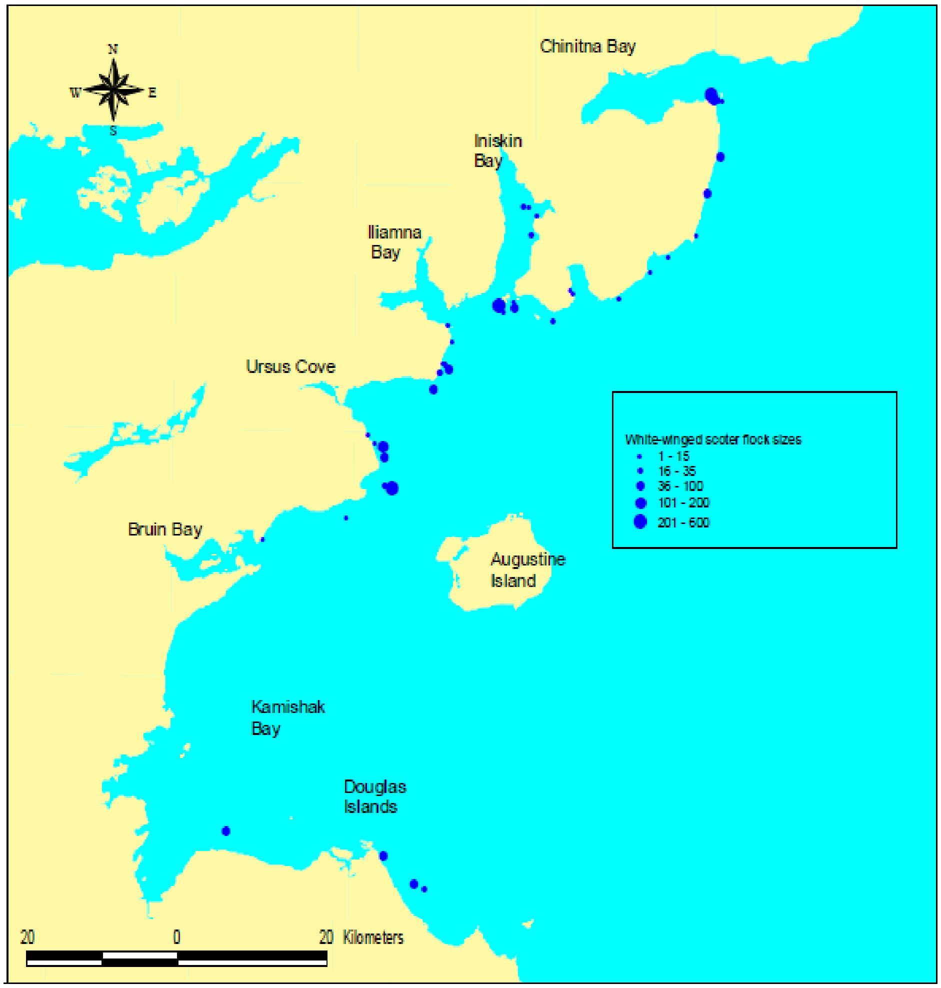


Figure 6. Locations of white-winged scoter flocks recorded during an aerial survey of Cook Inlet, 14 Sept. 2005 (Larned 2005).

Prince William Sound

Winter population estimates of white-winged scoters in Prince William Sound (PWS), Alaska declined from 24,000 birds in 1973 to only 3,300 in 1990 (Klosiewski and Laing 1994). The most recent population estimate for PWS was 1,172 white-winged scoters during the winter survey in 2007 (McKnight et al. 2008). However, population estimates for white-winged scoters in PWS are imprecise and must be interpreted with caution (McKnight et al. 2008).

Southeast Alaska

Aerial surveys for waterbirds in Southeast Alaska were conducted during summers and winters 1997-2002 (Hodges et al. 2008). Approximately 25,000 km of shoreline were covered.

A boat survey double sampled 20% of the summer habitat and 5% of the winter habitat and was used to provide population correction factors. Scoters were not identified to species on aerial surveys, but were on boat surveys. During three successive winters from 1982-1984, Conant et al. (1988) calculated boat to air ratios for Port Frederick, which were used by Hodges et al. (2008) as winter correction factors.

Scoters were three times more abundant in summer than in winter from 1997-2002 (Table 1). It is believed that scoters summering in Southeast Alaska represented non-breeding, subadult birds, failed breeders, or adult males; many or most of these birds were likely molting. The total represents 20% of the estimated North American breeding population for scoter species combined. Scoters were highly concentrated in Glacier Bay and on the east side of Admiralty Island in summer, but far less so in winter (Figure 7). Flocks of scoters were often large and extended from near shore to 1 km offshore.

	Winter Survey			Summer Survey		
	Observed	Visibility Correction Factor	Expanded Estimate	Observed	Visibility Correction Factor	Expanded Estimate
Scoter (*spp.*)	44,410	1.74	77,300	132,643	1.40	185,700

Table 1. Southeast Alaska aerial shoreline surveys, including observed white-winged, black, and surf scoters, and population estimates corrected with visibility factors, 1997-2002. All visible scoters and sea otters were counted from the aircraft or boat regardless of distance from shore (Hodges et al. 2008).

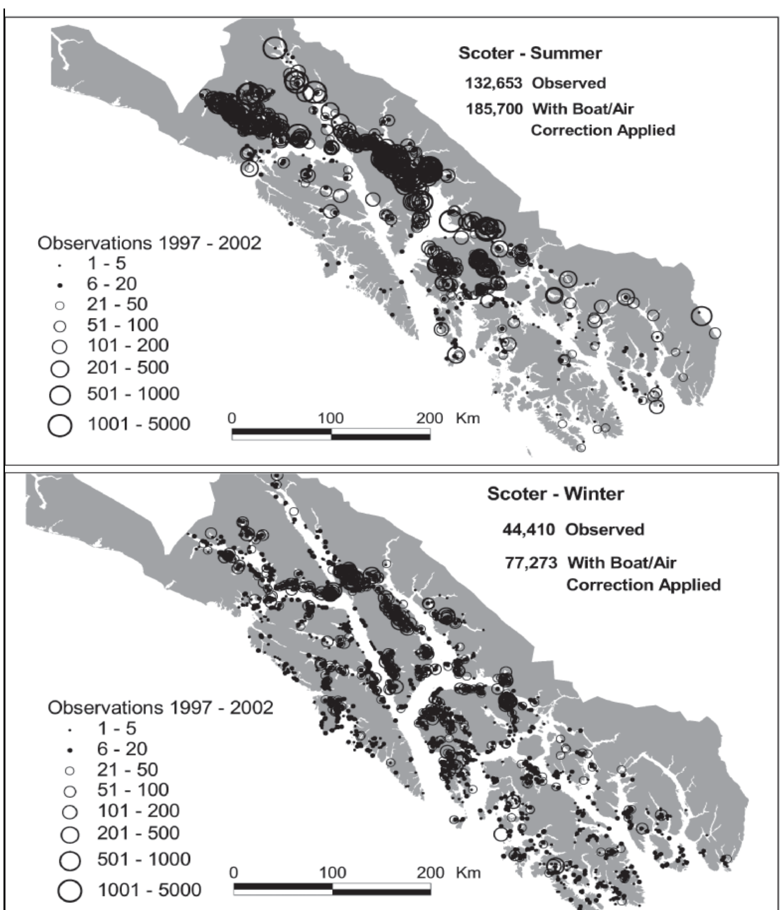


Figure 7. Observations of scoters in Southeast Alaska from aerial shoreline surveys, 1997-2002 (Hodges et al. 2008).

Interior Alaska

The Alaska-Yukon portion of the WBPHS is not timed to adequately monitor late nesting scoters. Consequently, an aerial survey was initiated in 2001 to monitor white-winged scoters that breed on the Yukon Flats NWR (Mallek and Groves 2002). The survey area covers 9,728 km^2 and consists of four strata with a total of 58 transects (678 km^2 sampled area; Fig. 8). Because lesser scaup (*Aythya affinis*) are also late nesters on the Flats, they were added to the Yukon Flats Aerial Scoter and Scaup Monitoring Survey in 2002 (Mallek 2002).

White-winged scoters accounted for 99% of indicated-total scoters observed on the 2010 aerial survey with a monitoring index of 24,172 birds. This is an increase of 53% in 2010, compared to the previous eight-year mean (2001-2005 and 2007-2009) of 15,823 birds. Differences among years were not significant (Fig. 9). Monitoring indices for white-winged scoters from 2001-2009 are as follows: 2001=16,434 (Mallek 2002); 2002=16,951 (Mallek 2003); 2003=15,707 (Mallek 2004); 2004=16,628 (Mallek 2005); no survey in 2006; 2008=15,345 (Guldager and Bertram 2010); 2009=15,784 (Guldager and Bertram 2010. However relative use of strata among years is inconsistent (Guldager and Bertram 2011).

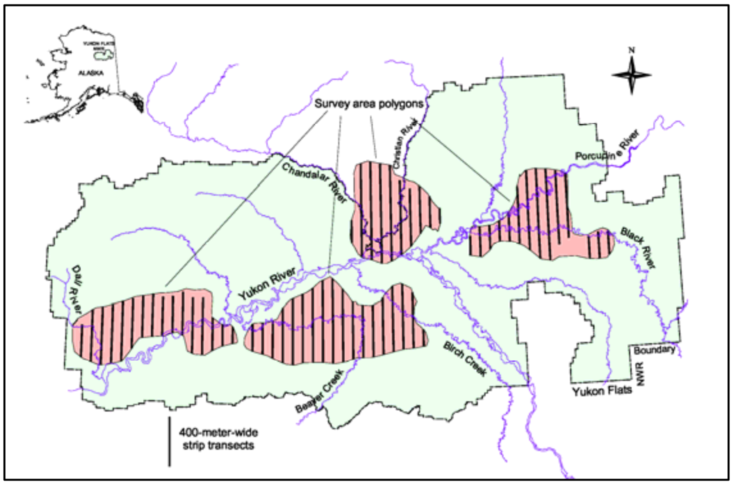


Figure 8. Map features of the Yukon Flats, Alaska in relation to stratum and transect locations, 2001–2009 (Guldager and Bertram 2011).

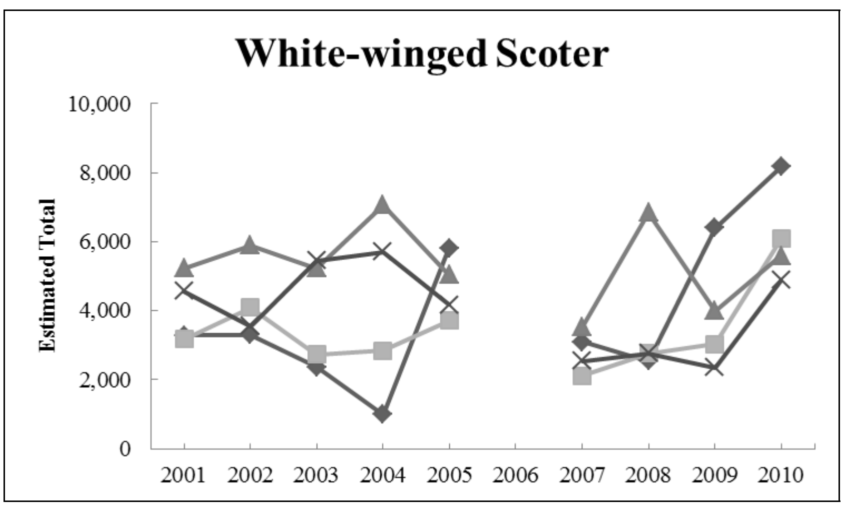


Figure 9. Estimated total number of white-winged scoters by strata from an aerial monitoring survey conducted on Yukon Flats, Alaska, June 2001-2010. A survey was not conducted in 2006 (Guldager and Bertram 2011).

British Columbia

White-winged scoters winter in large numbers in coastal British Columbia. From 2003-2009, the Washington Department of Fish and Wildlife (WDFW) assessed winter waterfowl population status and trends in lower British Columbia, from the U.S. border to the Fraser River Delta. Approximately 20,000-40,000 scoters (all three species combined) were estimated on these surveys, but no trend was apparent due to the high variance associated with the estimates (WDFW 2010).

Washington State

Since 1992, the primary survey index for sea duck status and trends for greater Puget Sound has been the December-early February aerial survey developed by the WDFW Puget Sound Assessment and Monitoring Program (PSAMP). Consistent winter aerial surveys have been conducted annually since the winter of 1993-1994 (except winter 2006-2007). Population indices represent combined estimates for the three scoter species (surf, black, and white-winged) with no adjustments for detection. The total relative index of the scoter population based on three year averages has declined 56% from 115,935 scoters (1994-1996) to 52,491 scoters (2009-2011; Fig. 10). A recent three-year index (2008-2010) for white-winged scoters was derived from scoter species ratio surveys conducted from 2008-2010. The index indicates a 36% decline of white-winged scoters from the 1999-2001 three-year index (Evenson et al. 2010).

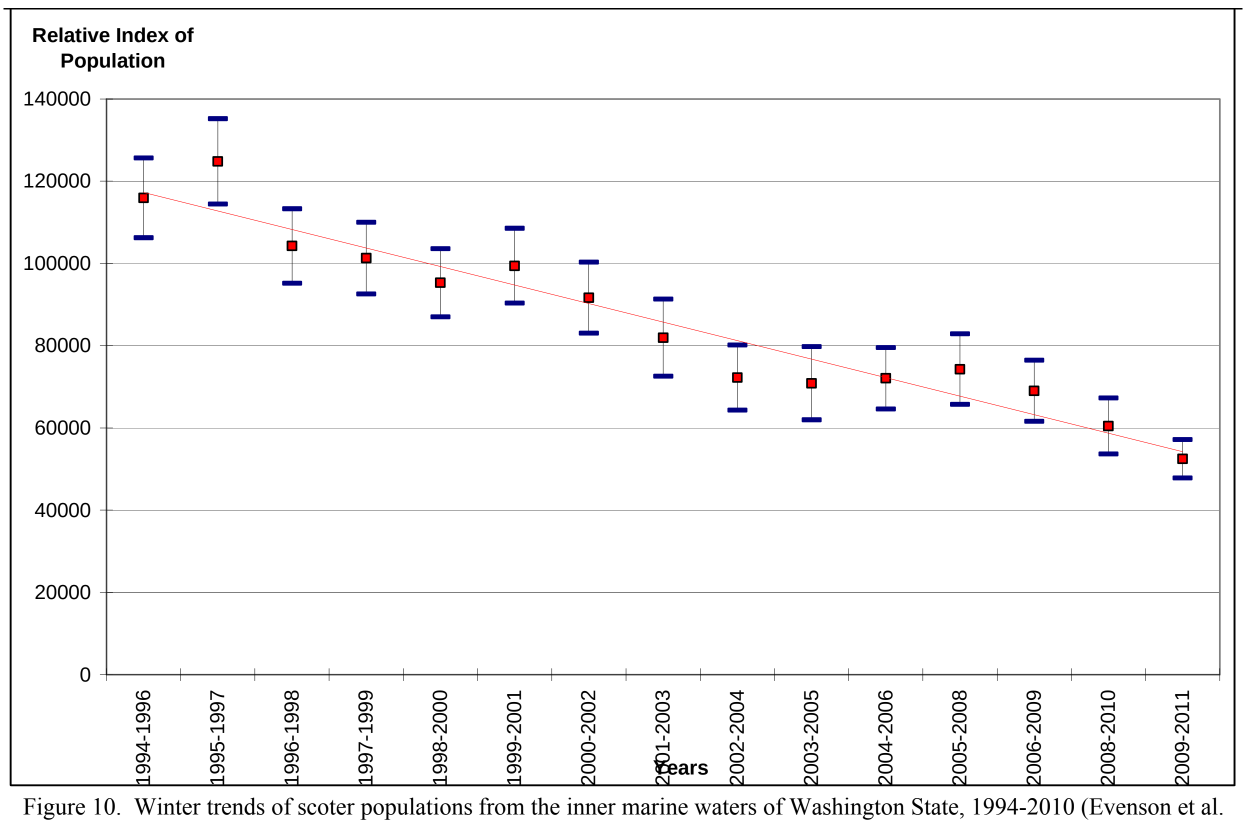


Figure 10. Winter trends of scoter populations from the inner marine waters of Washington State, 1994-2010 (Evenson et al. 2011, unpubl.data).

California and Oregon

Midwinter Waterfowl Surveys (MWS) are flown annually in the Pacific Flyway states (Trost and Collins 2009). Most scoters in California and Oregon occur on San Francisco Bay.

MWS trends (3-year averages) for California and Oregon averaged 23,401 during 2007-09, a 21% decline since 1994 (WDFW 2010). The Midwinter Survey is largely a near-shore survey and data for offshore species like scoters are highly variable.

LIMITING FACTORS

Some factors that have the potential to limit reproductive success, recruitment, and survival of white-winged scoters on breeding, molting, and wintering grounds include: predation, habitat degradation or loss due to development or climate change, anthropogenic disturbance, contaminants, sport and subsistence harvest, food availability, and adverse weather (Davidson 1981, Di Giulio and Scanlon 1984, Stapp et al. 1999). The relative importance of each of these limiting factors in regulating populations is unknown.

White-winged scoters and lesser scaup breed sympatrically, but mostly winter allopatrically. Since about 1980, estimates of continental populations of these taxa have been highly correlated (particularly in the NWT), even after correcting for long-term population declines (CWS 2009). This correlation suggests that the two taxa may potentially share limiting factors in the NWT (Slattery, see URL: http://seaduckjv.org/studies/pro3/pr20.pdf). Ducks Unlimited and Environment Canada examined demographic parameters of these two species from 2001-2007 to assess potential shared constraints (Slattery, see URL: http://seaduckjv.org/studies/pro3/pr20.pdf). Results are pending.

Predation by gulls (*Larus spp.*) is likely the most influential factor in duckling and brood mortality, particularly in the first few days of life (Kehoe 1986, Brown and Frederickson 1989, Walker et al. 2005, Traylor and Alisauskas 2006). Other known predators of ducklings and nests include northern pike (*Esox lucius*), black bear (*Ursus americanus*), mink (*Mustela vison*), great horned owl (*Bubo virginianus*) or great grey owl (*Strix nebulosa*), coyote (*Canis latrans*), red fox (*Vulpes vulpes*), lynx (*Lynx canadensis*), marten (*Martes americana*), red squirrel (*Tamiasciurus hudsonicus*), short-tailed weasel (*Mustela erminea*), wolf (*Canis lupus*), striped skunk (*Mephitis mephitis*), raccoon (*Procyon lotor*), black-billed magpie (*Pica pica*), red-tailed hawk (*Buteo jamaicensis*), common raven (*Corvus corax*), and American crow (*Corvus brachyrhynchos*; Lensink 1965, Brown and Frederickson 1997, Safine 2005, Swoboda 2007).

Duckling survival in the boreal forest of Alaska was higher than in the prairie-parklands of Canada and was higher on smaller, isolated lakes. Smaller lakes had fewer gulls than larger lakes, and did not appear to have northern pike (Safine 2005). Most mortality of scoter hens during the breeding season occurs during the egg-laying and incubation periods when females are exposed to both avian and mammalian predators. The role of predation across the breeding range of white-winged scoters should be identified and quantified.

Oil and gas development have been proposed for the Yukon Flats, Alaska (USFWS 2005); and gas development is being considered for the Mackenzie River Delta in Canada (Haszard 2001). Both areas are important breeding areas for white-winged scoters, and the Mackenzie River region is also an important molting area. Characterizing the breeding habitat in both locations is an important information need identified by the Sea Duck Joint Venture Continental Technical Team (2001). This will provide baseline information essential to managers developing future conservation plans with regards to development and climate change.

The dramatic warming that northern regions have experienced during the last 50 years raises questions about the effects on waterfowl and their habitat. The greatest temperature changes are expected at higher latitudes, consequently the boreal forest ecosystem could be among the most affected (Hartley and Marshall 1997; Arctic Climate and Impact Assessment, ACIA 2004). Some of the ecological predictions for this region include: lengthening ice-free seasons on lakes and rivers, earlier runoff, melting permafrost, increased natural and man-made fires, and northward range shifts by plants and animals (Intergovernmental Panel on Climate Change, IPCC 2007). Other studies have reported shrinking of thermokarst ponds and lakes in the discontinuous permafrost zone (Riordan et al. 2006, Smith et al. 2005, Yoshikawa and Hinzman 2003). As warming continues, expected ecological changes in the prairie pothole region include: fewer wetlands on average; shorter flooding duration for wetlands; greater annual variability in surface water; and changes to water depth, salinity, temperature, plants, and aquatic food webs (Ducks Unlimited, DU 2007; IPCC 2007). Changes in the aquatic food chain on breeding grounds of white-winged scoters could adversely affect key food sources used by breeding females and their broods. This could result in a harmful effect on productivity (Brown and Fredrickson 1986).

Females are prone to desertion if flushed from nests during the egg-laying or early incubation periods (Brown and Frederickson 1997). White-winged scoters have a low rate of recruitment and strong philopatry to nesting areas. Therefore, disturbance during the nesting season and hunting on breeding areas could have the potential to eliminate local populations (Brown and Frederickson 1997).

Low duckling survival has been identified as a critical factor limiting annual productivity of white-winged scoters in Canada (Brown and Frederickson 1997, Krementz et al. 1997, Traylor 2003, Traylor and Alisauskas 2006). A study on Yukon Flats, Alaska suggests that boreal forest white-winged scoters have higher duckling survival than scoters nesting in the prairie-parkland ecotone in Saskatchewan, but lower nest and adult female survival during the breeding season. It appeared that annual survival (specifically female mortality during the nesting season) could be a limiting factor for white-winged scoters breeding in the boreal forests of Alaska (Safine 2005).

Wintering and molting concentrations of white-winged scoters are highly vulnerable to oil spills and other marine pollutants. About 1,000 scoters (all three species combined) died as a direct result of the *Exxon Valdez* oil spill in Prince William Sound, Alaska in March of 1989. Three oiled white-winged scoter carcasses were also recovered after the M/V *Selandang Ayu* oil spill in the Aleutian Islands in December 2004. Southeast Alaska is an important wintering and staging area for white-winged scoters (Hodges et al. 2008). The large volume of marine traffic in this region (Alaska Department of Environmental Conservation, ADEC 2004) results in a high cumulative probability for accidental release of petroleum or other chemical products into the marine environment.

White-winged scoters are benthic feeders that feed on mollusks and crustaceans which are known to concentrate toxic chemicals. As a result, white-winged scoters could be at risk to harmful effects from contaminants. A recent study effectively demonstrated that negative effects of contaminant exposure on wintering, staging, and molting areas of waterfowl, may be carried over to breeding grounds where adverse effects may be more apparent (DeVink et al. 2007).

From 1961-2001, estimates of waterfowl harvests in the U.S. were derived from the USFWS Waterfowl Questionnaire Survey. In 1999, a new survey, the Harvest Information Program (HIP), was fully implemented. Consequently, harvest estimates yielded by the two surveys cannot be directly compared. From 1999-2008, the U.S. sport harvest including Alaska averaged 9,857 white-winged scoters (CWS 2009). The largest annual total harvests were 23,200 in 2001 and 12,287 in 2006. Seventy-four percent of the U.S. sport harvest occurred in the Atlantic Flyway. The Canadian sport harvest averaged 1,693 white-winged scoters from 1999-2008 with the largest total harvest (2,351) occurring in 2002 (Appendix 12).

White-winged scoters are also hunted for subsistence purposes in the western boreal forests of Alaska and Canada. The average annual statewide subsistence harvest estimate for white-winged scoters in Alaska (2004-2009) was 8,505 birds (Naves 2009a, b; 2010a, b, c; Appendix 13). Annual subsistence estimates were based on sampling of households in communities within 29 subregions of Alaska. Methods used in the survey, details of analysis, and summarized results are found in various reports by Alaska Department of Fish and Game (ADFG), working under contract with the USFWS Office of the Alaska Migratory Bird Co-Management Council (AMBCC). Most of the reports are available at: http://alaska.fws.gov/ambcc/harvest.htm, although the most recent data remains in draft status.

The ADFG reports do not provide a statewide subsistence harvest estimate. Additional analysis was provided by Robert Stehn, USFWS, Alaska Region, Migratory Bird Management to obtain a statewide estimate. By using the average harvest from each Alaska subregion for years when that subregion was not sampled and then adding all subregions, a statewide estimate was derived. The North Slope and Bering Strait results were not tabulated by subregion, but were presented as regional totals in Stehn's analysis. Additionally, the 2009 estimate from the St. Lawrence/Diomede subregion was reported, but not used in calculating averages or totals because the remaining subregion was not sampled in 2009 and previous subregion results were unavailable. Fall harvest (after 1 Sept, and including winter harvest in the Aleutian/Pribilof and Bristol Bay regions) was included in the annual estimate. The North Slope region does not collect fall harvest information because, except for flights of king and common eiders, nearly all birds have left the region by 15 Sept. Fall harvest data are not collected for the Kodiak City & road subregion perhaps because data from USFWS Hunter Information Program surveys (HIP) may provide redundant estimates. Participation in HIP surveys is limited among subsistence hunters in most of Alaska.

Subsistence harvest survey participation was voluntary at the household and community levels. If other communities were sampled within the same subregion, the average household harvest was expanded to include the number of unsampled households both in the sampled and non-participating villages. Data were lacking from the Kotzebue subregion and therefore, no estimate was possible for this subregion. A considerable potential for error exists in the harvest estimates. Sampling error is measured by the variation observed among the households, villages, and subregions within the 3-stage cluster sampling design (see Naves, various reports, http://alaska.fws.gov/ambcc/harvest.htm). Various sources of bias may also contribute to potential error in estimates. Alaska subsistence surveys have not measured recall bias, exaggeration bias, unrepresentive participation of households, unrepresentative participation by villages, and confusion among names and other difficulties in species identification.

Die-offs of white-winged scoters have occurred in Alaska and more recently in the marine waters off the coast of Washington State. During the molt near Cape Yakataga and Cape Suckling in the eastern Gulf of Alaska (1990-1992), at least several hundred white-winged scoters were found dead (Henny et al. 1995). No definitive cause was identified, although cadmium concentrations from kidneys of collected birds were high (Henny et al. 1995). The lack of specific information on locations and movements of birds prior to their death increased the difficulty of identifying the cause of mortality. In 2009, an estimated 12,000 molting scoters were found dead on the outer coast of Washington State after a large algal bloom. According to Northwest Fisheries Science Center in Seattle, the species of algae (*Akashiwo sanguinea*) occurs in Washington waters, but rarely at high concentrations (≤ 1.5 million cells per liter of seawater) (see URL: http://www.nwfsc.noaa.gov/hab/). Although the cause of mortality to scoters was not confirmed, speculation includes hypothermia and ingestion and inhalation of toxins produced by the algae. In 2010, another algal bloom occurred, but it was after most white-winged scoters had finished molting, so few birds were affected. Because the outer coast of Washington State hosts large numbers of white-winged scoters during molt and spring migration, toxic algal blooms could significantly impact the population.

Reasons for the decline of white-winged scoters are unknown. Brown and Fredrickson (1986) hypothesized that an adverse change in the invertebrate food source of white-winged scoters on the nesting and brood rearing grounds could have negatively affected production. An age-ratio study conducted by Krementz et al. (1997) in the Atlantic Flyway reported high variation in annual production from 1961-1993, suggesting that factors affecting production were not constant over time and might not be restricted to the breeding grounds. DeVink et al. (2011) suggested that identification of nutrient acquisition and allocation patterns in white-winged scoters could be important for conservation of critical habitats that supply essential nutrients at appropriate times of the annual cycle. Turner et al. (1987) speculated that alteration of lakes in Prairie Canada, caused by development for recreational or agricultural use, along with resultant degradation of nesting habitat could have caused low recruitment. Traylor and others (2004a) suggested that depleted body reserves caused lowered reproductive success of breeding white-winged scoters at Redberry Lake, Saskatchewan. The authors hypothesized that scoters returning to breed in poorer physical condition required more time before nesting to store nutrient reserves for incubation.

CONSERVATION STRATEGY

Although some studies have begun to address information gaps regarding white-winged scoters, relatively little is known about their life history, habitat preferences, population delineation, and limiting factors. Therefore, developing a conservation strategy at this time is difficult.

To effectively manage white-winged scoter populations, better population information and an increased understanding of factors influencing population dynamics throughout all phases of the annual cycle are needed. Management actions would undoubtedly vary across the white-winged scoter's wide geographic range.

A. Population Definition and Delineation

Justification: Satellite telemetry studies and mark-recapture studies of white-winged scoters suggest geographic structuring within the population. All white-winged scoters equipped with satellite radios on the Pacific coast wintering grounds appear to breed in the western Canadian arctic, and return to the Pacific coast to winter. Information about temporal and geographic use throughout the species' range is essential for appropriate design and interpretation of monitoring programs and management plans. There is also a need for sex and age-specific information on population delineation and site fidelity.

Specific actions:

A1. Continue to identify links among white-winged scoter's breeding, molting, staging, and wintering areas in the Pacific Flyway.

a. **Relative priority:** High
b. **Timeline:** 2012-2014
c. **Estimated costs:** $150,000 - $250,000

d. Responsible parties or potential partners: ADFG; USFWS, MBM-R7; USGS; CWS; WDFW; Yukon Flats NWR

e. Programs available or needed to address issue: SDJV; waterfowl programs of ADFG; Pacific Coast JV.

f. Feedback pathways to future strategy iterations: Information collected from satellite telemetry studies will help to delineate affiliations among wintering, breeding, and molting populations and their seasonal habitats, and will help to determine the geographic scale for effective management. If sufficient fidelity to specific molting or wintering areas is identified through these studies, large scale banding projects at sites with high fidelity could be conducted to estimate annual survival. Estimating annual survival for this species would be very useful, as little data are available. Some studies have estimated winter survival or breeding season survival, but few have estimated annual survival (especially of boreal WWSC).

A2. Determine migration corridors and timing of migration between breeding, molting, and staging areas of white-winged scoters wintering in the Pacific Flyway.

a. Relative priority: High (information would be obtained via Task A1)

b. Timeline: 2012-2014

c. Estimated costs: Same, but not additive to Task A1

d. Responsible parties or potential partners: ADFG; USFWS, MBM-R7; USGS; CWS; WDFW; Yukon Flats NWR.

e. Programs available or needed to address issue: SDJV; ADFG; Pacific Coast JV

f. Feedback pathways to future strategy iterations: Information collected through satellite telemetry will help to determine the correct timing of breeding and midwinter surveys for white-winged scoters, identify important seasonal habitats, and help to determine the geographic scale of conservation actions.

B. Monitoring Abundance and Population Trends

Justification: There is little quantitative information about abundance and trends of white-winged scoters. Numbers appear to be declining based on a long-term decline in breeding populations of all three scoter species occurring in North America, particularly in areas where white-winged scoters predominate. Consequently, population goals based on abundance and trends cannot be determined until baseline information is obtained. It is likely that metrics used to evaluate changes in the population will vary with regions or populations.

Specific actions:

B1. Develop a monitoring survey and population estimate for white-winged scoters wintering in the Pacific Flyway.

a. Relative priority: High

b. Timeline: 2012-2017

c. Estimated costs: Approximately $60,000-$80,000/year once survey has been developed as operational; would include sampling all sea duck habitats from CA to western AK. Other sea duck and marine bird species would be surveyed as well; survey would likely be a combination of aerial and boat surveys to ascertain species composition.

d. Responsible parties or potential partners: SDJV; USFWS, MBM-R7; WDFW, Puget Sound Coordinated Monitoring Program; Oregon Department of Fish and Wildlife;

California Department of Fish and Game; ADFG; CWS, British Columbia; Bird Studies Canada, British Columbia; Pacific Flyway Study Committee

e. Programs available or needed to address issue: SDJV (efforts currently underway to develop survey), Pacific Coast JV, USFWS, MBM-R7; Bird Studies Canada; CWS Monitoring Program.

f. Feedback pathways to future strategy iterations: There are currently no monitoring surveys that specifically target scoters and that differentiate species of scoters throughout their winter range in the Pacific. A winter monitoring study could provide a baseline for abundance and trends that would be used to help establish population objectives, and help direct management actions on areas where most threats are thought to occur.

B2. Develop a standardized survey to estimate numbers and trends of white-winged scoters breeding in Alaska.

a. Relative priority: High

b. Timeline: 2012-2013

c. Estimated costs: Approximately $15,000-$20,000 for Yukon Flats NWR only (already developed; additional costs for other breeding areas in AK)

d. Responsible parties or potential partners: USFWS, MBM-R7; Yukon Flats NWR

e. Programs available or needed to address issue: SDJV

f. Feedback pathways to future strategy iterations: There are currently no monitoring surveys that are timed appropriately for breeding scoters and that differentiate species of scoters. A monitoring survey on breeding grounds would provide a baseline for abundance and trends complementary to that on wintering areas and would help establish population objectives.

B3. Develop a standardized survey to estimate numbers and trends of white-winged scoters breeding in the western Canadian boreal forest

a. Relative priority: High

b. Timeline: 2013-2016

c. Estimated costs: Unknown at this time; requires further discussions with USFWS-R9 about expansion of the Waterfowl Breeding Population and Habitat Survey.

d. Responsible parties or potential partners: USFWS, MBM-R7 and R9; CWS

e. Programs available or needed to address issue: SDJV; USFWS, MBM-R7

f. Feedback pathways to future strategy iterations: There are currently no monitoring surveys that are timed appropriately for breeding scoters and that differentiate species of scoters. A monitoring survey on breeding grounds would provide a baseline for abundance and trends complementary to that on wintering areas and would help establish population objectives.

B4. Develop population objectives for white-winged scoters at continental and regional scales

a. Relative priority: High

b. Timeline: 2015-2016; requires better information on abundance

c. Estimated costs: Unknown at this time

d. Responsible parties or potential partners: USFWS, MBM-R7; CWS

e. Programs available or needed to address issue: SDJV; migratory bird management programs in the U.S. and Canada, Habitat Joint Ventures via the North American Waterfowl Management Plan

f. Feedback pathways to future strategy iterations: There are currently no adequate monitoring surveys for white-winged scoters over a large scale. Monitoring surveys are a precursor to establishing population objectives. Population objectives at regional scales will help guide habitat conservation efforts at the Habitat Joint Venture scale. Population objectives at both the regional and continental scale will help evaluate the effectiveness of habitat conservation and management efforts and document progress toward the goals of North American Waterfowl Management Plan.

EVALUATING ACCOMPLISHMENTS

All projects initiated under this Action Plan will be tracked in the USFWS Migratory Bird Program project database. Similarly, the SDJV provides opportunities and funding for research. All projects endorsed or funded by the SDJV are tracked to evaluate progress and accomplishments.

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

LITERATURE CITED

Agler, B. A., S. J. Kendall, P. E. Seiser, and D. B. Irons. 1995. Estimates of marine bird and sea otter abundance in Lower Cook Inlet, Alaska during summer 1993 and winter 1994. OCS Study, MMS 94-0063. Final Report. U.S. Fish and Wildlife Service, Migratory Bird Management, Anchorage, AK.

Alaska Department of Environmental Conservation (ADEC). 2004. Assessment of cruise ships and ferry wastewater impacts in Alaska. Commercial Vessel Environmental Compliance Program, Juneau, AK.

Anderson, E. M., D. Esler, J. Hupp, D. Ward, K. Brodhead, R. Dickson, E. Palm, B. Uher-Koch, and C. VanStratt. 2011. Spatial and seasonal variation in nonbreeding diets of scoters along the Pacific Coast. Poster session presented at: 4th International Sea Duck Conference, Sept. 12-16, 2011, Seward, AK.

Anderson, E. M., J. R. Lovvorn, and M. T. Wilson. 2008. Reevaluating marine diets of surf and white-winged scoters: interspecific differences and the importance of soft-bodied prey. Condor 110:285-295.

Anderson, E. M., J. R. Lovvorn, D. Esler, W.S. Boyd, and K. C. Stick. 2009. Using predator distributions, diet, and condition to evaluate seasonal foraging sites: sea ducks and herring spawn. Marine Ecology Progress Series 386:287-302.

Anderson E. M., Lovvorn J. R. 2011. Contrasts in energy status and marine foraging strategies of white-winged scoters (*Melanitta fusca*) and surf scoters (*M. perspicillata*). Auk 128(2):248-257.

Arctic Climate Impact Assessment (ACIA). 2004. Impacts of a warming arctic. Cambridge University Press. Available at: http://www.acia.uaf.edu.

Bellrose, F. C. 1980. The ducks, geese, and swans of North America. Stackpole Books. Harrisburg, PA.

Brieger, G., and R. D. Hunter. 1993. Uptake and depuration of PCB 77, PCB 169, and hexachlorobenzene by zebra mussels (*Dreissena polymorpha*). Ecotoxicology and Environmental Safety 26:153-165.

Brown, P. W. 1977. Breeding biology of the white-winged scoter (*Melanitta fusca deglandi*). Master's Thesis, Iowa State University, Ames, IA.

Brown, P. W. 1981. Reproductive ecology of the white-winged scoter. Phd. Thesis. University of Missouri, Columbia.

Brown, P. W. and M. A. Brown. 1981. Nesting biology of the white-winged scoter. Journal of Wildlife Management 45:38-45.

Brown, P. W. and L. H. Fredrickson. 1983. Growth and moult progression of white-winged scoter ducklings. Wildfowl 34:115-119.

Brown, P. W., and L. H. Fredrickson. 1987a. Body and organ weights, and carcass composition of breeding female white-winged scoters. Wildfowl 38:103-107.

Brown, P. W., and L. H. Fredrickson. 1987b. Time budget and incubation behavior of breeding white-winged scoters. Wilson Bulletin 99:50-55.

Brown, P. W. and L. H. Fredrickson. 1997. White-winged scoter (*Melanitta fusca*), The Birds of North America Online. No. 274 (A. Poole, Ed.). Ithaca: Cornell Lab of Ornithology: Retrieved from the Birds of North America Online: http://bna.birds.cornell.edu/bna/species/274. Accessed 2 August, 2010.

Brown, P. W., and L. H. Fredrickson. 1989. White-winged Scoter populations and nesting at Redberry Lake, Saskatchewan. Canadian Field-Naturalist 103:240-247.

Brown, P. W. and C. S. Houston. 1982. Longevity and age of maturity of white-winged scoters. Journal of Field Ornithology 53:93-94.

Campbell, R. W., N. K. Dawe, I. McTaggart-Cowan, J. M. Cooper, G. W. Kaiser, and M. C. E. McNall. 1990. The birds of British Columbia, Vol. 1: Introduction and loons through waterfowl. Royal British Columbia Museum, Victoria.

Canadian Endangered Species Conservation Council (CESCC). 2006. Wild species 2005: the general status of species in Canada. Available at: http://www.wildspecies.ca/wildspecies2005/index.cfm?lang=e&sec=9 Accessed on 30 August, 2010.

Canadian Wildlife Service (CWS) Waterfowl Committee. 2009. Population status of migratory game birds in Canada (and regulations for overabundant species). Canadian Wildlife Service, Migratory Birds Regulations Report, No. 28.

Canadian Wildlife Service (CWS) Prairie Northern Region Sea Duck Team. 2000. Sea duck research priorities for prairie and northern region. Unpublished Report, Canadian Wildlife Service, Edmonton, Alberta.

Conant B., J. G. King, J. L. Trapp, J. I. Hodges. 1988. Estimating populations of ducks wintering in Southeast Alaska. Pages 541-551 *in* Waterfowl in Winter. (M. W. Weller, ed.). University of Minnesota Press, Minneapolis, MN.

Cramp, S. and K. E. L. Simmons. 1977. Handbook of the birds of Europe, the Middle East, and North Africa. Oxford University Press, Oxford.

Davidson, N. C. 1981. Survival of shorebirds (*Charadrii)* during severe weather: the role of nutritional reserves. Pages 231-249 *in* Feeding and survival strategies of estuarine organisms. (N. V. Jones and W. J. Wolf, eds.). Plenum Press, New York, NY.

DeVink, J. M., S. M. Slattery, R. G. Clark, R.T. Alisauskas, and K.A. Hobson. 2011. Combining stable-isotope and body-composition analyses to assess nutrient-allocation strategies in breeding white-winged scoters (*Melanitta fusca*). The Auk 128(1):166-174.

Dickson, R., D. Esler, S. Slattery. 2011. Biome-level moult locations of white-winged scoters. Poster session presented at: 4th International Sea Duck Conference, Sept. 12-16, 2011, Seward, AK.

Di Giulio, R. T., and P. F. Scanlon. 1984. Heavy metals in tissues of waterfowl from the Chesapeake Bay, USA. Environmental Pollution Series A, Ecological and Biological 35(1):29-48.

Ducks Unlimited (DU). 2007. Conserving waterfowl and wetlands amid climate change. (D. M. Browne and R. Dell, eds.). Ducks Unlimited, Inc. Memphis, TN. Available online: http://www.seasonsend.org/pdfs/DU%20-%20Conserving%20Waterfowl%20and%20Wetlands.pdf. Accessed 7 October, 2010.

Duebbert, H. F. 1961. Recent brood records for the white-winged scoter in North Dakota. Wilson Bulletin 73:209-210.

Evenson, J. R., D. R Nysewander, B. M. Murphie, T. C. Cyra, D. Kraege, B. Hall and D. Lambourn. 2010. Satellite telemetry project for surf and white-winged scoters in Puget Sound, Washington. Washington Department of Fish and Wildlife, Olympia, WA.

Ewins, P. J., and C. S. Houston. 1992. Recovery patterns of ospreys, *Pandion haliaetus*, banded in Canada up to 1989. Canadian Field-Naturalist 106(3):361-365.

Gabrielson, I. N. and F. C. Lincoln. 1959. The birds of Alaska. Wildlife Management Institute, Washington, D.C., and Stackpole Company. Harrisburg, PA.

Gibson, D. D. and G. V. Byrd. 2007. Birds of the Aleutian Islands, Alaska. Series in Ornithology Number 1. Nuttall Ornithological Club and American Ornithologists' Union.

Gilligan, J., M. Smith, D. Rogers, and A. Contreras. 1994. Birds of Oregon: status and distribution. Cinclus Publications. McMinnville, OR.

Godfrey, W. E. 1986. The Birds of Canada. National Museum of Natural Sciences. Ottawa. 595 pp.

Grosz, T. and C. Yocom. 1972. Food habits of the white-winged scoter in northwestern California. Journal of Wildlife Management 36:1279-1282.

Guldager. N., and M. Bertram. 2010. Aerial scoter and scaup monitoring survey of the Yukon Flats, Alaska – 2008 and 2009. U. S. Fish and Wildlife Service, Yukon Flats National Wildlife Refuge, Fairbanks, AK.

Guldager. N., and M. Bertram. 2011. Aerial scoter and scaup monitoring survey of the Yukon Flats, Alaska – 2010. U. S. Fish and Wildlife Service, Yukon Flats National Wildlife Refuge, Fairbanks, AK.

Gunn, T. 2009. Habitat correlates of wintering sea duck occurrence in Southeast Alaska. MS Thesis, Simon Fraser University, British Columbia, Canada.

Haegle, C. W., and J. F. Schweigert. 1985. Distribution and characteristics of herring spawning grounds and description of spawning behavior. Canadian Journal of Fisheries and Aquatic Sciences 42(1):39-55.

Hamilton, D. J., and C. D. Ankney. 1994. Consumption of zebra mussels, *Dreissena polymorpha*, by diving ducks in Lakes Erie and St. Clair. Wildfowl 45:159-166.

Hartley, I., and P. Marshall. 1997. Modeling forest dynamics in the Mackenzie Basin under a changing climate. Pages 146-156 *in* Mackenzie Basin Impact Study (MBIS), Final Report. Environment Canada, Environmental Adaptation Research Group, Climate and Atmospheric Research Directorate, Atmospheric Environment Service, Ontario.

Haszard, S. L. 2001. Habitat requirements of white-winged scoters and surf scoters in the Mackenzie Delta Region, Northwest Territories. Arctic 54(4):472-473.

Hellmayr, C. E. and B. Conover. 1948. Catalogue of birds of the Americas and the adjacent islands. Zoology Series Field Museum of Natural History 13, part 1(2).

Henny, C. J, D. B. Rudis, T. J. Roffe, and E. Robinson-Wilson. 1995. Contaminants and sea ducks in Alaska and the circumpolar region. Environmental Health Perspective 103(4):41-49.

Hildén, O. 1964. Ecology of duck populations in the island group of Valassaaret, Gulf of Bothnia. Annales Zoologici Fennici 1:153-279.

Hochbaum, H. A. 1944. The canvasback on a prairie marsh. American Wildlife Institute Washington, D.C.

Hochbaum, H. A. 1946. Recovery potentials in North American waterfowl. Transactions of the North American Wildlife and Natural Resources Conference 11:403-418.

Hodges, J. I., D. J. Groves, B. P. Conant. 2008. Distribution and abundance of waterbirds near shore in Southeast Alaska, 1997-2002. Northwestern Naturalist 89:85-96.

Houston, C. S. and P. W. Brown. 1983. Recoveries of Saskatchewan-banded white-winged scoters, *Melanitta fusca.* Canadian Field-Naturalist 97:454-455.

Howell, S. N. G. and S. Webb. 1995. The birds of Mexico and northern Central America. Oxford University Press, New York, NY.

Intergovernmental Panel on Climate Change (IPCC). 2007. Contribution of Working Group II to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change, 2007. (M. L. Parry, O. F. Canziani, J. P. Palutikof, P. J. van der Linden and C. E. Hanson, eds.). Cambridge University Press, Cambridge, United Kingdom and New York, NY. Available at: http://www.ipcc.ch/publications_and_data/ar4/wg2/en/contents.html. Accessed 7 October, 2010.

Irving, L. 1960. Birds of Anaktuvuk Pass, Kobuk, and Old Crow. U.S. Natural Museum Bulletin 217.

Jewett, S. G., W. P. Taylor, W. T. Shaw, and J. W. Aldrich. 1953. Birds of Washington State. University of Washington Press, Seattle, WA.

Johnsgard, P. A. 1978. Ducks, geese and swans of the world. University of Nebraska Press, Lincoln, NB.

Kehoe, F. P. 2002. Status of the white-winged scoter (*Melanitta fusca deglandi*) in Alberta. Alberta Sustainable Resource Development, Fish and Wildlife Division and Alberta Conservation Association, Wildlife Status Report No. 45, Edmonton, Alberta. 15 pp.

Kehoe, F. P. 1986. Adaptive significance of crèching behavior in the white-winged scoter (*Melanitta fusca deglandi*). MS Thesis, Univ. of Guelph, Guelph, ON. 40 pp.

Kehoe, F. P., P. W. Brown, and C. S. Houston. 1989. Survival and longevity of white-winged scoters nesting in central Saskatchewan. Journal of Field Ornithology 60:133-136.

Kehoe, F. P., D. Caithamer, J. Myers, R. Burrell, and B. Allen. 1994. Status of sea ducks in the Atlantic Flyway with strategies towards improved management. Ad Hoc Sea Duck Committee, Atlantic Flyway Technical Section.

Kertell, K. 1991. Disappearance of the Steller's eider from the Yukon-Kuskokwim Delta, Alaska. Arctic 44(3):177-187.

Klosiewski, S. P., and K. K. Laing. 1994. Marine bird populations of Prince William Sound, Alaska, before and after the *Exxon Valdez* oil spill. EVOS Bird Study No. 2. U.S. Fish and Wildlife Service, Anchorage, AK. 85pp.

Krementz. D. G., P. W. Brown, F. P. Kehoe, and C. S. Houston. 1997. Population dynamics of white-winged scoters. Journal of Wildlife Management 61:222-227.

Larned, W. W. 2005. Aerial Survey of Lower Cook Inlet to locate molting flocks of Steller's eiders and mergansers. Trip Report. U.S. Fish and Wildlife Service, Soldotna, AK.

Larned, W. W., and K. S. Bollinger. 2009. Steller's eider spring migration surveys, Southwest Alaska, 2009. U.S. Fish and Wildlife Service, Migratory Bird Management, Anchorage, AK.

Larned, W., R. Stehn, R. Platte. 2008. Waterfowl Breeding Population Survey Arctic Coastal Plain, Alaska 2007. U.S. Fish and Wildlife Service, Migratory Bird Management, Anchorage, AK.

Larned, W., R. Stehn, R. Platte. 2009. Waterfowl Breeding Population Survey Arctic Coastal Plain, Alaska 2008. U.S. Fish and Wildlife Service, Migratory Bird Management, Anchorage, AK.

Larned, W., R. Stehn, R. Platte. 2010. Waterfowl Breeding Population Survey Arctic Coastal Plain, Alaska 2009. U.S. Fish and Wildlife Service, Migratory Bird Management, Anchorage, AK.

Larned, W., R. Stehn, R. Platte. *In Prep.* Waterfowl Breeding Population Survey Arctic Coastal Plain, Alaska 2011. U.S. Fish and Wildlife Service, Migratory Bird Management, Anchorage, AK.

Larned, W., R. Stehn, R. Platte. *In Prep.* Waterfowl Breeding Population Survey Arctic Coastal Plain, Alaska 2010. U.S. Fish and Wildlife Service, Migratory Bird Management, Anchorage, AK.

Larned, W. W., and D. Zwiefelhofer. 2002. Distribution and abundance of Steller's eiders (*Polysticta stelleri*) in the Kodiak Archipelago, Alaska, January, 2002. U.S. Fish and Wildlife Service, Waterfowl Management, Soldotna, AK.

Lensink, C. J. 1965. Waterfowl of the Yukon Flats, Alaska. Unpublished Report, U.S. Fish and Wildlife Service, Anchorage, AK.

Lewis, T. L., D. Esler, and W. S. Boyd. 2007. Foraging behaviors of surf scoters and white-winged scoters during spawning of Pacific herring. Condor 109:216-222.

Littlefield, C. D. and A. Pakulak. 1969. Arrival dates of birds at Churchill, Manitoba, 1968. Canadian Field-Naturalist 83:397-399.

Livezey, B. C. 1995. Phylogeny and evolutionary ecology of modern seaducks (Anatidae: Mergini). Condor 97:233-255.

Lok, E. K., M. Kirk, D. Esler, and W. S. Bond. 2008. Movements of pre-migratory surf and white-winged scoters in response to Pacific herring spawn. Waterbirds 31(3): 385-393.

Mallek, E. J. 2002. Aerial scoter monitoring survey of the Yukon Flats of Alaska – 2001. Unpublished Report, U. S. Fish and Wildlife Service, Fairbanks, AK.

Mallek, E. J. 2003. Aerial scoter and scaup monitoring survey of the Yukon Flats, Alaska – 2002. Unpublished Report, U. S. Fish and Wildlife Service, Fairbanks, AK.

Mallek, E. J. 2004. Aerial scoter and scaup monitoring survey of the Yukon Flats, Alaska – 2003. Unpublished Report, U. S. Fish and Wildlife Service, Fairbanks, AK.

Mallek, E. J. 2005. Aerial scoter and scaup monitoring survey of the Yukon Flats, Alaska – 2004. Unpublished Report, U. S. Fish and Wildlife Service, Fairbanks, AK.

Mallek, E., and D. J. Groves. 2010. Waterfowl Breeding Population Survey: Alaska-Yukon (Crew Area 1). Unpublished Report, U.S. Fish and Wildlife Service, Fairbanks, AK.

Mazak, E. J., H. J. MacIsaac, M. R. Servos, and R. Hesslein. 1997. Influence of feeding habits on organochlorine contaminant accumulation in waterfowl on the Great Lakes. Ecological Applications 7(4):1133-1143.

McKnight, A., K. M. Sullivan, D. B. Irons, S. W. Stephensen, and S. Howlin. 2008. Prince William Sound marine bird surveys, synthesis and restoration. *Exxon Valdez* Oil Spill Restoration Project Final Report (Restoration Project 080751), U. S. Fish and Wildlife Service, Anchorage, AK.

Mitchell, C. A., and J. Carlson 1993. Lesser scaup forage on zebra mussels at Cook Nuclear Plant, Michigan. Journal of Field Ornithology 64:219-222.

Mitchell, J. S., R. C. Bailey, and R. W. Knapton. 2000. Effects of predation fish and ducks on *dreissenid* mussels at Nanticoke, Lake Erie. Ecoscience 7:398-409.

Murdy, H. W. 1964. Population dynamics and breeding biology of waterfowl on the Yellowknife study area, Northwest Territories. U.S. Fish and Wildlife Service Progress Report, Washington, D.C.

National Audubon Society. 2002. The Christmas Bird Count historical results online. Retrieved from: http://www.audubon.org/bird/cbc. Accessed 28 September, 2010.

NatureServe. 2009. NatureServe Explorer: An online encyclopedia of life [web application]. Version 7.1. NatureServe, Arlington, Virginia. Available at: http://www.natureserve.org/explorer Accessed: August 30, 2010.

Naves, L.C. 2009. AMBCC subsistence harvest assessment program 2004-2007 harvest estimates. ADFG Technical Paper No. NNN, Draft, September 2009.

Naves, L.C. 2009. AMBCC subsistence harvest assessment program 2008 harvest estimates. ADFG Technical Paper No. NNN, Draft version 16 September 2009.

Naves, L.C. 2010. Alaska migratory bird subsistence harvest estimates, 2004-2007, AMBCC. ADFG Technical Paper No. 349, revised March 2010.

Naves, L.C. 2010. Alaska migratory bird subsistence harvest estimates, 2008, AMBCC. ADFG Technical Paper No. 353, July 2010.

Naves, L.C. 2010. Alaska migratory bird subsistence harvest estimates, 2009, AMBCC. ADFG Technical Paper No. NNN, Draft 2010.

Palmer, R. S. 1976. Handbook of North American birds. Vol. 3. Yale University Press. New Haven, CT. 560 pp.

Paton, P. W. C. 1994. The edge effect: how strong is the evidence? Conservation Biology 8(1):17-26.

Paul, A. J., and M. Paul. 1999. Energy contents of whole body, ovaries, and ova from pre-spawning Pacific herring. Alaska Fishery Research Bulletin 6(1):29-34.

Petrie, S. A., and R. W. Knapton. 1999. Rapid increase and subsequent decline of Zebra and Quagga Mussels in Long Point Bay, Lake Erie: possible influence of waterfowl predation. Journal of Great Lakes Research 25:772-782.

Petrie, S. and M. L. Schummer. 2002. Waterfowl responses to zebra mussels on the Lower Great Lakes. Birding 346-351.

Petrula M. J. 1994. Nesting ecology of ducks in interior Alaska. M.S. thesis. University of Alaska-Fairbanks.

Petrula M. J., D. H. Rosenberg, D. D. Hill, W. W. Larned. 2006. Small Boat and Aerial Surveys of waterfowl in Kachemak Bay, Alaska during winter 1999-2003. Unpublished Report. Alaska Department of Fish and Game, Wildlife Conservation Division, and U. S. Fish and Wildlife Service, Migratory Bird Management, Anchorage, AK.

Rawls, Jr., C. K. 1949. An investigation of the life history of the white-winged scoter (*Melanitta fusca deglandi*). MS Thesis. University of Minnesota, Minneapolis, MN.

Riordan, B., D. Verbyla, and A.D. McGuire. 2006. Shrinking ponds in subarctic Alaska based on 1950-2002 remotely sensed images. Journal of Geophysical Research-Biogeosciences 111(G4).

Robertson, G. J., and F. Cooke. 1999. Winter philopatry in migratory waterfowl. The Auk 116:20-34.

Robbins, Jr., S. D. 1991. Wisconsin birdlife: population and distribution-past and present. University of Wisconsin Press, Madison, WI.

Rosenberg, D. H., M. J. Petrula, and D.D. Hill. 2006. Seasonal movements of white-winged scoters (*Melanitta fusca*) from Prince William Sound, Alaska. *Exxon Valdez* Oil Spill Restoration Project Final Report (Restoration Project /273), Volume II, Alaska Department of Fish and Game, Division of Wildlife Conservation, Anchorage, AK.

Safine, D. E. 2005. Breeding ecology of white-winged scoters on the Yukon Flats, Alaska. MS Thesis, University of Alaska, Fairbanks, Fairbanks, AK. 103pp.

Safine, D. E., and M. S. Lindberg. 2008. Nest habitat selection of white-winged scoters on Yukon Flats, Alaska. The Wilson Journal of Ornithology 120(3):582-593.

Sanger, G. A. and R. D. Jones, Jr. 1981. The winter feeding ecology and trophic relationships of marine birds in Kachemak Bay, Alaska. Final Report to Outer Continental Shelf Assessment Program (OCSEAP), U.S. Fish Wildlife Service, Anchorage, AK.

Savard, J. P. L., D. Bordage, and A. Reed. 1998. Surf Scoter (*Melanitta perspicillata*). *In* The Birds of North America, No. 363 (A. Poole and F. Gill, eds.). The Birds of North America, Inc., Philadelphia, PA.

Sea Duck Joint Venture Continental Technical Team. 2001. Sea Duck Joint Venture Strategic Plan, 2001-2006. USFWS, Anchorage, Alaska; CWS, Sackville, New Brunswick.

Sea Duck Joint Venture. 2007. Recommendations for monitoring distribution, abundance, and trends for North American sea ducks. U.S. Fish and Wildlife Service and Canadian Wildlife Service.

Sea Duck Joint Venture. 2010. Sea Duck Joint Venture Implementation Plan for April 2010 through March 2013. Report of the Sea Duck Joint Venture. Available at U.S. Fish and Wildlife Service, Anchorage, and Environment Canada, Sackville, New Brunswick. Also available at http://www.seaduckjv.org/sdjv_implementation_plan.pdf. 25pp.

Sea Duck Joint Venture Management Board. 2008. Sea Duck Joint Venture Strategic Plan 2008-2012. USFWS, Anchorage, Alaska; CWS, Sackville, New Brunswick. Available at U.S. Fish and Wildlife Service, Anchorage, and Environment Canada, Sackville, New Brunswick. Also available at http://www.seaduckjv.org/sdjv_strategic_plan_2008-12_final_17dec2008.pdf. 95pp.

Small, A. 1994. California birds: their status and distribution. Ibis Publications Company, Vista, CA.

Smith, L.C., Y. Sheng, G.M. MacDonald, and L.D. Hinzman. 2005. Disappearing Arctic lakes. Science 308(5727):1429-1429.

Sorensen, M. F., S. M. Carney, and L. D. Schroeder. 1974. Age and sex composition of ducks and geese harvested in the 1973 hunting season in comparison with prior years. U.S. Fish and Wildlife Service Administrative Report.

Stapp, P., G. A. Polis, and P. F. Sanchez. 1999. Stable isotopes reveal strong marine and El Nino effects on island food webs. Nature 401(6752):467-469.

Stewart, R. E. 1975. Breeding birds of North Dakota. Tri-College Center for Environmental Studies, Fargo, ND.

Stott, R. S. and D. P. Olson. 1973. Food-habitat relationship of sea ducks on the New Hampshire coastline. Ecology 54:996-1007.

Swoboda, C. J. 2007. Population delineation and wintering ground influence on vital rates of white-winged scoters. MS Thesis, University of Saskatchewan Saskatoon.

Traylor, J. J. 2003. Nesting and duckling ecology of white-winged scoters (*Melanitta Fusca Deglandi*) at Redberry Lake, Saskatchewan. MS Thesis. University of Saskatchewan, Saskatoon, Canada.

Traylor, J. J., and R. T. Alisauskas. 2006. Effects of intrinsic and extrinsic factors on survival of white-winged scoter ducklings. The Auk 123(1):67-81.

Traylor, J. J., R. T. Alisauskas, and F. P. Kehoe. 2004a. Nesting ecology of white-winged scoters (*Melanitta fusca deglandi*) at Redberry Lake, Saskatchewan. The Auk 121(3):950-962.

Traylor, J. J., R. T. Alisauskas, and F. P. Kehoe. 2004b. Multistate modeling of brood amalgamation in white-winged scoters *Melanitta fusca deglandi*. Special Issue: Proceedings of the International Conference EURING 2003, Deutschland. (J. C. Senar, A. Dhondt, and M. Conroy, eds.). Animal Biodiversity and Conservation 27(1):369-370.

Trost, R. E. and D. P. Collins. 2009. Pacific Flyway data book. U.S. Fish and Wildlife Service, Division of Migratory Bird Management, Portland, OR.

Tschaekofske, H. J., J. R. Evenson, E. M. Anderson, T. A. Cyra, B. L. Murphie, and A. Styring. 2011. Prey selection and its relationship to habitat and foraging strategy of remigial molting white-winged (*Melanitta fusca*) and surf scoters (*M. perspicillata*) in Puget Sound, Washington, and the Strait of Georgia, British Columbia. Poster session presented at: 4th International Sea Duck Conference, Sept. 12-16, 2011, Seward, AK.

Turner, B. C., G. S. Hochbaum, F. D. Caswell, and D. J. Nieman. 1987. Agricultural impacts on wetland habitats on the Canadian prairies, 1981-1985. Transactions of the North American Wildlife and Natural Resources Conference 52:206-215.

Uher-Koch, B., D. Esler, J. Hupp, D. H. Ward, C. S. VanStratt, R. Dickson, K. Brodhead, S. Boyd, J. R. Evenson, S. A. Iverson, M. Kirk, T. Lewis, E. A. Anderson, and J. Schmutz. 2011. Live long and prosper: latitudinal and seasonal variation in non-breeding survival of surf and white-winged scoters. Presentation at: 4th International Sea Duck Conference, Sept. 12-16, 2011, Seward, AK.

U.S. Fish and Wildlife Service. 1999. Population status and trends of sea ducks in Alaska. U.S. Fish and Wildlife Service, Migratory Bird Management Waterfowl Management Branch, Anchorage, AK.

U.S. Fish and Wildlife Service. 2005. The migratory bird program's focal species strategy. Retrieved from: http://www.fws.gov/migratorybirds/CurrentBirdIssues/Management/FocalSpecies/The%20Focal%20Species%20Fact%20Sheet%20and%20Table.pdf Accessed 24 August, 2010.

Vermeer, K. 1968. Ecological aspects of ducks nesting in high densities among larids. Wilson Bulletin 80:78-83.

Vermeer, K. 1969. Some aspects of the breeding of the white-winged scoter at Miquelon Lake, Alberta. Blue Jay 27:72-73.

Walker, J., M. S. Lindberg, M. C. MacCluskie, M. J. Petrula, and J. S. Sedinger. 2005. Nest survival of scaup and other ducks in the boreal forest of Alaska. The Journal of Wildlife Management 69(2):582-591.

Washington Department of Fish and Wildlife (WDFW), Waterfowl Section. 2010. Washington Sea Duck Management Strategies. Draft Report to the Washington Fish and Wildlife Commission. Washington Department of Fish and Wildlife Waterfowl Section. Retrieved from: http://wdfw.wa.gov/publications/01007/wdfw01007.pdf. Accessed: 20 September, 2010.

Weller, M. W. 1957. Growth, weights, and plumages of the redhead, *Aythya americana*. Wilson Bulletin 69:5-38.

Wolfe, R. J., A. W. Paige and C. L. Scott. 1990. The subsistence harvest of migratory birds in Alaska. Alaska Department of Fish and Game Technical Paper 197:1-183.

Wormington, A., and J. H. Leach. 1992. Concentrations of migrant diving ducks at Point Pelee National Park, Ontario, in response to invasion of zebra mussels, *Dreissena polymorpha*. Canadian Field-Naturalist 106:376-380.

Yocom, C. F. 1951. Waterfowl and their food plants in Washington. University of Washington Press, Seattle, WA.

Yoshikawa, K., and L.D. Hinzman. 2003. Shrinking thermokarst ponds and groundwater dynamics in discontinuous permafrost near Council, Alaska. Permafrost and Periglacial Processes 4(2):151-160.

Zwiefelhofer, D. 1992. 1992 winter population survey of Steller's eiders on Kodiak Island, Alaska. U.S. Fish and Wildlife Service Unpublished Report. Kodiak National Wildlife Refuge, Kodiak, AK. 4 pp.

Zwiefelhofer, D. C., J. H. Reynolds, and M. J. Keim. 2008. Population trends and annual density estimates for select wintering seabird species on Kodiak Island, Alaska. U.S. Fish and Wildlife Service, Region 7 Technical Report 2008.

APPENDICES

Appendix 1. U.S. Fish and Wildlife Service Focal Species Strategy for Migratory Birds – Fact Sheet..

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

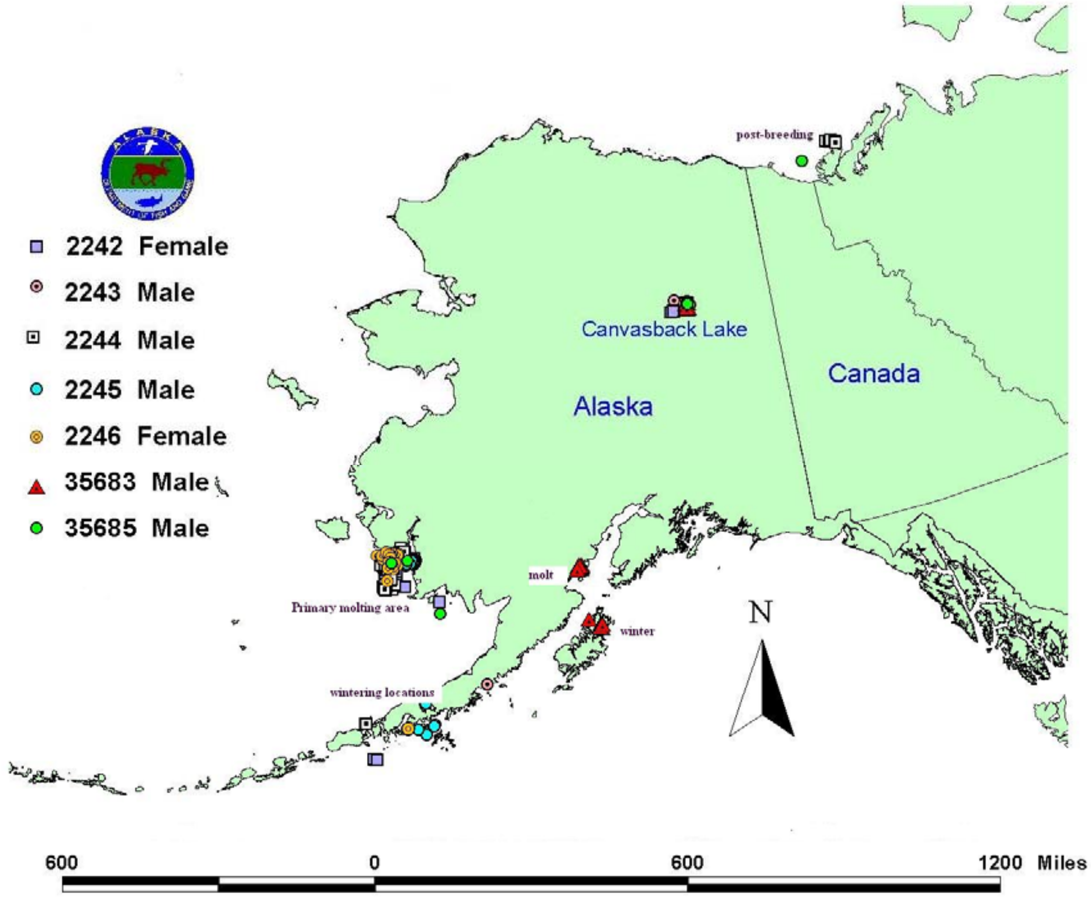
Appendix 1. U.S. Fish and Wildlife Service Focal Species Strategy for Migratory Birds – Fact Sheet (Cont'd).

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

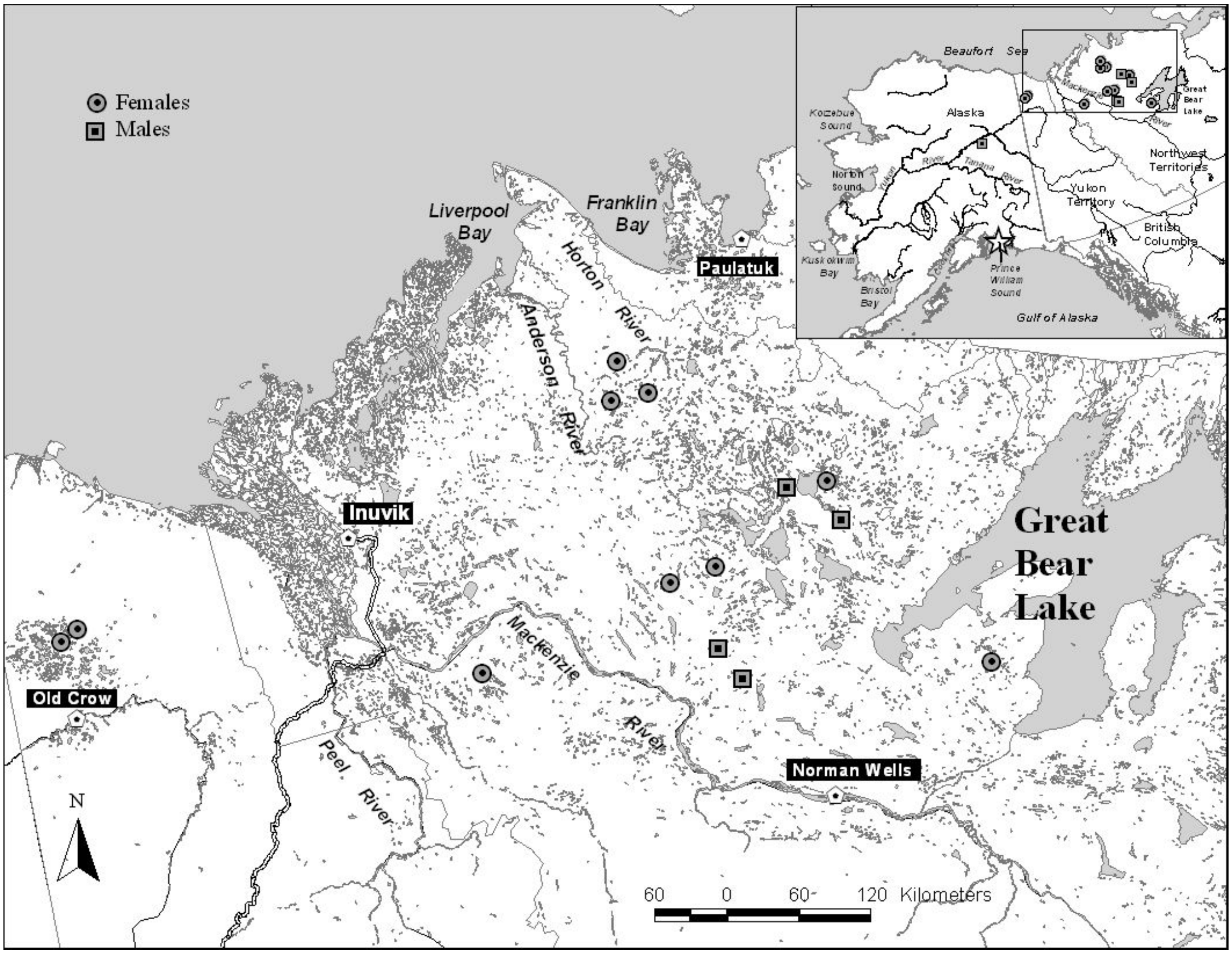
Greater White-fronted Goose (Tule)	Black-capped Petrel	Marbled Godwit	Gilded Flicker
Emperor Goose	Hawaiian Petrel	Red Knot (Atlantic)	Olive-sided Flycatcher
Snow Goose (Wrangel Island)	Christmas Shearwater	Dunlin (Arctic)	Buff-breasted Flycatcher
Snow Goose (Lesser)	Townsend's Shearwater (Newell's)	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).

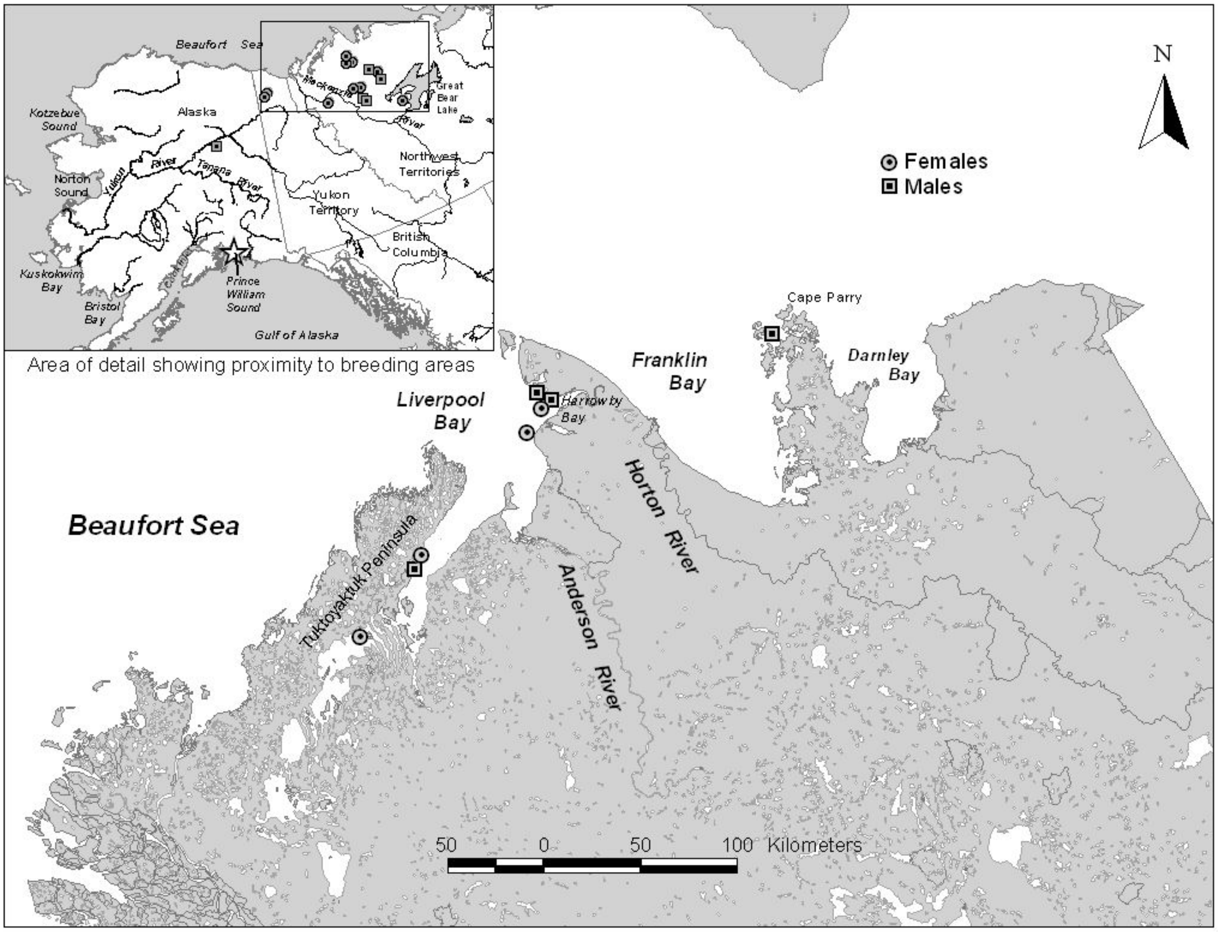
Appendix 2. Molt and wintering locations of white-winged scoters marked with satellite transmitters during the breeding season on Canvasback Lake, Yukon Flats, Alaska, 2002.



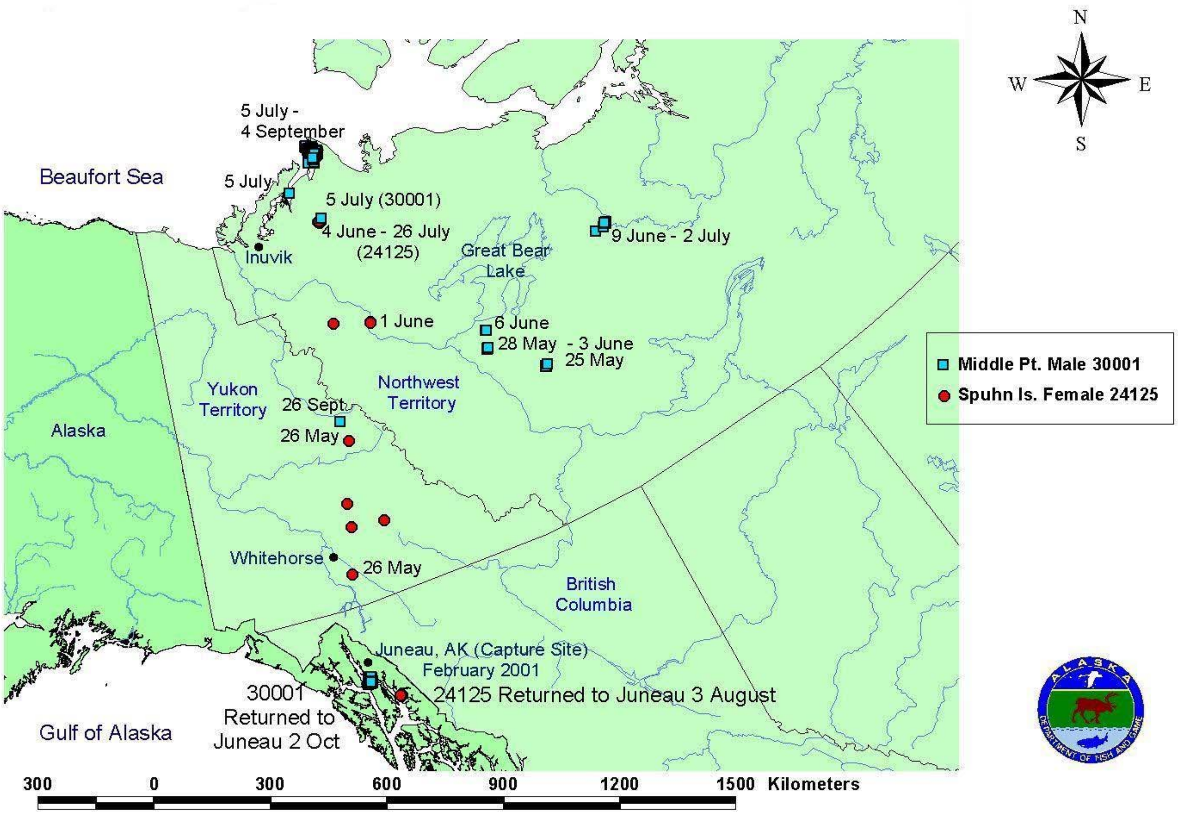
Appendix 3. Map of breeding areas in Northwest and Yukon territories used by white-winged scoters equipped with satellite transmitters in Prince William Sound, Alaska, 1999-2000 (Rosenberg et al. 2006).



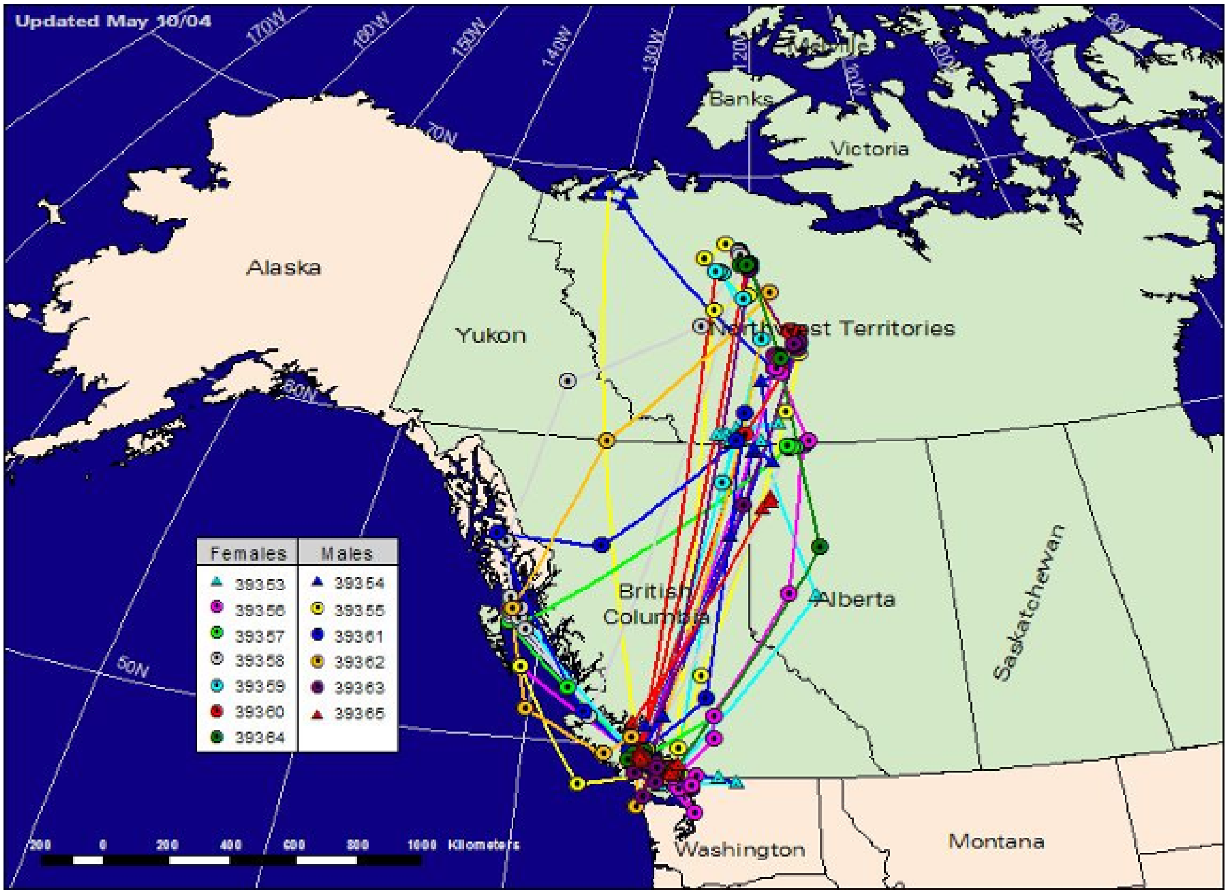
Appendix 4. Map of molting areas in the Beaufort Sea, Northwest Territories, Canada used by white-winged scoters equipped with satellite transmitters in Prince William Sound, Alaska, 1999-2000 (Rosenberg et al. 2006).



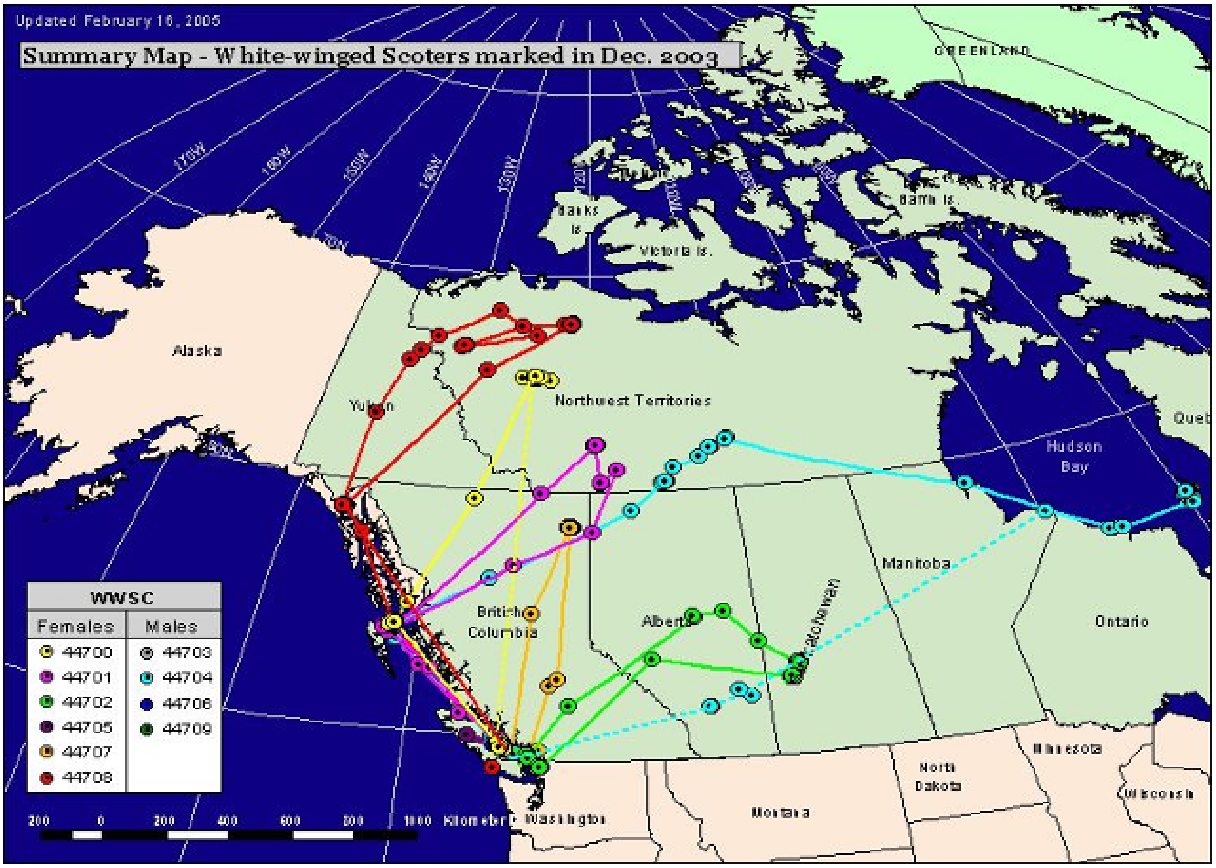
Appendix 5. Movements of white-winged scoters marked in Southeast Alaska with satellite transmitters during winter 2001.



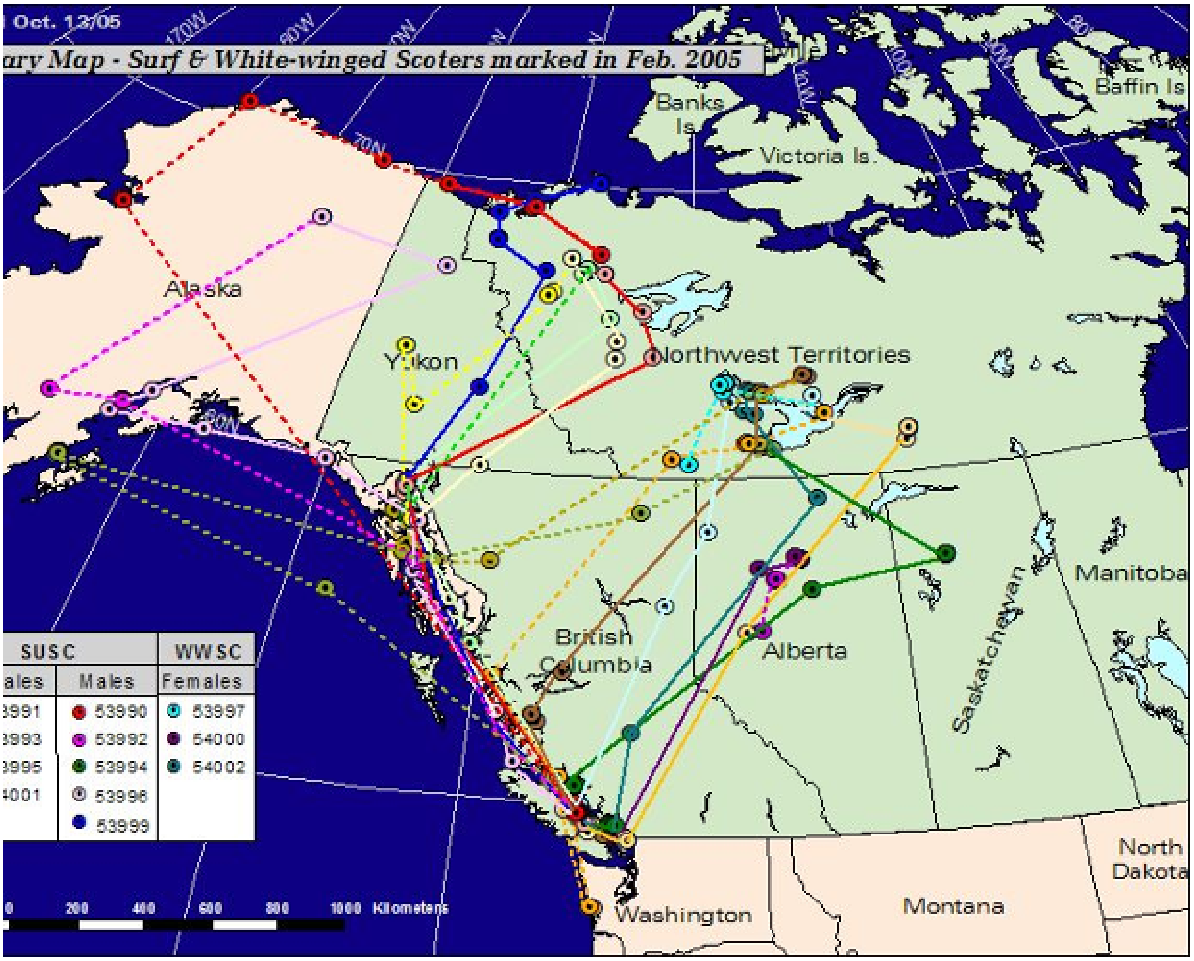
Appendix 6. Migration patterns of white-winged scoters marked with satellite transmitters in Baynes Sound, British Columbia, 2002.



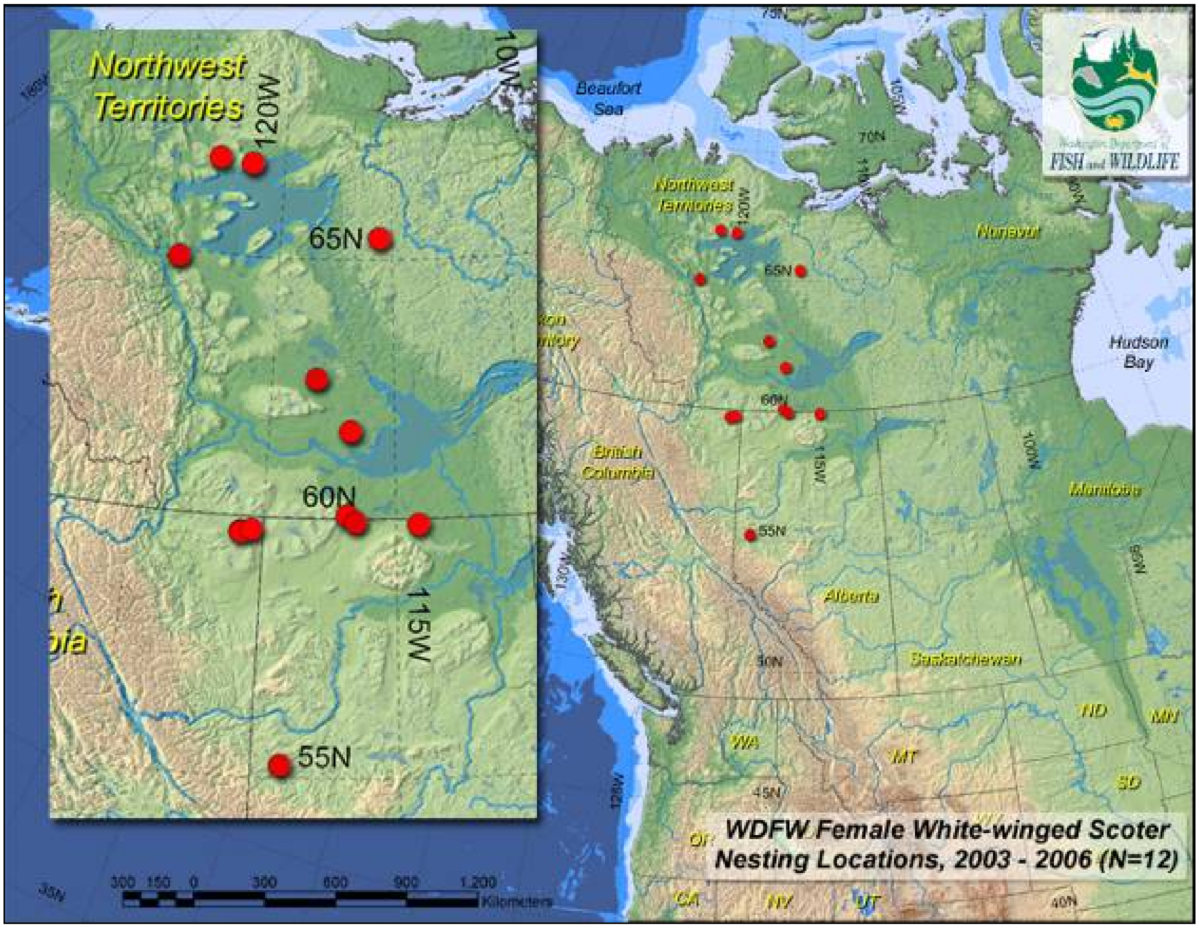
Appendix 7. Migration patterns of white-winged scoters marked with satellite transmitters in Baynes Sound, British Columbia, 2003.



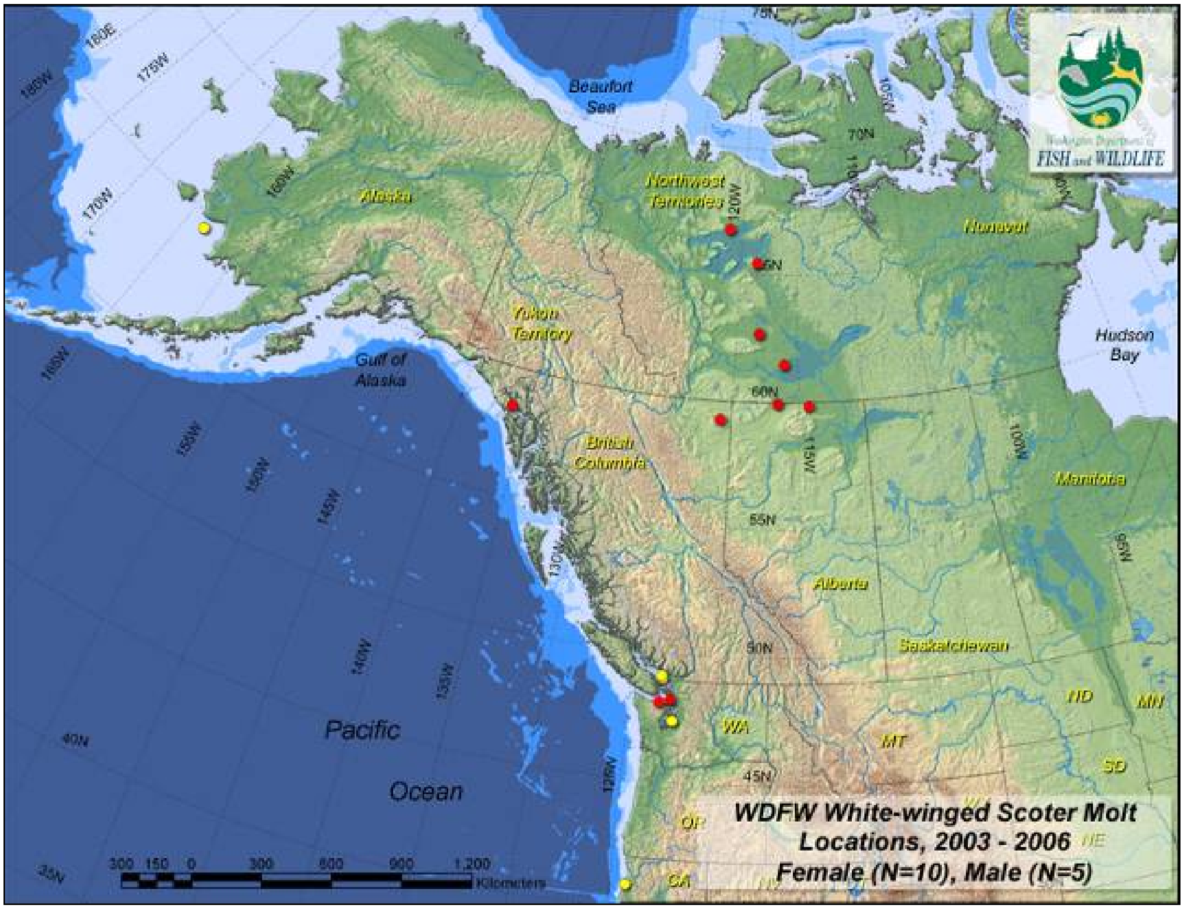
Appendix 8. Migration patterns of white-winged and surf scoters marked with satellite transmitters in Baynes Sound, British Columbia, 2005.



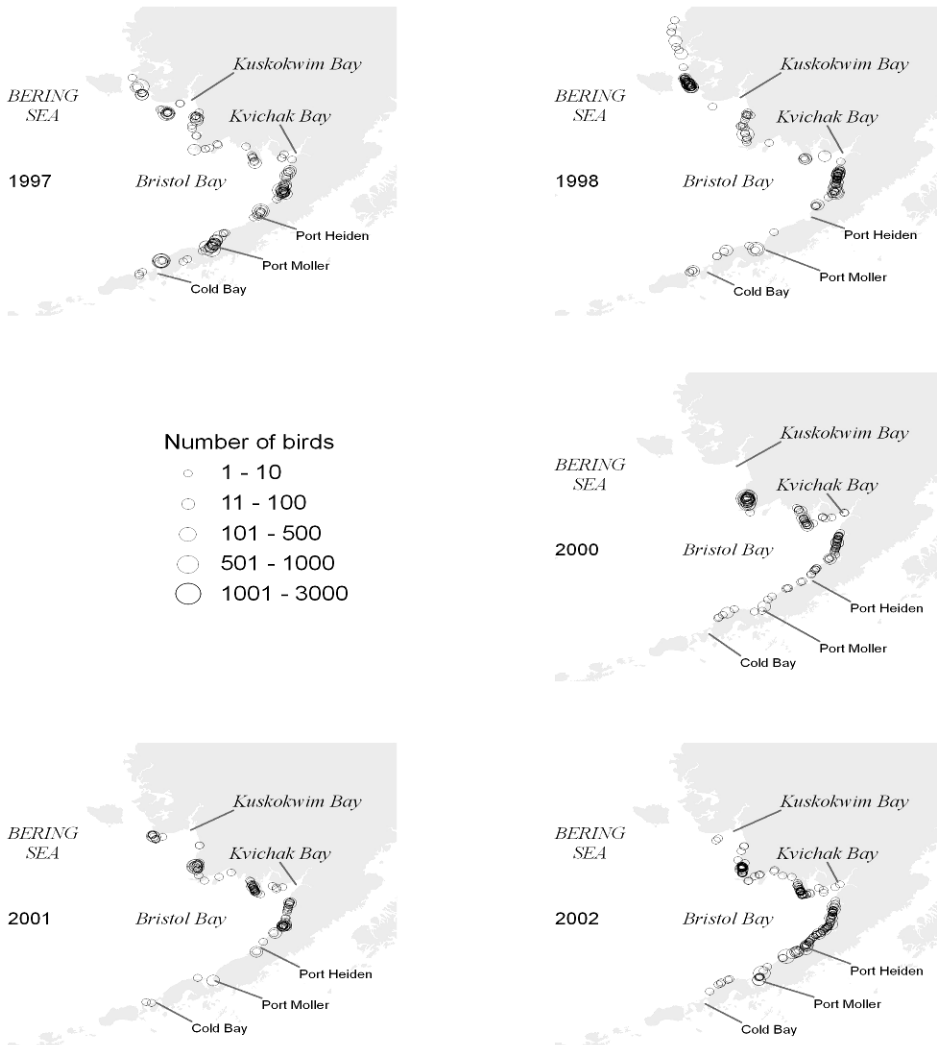
Appendix 9. Nesting locations of white-winged scoters marked with satellite transmitters at wintering locations in inland marine waters of Washington State, 2003–2006.



Appendix 10. Molting locations of white-winged scoters marked with satellite transmitters at wintering locations in inland marine waters of Washington State, 2003–2006.



Appendix 11. Distribution of white-winged scoters seen during spring aerial surveys of southwest Alaska, 1997-2009.



1. The survey was designed for Steller's eiders, so was not inclusive within the survey area for white-winged scoters, as they are often in deeper waters further offshore.
2. Flight paths (effort) are standardized from year to year with some variation due to annual ice coverage, weather, and operational matters.
3. There is a known bias with scoters – white-winged scoters (on the water) are often identified as black scoters, but black scoters are less likely to be counted as white-winged scoters.
4. The survey is conducted during spring migration. Most birds are detected on "traditional" staging areas, and only occasionally in transit.
5. Distributions are likely to be influenced by survey timing in relation to calendar date and weather systems.

Appendix 11. Distribution of white-winged scoters seen during spring aerial surveys of southwest Alaska, 1997-2009 (USFWS unpubl. data) (Cont'd).

1. The survey was designed for Steller's eiders, so was not inclusive within the survey area for white-winged scoters, as they are often in deeper waters further offshore.
2. Flight paths (effort) are standardized from year to year with some variation due to annual ice coverage, weather, and operational matters.
3. There is a known bias with scoters – white-winged scoters (on the water) are often identified as black scoters, but black scoters are less likely to be counted as white-winged scoters.
4. The survey is conducted during spring migration. Most birds are detected on "traditional" staging areas, and only occasionally in transit.
5. Distributions are likely to be influenced by survey timing in relation to calendar date and weather systems.

Appendix 12. White-winged scoter harvest estimates in Canada and the United States, 1974-2008 (CWS 2009).

	Canada													United States[1] (PF includes Alaska)					Continental
	NF	PE	NS	NB	QC	ON	MB	SK	AB	BC	NT/NU	YT	Total	AF	MF	CF	PF2	Total	Total
1974		113	1 105	46	9 676	4 611	291		251	174			16 267	26 700	6 393	0	424	33 517	49 784
1975			1 742	233	4 934	4 277	141		357	143		54	11 881	33 000	1 944	117	125	35 186	47 067
1976	95	204	2 792	193	8 245	4 122	396		648	61		164	16 920	18 100	497	565	1 010	20 172	37 092
1977			2 253		10 277	4 393	183		118	57		247	17 528	12 200	2 341	257	1 531	16 329	33 857
1978	1 105	153	417	283	5 042	3 310		381	334	265			11 290	12 100	205	0	3 534	15 839	27 129
1979	565		989	117	8 018	5 845		364	172				16 070	8 730	966	0	748	10 444	26 514
1980	3 483		3 497	92	10 829	3 142				102			21 145	13 900	2 284	34	792	17 010	38 155
1981	728		1 231	114	7 831	2 510				689	116		13 219	11 900	1 644	126	1 172	14 842	28 061
1982	767		1 459	151	7 798	2 000			1 484	1 259			14 918	13 900	1 269	0	172	15 341	30 259
1983	710		1 418	199	7 842	2 470		516		162			13 317	9 600	2 339	0	177	12 116	25 433
1984	1 645	30	2 253		11 052	3 636					408		19 024	27 800	2 283	0	3 970	34 053	53 077
1985	1 028		791	97	7 792	2 892	283		252	66	1 661		14 862	19 300	2 074	36	425	21 835	36 697
1986	215		401	46	2 359	1 443		213		297			4 974	9 300	1 142	0	276	10 718	15 692
1987			1 090	90	6 950	3 618			106	78			11 932	20 300	2 885	101	1 019	24 305	36 237
1988	2 190		1 963	60	7 072	1 403				51			12 739	17 500	1 086	0	134	18 720	31 459
1989	202		1 515	128	8 078	1 858							11 781	7 100	1 197	70	43	8 410	20 191
1990	899		2 200	139	5 297	801	789						10 125	14 690	546	0	238	15 474	25 599
1991			465	90	2 505	1 096							4 156	18 391	1 036	312	88	19 827	23 983
1992	283		1 638		5 213	441							7 575	10 992	661	151	0	11 804	19 379
1993	544	379	1 238	123	4 415	2 041	162				35		8 937	8 293	380	0	247	8 920	17 857
1994	344		2 132		5 932	1 343							9 751	5 594	738	111	240	6 683	16 434
1995			1 846		1 795	672							4 313	7 995	314	0	239	8 548	12 861
1996	89		1 034		2 464	1 175							4 762	9 996	3 478	119	361	13 954	18 716
1997	58		1 191		2 306	470							4 025	6 800	568	0	499	7 867	11 892
1998	598		758	198	3 363	291							5 208	4 700	632	0	787	6 119	11 327
1999[2]	41		412		1 337	260						3	2 053	2 200	0	200	1 100	3 500	5 553
2000	47		313		527	104					24		1 015	4 900	0	100	1 200	6 200	7 215
2001	72		227	199	1 021	379	159	157		26			2 240	15 100	1 500	0	6 600	23 200	25 440
2002		168	680	52	1 179	282							2 361	7 300	800	200	800	9 100	11 451
2003	409		636	43	789	97			173				2 147	6 800	1 900	200	2 200	11 100	13 247
2004			156		1 238	137							1 531	6 800	1 900	200	2 200	11 100	12 631
2005			151	34	908	78							1 171	4 215	793	113	1 426	6 547	7 718
2006			407	42	1 202	404							2 055	8 725	697	0	2 865	12 287	14 342
2007			130	85	281	334							830	4 294	1 218	0	2 497	8 009	8 839
2008[3]			480	31	950		64						1 525	5 643	336	0	1 653	7 632	9 157

[1]AF: Atlantic Flyway, MF: Mississippi Flyway, CF: Central Flyway, PF: Pacific Flyway (including Alaska).

[2] The USFWS recently implemented an improved national harvest survey in 1999. The results for years prior to 1999 are not directly comparable to those from 1999 onward.

[3]Harvest data for the U.S. are preliminary.

Data source: M. H. Gendron and B. Collins (CWS), and R.V. Raftovich *et al.* 2009 (USFWS).

Appendix 13. Scoter subsistence harvest estimates in Alaska 2004-2009 (Naves 2009a, b; 2010a, b, c).

	White-winged Scoter							
nsr	subregion	2004	2005	2006	2007	2008	2009	average
1	Chugach	94	47	0	47	47	47	**47**
2	Cook Inlet	0	0	0	0	0	0	**0**
3	Kodiak villages	278	278	278	278	278	278	**278**
4	Kodiak city & road	0	0	0	0	0	0	**0**
5	Aleutian / Pribilof villages	401	123	401	1021	58	401	**401**
6	Unalaska	0	0	0	0	0	0	**0**
7	South AK peninsula	0	3	3	9	0	3	**3**
8	SW Bristol Bay	21	162	179	71	0	87	**87**
9	Dillingham	0	0	0	0	0	0	**0**
10	south coast	258	134	146	234	64	10	**141**
11	mid coast	0	39	131	0	0	0	**28**
12	north coast	0	0	0	0	0	20	**3**
13	lower Yukon	0	34	23	0	19	67	**24**
14	lower Kuskokwim	962	370	3206	1340	2181	1462	**1587**
15	central Kuskokwim	0	10	30	0	10	10	**10**
16	Bethel	1058	243	336	498	320	534	**498**
17	St Lawrence / Diomede						45	
17,18,19	Bering Strait / Norton Sound	30	73	34	0	34	34	**34**
20	NW Arctic villages	32	32	32	32	32	32	**32**
22,23	North Slope	1	0	1	5	0	0	**1**
24	Mid-Yukon / Upper Kuskokwim	16	0	0	5	5	5	**5**
25	Yukon / Koyukuk	90	0	0	0	381	94	**94**
26	Upper Yukon	2437	3423	2502	5331	3423	3423	**3423**
27	Tanana villages	681	538	394	538	538	538	**538**
28	Tok	1216	1216	1216	1216	1216	1216	**1216**
29	Upper Copper R	109	55	55	0	55	55	**55**
annual statewide harvest estimate =		7684	6779	8967	10625	8661	8315	**8505**

Average harvest was used from each subregion for years when that subregion was not sampled. Average harvest indicated in the rightmost column and copied into grey-shaded cells. North Slope and Bering Strait results not tabulated by subregion, but presented as regional totals. 2009 estimate from St Lawrence/Diomede subregion reported, but not used in calculating averages or totals because remaining subregion not sampled in 2009 and previous subregion results unavailable.

Fall harvest (after 1 Sept, and including winter harvest in the Aleutian/Pribilof and Bristol Bay regions) included in annual estimate. Fall harvest data not collected for North Slope and Kodiak City & road subregions.

Subsistence harvest survey participation voluntary at household and community levels. If other communities were sampled within the same subregion, the average household harvest was expanded to include the number of unsampled households in the sampled and non-participating villages. Data were lacking from Kotzebue subregion, therefore no estimate was possible for this subregion.

Considerable potential for error exists in harvest estimates. Sampling error was measured by variation observed among households, villages, and subregions within the 3-stage cluster sampling design (see Naves, various reports, http://alaska.fws.gov/ambcc/harvest.htm). Various sources of bias may also contribute to potential error in estimates. Alaska subsistence surveys have not measured recall bias, exaggeration bias, unrepresentive participation of households, unrepresentative participation by villages, and confusion among names and other difficulties in species identification. **Estimates are presented for all three species of scoters based on potential difficulties in species identification**.

Appendix 13. Scoter subsistence harvest estimates in Alaska 2004-2009 (Naves 2009a, b; 2010a, b, c) (Cont'd).

	Black Scoter							
nsr	**subregion**	**2004**	**2005**	**2006**	**2007**	**2008**	**2009**	**average**
1	**Chugach**	308	175	41	175	175	175	**175**
2	**Cook Inlet**	0	0	0	0	0	0	**0**
3	**Kodiak villages**	413	413	413	413	413	413	**413**
4	**Kodiak city & road**	0	0	0	0	0	0	**0**
5	**Aleutian / Pribilof villages**	201	143	201	383	77	201	**201**
6	**Unalaska**	0	0	0	0	0	0	**0**
7	**South AK peninsula**	29	26	26	36	14	26	**26**
8	**SW Bristol Bay**	344	565	510	377	97	379	**379**
9	**Dillingham**	0	0	0	0	0	0	**0**
10	**south coast**	1605	441	397	248	995	144	**638**
11	**mid coast**	135	0	388	58	20	401	**167**
12	**north coast**	12	0	0	0	0	0	**2**
13	**lower Yukon**	0	469	454	0	565	227	**286**
14	**lower Kuskokwim**	6069	1230	4695	7347	1977	6655	**4662**
15	**central Kuskokwim**	27	9	0	0	9	9	**9**
16	**Bethel**	41	1460	1385	812	695	479	**812**
17	**St Lawrence / Diomede**						0	
17,18,19	**Bering Strait / Norton Sound**	0	191	199	407	199	199	**199**
20	**NW Arctic villages**	741	741	741	741	741	741	**741**
22,23	**North Slope**	16	0	16	17	0	46	**16**
24	**Mid-Yukon / Upper Kuskokwim**	0	0	0	0	0	0	**0**
25	**Yukon / Koyukuk**	7	11	0	0	12	6	**6**
26	**Upper Yukon**	0	2	0	6	2	2	**2**
27	**Tanana villages**	260	400	540	400	400	400	**400**
28	**Tok**	303	303	303	303	303	303	**303**
29	**Upper Copper R**	36	18	18	0	18	18	**18**
annual statewide harvest estimate =		10547	6597	10327	11723	6712	10824	**9455**

Average harvest was used from each subregion for years when that subregion was not sampled. Average harvest indicated in the rightmost column and copied into grey-shaded cells. North Slope and Bering Strait results not tabulated by subregion, but presented as regional totals. 2009 estimate from St Lawrence/Diomede subregion reported, but not used in calculating averages or totals because remaining subregion not sampled in 2009 and previous subregion results unavailable.
Fall harvest (after 1 Sept, and including winter harvest in the Aleutian/Pribilof and Bristol Bay regions) included in annual estimate. Fall harvest data not collected for North Slope and Kodiak City & road subregions.
Subsistence harvest survey participation voluntary at household and community levels. If other communities were sampled within the same subregion, the average household harvest was expanded to include the number of unsampled households in the sampled and non-participating villages. Data were lacking from Kotzebue subregion, therefore no estimate was possible for this subregion.
Considerable potential for error exists in harvest estimates. Sampling error was measured by variation observed among households, villages, and subregions within the 3-stage cluster sampling design (see Naves, various reports, http://alaska.fws.gov/ambcc/harvest.htm). Various sources of bias may also contribute to potential error in estimates. Alaska subsistence surveys have not measured recall bias, exaggeration bias, unrepresentive participation of households, unrepresentative participation by villages, and confusion among names and other difficulties in species identification.
Estimates are presented for all three species of scoters based on potential difficulties in species identification.

Appendix 13. Scoter subsistence harvest estimates in Alaska 2004-2009 (Naves 2009a, b; 2010a, b, c) (Cont'd).

	Surf Scoter							
nsr	**subregion**	**2004**	**2005**	**2006**	**2007**	**2008**	**2009**	**average**
1	**Chugach**	168	86	4	86	86	86	**86**
2	**Cook Inlet**	0	0	0	0	0	0	**0**
3	**Kodiak villages**	247	247	247	247	247	247	**247**
4	**Kodiak city & road**	0	0	0	0	0	0	**0**
5	**Aleutian / Pribilof villages**	5	15	5	0	0	5	**5**
6	**Unalaska**	0	0	0	0	0	0	**0**
7	**South AK peninsula**	28	11	11	5	0	11	**11**
8	**SW Bristol Bay**	15	273	218	92	145	149	**149**
9	**Dillingham**	42	125	42	0	0	42	**42**
10	**south coast**	63	47	47	14	50	0	**37**
11	**mid coast**	0	0	223	0	0	0	**37**
12	**north coast**	0	0	6	0	0	0	**1**
13	**lower Yukon**	0	35	121	18	28	61	**44**
14	**lower Kuskokwim**	39	371	1237	1276	414	1179	**753**
15	**central Kuskokwim**	0	0	0	0	0	0	**0**
16	**Bethel**	0	528	0	147	207	0	**147**
17	**St Lawrence / Diomede**						18	
17,18,19	**Bering Strait / Norton Sound**	0	111	37	0	37	37	**37**
20	**NW Arctic villages**	44	44	44	44	44	44	**44**
22,23	**North Slope**	0	0	0	0	0	0	**0**
24	**Mid-Yukon / Upper Kuskokwim**	44	14	0	19	19	19	**19**
25	**Yukon / Koyukuk**	87	0	16	55	381	108	**108**
26	**Upper Yukon**	19	44	44	69	44	44	**44**
27	**Tanana villages**	444	436	428	436	436	436	**436**
28	**Tok**	194	194	194	194	194	194	**194**
29	**Upper Copper R**	0	0	0	0	0	0	**0**
annual statewide harvest estimate =		1439	2581	2924	2702	2332	2661	**2440**

Average harvest was used from each subregion for years when that subregion was not sampled. Average harvest indicated in the rightmost column and copied into grey-shaded cells. North Slope and Bering Strait results not tabulated by subregion, but presented as regional totals. 2009 estimate from St Lawrence/Diomede subregion reported, but not used in calculating averages or totals because remaining subregion not sampled in 2009 and previous subregion results unavailable.

Fall harvest (after 1 Sept, and including winter harvest in the Aleutian/Pribilof and Bristol Bay regions) included in annual estimate. Fall harvest data not collected for North Slope and Kodiak City & road subregions.

Subsistence harvest survey participation voluntary at household and community levels. If other communities were sampled within the same subregion, the average household harvest was expanded to include the number of unsampled households in the sampled and non-participating villages. Data were lacking from Kotzebue subregion, therefore no estimate was possible for this subregion.

Considerable potential for error exists in harvest estimates. Sampling error was measured by variation observed among households, villages, and subregions within the 3-stage cluster sampling design (see Naves, various reports, http://alaska.fws.gov/ambcc/harvest.htm). Various sources of bias may also contribute to potential error in estimates. Alaska subsistence surveys have not measured recall bias, exaggeration bias, unrepresentive participation of households, unrepresentative participation by villages, and confusion among names and other difficulties in species identification. **Estimates are presented for all three species of scoters based on potential difficulties in species identification.**