Species Status Summary and Information Needs

Sea Duck Joint Venture, March 2015

White-winged Scoter *(Melanitta fusca)*

Population Size and Trends: The number of White-winged Scoters breeding in western Canada and Alaska appear to have declined in the past half-century, based on declines in total scoter numbers in regions where White-winged Scoters predominate. The recent trend is unknown, but the population is probably below historic levels (Bowman et al. 2015). Scoters (all three species combined) declined from the early 1980s to the early 2000s but seem to have increased beginning around 2004 (Bowman et al. 2015). The number of White-winged Scoters breeding in the Yukon Flats National Wildlife Refuge was apparently stable from 2001 to 2011, with no apparent trend and no significant differences between years (Guldager and Bertram 2010; Bowman et al. 2015). However, species-specific data from the Waterfowl Breeding Population and Habitat survey indicates an increasing trend in Alaska between 1993 and 2012 (Bowman et al. 2015). Alisauskas et al. (2004) found that the number of breeding White-winged Scoters in northern Manitoba and Saskatchewan increased during the 1990s while continuing to decline in northern Alberta and the Northwest Territories; breeding populations disappeared from southern Alberta and southern Manitoba by 1998.

Range-wide surveys during winter are only at the developmental stage. A 35% decline has been observed in Puget Sound, Washington, from 1999 to 2013 (Bowman et al. 2015) and a significant negative trend (-7.6%/year) in the Strait of Georgia, British Columbia, has been recorded by the BC Coastal Waterbird Survey (Crewe et al. 2012). The Atlantic Coast Wintering Sea Duck Survey reported an average of 58,600 White-winged Scoters (and 429,400 scoter spp.) from the US-Canada border south to Palm Beach, Florida, during the period 2008-2011 (Silverman et al. 2012). Long-term trend data for White-winged Scoters wintering on the Atlantic coast are not available.

Priority Information Needs:

1. Develop and implement monitoring surveys for the eastern and western populations during both winter and breeding seasons, to better estimate numbers and trends.
2. Develop protocols for identifying scoters to the species level during aerial surveys on both the breeding grounds and wintering areas.

Population Delineation: White-winged Scoters breed throughout the boreal forest, from Alaska to Québec. The highest nesting densities occur in northeastern Alaska and the Northwest Territories with small breeding populations in the mid-continent prairie region (Baldassare 2014). Satellite telemetry data indicate that individuals wintering on the Atlantic coast breed as far as Great Bear Lake in the Northwest Territories (SDJV 2014). Stable isotope analysis classified 12-25% of nesting females at Redberry Lake, Saskatchewan, as wintering on the Atlantic coast, with 75-88% wintering on the Pacific coast; in contrast, at Cardinal Lake in the Northwest Territories almost all individuals (male and female) were classified as wintering on the Pacific coast (Gurney et al. 2014).

White-winged Scoters marked with satellite transmitters in Prince William Sound, Alaska, migrated to breeding areas ranging from the Northwest Territories to Alaska. These marked birds used molting areas in the Beaufort Sea, the Gulf of Alaska, and the Bering Sea and most birds (82%) returned to winter in Prince William Sound (Rosenberg et al. 2006). Adult males and females implanted with satellite transmitters in Baynes Sound, British Columbia, migrated to breeding areas mainly in the Northwest Territories (particularly around Great Slave Lake and Great Bear Lake) and northern Alberta, with some going as far east as Saskatchewan and even Manitoba. Rose Spit, off the northeast corner of Haida Gwaii was an important spring staging area for these birds, and southeast Alaska was used as a molt location (Boyd and Esler 2004). White-winged scoters marked in Puget Sound, Washington, migrated to northern Alberta and the Northwest Territories to breed, with some individuals nesting in northern British Columbia, Saskatchewan and the Yukon. Most females molted near their nesting sites while the males migrated to marine waters from Kuskokwim Bay, Alaska, south to Humboldt Bay, California to molt; 5 of 6 males and 9 of 11 females returned to winter in the Puget Sound-Strait of Georgia area (WDFW 2014).

White-winged Scoters marked with satellite transmitters on the Atlantic coast wintered from Newfoundland south to Long Island, New York, and on Lake Ontario; the majority (75%) of these marked birds wintered between Massachusetts and Long Island (SDJV 2014). Individuals used wintering areas for 4-7 months and 67% used wintering areas <50 km apart in consecutive years (SDJV 2014). Breeding sites ranged from Great Bear Lake and Great Slave Lake in the Northwest Territories, northern Saskatchewan, northern Manitoba, northwestern Ontario, and northern Québec. Females had high return rates to breeding sites, while males apparently used breeding locations separated by 500 -1800 km in consecutive years (SDJV 2014). Molting areas included southern Hudson Bay (Belcher Islands), James Bay, St. Lawrence Estuary and Prince Edward Island, as well as locations within the breeding range (SDJV 2014). Many non-breeding and/or sub-adult White-winged Scoters traveled to the St. Lawrence Estuary in spring and remained until late fall. The St. Lawrence Estuary is used during a large portion of annual cycle (early June – late October), particularly by non-breeding individuals but also during spring migration, summer, molting, and fall migration/staging (SDJV 2014).

Priority Information Needs:

1. Complete satellite telemetry projects on the Atlantic coast and Pacific coast to determine the following: a) linkages among breeding, molting, staging and wintering areas, b) key migration corridors and timing of migration, c) important habitats/sites used during the above stages, d) level of inter-annual site fidelity to breeding, molting and wintering habitats, and e) determine the magnitude of overlap in breeding distribution between Atlantic and Pacific wintering populations.

2. Determine seasonal movements of non-breeding birds, especially juveniles.

<u>Population Dynamics</u>: There are few data on demographic rates for this species, and those available mostly come from small populations at the southern edge of their breeding range in the mid-continent prairies. A few studies have been conducted in boreal breeding areas in Alaska (Safine 2005) and the Northwest Territories (S. Slattery, Ducks Unlimited Canada, unpubl. data). In the Yukon Flats National Wildlife Refuge, Alaska, summer survival (87-day period) of White-winged Scoters was 0.88 for egg-producing females and 0.93 for non-egg producing females (as determined by blood levels of plasma yolk precursors) and 28% of females captured in the pre-nesting period were non-egg producers (Safine 2005). Nest survival during the 28-day incubation period was estimated at 0.25 in forest or scrub habitat and 0.03 in graminoid habitat (Safine 2005). Duckling survival to 30 days was 0.01 – 0.33 on large wetlands and 0.59 – 0.89 on small wetlands (Safine 2005). At Redberry Lake, Saskatchewan, apparent survival for adult females was estimated at 0.77 during 1975-1985 and 0.84 during 2000-2003 (Alisauskas et al. 2004) while nest success was 0.684 during 1977-1980 (Brown and Brown 1981) and 0.295 during 2000-2001 (Traylor et al. 2004). Also at Redberry Lake, production was 0.22 - 0.45 ducklings/breeding pair during 1997-1980 (Brown 1981), 0.24 - 0.27 ducklings/pair in 1984-1985 (Kehoe et al. 1989), and 0.11 ducklings/nesting female in 2000-2001 (Traylor and Alisauskas 2006). Within 6 days after hatch, 80-95% of ducklings had died and survival to 30 days was 0.0027 - 0.0065 and brood survival was 0.00048 - 0.015 (Traylor and Alisauskas 2006).

Daily and period survival rates were 1.00 for White-winged Scoters during remigial molt on the Pacific coast (SE Alaska and Salish Sea) (Uher-Koch et al. 2014).

Priority Information Needs:

1. Estimate seasonal and annual survival rates for the Pacific and Atlantic/Great Lakes wintering populations and determine important driving factors.
2. Estimate productivity and recruitment rates across the breeding range and determine important driving factors.

Population Ecology: Studies of nesting ecology have been done at only a few sites in Canada and Alaska. Data have been collected on food habits and feeding ecology in breeding and wintering areas. In the western boreal forest, lower densities of breeding scoters (all species) were observed in years following springs with shorter duration of snow cover (Drever et al. 2012). At Redberry Lake, Saskatchewan, predation by California and Ring-billed Gulls was likely the main cause of duckling mortality although the highest nest densities were found on islands where these gulls also nested (Traylor and Alisauskas 2006). Duckling survival was also strongly negatively affected by adverse weather and was correlated with duckling size and condition and brood size (Traylor and Alisauskas 2006). Lower reproductive success at this site relative to 1977-1980 may be related to depleted body reserves of nesting females, protracted incubation, delayed hatching date, reduced food availability for hens and ducklings, increased salinity levels and greater abundance of predators (Traylor et al. 2004, Alisauskas et al. 2004).

At both Redberry Lake and Yukon Flats National Wildlife Refuge, nesting females chose sites with higher overhead and lateral concealment (Traylor et al. 2004, Safine 2008). At Redberry Lake, nest survival was higher for nests with greater overhead and lateral concealment, closer to habitat edges and further from water (Traylor et al. 2004). Predation on nesting females may be a significant source of mortality in some areas; of 79 radio-marked females, 11 were killed by predators during incubation (confirmed: black bear, mink, owl; suspected: red fox, lynx and wolf) (Safine 2005).

No predation was observed during molt on radio-marked White-winged Scoters in southeast Alaska, southern British Columbia, and northern Washington (Anderson et al. 2012). However, during winter in southern British Columbia, 13.3% of radio-marked individuals were depredated/scavenged (by Bald Eagles, mustelids, and unidentified predators), suggesting that predation rates may be high enough to contribute to population declines but formal population analyses are needed to confirm this (Anderson et al. 2102). Predation by Bald Eagles is likely not frequent, but may be increasing as Bald Eagle populations have increased dramatically in recent decades and, concurrently, the abundance of other prey items such as salmon and herring has decreased (Anderson et al. 2009). Predation risk alone from Bald Eagles may be causing WWSC to change their distribution patterns during molt and wither periods.

Priority Information Needs:

1. Determine important factors (weather, predators, food, etc.) affecting survival and reproductive success (fitness) throughout its range.
2. Determine the significance of predation risk from increasing Bald Eagle numbers on WWSC distribution and habitat use patterns during molt and winter periods.

Harvest Assessment: Current surveys in the United States and Canada do not adequately estimate harvest rates. From 1999-2008, the average harvest in the United States was 8,527, of which 66% were shot in the Atlantic Flyway, and the average Canadian harvest was 1,693 (Baldassare 2014). Subsistence harvest was initially estimated at 5,000 in Alaska and 3,000 in Canada (SDJV 2007), but these estimates are uncertain. More recently, data from a variety of sources suggest that Alaska subsistence harvest was generally low (7,541 birds/year); most harvest occurred in interior Alaska (59%) and on the Yukon-Kuskokwim Delta (30%) (Rothe et al. 2015).

Priority Information Needs:

1. Determine sustainability of current harvest rates for the Pacific and Atlantic/Great Lakes wintering populations.
2. Evaluate methods and improve estimates of sport and subsistence harvest rates.

Habitat Requirements: Breeding, molting and winter habitat needs are not well documented, although the locations of many key areas have been described via satellite telemetry and surveys. Breeding sites are generally in the boreal forest and rarely on open tundra and highest nest densities have been found on lakes having islands covered with dense, low-growing shrubs (Baldassare 2014). In the Mackenzie River delta, Northwest Territories, higher densities of pairs and broods were found on wetlands with higher numbers of amphipods (although there was a negative correlation with total biomass of amphipods) and broods were more common on wetlands having higher total phosphorus concentrations and clearer water (Haszard and Clark 2007). In the Yukon Flats National Wildlife Refuge, Alaska, White-winged Scoters avoided nesting in meadows but nested in scrub or forest habitat in proportion to the availability of these habitat types; within scrub and forest, hens chose sites with more variable and abundant overhead and lateral cover, and sites close to habitat edges and water (Safine and Lindberg 2008). This suggests random use of available scrub and forest habitat, but selection of attributes at the level of the nest site; sites far from water with dense cover may increase nest survival but could negatively affect adult female survival by making it difficult to escape from mammalian predators (Safine and Lindberg 2008). Similarly, at Redberry Lake in Saskatchewan, nest sites had higher lateral and overhead concealment compared to random sites, and successful nests were more concealed than depredated nests (Traylor et al. 2004). Almost all nests were found on islands, rather than mainland areas and were mostly located under northern gooseberry bushes (Traylor et al. 2004). In the Hudson Bay Lowlands, Ontario, breeding scoters were more abundant in areas with higher densities of small wetlands (<100 ha) and they may have avoided areas of fen and forest cover (Brook et al. 2012).

White-winged Scoters winter in marine areas on both coasts and increasingly on the Great Lakes; they tend to use shallow areas with sandy or gravelly bottoms and abundant shellfish in estuaries, bays and open coastlines (Baldassare 2014). In Narragansett Bay, Rhode Island, the highest densities of scoters were found in areas with sand substrates and homogeneous assemblages of infaunal prey (Loring et al. 2013) while in British Columbia higher densities of wintering White-winged Scoters were in more sheltered sites, with shallower water and more abundant bivalves (Palm et al. 2013). Males wintering in exposed, offshore habitat had higher mass and higher lipid reserves than at other sites, possibly to buffer against reduced foraging opportunities and/or higher thermoregulatory costs (Palm et al. 2013). In coastal British Columbia, large infaunal bivalves were the main prey of males although at one offshore site, a higher proportion of fish, crustaceans, polychaetes, and echinoderms were consumed (Palm et al. 2012). In southern British Columbia, diet composition was fairly consistent through mid and late winter, with varnish clams (*Nuttalia obscurata*) being the most common species consumed. However, in northern BC, diet became more varied in late winter, presumably due to decreased availability of preferred prey (Palm et al. 2012). In Baynes Sound, British Columbia, clam density had very little effect on either clam-capture success or time spent foraging, indicating that this area was high quality winter habitat, where foraging behavior was not constrained by food availability (Lewis et al. 2008). Clam density decreased over the winter period and this was attributed to foraging by scoters (Lewis et al. 2007). In southern British Columbia, many scoters move from wintering sites to areas with herring spawn in early March (Lok et al. 2008). The length of foraging dives increased, but total time spent foraging decreased (time underwater/hour) by 50% and dive rate (number of dives/hour) decreased by 70% compared to winter foraging behavior when feeding on bivalves (Lewis et al. 2007). Females at spawn sites gained mass while those at non-spawn sites did not, indicating this may be an important late winter/early spring food source, prior to migration to breeding areas (Anderson et al. 2009). In Baynes Sound, British Columbia, density of White-winged Scoters was positively related to intertidal width and to density of varnish clams, while presence of oyster rafts (for aquaculture) may have had a negative effect (Zydelis et al. 2006). In southeast Alaska, scoters (all species combined) tended to be less common in areas of more exposed shoreline and presence was positively related to the numbers of islets in an area (Gunn 2009). A similar analysis for British Columbia using BC Coastal Waterbird Survey data is being undertaken by Ducks Unlimited Canada and the Canadian Wildlife Service (B. Harrison, DUC and K. Moore, CWS).

Priority Information Needs:

1. Determine if wintering habitat is limiting for populations in eastern and western North America.

2. Characterize wintering, breeding and molting habitats and identify key factors responsible for their selection.
3. Assess spatial and temporal variation in diets throughout the range of this species.

Parasites, Disease, and Contaminants: Little is known about prevalence or effects of parasites, disease, and contaminants. No relationship was found between apparent annual survival rate and blood levels of cadmium, selenium, lead, or mercury for females breeding at Redberry Lake, Saskatchewan (Wayland et al. 2008). However, there was a negative relationship between blood mercury level and recapture probability, suggesting that increased mercury levels may decrease breeding probability (Wayland et al. 2008). For individuals sampled in multiple years, a correlation was apparent across years in blood levels of cadmium, selenium, and lead (but not mercury); that is, individuals with high levels in one year were more likely to have high levels in subsequent years (Wayland et al. 2007). At Redberry Lake, females that wintered on the Atlantic coast had higher blood lead and selenium levels in both years and higher cadmium levels in one year than females that wintered on the Pacific coast while mercury levels varied between years but not by wintering origin (Gurney et al. 2014). There was a positive relationship between selenium level and body mass (Gurney et al. 2014). DeVink et al. (2008) found high levels of selenium in breeding White-winged Scoter females in the Northwest Territories, relative to scaup and Ring-necked Ducks, but selenium levels did not appear to be negatively correlated with body condition or breeding propensity. Devink et al (2008) also found that liver selenium levels in breeding White-winged Scoter females were positively correlated with $\delta^{15}N$ levels in claws, indicating that individuals feeding at higher trophic levels accumulated more selenium. For White-winged Scoters harvested in northern Canada, mercury levels in liver were below established toxicological levels and low relative to other species, but selenium levels were high enough to be of concern (Braune and Malone 2006). Levels of polybrominated diphenyl ethers (PBDEs), polychlorinated biphenyls (PCBs) and organochlorine pesticides (DDTs, HCHs, CBz, and cyclodienes) were measured in liver tissue of White-winged Scoters collected in Hudson Strait; detectable levels of some PBDEs, as well as PCBs, DDTs, HCHs, CDz, and cyclodienes were found, although the significance of observed levels were not discussed (Kelly et al. 2008).

Priority Information Needs:

1. Opportunistically collect blood samples from captured birds to determine contaminant levels.
2. Expand laboratory studies to determine effects of specific contaminants and exposure levels on physiological functions, reproduction and survival. Particular emphasis should be given to crude oil, heavy metals, and compounds that accumulate in invertebrate foods.
3. Assess population-level impacts of disease-, parasite-, and contaminant-induced morbidity and mortality.

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