Species Status Summary and Information Needs

Sea Duck Joint Venture, January 2018

Common Eider, Hudson Bay Race (*Somateria mollissima sedentaria*)

<u>Population Size and Trends</u>: Hudson Bay Common Eiders are resident to Hudson Bay, and it is both logistically difficult and expensive to conduct surveys for this subspecies. Data on size and trends throughout this range are required to monitor the population and establish a sustainable harvest. Surveys around the Belcher Islands, Hudson Bay detected about 255,000 birds, which was thought to cover most of the subspecies' wintering range (Gilliland et al. 2008). However, there are anecdotal reports of eiders (species and subspecies are unknown) wintering in Hudson's Straight (Gilliland and Lepage unpublished data), northeast Hudson Bay, northern Hudson Bay and Foxe Basin (Gilliland et al. 2008, Rockwell et al. 2009). Nakashima and Murray (1998) estimated that about 83,000 pairs nesting in the Belcher Islands in the 1980's. Robertson and Gilchrist (1998) repeated Nakashima and Murray's (1998) surveys in five of the island archipelagos in the Belcher Islands and detected a decline of 75% from 1985-88 to 1997. Local residents who are generally very knowledgeable about eider abundance and ecology attributed the decline to a mass die-off that had occurred during the winter of 1991-92 when extensive sea ice severely reduced the amount of open water habitat available for eiders (Robertson and Gilchrist 1998). However, the frequency and magnitude of these die-off events is unknown and population impacts are not understood (Robertson and Gilchrist 1998). No recent trend estimates are available for this species.

Priority Information Needs:

1. Monitor colonies in Hudson Bay through the establishment of a community-based colony monitoring program; repeat surveys of eider breeding colonies where historical data exist (e.g. Belcher, Sleeper, and Nastapoka Islands, and La Perouse Bay), and initiate new surveys to establish baseline data throughout the breeding range (including the Ottawa Islands and Mansel Island in western Hudson Bay, and islands near Rankin Inlet in East Hudson Bay).
2. Periodically conduct a winter aerial survey (at least every 5 years) in the area of the Belcher and Sleeper Islands where eiders are known to overwinter; conduct at least an exploratory survey up to the Ottawa Islands to figure out if eiders overwinter there and should be regularly covered.

<u>Population Definition and Delineation</u>: The zone of contact between the breeding ranges of the Hudson Bay Common Eider and Northern Common Eider occurs in northern Hudson Bay. Common Eiders breeding around Hudson Strait westward to Southampton Island are thought to be Northern Eiders, with Hudson Bay Eiders breeding from the Ottawa Islands and south (Abraham and Finney 1986). Within Hudson Bay, the links between nesting areas and wintering areas (where harvest levels vary) are poorly known. Female Common Eiders were structurally smaller and laid smaller eggs in western Hudson Bay than in eastern Hudson Bay; body size and egg size are likely to be highly heritable so this regional difference may indicate genetic differentiation within the subspecies (Robertson et al. 2001). Genetic differentiation within

Hudson Bay could be caused by female natal philopatry and/or limited male dispersal due to restricted wintering habitat availability (Robertson et al. 2001). Most wintering habitat (i.e., open water) is found in southeastern Hudson Bay and it is assumed that the eiders wintering in this region breed in eastern Hudson Bay while Common Eiders breeding in western Hudson Bay likely winter off the landfast ice edge on the west coast or in a large polynya in Roes Welcome Sound (Robertson et al. 2001). Thus, eastern and western breeders may be separated from each other during winter, which is when pair bonding usually occurs (Robertson et al. 2001). Smaller body and egg sizes in western Hudson Bay could also be an indication of interbreeding with Northern Eider in this area (Robertson et al. 2001). Greater understanding of eider movements within Hudson Bay is required to assess population size and trends, and the effects of harvest and other factors on population dynamics within Hudson Bay.

Priority Information Needs:

1. Use satellite telemetry and banding to determine affiliations between breeding, molting, and wintering areas and identify wintering areas and molting sites.

Population Dynamics: Very little information exists on annual productivity, survival, and recruitment of the Hudson Bay Common Eider. Some information is available for La Perouse, but there is a need to concurrently measure these parameters at other breeding sites (e.g. Belcher Islands, Ottawa Islands).

1. Initiate a study of survival, productivity, and recruitment at a major nesting area in Hudson Bay where, (a) a study would be logistically feasible, (b) some baseline data already exist, and (c) where significant proportions of the Hudson Bay Common Eiders nest.

Population Ecology: Recent studies of reproductive success have been completed in the La Perouse Bay area, but similar information is lacking for eastern Hudson Bay and little is known about the factors that influence adult survival and reproductive success of Hudson Bay Common Eiders. At La Perouse Bay, nest success has varied widely among years, but declined overall during 1972-2011 (Iles et al. 2013). During 1991-1993, eiders preferentially nested on islands with incubating Lesser Snow Geese (*Chen caerulescens caerulescens*) and on these islands, eiders experienced less egg predation and higher hatching success, likely due to defensive behavior by Snow Geese (Robertson 1995a). However, the long-term decline in eider nest success has been attributed to the concurrent increase in Snow Goose abundance, with speculation that the presence of abundant Snow Goose eggs and goslings facilitated increased abundance of predators such as Arctic Foxes and Herring Gulls, which also take eider eggs and ducklings (Iles et al. 2013). However, the local breeding population of Herring Gulls appears to have increased dramatically since the early 1970s and they are now a major nest predator as well (Iles et al. 2013). The La Perouse Bay breeding population has also experienced intermittent catastrophic reproductive failure due to predation by other species (Rockwell et al. 2009). During a single decade, there were three separate years with almost no duckling production, due to predation by Arctic Foxes, sub-adult Bald Eagles, and a single sub-adult Polar Bear (Rockwell et al. 2009).

Abiotic factors were also found to influence nest success, with higher nest survival occurring when early spring conditions were warm and wet; both cold and wet or warm and dry springs coincided with lower nest survival (Iles et al. 2013). Hatching success was higher on islands farther from shore and in deeper water because of reduced accessibility to Arctic Foxes (Robertson 1995a). Foxes were able to reach more islands if cool spring weather allowed the persistence of ice bridges and also when low snow accumulation led to low water levels in the river (Robertson 1995a). As well, eiders laid smaller clutches in a year with late nest initiation and laid smaller eggs in cold years (Robertson 1995b). Early nest attendance by incubating female eiders may increase clutch survival significantly, but at the expense of clutch size and/or female survival (Andersson and Waldeck 2006). Conspecific brood parasitism is common, and 'parasites' are more likely to lay eggs in nests of related females; a lack of correlation between relatedness and inter-nest distance indicates this is not an indirect effect of natal philopatry but rather a more active form of kin association (Andersson and Waldeck 2007).

Clutch sizes of Hudson Bay Common Eiders averaged between 4 and 4.5 eggs/clutch, about the same as American Common Eiders, but larger than average clutch size for Northern Common Eiders (Robertson et al. 2001). Nesting chronology in the Belcher Islands is similar to populations of Northern Eider breeding > 1000 km further north (Robertson and Gilchrist 1998).

Polynyas are important wintering habitat but many eiders also use the floe edge between the Belcher and Sleeper islands (Mallory et al. 2006). Eiders in polynyas are unable to feed for several hours each day because of strong tidal currents which prevent them from diving to the seafloor, so daily movements to other open water areas allow increased foraging opportunities (Mallory et al. 2006). The availability of open water habitat in winter is probably a very important factor for long-term population trends in this subspecies (Mallory et al. 2010). In winters with heavy ice cover, eiders seek refuge in polynyas, where access to benthic food resources may be constrained by competition, strong tidal currents, availability of daylight and physiological requirements for prey digestion and rest (Mallory et al. 2010, Heath et al. 2010). Such conditions can lead to mass starvation and mortality, which may reduce population size dramatically and also change demographic structure by removing entire cohorts from the population (Mallory et al. 2010).

Priority Information Needs:

1. Study factors affecting winter survival in the Belcher Islands. These include predation, weather, ice conditions, contaminants, parasitology, diet, and body condition.
2. Initiate a study to examine the reproductive ecology and survival of eiders at a site where, (a) a study would be logistically feasible, (b) some baseline data already exist, and (c) where significant proportions of the Hudson Bay Common Eiders nest.

Habitat Requirements: During nesting, molting, brood rearing, and at over-wintering sites, Hudson Bay Common Eiders are vulnerable to disturbance and potentially, food shortages. In the La Perouse Bay region, eiders nested under vegetation of medium height, mainly on small islands or on promontories near the shore of larger islands or mainland areas (Schmutz et al. 1983). In a survey of archipelagos within the Belcher Islands, islands without nesting eiders tended to be either close to the mainland, small, shallow and devoid of vegetation or very large (> 100 ha) (Robertson and Gilchrist 1998). In southeastern Hudson Bay, wintering habitat is restricted to areas of open water at polynyas and in leads among pack ice; if these areas freeze over, movement to other locations may not be possible (Robertson and Gilchrist 1998). Differential use of wintering habitat by age-classes has been documented with adults moving between polynyas (used mainly for roosting) and open-water leads in the pack ice (for foraging) while juveniles are more likely to remain in polynyas throughout the winter (Gilchrist et al. 2005). Through consultation with Inuit in Sanikiluaq and surveys, some of the most important polynyas for wintering eiders have been identified (Gilchrist et al. 2005). Large concentrations of eiders may exist for several weeks at a single location, and these sites must be identified with the long-term view of formal marine habitat protection under the Oceans Act and the revised Canadian Wildlife Act.

Priority Information Needs:

1. Identify key molting, brood-rearing, and wintering areas in Hudson Bay. Quantify the key environmental and habitat factors that influence habitat selection, and annual variation in habitat use.
2. Identify key nesting areas in Hudson Bay. Quantify key environmental and habitat factors that influence nest site selection, colony size, and annual variation in habitat use (e.g. island size, proximity to a mainland, and frequency of Polar Bear predation).

Harvest Assessment: The Hudson Bay Common Eider is harvested in Québec and the Belcher Islands, and a fairly intense harvest of eiderdown occurs in the Belcher Islands. Sport harvest is virtually non-existent. Harvest management differs from most sea ducks, as this subspecies remains in Hudson Bay throughout the annual cycle and thus can be managed at a relatively local level (Rothe et al. 2015). Harvest on the Belcher Islands is significant but likely sustainable, unless other factors cause increased mortality (Rothe et al. 2015). Harvest in the Belcher Islands was estimated at 6,000 birds in 1982 (Reed 1986) while more recent estimates indicate a total subsistence harvest of 3,000 (SDJV 2007). In the Belcher Islands, harvest occurs throughout the year, but is highest in the fall (Gilchrist et al. 2005). Egg collection is also important in the Belcher Islands; harvest of duck eggs during 1973-1980 were estimated at ~13,500 annually (Reed 1986). Eiderdown harvesters in the Belcher Islands self-impose harvest restrictions in years following heavy ice conditions and eider die-offs (Mallory et al. 2006). Since Hudson Bay Common Eiders occasionally experience mass die-offs during winter, the influence of such stochastic events should be taken into consideration when assessing the impact of harvest. Furthermore, changing habitat may be causing shifts in wintering distribution of eiders within Hudson Bay, which could lead to population-level changes in harvest rates (Mallory et al. 2010).

Priority Information Needs:

1. Periodically estimate the subsistence and sport harvests of birds and eggs throughout Hudson’s Bay.

2. Develop techniques to classify sub-specific composition of the harvest (e.g. expand on work by Sonsthagenand Dwyer 2017.). Current methodology requires the bird’s head to determine subspecies, and the key cannot discriminate between *S. m. sedenteria* and *dresseri* (Mendel 1980).

3. Assess sources and degree of bias in harvest reporting from each area, and establish correction factors to refine harvest estimates.

4. Assess crippling loss of eiders under various harvest scenarios (e.g. shot over pack ice, solid ice, from shore over open water, from boats etc.). Given their large size, fast flight, and often dense flocks, crippling loss is likely an important parameter in harvest assessment.
5. Implement a monitoring program to document levels of eiderdown harvest; inform harvesters of the existing guidelines for sustainable down harvesting (Bédard et al. 2008). The participation and input of local residents should be sought.

Parasites, Disease, and Contaminants: There are few data on the levels of contaminants, parasites and disease in the Hudson Bay Common Eider. Recent collections have been made in the Belcher Islands in collaboration with Inuit hunters (J. Provencher, Carleton University, pers. comm.). Eiders collected in Sanikiluaq, Belcher Islands had higher significantly higher concentrations of persistent organic pollutants (POPs) such as DDT, chlordane-related compounds, dieldrin, mirex and hexachlorocyclohexanes than eiders collected at more northern locations (Mallory et al. 2004). Although concentrations were elevated, they were still generally lower than levels associated with negative health impacts (Mallory et al. 2004). Conversely, mercury concentration in breast muscle of eiders collected in the Belcher Islands was just over 0.5 µg/g dry weight, lower than for samples collected from Common Eiders further north (Cape Dorset, Coral Harbour, and East Bay Island) (Gilchrist and Provencher 2014). Another study reported levels of hydroxylated and methoxylated polybrominated diphenyl ethers, as well as PCBs and organochlorine pesticides in Hudson Bay Common Eiders (Kelly et al. 2008).

There have been no reports of avian cholera outbreaks in Hudson Bay Common Eiders, but this disease has occurred amongst Northern Eiders breeding in Ungava Bay, Ungava Peninsula and Southampton Island (Iverson 2015), including along the zone of contact between Hudson's Bay and Northern Eiders in northern Hudson Bay.

Priority Information Needs:

1. Compare levels of contaminants in recently collected Hudson Bay Common Eiders to museum specimens to determine if levels have increased over the past century.
2. Compare levels of contaminants found in Hudson Bay Common Eiders to other North American and Circumpolar eider duck populations. A recent pan-Arctic comparison suggests that the Hudson Bay Common Eiders carry lower levels of trace metal concentrations (e.g. cadmium) than other northern eider populations. The effect of these levels on reproduction and survival are not known and require further study.
3. Compare parasite loads (i.e. parasite species and numbers) found within Hudson Bay Common Eiders across the population, during different times of year, with other circumpolar Common Eiders in the Arctic, and with other sea duck species. Such a comparison would provide insights into whether Hudson Bay Common Eiders are heavily parasitized. Preliminary studies indicate that nesting hens are heavily parasitized, and that parasite levels vary considerably between individuals nesting within a colony. The effect of these levels on reproduction and survival are not known, and require further study.
4. Implement a disease detection program linked with community-based colony monitoring program (outlined in the Population Size and Trends section above).

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