Sea Duck Joint Venture

Species Status Reports

Continental Technical Team

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Introduction:

Sea ducks are the least understood group of waterfowl in North America. At the time of the signing of the North American Waterfowl Management Plan in 1986, most sea duck populations were thought to be at least stable and no special considerations were given to sea ducks. Since that time, the eastern population of Harlequin duck has been listed as endangered in Canada and Spectacled eiders and the Alaskan breeding population of Steller's Eider have been listed as threatened in the United States.

Increasing concerns over perceived population declines led the Atlantic Flyway Council to request a sea duck joint venture in the mid 1990's. New information gathered with Exxon Valdez funding in Alaska heightened concern for sea ducks on the Pacific coast. On behalf of the Canadian Wildlife Service, the US Fish and Wildlife Service and the US Geological Survey, a concept paper for a sea duck joint venture was drafted in November 1997. The existing data indicated declines in 10 of the 15 species of *Mergini* commonly known as sea ducks. Based on the presentation of that paper, the North American Plan Committee approved the formation of the Sea Duck Joint Venture in November 1998.

Because the paucity of information is the main limiting factor to the conservation of sea ducks, the compilation of objective status and trend data for each species or population and the identification of critical information gaps became the first tasks of the SDJV. This document summarizes the most basic management information available in a series of species status reports that are intended to be starting points for the SDJV science program. For the purposes of the Sea Duck Joint Venture the status reports concentrate on the level of knowledge as of the year 2000 for the following aspects of North American sea ducks:

Population Delineation
Distribution
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Nineteen status reports have been produced to cover the 15 species of the Tribe *Mergini* which breed in North America. A report on the Hooded Merganser is currently in preparation. The Common Eider has long been recognized to include 4 distinct races (Pacific, Hudson Bay, Northern and Southern) and both the Barrow's Goldeneye and Harlequin Duck appear to have distinct eastern and western populations. Other species of sea ducks, notably Long-tailed Ducks and Scoters may very well have distinct populations but too little is presently known to delineate separate population units.

March 21, 2003

Common Eider - Pacific Race

(Somateria mollissima v- nigra)

Population Delineation:

The Pacific Common Eider is one of six genetically distinct subspecies.

Distribution

Breeding Range

The Pacific race breeds from Victoria Island and Kent Peninsula, Northwest Territories, Canada, west along the Beaufort Sea and Chukchi Sea coasts of Alaska and Siberia to Cape Vankarem and Chaun Bay and south along the Bering Sea coast to the Alaska Peninsula, Aleutian, Commander and Kuril Islands and the Kodiak Archipelago. Extralimital breeding of the Pacific Eider extends to Ayan on the Sea of Okhotsk and Sitka and Glacier Bay in southeast Alaska (Palmer 1976, Bellrose 1980).

Migration Routes

The presence or absence of open water appears to be one of the most important factors regulating spring migratory movements of Pacific Eiders (Schamel 1974). Migrants leave the Bering Sea in late March or April. Their route to breeding areas follows the ice edge or shore leads, but many migrate farther offshore. Eiders frequently fly low across points of land that project into the sea. One of the best-known passes is at Point Barrow, Alaska (Suydam et al. 1997). The peak of spring migration at Point Barrow is about 7 June for Pacific Eiders. There is a continual westward movement of eiders from breeding areas in the western Canadian Arctic from early July until November that follows the same general paths as spring migration.

Staging areas

Not well documented. Up to 22,000 Pacific Eiders have been counted in the nearshore waters of Bristol Bay, Alaska, during spring migration surveys. Minor staging areas include areas offshore of the Platinum/Goodnews Bay area, the southern portion of Etolin Strait, the south side of Nunivak Island, and the Hazen Bay/Hooper Bay area.

Molting Areas

Pacific Eiders in the arctic are known to make extensive molt migrations, presumably to western Alaska or the Bering or Chukchi Seas, although specific molting areas are not well known (Johnson and Herter 1989, Barry 1986).

Wintering Grounds

Pacific Eiders may overwinter in the Arctic Ocean but most are believed to winter from the Bering Sea pack ice south to the Aleutian Islands (Byrd 1992), the Kodiak Archipelago (Larned and Zwiefelhofer 1995), Cook Inlet in Alaska (Gabrielson and Lincoln 1959), and in Russia south to the Kuril Islands (Gizenko 1955, Kistchinski 1973). South of Kodiak Island, Pacific Eiders are seen infrequently. Pacific Eiders are inadequately monitored throughout their range.

Abundance

Breeding Grounds
The majority of Pacific Eiders probably nest in Western Canada, mostly in Amundsen Gulf, Dolphin and Union Strait, Coronation Gulf, and Queen Maud Gulf. A crude estimate of the size of the Canadian breeding population, calculated as the number passing Point Barrow in spring minus the estimated breeding population of the Alaska Beaufort Sea, is 68,000 Pacific Eiders. The most recent spring survey, in 1994, estimated that about 71,000 Pacific Eiders passed Point Barrow, and occasional ground surveys since 1980 suggest that up to 3,000 Pacific Eiders nest on Alaska's Beaufort Sea barrier islands (Johnson and Herter 1989). An aerial survey of islands and lagoons along the Arctic Coastal Plain and barrier islands in the Alaska Beaufort Sea coast was conducted during summer 1999 and generally corresponded with ground surveys over the past 2 decades.

An estimated 16,000 - 24,000 Pacific Eiders were estimated breeding on the west coast of Alaska north of the Yukon Delta in 1992 and 1993 (Larned et al. 1992). Most of these were on the Seward Peninsula. The nesting population on the Yukon-Kuskokwim Delta has been estimated by ground plot searches since 1986 and by aerial survey since 1988. About 5, 000 Pacific Eiders have nested there in recent years and an estimated 10,000 - 15,000 in the Aleutian Islands. The Saint Lawrence Island breeding population has been estimated at about 3,500 birds (Fay 1961) while approximately 200 nest in the Kodiak Archipelago (D. Zwiefelhofer, pers. comm.). A minimum of 22,000 Pacific Eiders inhabited the Arctic coast of Eastern Russia in 1993 (W. Eldridge, pers. comm.), although this estimate was not adjusted for visibility bias and the true figure may be 3-4 times greater.

Staging Areas
No Data

Molting Areas
Large flocks reportedly molt in northwest Alaska in the vicinity of Point Lay, Icy Cape, and Cape Lisburne (Johnson and Herter 1989), but numbers are unknown.

Wintering Grounds
No comprehensive surveys or estimates of wintering populations have been made.

Population Trends

Lack of comprehensive nesting surveys and standardized survey methods along the Arctic coast and in Canada hinders the interpretation of regional population trend data.

Birds that summer east of Barrow, Alaska have been monitored sporadically through spring and fall migration watches at Point Barrow. Spring counts suggest that numbers of Pacific Eiders nesting in northern Alaska and the western Canadian arctic may have declined by 56% from 156,100 in 1976 to 72,600 birds in 1996 (Suydam et al. 2000), although the counts may be subject to certain biases (Suydam et al. 1997) and should be viewed with caution.

The Pacific Eider has declined severely as a breeding species in western Alaska since the late 1950s (Hodges et al. 1996) and probably in the Russian Far East since the early 1970s (Goudie et al. 1994). Eiders counted on the continental waterfowl breeding survey, primarily Spectacled Eiders and Pacific Eiders, have exhibited a sharp decline as a group in western Alaska with

numbers falling over 90% on the Yukon-Kuskokwim Delta (Stehn et al. 1993, Hodges et al. 1996). King and Lensink (1971) proposed a possible summer population of 75,000 Pacific Eiders in Alaska based on averages from the continental survey, 1957-70, with an estimated 51,000 on the principal breeding ground on the coast of the Yukon-Kuskokwim Delta. An estimated 5,000 breeding Pacific Eider were present on the Yukon-Kuskokwim Delta in 1996-99 (Bowman et al. 1999) suggesting a dramatic overall decline may have occurred over the past two decades. Data from nest surveys and aerial breeding bird surveys since 1986 and 1988, respectively, indicate a stable or slightly increasing Pacific Eider population on the Yukon-Kuskokwim Delta.

Pacific Eiders nesting throughout the Aleutian Islands declined as a result of the introduction of foxes but their numbers later recovered on some islands with the removal of foxes (Byrd 1992, Bailey 1993). Although an uncommon breeder along the Alaska Peninsula, Pacific Eiders may have declined sharply there (Gill et al. 1981).

Pacific Eiders are a locally important subsistence species for Native peoples in Alaska and Canada. An estimated 2,475 Pacific Eiders are taken in northwestern Canada and in northern and western Alaska annually, including both subsistence and sport harvest (Fabijan et al. 1997). Most harvested birds are adults taken during spring and molt/fall migrations (Paige and Wolfe 1997). Sport harvest of Beaufort Sea eiders is minimal because eiders inhabit remote areas largely inaccessible to sport hunters (R. Suydam, pers. comm.).

Because of the species' propensity to nest colonially in the Beaufort Sea, Pacific Eider eggs are more susceptible to subsistence egging than those of other eider species, but no data exist on the magnitude of take (R. Suydam, pers. comm.). An average of 410 Pacific Eiders were reported taken annually on the Yukon-Kuskokwim Delta from 1987-97.

Management and Conservation Concerns

Eiders are particularly vulnerable to oil spills because they congregate in large, dense, flocks during winter, molting, and migration. High concentrations of nesting Pacific Eiders on several islands in the Beaufort Sea may be particularly vulnerable to impacts from offshore oil development, which is increasing in the area. Johnson et al. (1987) found that Pacific Eiders nesting on Thetis Island in the Beaufort Sea were tolerant of industrial activity, mainly helicopter overflights.

There is circumstantial evidence suggesting an inverse relationship between Pacific Eider and sea otter abundance in the Aleutians. Periodic surveys over the past 20 years indicated that Pacific Eiders have decreased where sea otters increased, and vice versa (D. Irons, pers. comm.); sea otters are currently declining. The mechanism for this relationship is unclear, but may involve competition for invertebrate food.

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Common Eider Duck – Hudson Bay Race

(Somateria mollissima sedentaria)

Population Delineation

The Hudson Bay Eider spends its entire annual cycle in Hudson Bay. This race of Common Eider is characterized by its bill morphology and large body size when compared to the Northern Common Eider, *S. m. borealis* (Mendall 1986). *S. m. sedentaria* overlaps breeding range with *S. m. borealis* on Southampton Island (a more northerly range than previously reported; Abraham and Finney 1986), and limited inter-breeding occurs there (Gilchrist *unpub*.).

Distribution

Breeding Range

The Hudson Bay race of Common Eider breeds on the east and west coasts of Hudson and James Bay, and on the Belcher, Sleeper, and Ottawa Islands. The majority of the population is thought to breed in eastern Hudson Bay (Nakashima and Murray 1988). Small numbers also breed on Coats, Southampton, and Mansel Islands in northern Hudson Bay (Gilchrist, *unpub*.). Recent surveys (1999) of eiders nesting in Digges Sound at the northeastern tip of Quebec, and along the south coast of Baffin Island were found to be of the Northern Race (Hipfner et al. *submitted*, Gilchrist *unpub*.). These findings suggest that *S. m. sedentaria* eiders occur farther north along the west coast of Hudson Bay than they do along the east coast.

Migration Routes

Very little known. However, recent reviews of banding (Gilchrist et al., *in prep*.) and morphological data (Robertson et al. *submitted*) suggest that populations along the east and west coats of Hudson Bay may be geographically distinct. No birds banded in west Hudson Bay have ever been recovered in eastern Hudson Bay, despite the fact that significant hunting takes place there. Along the Québec coastline eiders are seen moving southward in fall and northwards in spring (Nakashima and Murray 1988).

Spring and Fall Staging Areas

In spring, *S. m. sedentaria* eiders stage near colonies in late May and first visit colonies in early June. Timing of colony attendance is often determined by when ice bridges break up between nesting islands and mainland coasts, preventing Arctic Foxes from visiting colonies. Nothing is known about fall staging.

Molting Areas

For eiders nesting in the Belcher Islands, local molting and brood-rearing areas have been identified through consultations with local Inuit and through limited boat-based surveys (Nakashima and Murray 1988). Molting areas in other parts of the breeding range have yet to be discovered. Large flocks of eiders seen near Fox Island 35 km east of Churchill in late July and August are likely to be molting males (Cooke et al. 1975, G. Robertson *pers. com.*)

Winter Range

Large concentrations are known to over-winter in the Belcher Islands (Freeman 1970, Gilchrist and Robertson 2000). Other winter concentrations likely exist, but their size and location remain

unknown. Given the obvious requirement for consistent areas of open water, possible wintering sites for Hudson Bay Eiders include the Nastapoka Islands, the Roes Welcome Sound polynya west of Southampton Island, and possibly coastal leads between the communities of Whale Cove and Arviat, Nunavut (F. Cooke and G. Robertson, *pers. com*.)

Abundance

Breeding Grounds

The entire Hudson Bay population was crudely estimated to be in the order of 45 000 birds in 1986 (Reed and Erskine 1986). A revised estimate by Nakashima and Murray (1988) placed the number of eiders at 83 000 birds in eastern Hudson Bay alone.

Staging Areas

Nothing known.

Molting Areas

Nothing known.

Wintering Grounds

Nothing known.

Population Trends

Little information. Extensive surveys of breeding colonies (>400 islands in 5 regions) in the Belcher Islands archipelago in 1997 (a key breeding area), indicate that the resident breeding population had declined by 75% since the late 1980s (Robertson and Gilchrist 1998). Historical data exists for colonies in the Nastapoka Islands along the west coast of Quebec, but repeat surveys have not been initiated there. The number of Common Eiders nesting at river estuaries along the Hudson Bay coast of Manitoba has remained stable since the 1980s (G. Robertson, pers. com.)

Harvest

Hudson Bay eiders are harvested throughout their range during the breeding season; particularly during winter in the Belcher Islands when they are concentrated at polynyas. The annual harvest of eiders by residents in the Belcher Islands alone, was estimated to be 6000 birds in 1986 (Reed 1986). Egging and down collection occurs throughout the range during the breeding season, but to an unknown extent. Harvest data from Inuit communities in the Belcher Islands and along the west coast of Hudson Bay are now being collected monthly as part of the Nunavut Wildlife Harvest Study. The data are urgently needed, and are forthcoming. However, Harvest Study data should be interpreted cautiously and viewed as a 'harvest index' rather than an absolute measure of the number of birds killed annually.

Management and Conservation Concerns

Despite the fact that aboriginal subsistence hunters harvest this eider population (adults, egging, and down collection) throughout the year (Wein et al. 1996), there is little information regarding population trends and harvest levels. Harvest and population surveys have recently been initiated in selected areas to address this lack. There are also concerns that polynyas that occur near the

Belcher Islands (a key wintering area for eiders), are now freezing in winter. This apparently resulted in mass die-offs of common eiders in the winter of 1991 (Robertson and Gilchrist 1998). The frequency and magnitude of these die-offs, and their impact on the Hudson Bay eider population, is unknown (Gilchrist and Robertson 2000). Ecological studies examining the winter ecology and habitat use of polynyas in the Belcher Islands have been initiated. Repeat surveys and banding in other parts of the breeding range in Hudson Bay are urgently needed to assess whether declines detected in the Belcher Islands have occurred elsewhere across the breeding range (e.g. Nastapoka Islands along the west coast of Quebec).

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Common Eider Duck – Northern Race

(Somateria mollissima borealis)

Population Delineation

The northern eider is a migratory subspecies of Common Eider found in the eastern Canadian Arctic, Labrador and Greenland (Abraham and Finney 1986). The northwestern boundary of its range has not been accurately delimited. The area from Queen Maud Gulf north through eastern Victoria Island to eastern Melville Island is generally regarded as the transition zone between *borealis* and *v-nigra*. In northern Hudson Bay, it overlaps with the Hudson Bay sub-species of Common Eider, *S. m. sedentaria*. Limited inter-breeding of *S. m. borealis* and *S. m. sedentaria* occurs at a colony on Southampton Island (Gilchrist, *unpub*.). During breeding, it overlaps with *S. m. dresseri* at approximately 54°N latitude along the Labrador coast (Mendell 1980).

Distribution

Breeding Range

This subspecies typically breeds on small islands in the Arctic Archipelago of the eastern Canadian Arctic, with the majority of the population nesting along coasts of Hudson Strait and southeast Baffin Island (Abraham and Finney 1986). Key breeding areas include northern Labrador (north of 54 °N latitude), Ungava Bay, southern Baffin Island, Frobisher Bay and Cumberland Sound in southeast Baffin Island, Southampton Island, the western part of Foxe Basin, and a few high Arctic islands in Jones Sound located between Devon and Ellesmere Islands. All high Arctic colonies are located near permanent areas of open water.

Migration Routes

The migration for *borealis* is not well documented and the molting areas are poorly known. Large movements of eiders, likely birds that winter along the north coast of the Gulf of St. Lawrence, move north along the south coast of Labrador (62 000 birds; Gilliland, *unpbl. data*), and arrive in Hudson Strait (MacLaren Marix, *unpbl. rept.*) and Ungava (Nakashima 1986) during the first half of May. There is little information on migration for the portion of the population that over-winters in southwestern Greenland, but it must take place in early May. Male eiders leave the breeding grounds for molting areas soon after breeding (McKinney 1961, Milne 1963). The timing and migratory routes used by *borealis* between the breeding, molting and wintering areas have not been documented.

Spring and Fall Staging Areas

Little information. Large numbers of eiders move along the coast of Labrador in spring (above) and accumulate in Hudson Strait and Ungava Bay prior to breeding (MacLaren Marix, *unpbl. rept.,* Nakashima 1986); no information exists for the Frobisher Bay or Cumberland Sound, but they have ice-free areas during the winter and are likely important spring staging areas. No information on fall staging areas.

Molting Areas

The molt migration for *borealis* is not well documented and the molting areas are poorly known. Salomonsen (1968) and Palmer (1976) thought that the majority of Canadian breeding *borealis*

migrated to southwestern Greenland to molt; however, reports from Inuit hunters establish certain regions of Ungava Bay as molting areas (Nakashima 1986). Recent observations of large rafts of male molting Common Eiders along the south coast of the Meta Incognita Peninsula of Baffin Island in 1999 (D. Kay, *pers. com*.) provide further evidence that historical observations of eiders along the south coast of Baffin Island (Soper 1946, MacPherson and McLaren 1959) and southeastern Baffin Island (MacLaren Atlantic *unpb. rept*., MacLaren Marix, *unpbl. rept*.) may represent important molting areas for this subspecies. Little is known about molting locations of females, although many must molt near their nesting areas.

Winter Range

In Canada, *S. m. borealis* winters as far north as open water persists in Newfoundland, south to the north shore and Gulf of St. Lawrence, the Maritime Provinces of Canada, and part of Maine (Palmer 1976). This distribution was confirmed by a recent review of band recovery data (Gilchrist *et al*., *in prep*.). In Greenland, Common Eiders winter along coasts and inland fiords from Disco Bay south (i.e. from the northern margin of open water south; F. Merkel, *pers. com*.). Many of the eiders that winter in Greenland breed in Canada. Two thirds of the recoveries of eider ducks banded on Southampton Island, Canada, since 1996 occurred in Greenland (Gilchrist *et al*., *in prep*.). This indicates that significant proportions of eiders breeding at even low Arctic sites in Canada winter in Greenland.

Abundance

Breeding Grounds

In Canada, estimates of *S. m. borealis* populations breeding in the Canadian Arctic include 100 000 birds in Ungava Bay, 50 000 birds along the south coast of Baffin Island, 20 000 birds along the Labrador coast, and 2000 birds on islands in Jones Sound (Abraham and Finney 1986). These figures must be underestimates (Abraham and Finney 1986). Extensive areas of potentially suitable habitat in Frobisher Bay, Cumberland Sound, Foxe Basin, and islands in the high Arctic have never been surveyed. Thus, the estimate of approximately 200 000 breeding *S. m. borealis* eiders in Canada needs to be revised (Abraham and Finney 1986), particularly given recent findings of winter surveys in Greenland (see below). Recent colony surveys in north and west Greenland suggest that only 40 000 birds nest in Greenland (F. Merkel, *pers. com.*); this is several orders of magnitude less than historical populations.

Staging Areas

Nothing known.

Molting Areas

Nothing known.

Wintering Grounds

Surveys indicate that 50-80 000 eiders winter in Newfoundland (Gilliland, pers. com.) and about 100 000 eiders winter along the north shore and Gulf of St. Lawrence, Québec. Data on birds collected from hunters suggest that 65% (Gilliland unpbl. data) of the eiders wintering in Newfoundland and greater than 50% of the eiders wintering along the north shore and Gulf of St. Lawrence (Reed et al. 1986) are *S. m. borealis*; few of the eiders that winter in the Maritimes (R. Milton and P. Hicklin, *pers. comm*) and the New England States are *S. m. borealis* (Krohn *et al.* 1992). In Greenland, recent surveys of wintering eider populations conducted by the Greenland Institute of Nature estimate approximately 400 000-500 000 *S. m. borealis* eiders. Given that the Greenland breeding population is estimated to be only 40 000 birds, large numbers of eiders that

breed in Canada *must* over-winter in southwest Greenland (confirming the earlier views of Salomonsen 1968).

Population Trends

Little information. In Canada, key breeding areas in the Arctic that were surveyed in the mid 1980's (e.g. Ungava Bay, Chapdelaine *et al.* 1986) have not been re-surveyed, so population trend data do not exist. Other important breeding areas in the Arctic have *never* been surveyed. Recent repeated surveys of six small *S. m. borealis* colonies in Digges Sound (north eastern Quebec) found that the regional breeding population had increased since the early 1980s. Interpretation of these findings is problematic because these colonies occur near an aboriginal settlement. The increases detected may simply reflect changes in local harvest practices, rather than population increases of *S. m. borealis* on a broad geographical scale (Hipfner *et al. submitted*). Many *S. m. borealis* colonies along the west coast of Greenland have been completely extirpated in recent decades. The entire Greenland breeding population is now estimated to be only 40 000 birds (Boertman and Mosbech *pers. com*.; F. Merkel, *pers. com*.).

Harvest

Little information. This eider population is harvested during the breeding season by aboriginal subsistence hunters who take adults, eggs and down, and in winter in Greenland and Newfoundland. In the early 1980s, approximately 14 000 birds were taken annually by aboriginal hunters in the eastern Canadian Arctic (Reed and Erskine 1986). The mean annual harvest in eastern Canada was estimated to be 9154 birds in Labrador and Newfoundland (NHS 1989-98, *unpbl. data*); however, there are serious biases in the estimation of kill of sea ducks by the NHS (Wendt and Silieff 1986). Recent special sea duck harvest surveys in Newfoundland and Labrador place the annual harvest of eiders at about 24 000 birds (Collins and Lévesque, *unpbl. rept*). The greatest harvest of northern common eiders likely occurs in southwest Greenland where eiders over-winter near communities. In 1996 alone, at least 100 000 common eiders were taken in southwest Greenland as part of market and subsistence hunts (Greenland Department of Fisheries and Hunting, *unpbl. data*). It is unknown whether these harvest levels are sustainable. Egging and down collection also occurs throughout the range during the breeding season, particularly in Frobisher Bay and Hudson Strait, Canada (Cooch 1965, Gilchrist, *pers. obs*.)

Management and Conservation Concerns

Northern eiders are subjected to heavy subsistence and sport harvest throughout their breeding, staging and wintering areas (Wendt and Silief 1986, Christensen 1999), and are vulnerable to catastrophic events during molt, winter and migration (e.g., oil spills). In addition, climate change models predict that the eastern Arctic ecosystems in which these populations reside may be heavily impacted by global warming. Currently, reliable data on northern eider population status do not exist. The primary threats to the *S. m .borealis* subspecies include, 1) over-harvest particularly in Greenland and Newfoundland, 2) disturbance to eiders at breeding colonies due to down harvest (Cooch 1965), 3) bio-accumulation of contaminants from their environment (Wayland *et al. submitted*) and 4) possible displacement from foraging areas in winter by developing mussel-culture industry in Newfoundland (Burnett *et al. unpb. rept*.)

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Common Eider – Southern Race

(Somateria mollissima dresseri)

Population Delineation

The southern race of the Common Eider extends occurs from southern Labrador to Massachusetts (Mendall 1980, Chapdelaine et al 1986, Lock 1986, Goudie 1988, Corr et al 1989, Krohn et al 1992). Intergrades of *S. m . dresseri* with *S. m. borealis* to the north occurs from about 53^{o} N to 55^{o} 30' N latitude with the highest prevalence centered on Groswater Bay at approximately 54^{o} N latitude (Mendall 1980).

Distribution

Breeding Range

The Southern race breeds from southern Labrador (Mendall 1980, Lock 1986) south through Newfoundland (Goudie 1986) and along the Quebec North Shore and St. Lawrence estuary (Chapdelaine et al 1986). Colonies also occur along the Atlantic and Bay of Fundy coasts of Nova Scotia (Erskine and Smith 1986, Lock 1986, Austin-Smith et al 1987, 1991, Milton unpublished data), Fundy coast of New Brunswick (Erskine and Smith 1986, Lock 1986, Mawhinney et al 1999) and coast of Maine (Mendall 1968, Corr et al 1989, Krohn et al 1992). Small but increasing numbers are breeding in Massachusetts (Corr et al 1989, Heusmann pers. comm) having been introduced in the mid- 1970s (Stanton 1977, 1989)

Migration Routes

The migration for *S. m.dresseri* is not well documented and likely overlaps with *S. m. borealis* or Northern Common Eider, which co-winter along the north coast of the Gulf of St. Lawrence and move north along the south coast of Labrador (see report on *S .m. borealis*). Eider from the St. Lawrence estuary migrate directly overland (25%) or by a coastal route (75%) through the gulf crossing the Isthmus of Chignecto to wintering areas off southwestern Nova Scotia and New England (Reed 1975, Gauthier et al 1976, Erskine and Smith 1986). An additional movement of birds follows the coast to the Strait of Canso, along the Atlantic coast of Nova Scotia to Cape Sable and then direct across the Gulf of Maine to New England (Erskine and Smith 1986, Barrow and Hicklin 1996). Nova Scotia *S. m. dresseri* move south along the coast and across the Gulf of Maine in September through early October. The peak movement of northern *dresseri* takes place during the latter half of November (Erskine and Smith 1986, Hicklin and Barrow 1996). Spring migrants from wintering areas off New England generally move through New Brunswick and Nova Scotia in early April following the coast up the Strait of Canso, or across the Chignecto Isthmus (Erskine and Smith 1986, G. R. Milton unpubl. data) to arrive in the St. Lawrence estuary by late April (Gauthier et al 1976). There is only limited information about an overland spring migration route to the St. Lawrence estuary (Gauthier et al 1976). By early May only local breeders are evident (Erskine and Smith 1986, G. R. Milton unpubl. data).

Spring and Fall Staging Areas Nothing known.

Molting Areas

The molt migration for *dresseri* is not well documented although some molting areas have been reported. Palmer (1976) documented some northern movement of molting adult males. Milton (unpubl data) has documented large rafts of molting male *dresseri* numbering between 30,000 and 40,000 birds in the early 1990s along the south coast of Nova Scotia. Numbers begin to increase in late June and birds remain through August. Similarly Corr et al (1989) identified a predominantly male molt migration of Maine eider during August and September with flocks in excess of 10,000 birds at several sites. Recently, eider molting areas have been identified along the north shore of the St. Lawrence estuary and gulf, but the subspecies composition of birds found there has not been determined (J.-P.L. Savard, pers. comm.). Although these rafts probably include non-breeding males, only 1.1% of 911 birds captured during three years (1997-1999) of banding off Nova Scotia were female. Captured birds were exclusively of the *dresseri* subspecies. Little is known about molting locations of females, although many must molt near their nesting areas.

Winter Range

S. m. dresseri winters along the Quebec North shore of the Gulf of St. Lawrence and estuary south through Newfoundland and along the Atlantic and Bay of Fundy coasts of Nova Scotia and New Brunswick to Massachusetts with small numbers occasionally reported off Rhode Island (Bourget et al 1986, Erskine and Smith 1986, Krohn et al 1992). Band recovery locations for Common Eider shown in Caithamer et al (2000) provides information on migratory and wintering affinities of *dresseri* from regional populations described by Reed and Erskine (1986). Those wintering in the Gulf probably originate from colonies along south-central Labrador, the Gulf and St. Lawrence estuary (Reed et al 1986). The New England, New Brunswick and Nova Scotia coasts receive wintering birds from all areas further north. Newfoundland winters birds from southern Labrador and the Gulf while its birds are sedentary or winter from Nova Scotia south to Massachusetts (S. Gilliland, pers. comm). Adult female and male *dresseri* banded in Nova Scotia are sedentary or undertake short movements southward along the coast or across the Gulf of Maine to Maine and Massachusetts (Erskine and Smith 1986, G. R. Milton unpubl data). Birds from colonies in New Brunswick and Maine are relatively sedentary, with their wintering range extending into Massachusetts (Reed 1989)

Abundance

Breeding Grounds

Recent surveys suggest that the breeding population of *S. m. dresseri* is approximately 95,000 pairs. Approximately 7,300 pairs occur in the Gulf of St. Lawrence (Chapdelaine 1995), 18,500 pairs in the St. Lawrence estuary (Chapdelaine et al 1986), and 3,200 and 18,200 pairs in Newfoundland and Labrador south of 54^{o} 30' N latitude respectively (Gilliland, pers. comm.). An additional 10,000-12,000 pairs occur in Nova Scotia (Milton pers. comm) 8,000-10,000 pairs in New Brunswick (Mawhinney et al 1999), 28,000 - 29,000 pairs in Maine (Krohn et al. 1992, Allen 2000) and 100-200 pairs in Massachusetts (Burrel pers. comm).

Staging Areas

Nothing known.

Molting Areas

See above

Wintering Grounds

Surveys indicate that 50-80,000 eiders winter in Newfoundland (S. Gilliland, pers. com.) and about 155,000 eiders winter along the north shore and Gulf of St. Lawrence (Bourget et al 1986). Data on birds collected from hunters suggest that 30-35% of the eiders wintering in Newfoundland are *dresseri* (Gilliland unpbl. data), and 43% and 20% of the eiders wintering along the north shore and Gulf of St. Lawrence (Reed et al. 1986) are *dresseri* and *borealis-dresseri* intergrades respectively. Numbers of *dresseri* wintering (1980-1988) along the New England coast average approximately 139,000 (Krohn et al 1992: Table 1) but with high interannual variation.. Averaging 11,000, interannual variation is also high for numbers of Common Eider surveyed (late January - early February:1992-2000) in Nova Scotia, (G.R. Milton, unpubl. data). Winter surveys along New Brunswick's Bay of Fundy coast report approximately 2,500 birds (S. Bowes, pers. comm). An examination of harvested birds indicates few *borealis* winter in Nova Scotia (G. R. Milton, unpubl. data) or New Brunswick (P. Hicklin pers. comm.) and reflects the situation in Maine (Mendall 1980).

Population Trends

Subpopulations of *dresseri* appear to be stable or have shown a slight increase in New Brunswick through the 1990s (Erskine and Smith 1986, Mawhinney et al 1999). Colony surveys in Nova Scotia up to the mid-1990s (G.R. Milton unpubl. data) indicate an increase over the population estimate of Erskine and Smith (1986). Recent declines observed in monitored colonies are believed to be only in part related to the proportion of the population that may defer breeding in some years (Coulson 1984) . The sub-population is stable in the St. Lawrence estuary (Chapdelaine et al. 1986, Reed 1990, but see Bédard 1995), increasing in Newfoundland and southern Labrador (S. G. Gilliland, pers. comm.) and in the Gulf of St. Lawrence (Chapdelaine 1995), and possibly stable in Maine, (Krohn et al. 1992, Allen 2000). Population indices (Mid-Winter Inventory, Christmas bird Count, and Sea Duck Survey) of Common Eider reveal increasing or stable numbers in the Atlantic flyway during 1955-97 (Caithamer et al 2000).

Harvest

The level of harvest of Common Eider is estimated by federal agencies in Canada and the United States although serious biases exist in the estimate of the kill of sea ducks (Wendt and Silieff 1986); and precision diminishes for species such as sea ducks, which are not well represented in the harvest sample (Geissler 1990). Harvest of Common Eider in the US Atlantic Flyway (principally *dresseri*, see Mendall 1980) increased approximately 7.5% per year during 1961-96 although the rate of increase has probably diminished since about 1975 (Caithamer et al 2000). Total Common Eider harvest in the Atlantic Flyway (Canada and US) averaged approximately 50,000 birds during 1974-97, with the proportional harvest attributed to each country varying considerably with no discernible pattern (Caithamer et al 2000).

Management and Conservation Concerns

Common Eider are k-strategists and have limited capacity to compensate for hunting mortality through increased recruitment or survival outside of the hunting season (Patterson 1979, Krementz et al 1996). Increasing populations for *S. m. dresseri* (see above) coincide with a constant annual survival rate estimated to be 0.873 " 0.016 (se) using recovery data (1977-92) for adult females banded in eastern North America (Krementz et al 1996). Mawhinney et al (1999) report higher fledging success (12% vs. 6%) in an area of active gull control. Increasing avian predator populations, particularly Great Black-backed and Herring Gulls, may begin to exert a

negative impact on eider populations, especially recruitment of young. The proportion of immatures in the US Atlantic Flyway harvest of Common Eider suggests a long-term decline in recruitment (Caithamer et al 2000). At 6% fledging success, recruitment to the population is less than 10% and may be insufficient to offset the 13% mortality among *dresseri* adult females if continued (Mawhinney et al 1999). The population impact will be magnified if survival rates decrease because of increased harvest..

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King Eider

(Somateria spectabilis)

Population Delineation

King Eiders that nest in North America come from two geographically separate wintering areas on either side of the continent. Scant data on migratory patterns obtained from banding and telemetry indicate that a fundamental distinction might exist between King Eiders breeding in eastern and western arctic Canada (Salomonsen 1968; Dickson et al. 1997). However, it is unknown how rigid this migratory tendency is, and thus whether there are genetically distinct populations of King Eiders in North America.

Distribution

Breeding Range

The King Eider has a circumpolar breeding distribution including Russia, Alaska, Canada and Greenland. In Alaska, it nests primarily on the Arctic Coastal Plain (Anonymous 1999). In western Canada the majority nest on Banks and Victoria islands with lower densities occurring on mainland tundra (Barry 1986; Dickson et al. 1997). In eastern arctic Canada, the breeding range extends from the High Arctic Islands to lower Hudson Bay, but the prime nesting areas are likely on Boothia Peninsula and along the coasts of Foxe Basin including Southampton Island (Abraham and Finney 1986).

Migration Routes

Migration routes in spring are primarily offshore and hence not well defined. King Eiders wintering west of the continent presumably pass through the Bering Strait, across the Chukchi Sea past Point Barrow then eastward across the Beaufort Sea (Barry 1986). Eastern arctic eiders travel north along both the west coast of Greenland, and the east coasts of Labrador and Baffin Island (Abraham and Finney 1986). On both sides of the continent, migration starts in early April, but most of the birds do not arrive on their breeding grounds until mid-June (Anonymous 1999; Cotter et al. 1997; L. Dickson pers. comm.).

Males depart nesting areas on Banks and Victoria islands in the last week of June (Cotter et al. 1997; Dickson et al. 1999). Westward migration is again offshore likely following the open water lead system across the Beaufort Sea to molting areas primarily in the Bering Sea. Some females molt at nesting areas, but the majority depart 4-5 weeks later following the same general route and arriving on molting areas in late August and early September. Movement through the Bering Sea from molting to wintering areas in late fall is generally nearshore along both the Russian and Alaskan coasts.

Males in the eastern arctic depart nesting areas in late June to mid July (Abraham and Finney 1986). Eastward migration follows Lancaster Sound, traverses central Baffin Island and Hudson Strait and then crosses Baffin Bay or Davis Strait to Greenland (Mosbech and Boertmann 1999). Peak arrival of males on molting areas off Greenland occurs in early August, whereas peak arrival of females is in late August (Frimer 1994).

Spring and Fall Staging Areas

Spring staging areas in the Bering Sea are not well known (with the exception of Kvichak Bay, Alaska) since the birds tend to migrate off shore (Larned 1998; Anonymous 1999). Once they reach the southeastern Beaufort Sea in mid to late May, they stage in an open water lead off the west coast of Banks Island and to a lesser extent in a polynya off Cape Bathurst (Alexander et al. 1997). Preliminary data suggest Cape Bathurst is a key staging area for males during molt migration (Dickson et al. 1998).

Spring staging areas for eastern King Eiders are not well known, although they are presumably using the network of polynyas and leads that occur there each spring (Abraham and Finney 1986). Little is also known about the location of key staging areas during molt and winter migration in the east.

Molting Areas

Western arctic King Eiders molt primarily in the Bering Sea, and to a lesser extent in the Chukchi Sea (Kistchinski 1973; Dickson et al. 1999). Recent satellite telemetry has identified several key molting areas in the Bering Sea for North American breeders: off the south and east coasts of Chukotsk Peninsula, south of St. Lawrence Island and north Bristol Bay (Dickson et al. 1999). Likely most eastern King Eiders molt off central west Greenland, but an unknown number remain in eastern arctic Canada to molt (Salomonsen 1968; Mosbech and Boertmann 1999).

Winter Range

King Eiders winter in polynyas in the Bering Sea: most notably the one off the southeast coast of Chukotsk Peninsula, but also polynyas associated with offshore islands such as St. Matthew Island (Kistchinski 1973; Anonymous 1999; Dickson et al. 1999). They also winter off the Aleutian Islands and Alaska Peninsula, south to Kodiak Archipelago, and off Kamchatka Peninsula. Eastern arctic eiders winter off Newfoundland and Labrador, although a large portion of the population is thought to winter off west Greenland (Abraham and Finney 1986).

Abundance

Based on a systematic count of eiders flying past Point Barrow during spring migration in 1996, an estimated 370 000 King Eiders nest in northern Alaska and western arctic Canada (Suydam et al. 2000). An additional 100 000 or more eiders that winter in the Bering Sea and North Pacific nest in Russia (Goudie et al. 1994). Aerial surveys for eider breeding populations conducted in the past decade along the Arctic Coastal Plain of Alaska averaged 12 000 King Eiders (Larned and Balogh 1997). This suggests that about 350 000 of the Pacific wintering population nest in western arctic Canada. There is no reliable estimate of the number of King Eiders nesting in eastern arctic Canada, although this nesting population is thought to be smaller (Abraham and Finney 1986; Bellrose 1980).

Population Trends

Counts of King Eiders flying past Point Barrow, Alaska during spring migration indicate that the population nesting in northern Alaska and western arctic Canada declined by over 50% between 1976 and 1996 (Suydam et al.2000). Aerial surveys for breeding populations conducted for three years in the early 1990's in the western Canadian Arctic also suggest a substantial decline since 1960 (Dickson et al. 1997). In northern Alaska, two different sets of aerial surveys for breeding populations both indicate a stable population during the 1990's (King and Brackney 1997; Larned and Balogh 1997). There is little information on the population status of King Eiders nesting in

eastern arctic Canada, other than regional declines reported on Melville Peninsula and Boothia Peninsula (Gratto-Trevor, C,L., V.H. Johnston and S.T. Pepper 1998). However, surveys of King Eiders molting off central west Greenland suggest present numbers are only half of what they were in the 1950s (Mosbech and Boertmann 1999).

Harvest

An estimated 20 000 King Eider (i.e., 5.1% of the 1994 population) are harvested annually in Alaska and western arctic Canada (Fabijan et al. 1997). The take is primarily by subsistence hunters (>97% of harvest), with few taken by sport hunters (Fabijan et al. 1997). These figures do not include the unknown harvest along the Russian coast where a substantial proportion of North American breeding eiders molt and winter (Dickson et al. 1999). Eiders that nest in eastern arctic Canada are hunted there by both subsistence hunters and sport hunters. An additional, 10 000 to 20 000 King Eiders are harvested by commercial and subsistence hunters in Greenland during the molt (G. Gilchrist, pers. comm.). It is unknown whether harvest levels in either the east or west are sustainable.

Management and Conservation Concerns

A lack of data, including knowledge of key breeding, staging, molting and wintering sites, precludes assessment of population size and trends in eastern arctic Canada. Although more is known about the abundance and distribution of western arctic King Eiders, insufficient data preclude determining the cause of their recent decline. Information is needed on annual survival and productivity rates, including how factors such as harvest levels, contaminants, oil spills and ice conditions affect these rates. We also need to resolve whether there is more than one distinct breeding population in North America.

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Spectacled Eider

(Somateria fischeri)

Population Delineation

The three known, genetically distinct, breeding populations of Spectacled Eiders are currently found on the Yukon-Kuskokwim Delta, the North Slope of Alaska, and the Arctic coast of eastern Russia.

Distribution

Breeding Range

The vast majority of Spectacled Eiders breed in Russia from the northern Chukotka Peninsula west to the Lena River Delta, on Wrangel Island, and Novosibirski Islands (Kistchinski 1973). In Alaska, the species nests on the Arctic Coastal Plain of Alaska at least as far east as the Arctic National Wildlife Refuge and on the outer coastal fringe of the Yukon Kuskokwim Delta. Historically, Spectacled Eiders were reported breeding discontinuously from the Nushagak Peninsula, Alaska, north to Barrow and east nearly to the Yukon Territory (Johnson and Herter 1989, Garner and Reynolds 1986, Dau and Kistchinski 1977). Nesting was also reported on St. Lawrence Island, Alaska as recently as 1997 (Fay and Cade 1959, S. Stephensen, pers. comm.).

Migration Routes

Migration routes in spring and fall are not well known but are most likely direct routes between breeding sites and molting and wintering areas (Petersen et al. 1995). The arrival of Spectacled Eiders on the Yukon-Kuskokwim Delta from the northwest in spring may be evidence of direct routes (McCaffery et al. 1998, Dau and Kistchinski 1977).

Spring and Fall Staging Areas

Presumably, Spectacled Eiders use the same areas in spring as they do during molt in fall. They gradually move to wintering areas from molting areas and no distinct intermediate staging areas are known. Concentrations have been observed off Point Lay and Ledyard Bay in northwestern Alaska in spring.

Molting Areas

Major molting areas in Alaska are offshore waters in Ledyard Bay and eastern Norton Sound, and Peard Bay (Larned et al. 1995c, Laing and Platte 1994, Larned and McCaffery 1993). In Russia, known molting areas include Mechigmenskiya Bay and the Indigirka-Kolyma Delta region (Larned et al. 1995a, 1995b, Kistchinski 1973).

Winter Range

The only known wintering area for any population is in offshore waters south of St. Lawrence Island, where birds concentrate in open leads in the ice. Spectacled Eiders are inadequately monitored throughout their range.

Abundance

Breeding Grounds

Based on nest surveys, about 8,000 birds breed on the Yukon-Kuskokwim Delta (Bowman et al.

1998). Current minimum estimated populations (based on aerial surveys and uncorrected for incomplete detection) are 9,500 along the North slope (Larned et al. 1999). A minimum of 146,000 Spectacled Eiders (uncorrected for detection) was estimated during a one-time aerial survey of arctic Russia from 1992-1994 (W. Eldridge, pers. comm.).

Staging Areas
No numbers available.

Molting Areas
Larned et al. (1995a) estimated about 41,000 Spectacled Eiders were molting at Mechigmenskiya Bay, Russia, on 21-22 August, 1994, and 56,000 eiders on 5 September, 1995. Up to 4,000 eiders molt in eastern Norton Sound, several hundred molt at Peard Bay, and the highest estimate for Ledyard Bay was 33,192 on 21 September 1995 (Larned et al. 1995c, Laing and Platte 1994).

Wintering Grounds
Aerial surveys conducted in the northern Bering Sea from 1995-98 yielded estimates ranging from 148,000 to 375,000 (Larned and Tiplady 1999). This is believed to represent the worldwide population of Spectacled Eiders.

Population Trends

The NAWBPS and other more recent surveys indicate that numbers of Spectacled Eiders breeding on the Yukon-Kuskokwim Delta dropped by about 94% from about 48,000 pairs in the 1970s to <5,000 by 1992 (Ely et al. 1994, Stehn et al. 1993). The Yukon-Kuskokwim Delta breeding population continued to decline by 9-14% per year through 1992 although surveys suggest the population now stands at about 8,000 birds and has stabilized or increased slightly from 1992-1999 (Bowman et al. 1999, Eldridge et al. 1999). Surveys on the North Slope of Alaska suggest a fairly stable trend from 1993-1999 (Larned et al. 1999). Nothing is known about Spectacled Eider population trends in Russia due to the lack of systematic surveys.

Harvest

Spectacled Eiders are largely inaccessible to most hunters during fall and winter, and harvest is generally low. Sport hunting of Spectacled Eiders has been prohibited since 1991 and no Spectacled Eider wings have been received in the federal Parts Collection Survey. Recent Alaska subsistence harvest surveys indicate that about 150 Spectacled Eiders were taken at Wainwright, and a maximum of 50 were taken at Barrow in 1988 (Braund 1989a, 1989b). A few have been taken on St. Lawrence Island. Average reported subsistence harvest on the Yukon-Kuskokwim Delta from 1987-97 was 233 Spectacled Eiders (Wentworth 1998).

Management and Conservation Concerns

In May 1993 the Spectacled Eider was listed as a threatened species under the Endangered species Act of 1973. The primary reason for listing Spectacled Eiders was their rapid decline on the Yukon-Kuskokwim Delta breeding grounds (Federal Register 58(88):27474-27480). Predation, lead poisoning from ingested lead shotgun pellets, and spring and summer subsistence harvest may have contributed to this trend (Wentworth 1998, Flint and Grand 1997, Franson et al. 1995b). Studies on the Yukon-Kuskokwim Delta have shown that lead shot may continue to be available to waterfowl for many years, even after the use of lead shot is curtailed (Flint 1998).

Elements that are known to be toxic to waterfowl (cadmium, copper, lead, selenium, and zinc) have been found at high concentrations in Spectacled Eiders relative to other species; of these, only lead has been directly associated with eider deaths (Franson et al. 1995a, J. Stout, pers. comm.). The exposure risk of Spectacled Eiders to petroleum-related compounds is unknown, but may be less than from other contaminants. Organochlorine compounds have only been found in Spectacled Eiders at concentrations well below toxic thresholds for other waterfowl (J. Stout, pers. comm.).

Predation by gulls, jaegers, arctic foxes and red foxes probably lowers survival of Spectacled Eider eggs and ducklings throughout the species' range. Nest success at one study area on the Yukon-Kuskokwim Delta, more than doubled after Mew Gulls (*Larus canus*) were culled (J. Grand, pers. comm.). No remains of Spectacled Eider ducklings were found in the stomachs of 434 Glaucous Gulls (*Larus hyperboreus*) sampled on the Yukon-Kuskokwim Delta in 1994, suggesting that Glaucous Gull predation on Spectacled Eider ducklings is insignificant there (Bowman et al. 1997).

Because most of the worldwide Spectacled Eider population gathers during winter in a small area of the Bering Sea, they may be particularly vulnerable to human disturbance (direct or indirect), environmental contamination or, possibly, shifts in prey base due to long term climatic changes. Similarly, the large concentrations of molting Spectacled Eiders at Mechigmenan Bay, Russia, may be vulnerable to disturbance and environmental degradation (Larned et al. 1995c).

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Steller's Eider

(*Polysticta stelleri*)

Population Delineation

There are two geographical populations of Steller's Eiders, separated by their breeding and winter distribution. The Atlantic population breeds in western Siberia (Solovieva 1997) and winters in the Barents and Baltic seas (Nygard et al. 1995). Most of the Pacific population inhabits the maritime tundra of northeast Siberia (Solovieva 1997), and a smaller population nests in Alaska on the Yukon-Kuskokwim Delta (Flint and Herzog 1999) and the Arctic Coastal Plain (USFWS 1999). The Pacific population winters primarily in Alaska in the Bering Sea (Palmer 1976).

In Russia, the species is considered rare and recorded in the Red Book (Stepanyan 1990). The Alaska breeding population of Steller's eider is listed as a threatened species under authority of the Endangered Species Act (Federal Register 1997). Steller's eiders are not taxonomically divided into subspecies (AOU 1998), although genetic analyses of the disparate breeding populations in Russia and North America have not been conducted.

Distribution

Breeding Range

The Atlantic population nests on the Taimyr, Gydan, and Yamal peninsulas and perhaps the Kola and Ugorsky peninsulas in Siberia (Solovieva 1997). The principal breeding grounds of the Pacific population is the high arctic along the East Siberian Sea from the Taimyr Peninsula, New Siberian Islands, and particularly in the deltas of the Olenek, Lena, Yana, and Indigirka rivers east to the Chukotka Peninsula (Bellrose 1976, Palmer 1976, Solovieva 1997). The current Alaska breeding distribution of Steller's eiders includes the Yukon-Kuskokwim Delta (Flint and Herzog 1999) and the Arctic Coastal Plain from Point Barrow (Quakenbush and Suydam 1999) east to Prudhoe Bay (King and Dau 1997), and perhaps to the Alaska-Yukon Territories border (Johnson and Herter 1989).

Migration Routes

The routes of travel followed by Steller's Eider between wintering, breeding, and molting habitats are not well defined, but are presumed to be nearshore along the Bering, Chukchi, East Siberian, and Beaufort seas (Bellrose 1976, Palmer 1976). In Alaska, they begin their spring migration north to nesting areas in early May. Steller's eiders pass St. Lawrence Island in mid-May, most of them continuing northward (Fay 1961). Dau et al. (2000) analyzed 347 returns of nearly 53,000 Steller's eiders banded during molt at two estuaries along the Alaska Peninsula; almost all recoveries during summer were in Russia from the western Taimyr Peninsula eastward to the southern Chukotka Peninsula. Males depart breeding areas in mid-June and congregate at Izembek and Nelson lagoons along the north side of the Alaska Peninsula (Jones 1965; Petersen 1980, 1981). Steller's eiders leave the Beaufort Sea in late September (Gabrielson and Lincoln 1959) and migrate south to the Bering Sea and their main winter habitats.

Spring and Fall Staging Areas

In Alaska, important spring staging areas include Izembek Lagoon, Nelson Lagoon, Port Moller, Port Heiden, Ugashik Bay, the shoals of Kuskokwim Bay, and Nunivak Island (Larned 1998,

USFWS 1999). Many of these same estuaries and embayments serve as fall staging and molting areas.

Molting Areas
The lagoons along the north side of the Alaska Peninsula are the most important molting areas for Steller's eiders in most years (Jones 1965; Petersen 1980, 1981). Other areas that support flightless birds in Alaska include Cape Peirce (Petersen 1981) and St. Lawrence Island (Fay 1961). In Russia, concentrations of molting birds have been recorded near Karaginski Island in western Kamchatka (Gerasimov 1972), Stolbov Island in the Laptev Sea (Palmer 1976), and smaller numbers may molt along the north Chukotka Peninsula coast (Dement'ev and Gladkov 1967).

Winter Range

The Pacific population winters primarily from the Kodiak Archipelago west along the Alaska Peninsula and the eastern Aleutian Islands (Gabrielson and Lincoln 1959, Palmer 1976). Smaller numbers of Steller's Eiders winter in the Gulf of Alaska, from the central Aleutians west through the Commander and Kurile islands, on the east coast of the Kamchatka Peninsula, and Japan (Dement'ev and Gladkov 1967, Bellrose 1976, Palmer 1976).

Abundance

Historical estimates of the worldwide population of Steller's Eiders range from 400,000 (Palmer 1976) to 500,000 (Uspenski 1972), but these estimates were based on limited quantitative data.

Breeding Grounds
Aerial surveys of principal nesting areas in arctic Russia during 1993-1995 indicated a minimum of 149,000 (USFWS 1999). In North America, aerial surveys of the Arctic Coastal Plain of Alaska breeding habitats averaged 4,800 pairs from 1990-1998 (USFWS 1999), and on the Yukon-Kuskokwim Delta in western Alaska they currently breed in low numbers (Flint and Herzog 1999) where, historically they may have nested in greater densities (Kertell 1991). However, there are no reliable estimates of breeding numbers for the Yukon-Kuskokwim Delta.

Staging Areas
Spring aerial surveys along the Alaska Peninsula and southwest Alaska coast in 1992-1994 and 1997-1998 yielded counts that ranged from 88,600 to 137,900 (Larned 1998). Spring staging areas appear to be influenced by the distribution of sea ice.

Molting Areas
Numbers of molting birds at Izembek Lagoon average approximately 20,000 with an additional 30,000 at Nelson Lagoon (Dau pers. comm., Dau et al. 2000).

Wintering Grounds
Range-wide censuses have not been conducted during winter. Aerial surveys in the Kodiak Archipelago from 1992-1994 indicate a population of about 5000 birds (Larned and Zwiefelhofer 1995). At Izembek Lagoon on the Alaska Peninsula there were an average of 7,100 birds in December and 19,000 in March during 1975-1990 aerial surveys (C. P. Dau pers. comm.).

Population Trends

Molting and wintering populations of Steller's Eiders along the Alaska Peninsula have declined since the 1960's (Jones 1965, Kertell 1991, USFWS 1999). There is no trend data for other Pacific wintering populations. Coincident with declines in wintering populations, there is evidence of reductions in densities of breeding birds on the Yukon-Kuskokwim Delta and the Arctic Coastal Plain of Alaska (Kertell 1991, Flint and Herzog 1999). In Siberia, the species is now considered rare, although replicate aerial surveys of breeding habitats are limited to three years, 1993-1995 (USFWS 1999).

Harvest

There is no legal sport harvest of Steller's Eiders in Alaska. Subsistence harvest by indigenous people of the Yukon-Kuskokwim Delta and Bristol Bay regions of western Alaska averaged 130 birds during 1995-1998 (Wentworth and Wong 1999). No estimates of the native subsistence harvest of Steller's Eiders are available for the North Slope of Alaska. Illegal harvesting is known to occur in Russia, but there are no estimates of magnitude or trends.

Management and Conservation Concerns

No specific causes for reductions of Steller's Eiders on the Yukon-Kuskokwim Delta have yet been demonstrated. Redistribution to other breeding areas in Siberia, increased mortality associated with subsistence harvest, and change in availability of winter foods were identified by Kertell (1991) as possible reasons for their decline on the Yukon-Kuskokwim Delta. Flint and Herzog (1999) suggested lead toxicosis as another possible explanation for the apparent decline on the Yukon-Kuskokwim Delta. Flint et al. (2000) used mark-recapture techniques to estimate annual survival and found lower survival of males than females, and weak evidence that annual survival decreased between 1975-1981 and 1991-1997. A decrease in adult survival may have initiated the long-term population decline and the shortage of males may be limiting reproductive potential (Flint et al. 2000).

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Harlequin Duck - Eastern Population

(Histrionicus histrionicus)

Population Delineation

Three populations of Harlequin Duck are currently recognized in the East : one in Iceland which appears to be sedentary and two in eastern North America which isolate themselves by their different wintering areas, Greenland and along the eastern seaboard of North America. Preliminary genetic studies appear to confirm the isolation of these populations (Scribner in prep.).

Distribution

Breeding Range

The breeding range of Harlequin Ducks in eastern North America is being better documented but large sectors of Northern Québec and Labrador need to be surveyed (Robertson and Goudie 1999). The species breeds on the Gaspé peninsula and in northern New Brunswick, portions of Newfoundland, northern Québec and Labrador. The population that winters in Greenland breeds in northern Québec and Labrador. The eastern seaboard population breeds on the Gaspé Peninsula, in northern New Brunswick and Newfoundland, and in southern Labrador. It is not known whether these two populations overlap on the breeding grounds or whether there is a dividing line between them in Labrador.

Migration Routes

For males breeding in Labrador and northern Québec, migration appears to be direct and overland. Most males stage in coastal Labrador before migrating to Greenland (Brodeur et al. 1999). Migration routes of females and young are not known but are suspected to be similar to the males, but later in the season. Nothing is known about spring migration routes of Greenland birds. For the eastern seaboard population, migration is direct in spring, with some staging in the Gulf of St. Lawrence. Once again, migration appears to be overland to breeding locations (Brodeur et al. 1998). In fall, males and presumably females migrate to molting grounds. Little is known of fall migration, birds begin to arrive at major wintering grounds in Maine in October.

Spring and Fall Staging Areas

Spring and fall staging occurs along the Gaspé Peninsula. Chronology and length of stay are poorly documented. After females have initiated incubation, males breeding in northern Québec and Labrador stage for 1-3 weeks along the northern Labrador coast before moving to their molting area in Greenland (Brodeur et al. 1999)

Molting Areas

Molting areas of the U.S. population have been located along the Labrador coast, in coastal Newfoundland and along the Gaspé peninsula (Robertson and Goudie 1999). The Greenland population molts along the southwest coast of Greenland (Mosbech et al. 1996, Brodeur et al. 1999).

Winter Range

The U.S. population winters along the Atlantic coast with more than 50% of the birds concentrated along the coast of Maine particularly in the area of Penobscot and Jericho Bays (Vickery 1988, Mittlehauser 1991,1993). In Canada, Harlequin Ducks winter in a few areas in Newfoundland, New Brunswick and Nova Scotia (Tufts 1986, Vickery1988). The Greenland population is thought to winter along the southwest coast of Greenland (Mosbech et al. 1996, Brodeur et al. 1999).

Abundance

Breeding Grounds

Breeding densities on rivers are quite variable. Data are incomplete for several rivers. Recent surveys in northern Québec and Labrador indicated that Harlequin Ducks are quite abundant there (Brodeur et al. 1999, Rodway et al. 2000).

Staging Areas

There are few known staging areas in eastern North America. The best known is the Gaspé Peninsula and some are seen in western Newfoundland in the spring. The length of staging is unknown at these sites and there are probably other staging areas in the Maritimes.

Molting Areas

Several molting sites have been located along the Labrador coast, in Newfoundland and along the Gaspé Peninsula. Abundance estimates are available for a few sites and data are currently being compiled. The molting population in Greenland was recently estimated to be close to 5000 males (Mosbech, Boertman and Robertson, unpubl. data), however more work is needed to verify this estimate.

Wintering Grounds

The eastern seaboard population was estimated at less than 1000 individuals a decade ago (Vickery 1988, Goudie 1991). It is now estimated at around 1,500 individuals (Harlequin Duck Recovery Team, unpubl. data). The size of the Greenland wintering population is not known, however molting males remain in Greenland and are joined by females. Over 10,000 individuals could be wintering there.

Population Trends

The U.S. population has increased slightly since 1979 (Vickery 1988, Mittlehauser 1991, CBC). The wintering population at Cape St. Mary's has increased since early 1990, after undergoing serious declines in 1980's. However, it has not yet reached former numbers. Better estimates of trends are needed.

Harvest

The species is not currently hunted in eastern North America or in Greenland. However the level of subsistence harvest by natives and the incidental take are unknown.

Management and Conservation Concerns

The species has been listed as endangered in Canada (Goudie 1991) and as threatened in the state of Maine. It has not been listed under the U.S endangered species legislation. A recovery plan has been written for the eastern North American population (Montevechi et al. 1995) and is scheduled for revision soon. Molting and wintering concentrations of Harlequin Ducks are sensitive to oil spills (Patten et al. 1988).

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Harlequin Duck - Western Population

(*Histrionicus histrionicus*)

Population Delineation

Currently, Harlequin Ducks in western North America are not differentiated into subpopulations. However, genetic sampling and marking have been insufficient to describe gene flow between widely separated breeding areas or to establish a firm basis for defining population units. Genetic studies have shown some structuring of mitochondrial DNA haplotypes among samples from Puget Sound Washington west to the Aleutian Islands (Goatcher et al. 1998), suggesting a "Pacific Northwest" cluster and a "Bering Sea" cluster, but differences in allele frequencies were equivocal. At a regional level, genetic discreteness was not found among birds in three wintering areas on Alaska's south-central coast (Lanctot et al. 1999) or in Washington, Oregon and Montana (Brown 1998). Comparative studies indicate significant genetic differences between harlequins of the western and eastern populations (Scribner in prep.), but not to the degree seen in Common Eiders. More research into the relationships between widely separated breeding populations (Rocky Mountains to northeast Russia) and winter aggregations is necessary to determine whether designation of subpopulations is warranted.

Distribution

Breeding Range

The breeding range of Harlequin Ducks in western North America is summarized by Robertson and Goudie (1999). Western Harlequin Ducks breed in the Rocky Mountains in southwest Alberta, western Montana, Idaho and northwest Wyoming (Cassirer et al. 1996). They breed in the Cascade and Olympic Mountains of Washington and Oregon (Schirato 1993; Smith et al. 1997; Dowlan 1996) and perhaps south to California (Hare 1995). Harlequins breed across British Columbia from the western Rocky Mountains to the coast and north in the Queen Charlotte Islands (Campbell et al. 1990). Harlequins are found throughout the Yukon and western Northwest Territories north to the Yukon Coastal Plain (Fournier and Bromley 1996; Hawkings 1987). In Alaska, there are scattered breeding records from southeast Alaska and Glacier Bay, with more prevalence in Prince William Sound, the Kodiak Archipelago, the Alaska Peninsula and the Aleutian Islands. Harlequin Ducks breed throughout interior Alaska in the Alaska Range and south slope of the Brooks Range and west to the Bering Sea. Harlequins are common breeders in tributaries of the Yukon and Kuskokwim Rivers in western Alaska. Breeding has been recorded as far north as Point Hope on the northwest coast, and locations across the entire north side of the Brooks Range to the Yukon border. On the western Pacific Rim, harlequins are reported to breed from northeast Russia south to the Sea of Japan.

Migration Routes

Little is known of specific migration routes of western Harlequin Ducks. In spring, most breeding birds leave the Pacific Northwest and move inland to the Rocky Mountains; in Alaska, birds disperse from southern coasts into interior mountain ranges. An unknown proportion of Harlequins nest in coastal mountain habitats, with little or no migration. Migration routes are equally unknown for summer molt migrants and the fall return to wintering areas. Limited marking of Harlequins suggests little interchange between Alaska and the Pacific Northwest. It is

not known whether Harlequins cross the Bering Sea to molt or winter in North America, like Spectacled and Steller's Eiders and Long-tailed Ducks.

Spring and Fall Staging Areas

Spring and fall staging areas are poorly documented for western Harlequin Ducks and may not be used to a significant degree. Observations of marked birds suggest that post-breeding males move directly to molting and wintering areas on the coasts in June, followed by failed breeders and September arrivals of females and young. Spring migrations may be equally direct.

Molting Areas

Molting areas of western Harlequin Ducks are widespread throughout their range and fairly well known. Important areas include Puget Sound (Schirato 1993); the Strait of Georgia and Hecate Strait in British Columbia (Savard 1988; Breault and Savard 1999); southeast Alaska (Agler et al. 1995); Prince William Sound (Rosenberg and Petrula 1998); and Kodiak (Zwiefelhofer 1998). Molting birds also are found all along the Alaska Peninsula and Aleutian Islands.

Winter Range

Harlequins winter from the southern extent of the Bering Sea ice edge to Oregon on the eastern side of the Pacific and Japan on the western side. It is unknown whether Siberian breeders winter on the North American side of the Bering Sea like some other sea ducks (Spectacled and Steller's Eiders, Long-tailed Ducks). Major wintering areas coincide with molting areas from southern Alaska to British Columbia.

Abundance

Breeding Grounds

There are no regular breeding ground surveys to provide population estimates or indices for Harlequin Ducks. Their riverine breeding habitats are widespread, diverse and difficult to survey. A few directed studies have provided information on breeding densities in limited areas: Rocky Mountains (see Robertson and Goudie 1999); Oregon (Bruner 1997); eastern Prince William Sound (Crowley 1999); Kuskokwim River drainages (McCaffery and Morgart 1999).

Staging Areas

There are few known staging areas of western Harlequin Ducks. The extent of use, length of staging and abundance of birds are not known.

Molting Areas

Only a few molting areas have been monitored with enough regularity to characterize abundance of Harlequins: Prince William Sound (Rosenberg and Petrula 1998); Kodiak (Zwiefelhofer 1998); Strait of Georgia (Savard 1988; Breault and Savard 1999).

Wintering Grounds

Estimates of winter abundance have been made on some areas, but not on a regular basis. Crude abundance in specific wintering areas may be: Aleutian Islands – 147,000 (Byrd et al. 1992); Kodiak – 9,600 (Forsell and Gould 1981); Prince William Sound – 18,000 (Lance et al. 1999); southeast Alaska – 55,000 (Conant 1996); and British Columbia – 11,000-15,000 (*in* Goudie and Robertson 1999).

Population Trends

Surveys for western Harlequin Ducks are insufficient in geographic coverage and time series data to reliably determine population trends at the rangewide or regional levels. Breeding birds in the Rocky Mountain region may have been stable in recent years (Cassirer et al. 1996), but most of the breeding range remains unsurveyed. Winter surveys in Alaska suggest stable numbers of Harlequin Ducks in major areas (USFWS 1999). Wintering harlequin Ducks may have declined in the Strait of Georgia since 1994 (Robertson and Goudie 1999).

Harvest

Harlequin Ducks are hunted throughout western North America, under restricted regulations in most jurisdictions. However, harvest levels are not accurately known. Hunters that take sea ducks are significantly undersampled in state/provincial and national harvest surveys. Similarly, the number of sea duck wings in parts collection surveys are inadequate to accurately estimate species composition in duck harvests. Harlequin Ducks are taken in small numbers in Rocky Mountain states, Washington and Oregon. The Canadian national harvest survey suggests that <50 are harvested annually in British Columbia. State and federal survey data for Alaska suggest an average fall/winter harvest of about 500-1,000 Harlequins statewide. Harlequin Ducks are also harvested for subsistence use in Alaska, mostly during winter in the Bristol Bay, Aleutian/ Pribilof and Kodiak regions. Harlequin Ducks are not a highly desired subsistence species; annual harvest may be about 2,500 birds (Paige and Wolfe 1999).

Management and Conservation Concerns

Although western Harlequin Ducks are abundant and stable, rangewide, they face a variety of conservation challenges that need to be monitored and assessed. Breeding Harlequins in rivers and streams may be affected by mining operations and logging that affect water quality and nesting habitat. Riparian recreation is a major concern where breeding pairs are sparse and human traffic on rivers can affect distribution (Hunt 1998). Molting and wintering concentrations of Harlequin Ducks on coastal waters are vulnerable to oil spills (Patten et al. 2000; Esler et al. *in prep*.) and disturbance. The impacts of harvest on local wintering aggregations of Harlequin Ducks are unknown; correlative winter surveys, harvest surveys and assessment of population effects are needed.

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Long-Tailed Duck

(Clangula hyemalis)

Population Delineation

The Long-tailed ducks (formerly Oldsquaw) of North America are currently considered to be one population, but banding data do not preclude the possibility of subpopulations. There have been 2,569 bandings and only 58 recoveries (Caithamer et.al, 1998). Birds banded near Cape Churchill, Manitoba have only been recovered near the banding site or in the Great Lakes and Chesapeake Bay. Birds banded in Alaska have never been recovered in the Great Lakes or on the Atlantic Coast.

Distribution

Breeding Range

Circumpolar, in tundra habitat; on islands of coasts and lakes, shores of coasts and lakes into semi-barrens and on hills into the edge of the forest zone. Breeds from the West Coast of Alaska across North America to the East Coast of Labrador as far north as there is land with these habitats. Also breeds on Greenland, Iceland and Wrangel Island.

Migration Routes

Routes are largely unknown. It is likely that where breeding and wintering areas are near the sea, migration corridors parallel the coast. Band returns and observation of radar displays (Alison, 1972) suggest that an important migration corridor extends from Hudson and James Bay to the Great Lakes, and then probably south-southeast to Chesapeake Bay. Each May and June 250,000 and perhaps as many as 1,000,000 Long-tailed Ducks migrate into the Beaufort Sea area. The bulk of the nesting population in the Western Arctic passes through the Beaufort Region (Wilbor, 1999). Long-tailed Ducks banded on the YK Delta, Alaska have been recovered mostly in Northeast Russia and Western Alaska (Wilbor, 1999). The origin of breeding birds wintering from the Alaskan Peninsula to Southeast Alaska is largely unknown, as is the origin of a large portion of the birds wintering along the Atlantic Coast.

Spring and Fall Staging Areas

Mostly unknown. Long-tailed Ducks traditionally congregate at certain areas of coastal Southwest Alaska during spring migration (Larned, 1998). Some of the larger concentrations (5,000+) were near Herendeen Bay, Goose Point, and Kvichak Bay.

Molting Areas

Palmer (1976) lists the following as molting areas: Thule Dist.. Greenland; Ungava Bay; Hudson Strait; Hudson Bay, off Churchill; Fisher Strait, Southampton Island; north coast of Keewatin; MacKenzie Bay and vicinity; lakes and lagoons of St. Lawrence Island; and tundra lakes and some coastal lagoons of the Bering Sea coast of Alaska. An estimated “tens of thousands” molt on large inland thaw lakes and protected Beaufort Sea lagoons (Bergman et al.,1977, Johnson and Richardson, 1981, Johnson, 1985, Taylor, 1986)

Winter Range

Long-tailed Ducks winter from the ice edge southward. On the Pacific from the Northern Bering Sea, the large polynya associated with St. Lawrence, St. Matthew, and Nunivak Islands, and along the Alaska coast to southeast Alaska. Smaller numbers winter along the British Columbia coast to northern California. They also winter on the Great Lakes. On the Atlantic coast birds winter from Labrador south to North Carolina.

Abundance

Breeding Grounds

Bellrose (1980) estimated an early summer population of 3 to 4 million Long-tailed Ducks in North America. He estimated 2 million birds for Alaska and the western Arctic based on data from the North American Waterfowl Breeding Population Survey (NAWBPS), and surveys of Barry (1960), Tener (1963), Manning, et.al., (1956), and MacPherson and Manning (1959). As there were no data for eastern area he "somewhat arbitrarily" assigned a figure of 1.5 million birds based on the area of available tundra breeding ground. Goudie, et al. (1994) provides a "guesstimate" of 2.5 million for the U.S. and Canada. Recent surveys (which cover only a fraction of the breeding range) yield the following numbers: NAWBPS (strata 1-50, 75-77), 169,900 (1990-1997 mean); NAWBPS Eastern Area (strata 51-68), 3,100 (1990-1997 mean); Breeding Population Survey of the Arctic Coastal Plain, 116,400 (1990-1996 mean); Eastern Plot Survey of breeding populations, 3,100 (1990-1995 mean); YK Delta Coastal Zone Survey, 6,600 (1998); Total of above, 299,100.

Wintering Grounds

There are few current estimates of wintering numbers of Long-tailed Ducks in the Pacific Flyway. Conant (1996) estimated 163,000 wintering in Southeast Alaska. Fay (1961) estimated 500,000 birds wintering about St. Lawrence Island. Bellrose (1980), from refuge reports, estimated 700,000 to 1,000,000 birds wintering along the Aleutian Chain and 20,000 to 35,000 on the Izembak National Wildlife Refuge on the Alaskan Peninsula. He also reported an average of 500 Long-tailed Ducks wintering along the Coast of British Columbia and 50 to 75 in Puget Sound, Washington (Christmas Bird Counts). Bellrose (1980) Reported almost 20,000 Long-tailed Ducks wintering on the great Lakes (Christmas Bird Counts). The midwinter inventory for the Atlantic Flyway (U.S.) averaged 10,700 for the years 1990-1997. The Atlantic Coast Sea Duck Survey (U.S. and Canada) averaged 8,900 from 1990-1997 and subsequently were 5,155 in 1998 and 7,826 in 1999. Christmas Bird Counts of Long-tailed Ducks on Nantucket and Tuckernuck Islands (Massachusetts) were 258,000 in 1995 and 180,000 in 1996. Large concentrations of wintering Long-tailed Ducks are also found in Chesapeake Bay.

Population Trends

The NAWBPS traditional area survey indicates a decline of 5.3 % per year from 1973 to1997. Additional surveys in Alaska show a relatively stable breeding population since 1986 on the Arctic Coastal Plain Survey and slowly increasing numbers since 1988 on the YK Delta Coastal Zone Survey. The Midwinter inventory (U.S. Atlantic Coast) shows a decline of 1.1% per year from 1976-1997. The Atlantic Coast Sea Duck Survey shows no statistically significant change from 1991-1999 but the data suggest a declining trend. The Atlantic Flyway Christmas Bird Counts show no trend from 1973-1995.

Harvest

Long-tailed Ducks are harvested throughout their range. They are commercially hunted in Russia, taken for subsistence and sport in Alaska and Canada and for sport in the lower 48 states. Approximately 10,000 Long-tailed Ducks are harvested for subsistence in Alaska (Paige and Wolfe, 1999). An average (1994-1998) of 22,000 Long-tailed Ducks per year are harvested for sport in the U.S. and Canada (Martin and Padding, 1995-1999).

Management and Conservation Concerns

The possibility of migratory sub populations needs to be investigated. The majority of breeding birds surveyed are in Western Canada and Alaska and the majority of birds harvested are on the Atlantic Coast (no Alaska banded birds have been recovered in the Great Lakes or Atlantic Coast and no Manitoba banded birds have been recovered in Alaska). Long-tailed Ducks may be threatened by heavy metal contamination. Oil spills are of concern, especially where the birds occur in large concentrations. Winter Surveys would be helpful in determining distribution and population trends on the Pacific Coast and Great Lakes, and expanded breeding bird surveys in Eastern Canada would help document breeding bird numbers. Radio telemetry work on the breeding grounds and wintering areas could provide valuable information on molting areas, breeding grounds and origins of birds on the wintering grounds.

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Surf Scoter

(Melanitta perspicillata)

Population Delineation

Surf Scoters winter in two geographically separate wintering areas. They breed throughout the northern boreal and southern taiga regions of Canada. Migration corridors from the breeding areas to the wintering areas are poorly documented for this species. It is unknown whether there are distinct subpopulations of surf scoters.

Distribution

The Surf Scoter is a Nearctic species that breeds in northern boreal forests and southern taiga of Alaska and Western Canada east to Hudson Bay, Quebec and Labrador (Bellrose 1980) and winters along the Atlantic and Pacific Coasts.

Breeding Range

Bellrose (1980) reports that Surf Scoters are confined almost entirely to the closed and open boreal forest of Canada and Alaska. Little is known about the factors that determine breeding habitat preference in this species.

Migration Routes

The fall and spring migration along both the Atlantic and Pacific coasts are well documented, but little is know about the inland migration corridors. Spring migration begins in March with birds arriving on the breeding grounds in mid-May. Fall migration is more variable with migration beginning in September. Given the large extent of the wintering area, little is known about the seasonal movements within the winter area or about the factors that determine migration route preference.

Spring and Fall Staging Areas

Spring and Fall staging areas are well documented along the Atlantic and Pacific coasts. Savard *et al.* (1998) provides a good summary of these many areas. Little is known about the factors that determine staging area habitat preference.

Molting Areas

Western Surf Scoters molt along the coast of British Columbia and Alaska, and in the Bering Sea. Eastern Surf Scoters molt along the Labrador coast, in the St. Lawrence estuary and along the eastern coast of Hudson Bay. Little is know about the factors that determine molting area habitat preference.

Winter Range

Along the Atlantic Coast, Surf Scoter*s* winter from Quebec southward into Florida. Along the Gulf of Mexico Coast they winter from Florida westward into Texas. On the Pacific coast they winter from the Aleutian Islands southward into Mexico. Shallow marine coastal waters are preferred on the Pacific Coast (Goudie *et al.* 1994). Little is known about the factors that determine wintering area habitat preference, and the movements within the winter range on both coasts.

Abundance

Population estimates are very poor for this species. Goudie *et al.* estimated the Northwest American population to number approximately 536,000 breeding surf scoters. Savard *et al.* estimated the Northwest American population to number approximately 61,000 breeding surf scoters. The breeding range is not consistently censused.

Population Trends

The Surf Scoter population in Alaska is thought to be possibly declining (Anon. 1999). Similarly, the numbers in the Atlantic Flyway appear to have possibly declined (Caithamer *et al.* 2000), whereas no statistically significant population trend is apparent in the results of a fixed-wing aircraft survey covering the Atlantic Coast for the period 1991-1999.

Data currently used to monitor population trends for Black Scoters include the waterfowl breeding survey, the mid-winter inventory, the Christmas bird counts, special waterfowl surveys in Alaska, and a special sea duck survey covering the Atlantic Coast. Surf Scoters are a difficult species to monitor, and there is currently no survey or family of surveys designed to address this need throughout the range for this species.

Harvest

The surf scoter is hunted in Canada and the United States, and sport harvest averages approximately 30,000 annually for both countries. The majority of this harvest occurs in the Atlantic Flyway (~80%). This estimate of harvest is conservative, given the nature of the harvest survey in both countries. Subsistence harvest does not appear to be significant for this species, but few data are available on the actual extent of this harvest. Harvest restrictions have been imposed on the U.S. harvest in the Atlantic Flyway due to the apparently declining trend in population.

Management and Conservation Concerns

Little is know about the basic breeding biology and reproductive success of surf scoters. The relationships between breeding, molting, and wintering sites are not known, nor is much known about the factors that determine the selection of these sites. Estimates of abundance and population trends are not adequate for the management of this species. The causes of the apparent decline in both the Atlantic and Pacific Coast populations are unknown. Estimates of survival are absent, and data are needed on basic population dynamics and ecology for this species.

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Black Scoter

(Melanitta nigra americana)

Population Delineation

Black Scoters winter in two geographically separate wintering areas. They are known to breed in Alaska and Quebec and are probably breeding in Labrador, Ontario, North West Territories, and Yukon (Bordage, *et al.* 1995). Bordage, *et al.* (1995) describe separate eastern and western breeding populations for this species. Few surveys have been conducted within the extensive area separating these two populations, and few data exist documenting two disjunct populations at this time.

Distribution

Two races of the Black Scoter occur in a circumpolar breeding distribution. These races are the European and American. The American race breeds from Western Siberia into Alaska (Bellrose 1980) and eastward to Labrador, and winters along the Atlantic Coast and Pacific Coasts of both continents.

Breeding Range

For North America, the eastern breeding range is suspected to include Labrador, Ontario and Quebec, where shallow lakes are preferred. The western breeding range is suspected to include Alaska, and the Yukon and North West Territories, where disturbed areas such as sloughs and riverbanks are preferred (Bordage, *et al.*). Little is known about the factors that determine breeding habitat preference throughout the Nearctic range for this species.

Migration Routes

Fall and spring migrations along the Atlantic and Pacific coasts are well documented, but little is know about the inland migration corridors used by the Black Scoter. Spring migration begins in March with birds arriving on the breeding grounds in mid-May. Fall migration is more variable with migration beginning in September. Given the large extent of the wintering area, little is known about seasonal movements within the wintering area or about the factors that determine migration route preference.

Spring and Fall Staging Areas

Spring and Fall staging areas are well documented along the Atlantic and Pacific coasts. Bordage *et al.* (1998) provides a good summary of these many areas. Little is known about the factors that determine staging area habitat preference.

Molting Areas

Large molting sites have been identified in James and Hudson Bays; however, molting sites in the western population area are not well known (Bordage, *et al.* 1995). Little is known about the factors that determine molting area habitat preference.

Winter Range

Along the Atlantic Coast, Black Scoters winter from Quebec southward into Florida. In the Gulf of Mexico Coast they winter from Florida westward into Texas, while along the Pacific coast they winter from the Aleutian Islands southward into Mexico. Little is known about the factors that determine wintering area habitat preference or movements within the wintering area on both coasts.

Abundance

Population estimates are very poor for this species. Neither the breeding range nor the wintering range is consistently censused

Population Trends

The Alaskan population of the Black Scoter is thought to be declining in Western Alaska and stable on the Arctic Coastal Plain (Anon. 1999). The numbers appear to be declining in the Atlantic Flyway, whereas no statistically significant population trend is apparent in the results of a fixed-wing aerial survey covering the Atlantic Coast for the period 1991-1999.

Data currently used to monitor Black Scoter population trends include the waterfowl breeding survey, the mid-winter inventory, the Christmas bird counts, special waterfowl surveys in Alaska, and a special sea duck survey covering the Atlantic Coast. Black Scoters are a difficult species to monitor and there is currently no survey or family of surveys designed to address this need throughout the range of this species.

Harvest

The black scoter is hunted in Canada and the United States. This sport harvest averages approximately 11,000 annually for both countries. The majority of the sport harvest occurs in the Atlantic Flyway (~80%). This harvest estimate is conservative, given the nature of the harvest survey in both countries. Subsistence harvest may be significant for this species in some areas, with the harvest on the Yukon-Kuskokwim Delta of Alaska averaging approximately 6,000 in recent years. Restriction have been imposed on the U.S. harvest in the Atlantic Flyway due to the apparently declining trend in population.

Management and Conservation Concerns

Little is known about the basic breeding biology and reproductive success of black scoters. The relationships between breeding, molting, and wintering sites are not known, and little is known about the factors that determine the selection of these sites. Estimates of abundance and population trends are not adequate for the management of this species. The causes of the apparent declines in both the Atlantic and Pacific Coast populations are unknown. Estimates of survival are absent, and data are needed on basic population dynamics and ecology for this species.

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White-winged Scoter

(*Melanitta fusca deglandi*)

Population Delineation

Globally there are three sub-species of *Melanitta fusca*; the Velvet Scoter *(M. f. fusca)* of Europe and Eastern Asia, the White-winged Scoter *(M. f. deglandi)* of North America and *M. f. stejnegeri* of Western Asia (Brown and Fredrickson 1997). There is no evidence for subdivision of the North American population at this time. However, given strong female natal philopatry (Brown and Brown 1981) and the potential philopatry to wintering areas, it is likely that subpopulations may exist within the broad geographic range occupied by this species.

Distribution

Breeding Range

The primary breeding range of the White-winged Scoter is the Western Boreal Forest from Alaska through western Canada. This range extends east of Hudson's Bay and south into the prairies and parkland, although densities are lower in these biomes. White-winged Scoters once bred on large, permanent wetlands and lakes throughout the prairies and parklands as far south as North Dakota. However the southern extent of their former range has retracted, and now lies north of Saskatoon. White-winged Scoters are now extirpated from North Dakota, southern Manitoba and southern Alberta. Local populations in parkland Saskatchewan are presently showing patterns of decline and disappearance similar to those shown by populations in North Dakota early in the last century.

Migration Routes

Poorly understood. White-winged Scoters banded at Redberry Lake Saskatchewan have been recovered in roughly equal numbers from Atlantic and Pacific coasts (Houston and Brown 1983). It is generally thought that Scoters from the western part of the range winter on the Pacific coast and those from the eastern part of the range migrate to the Atlantic coast. However data are limited and further investigation is needed.

Spring and Fall Staging Areas

Poorly understood. White-winged Scoters migrating to the Atlantic coast use the St. Lawrence River and the Great Lakes in both spring and fall but the proportion of the population using these areas is unknown. Numbers using the Great Lakes, and the duration of stay have increased in recent years apparently in response to the abundant food source created by the invasion of Zebra Mussels. Staging areas used by western populations have not been documented. However the birds are thought to fly west to the Pacific and follow the coast south.

Moulting Areas

Unknown, thought to use coastal areas along the Northern Atlantic, Pacific and Hudson's Bay coasts and larger inland wetlands in the Boreal Forest.

Wintering Range

On the Pacific Coast White-winged scoters are found in localized areas from Alaska to California. Atlantic Coast White-winged scoters winter in localized areas from Newfoundland to

South Carolina. The highest densities are found from Nova Scotia to New York and in Chesapeake Bay. Some White-winged scoters winter on the Great Lakes.

Abundance

Breeding Grounds
Because the count for the three species of scoters is combined in the breeding waterfowl survey, no population estimate is possible. The highest breeding densities are thought to occur in the Western Boreal Forest. Prairie and parkland populations seem to be semi-colonial breeding on large, permanent water-bodies. However, White-winged scoters in the northern part of the range are generally more dispersed.

Staging Areas
Nothing known

Molting Areas
Nothing known

Wintering Grounds
Counts for the three species of scoter are combined in the mid-winter inventories conducted along the Atlantic and Pacific Coasts. Scoter counts are highly variable as this survey is not well designed for sea ducks, which tend to have a clumped distribution, in large flocks in specific habitats. The white-winged scoter is thought to be the most abundant of the three species on both coasts, but estimates of wintering populations are not available.

Population Trends

Poor data. Most indices indicate declining populations. However the magnitude of the decline cannot be estimated reliably. White-winged Scoters have definitely declined nearly to the point of extirpation in the prairie biome. However the number of birds formerly occupying this portion of the range cannot be estimated. Data from the USFWS-CWS breeding waterfowl survey indicate that the combined population of all three scoter species along survey transects in the western boreal forest may have declined by as much as 75% since the 1950's. However, trends specific to white-wings and the magnitude of the decline for this species cannot be identified. No trends are apparent in other parts of the breeding range. Mid-winter inventory data indicate no trend on the Pacific Coast and weakly indicate a decline on the Atlantic coast. However these data track scoter populations poorly and all three species are combined in one count.

Harvest

White-winged Scoters are harvested throughout their winter range. Harvest surveys are poorly designed for sea ducks. However, based on available data White-winged Scoters comprise less than 0.2% of the continental waterfowl harvest. An average of 30,000 White-winged Scoters are taken annually. Over 80% of the harvest occurs in the Atlantic Flyway. Subsistence harvest is unknown. However White-winged Scoters are an important bird among the First Nations of the Western Boreal Forest (D. Kay pers. Comm.).

Management and Conservation Concerns

Given the apparent decline of this species there is an immediate need to evaluate all available survey data to determine the reliability of this observation. We need to develop a population estimate for this species. We need to gain a better understanding of its population dynamics and the interaction between environmental factors and various aspects of demographics. White-winged Scoters are long-lived ducks with low annual productivity and high adult survival. We need to understand the factors that are driving populations so that management plans can be developed. By gaining an understanding of the important stages in their life cycle we can better target environmental factors for management. We also need to identify migratory routes, relative abundance across all seasonal ranges and molting and staging habitats. We also need to determine if sub populations exist. Although the current level of harvest seems low relative to other species we need to better quantify sport and subsistence harvest.

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COMMON GOLDENEYE

(Bucephala clangula)

Population Delineation

The Common Goldeneye is a circumpolar species breeding worldwide in northern boreal forests. In North America this species breeds in the northern Canadian forest and winters along both the Atlantic and Pacific coasts.

Distribution

Breeding Range

The Common Goldeneye breeds in forested areas of Alaska and across the wooded parts of northern Canada, east to the Maritime Provinces and south to northern Washington, northern North Dakota, northern New York state and Maine (Eadie et al. 1995). The center of abundance for the Common Goldeneye is among the lakes and boreal forests of Canada. It is also found in large numbers within the ranges of the Yukon and Kuskokwim River valleys in Alaska (Gabrielson and Lincoln 1959). A smaller number, perhaps as many as 10,000 to 20, 000 birds, breed in the Midwest, primarily on the Upper Peninsula of Michigan and south along Lake Huron through Presque Isle County.

Migration Routes

Migration data for the Common Goldeneye are scarce because of a lack of banding success and the fact that breeding and wintering sites are often in close proximity. Most observed movement has been from the feeding areas on interior large lakes and rivers towards the coasts (Eadie et al. 1995). There is also a strong movement to the Great Lakes region and the Mississippi River area (Bellrose 1980). The species is one of the last to migrate south (Bellrose 1980), although it is one of the first to arrive on the breeding grounds (Eadie et al. 1995). A visible separation by sex and age occurs in the winter, with mature drakes moving last (Palmer 1976).

Spring and Fall Staging Areas

The Common Goldeneye is typically a short to intermediate distance migrant along a broad front, with concentrations focused on major river and lake systems and seacoasts. There are relatively few major staging locations. It stages where open water is available, typically near the southern limit of frozen fresh water.

Molting Areas

Molting has been observed mostly in the Great Lakes region and in the interior lakes of Canada. Kazan Lake and Beaupré Lake in Saskatchewan, along with the area around James and Hudson Bays, are major molting locations (Bellrose 1980). A few ducks have been known to molt on Pacific waters, but not the interior lakes and waterways (Palmer 1976). However, we know very little about preferred molting locations for this species.

Winter Range

In the east, the Common Goldeneye winters in open coastal waters from Newfoundland to Florida, with the main wintering region lying between New England and Chesapeake Bay. In the west, it winters on the coasts of southeast Alaska and British Columbia. It is also found in

considerable numbers on large inland lakes and rivers where open water is available. Reliable data of the numbers of ducks wintering offshore are scarce, because of the difficulty in conducting offshore surveys (Bellrose 1980).

Abundance

Estimates of the continental population of the Common Goldeneye were once placed at around 1.25 million based on partial counts that were taken during the summer months on the breeding grounds (Bellrose 1980). More recent USFWS surveys indicate a smaller population (Eadie et al. 1995).

Breeding Grounds

The Common Goldeneye is a common breeder on the Precambrian Shield of Canada. Aerial surveys of Canadian boreal forests revealed numbers to be around 192 000 (Hansen 1967). Along the Yukon and the Kuskokwim River valleys the estimated population was somewhere around 90 000 (Gabrielson 1956, Lincoln 1956). In Tadoussac, Quebec, the current population of the Common Goldeneye is 6357 (Savard and Dupuis 2000). Increased acidification of wetlands has been considered a favorable factor to the survival of goldeneye broods, due to a decrease of fish as a competitor for invertebrate food (McNicol et al. 1995; Wayland and McNicol 1994).

Staging Areas

Little is known about abundance on the staging areas. The Great Slave River parklands contain an average of 3300 goldeneye (Bellrose 1980). Along the Athabasca Delta the population increases dramatically to an estimate of over 90 000 (Bellrose 1980). Four estuaries were surveyed in Quebec for the population of the Common Goldeneye with approximately 1000 ducks recorded (Savard and Dupuis 2000).

Molting Areas

Little is known about abundance on the molting areas. An aerial survey at Kazan Lake, east-central Saskatchewan, on August 17, 1951, recorded several thousand goldeneye. On Beaupré Lake, during September 1964, there was a reported estimate of 3300 Common Goldeneye (Bellrose 1980). Along the Gulf of St. Lawrence (North Shore) the total number of Common Goldeneye was 115 (Savard and Dupuis 2000).

Wintering Grounds

Aerial surveys of wintering grounds during 1950-94 indicated a stable population in the United States, but a significantly declining population in the Atlantic Flyway and Chesapeake Bay (Perry and Deller 1994). The average annual U. S. population during the 45-year period was 149 000 but these figures may be lower than actual numbers due to the widespread distribution of goldeneye and the difficulty in counting them. During the late 1990s the population in Chesapeake Bay averaged 4422 (Serie 1999) and in Jan. 2000 the Maryland section of Chesapeake Bay had 9000 (L. Hindman, pers. comm.).

Population Trends

The wintering population of the Common Goldeneye in the Chesapeake Bay area has been decreasing steadily since the mid-1960s. North American populations of have remained relatively stable since waterfowl surveys began (Perry and Deller 1994; Eadie et al. 1995). Breeding pairs in some north-central Minnesota lakes have declined in the last 30 years, and the proportion of goldeneye harvested in eastern North America has also declined between 1976-91. Overall, the

data from the Breeding Bird Survey and the Christmas Bird Counts suggest no overall significant trend in Common Goldeneye numbers in eastern North America. Little information exists for the west, but in some areas (e.g., Cariboo Parkland of British Columbia), numbers have been increasing. Long-term trends may be influenced by interventions such as the creation of reservoirs, which have altered preferred habitats.

Harvest

Harvest of Common Goldeneye in the Canadian portion of the Atlantic Flyway during the 25-year period 1974-98 has declined precipitously. In the U.S. portion of the Atlantic Flyway the take was not as high, nor has it declined as much as in Canada.

Management and Population Concerns

Loss of mature forests is one of the most important factors affecting the Common Goldeneye. Although there has been some concern that acid precipitation may adversely affect populations, there is also information to indicate that populations of this species are benefiting from the decline of fish as a result of acid precipitation, and the subsequent increase in invertebrate populations (Eadie et al. 1995). Numerous other habitat quality issues have been implicated as being deleterious to goldeneye populations (Stewart et al. 1988)

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Barrow's Goldeneye - Eastern Population

(Bucephala islandica)

Population Delineation

Three populations of Barrow's Goldeneye are currently identified on a geographical basis. A large population breeds and winters mostly west of the Rocky Mountains. Two smaller populations occur in eastern North America and Iceland (Savard 1987). A fourth population was thought to breed in Greenland but is currently thought to be absent (Boertmann 1994). Only one of the thousands of Barrow's Goldeneye banded west of the Rocky Mountains has ever been recovered in eastern North America, indicating that there is little if any exchange between these populations. The Icelandic population is sedentary and is not known to exchange with the population of eastern North America. This conclusion is supported by the near absence of dark-billed females (a characteristic of Icelandic females) in eastern North America. These populations have yet to be studied from a genetic perspective.

Distribution

Until a few years ago, the breeding area of Barrow's Goldeneye wintering in eastern North America was still a mystery. Recent studies using conventional survey techniques and satellite telemetry have identified the major breeding area (Savard and Dupuis 1999, Robert et al. 2000a,b).

Breeding Range

The exact limits (particularly the northern and eastern limits) of the breeding range of the eastern population are still largely unknown. The first breeding locations have just recently been identified, on the high plateaux north of the St. Lawrence River from the Saguenay River to at least as far as Mingan (Robert *et al.* 2000). It is probable that some Barrow's Goldeneye also breed on the high plateaux west of the Saguenay River (Savard and Dupuis 1999, Y. Hamel pers. comm., R. McNicoll pers. comm.). The first official breeding record for Québec and eastern North America was obtained in 1998 when a brood was sighted on Lac des Polices in the ZEC ("controlled hunting zone") Chauvin, a few dozen kilometers northwest of Tadoussac (at the outlet of the Saguenay River. Three other broods were subsequently (also in 1998) observed about 60 km northwest of Sept-Îles (Robert *et al.* 2000a,b). The exact boundaries of the breeding range have yet to be determined.

Migration Routes

Because of the proximity of breeding and wintering areas, migration from wintering to breeding areas is fast and direct. Satellite telemetry also indicates that the migration of males from breeding to molting areas is quite direct and overland with some birds covering 1000 km in less than two days (Robert et al. 1999).

Spring and Fall Staging Areas

A few birds may stage in the St. Lawrence River or on other available open waters while awaiting the thaw of their breeding lakes during late springs. Little is known of fall staging areas.

Molting Areas

A few molting sites have been located. Males apparently molt in different areas than females. Molting sites for males have been located in Hudson Bay, Ungava Bay, Frobisher Bay, and in northern fjords of the Labrador coast (Robert et al. 1999, 2000a, b). Females seem to molt on lakes located within the breeding area but to date only one such lake has been identified (Robert et al. 2000b). Numbers of birds at the various molting sites are not known and those sites have not yet been characterized.

Winter Range

Barrow's Goldeneye winter mostly in the St. Lawrence estuary, with a small population wintering along the Gaspé Peninsula (Robert et al. 2000b). A few birds winter in the Maritimes. No large wintering population has been located yet in the United States, although small numbers of birds do occur in several states.

Abundance

Abundance estimates are quite crude.

Breeding Grounds

Estimates based on aerial surveys for Black Ducks in the spring yielded an estimate of 1,300 to 1,700 breeding pairs (Robert et al. 2000a). However, the survey may not have covered the entire breeding range, as the northern boundary of the breeding area is still poorly defined.

Staging Areas

Relatively few data are available on abundance at spring and fall staging areas. They are known to use portions of the wintering area and in some years may concentrate in large numbers in certain locations (Robert et al. 2000a).

Molting Areas

A few molting sites have been located but estimates of abundance exist only for the Labrador coast. According to E. B. Chamberlain (fide Todd 1963), about 1,500 goldeneye were observed moulting in Nain Bay, Labrador in 1955, of which nearly half were apparently Barrow's Goldeneye. According to Daury and Bateman (1996), 24 and 132 Barrow's Goldeneye were also observed in Ramah Bay, Labrador, in 1981 and 1984, respectively. Observers reported a total of 54 birds in Hebron Fjord, Labrador, in four years of observations between 1981 and 1994 (Daury and Bateman 1996).

Wintering Grounds

Estimates based on winter surveys in Quebec and the Maritimes point to a population of about 4500 birds, which is quite close to the breeding estimate with the addition of non-breeding birds (Robert et al. 2000a).

Population Trends

Compilation of the EPOQ database, Christmas Bird Counts aerial and ground surveys indicate that the existing data are too crude to yield meaningful estimates about trends (Robert et al. 2000a).

Harvest

Harvest data are unusable due to small sample sizes. Better harvest surveys are clearly needed for this species. Recent restrictions on harvest should have reduced the rate of harvest of the species but no data are available to confirm this.

Management and Conservation Concerns

Barrow's Goldeneye nest in tree cavities and can be affected negatively by logging operations that reduce the availability of nesting cavities and possibly increase predation rates at remaining cavities. The area logged each year in the core breeding area of Barrow's Goldeneye rose from 5000 ha in the 1970 to nearly 50 000 ha in1989. Since then, between 30 000 and 40 000 ha of forests have been logged annually within their breeding range. Wintering areas are located in areas with a high frequency of ship traffic and various toxic products heavily contaminate two sites. Introduction of fishes in fishless lakes may be reducing the quality of several breeding lakes. Hunting is still a concern, especially for young birds whose distribution in the fall is poorly known (Robert et al.2000a).

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Barrow's Goldeneye - Western Population

(*Bucephala islandica*)

Population Delineation

The distribution of Barrow's Goldeneye is discontinuous, with three distinct populations. Ninety percent (approx. 70,000-150,000) of the world's Barrow's Goldeneye breed and winter west of the Rocky Mountains, while smaller populations exist in eastern North America (approx. 2000-4000), Iceland (approx. 2000), and Greenland (no estimates; currently thought to be absent; Boertmann 1994). Little if any exchange occurs between these populations.

Distribution

Breeding Range

The breeding range of the western population extends throughout boreal forest habitats from interior and south-central Alaska and western Yukon, southward through British Columbia and southwestern Alberta, into Washington and western Montana (Campbell et al. 1990, U.S.F.W. 1999, Eadie et al. unpubl.) Small breeding populations have been reported in Oregon, California and western Wyoming. Southern populations breed at higher elevations on alpine and subalpine lakes (up to 2400m; Campbell et al. 1990).

In British Columbia, breeding areas are concentrated in the south-central Chilcotin-Cariboo portion of the province (Campbell et. al 1990, Eadie et al. unpubl.).

Migration Routes

Little is known of the spring and fall migration routes but some evidence indicates migration is fast and direct (Savard 1985) and involves small group movements (Eadie et al. unpubl.).

Spring and Fall Staging Areas

Preferences during spring and fall staging are unknown. Birds are occasionally seen in spring associated with herring spawns on the coast until inland lakes have thawed (Campbell et al. 1990, Eadie et al. unpubl.). In fall, it is thought that Barrow's Goldeneye congregate on large inland lakes until freeze up (as late as November). It is believed that these staging areas are located north of breeding sites.

Molting Areas

Little is known about molting sites, especially for females. Very few molting birds have been seen in coastal areas and therefore molting sites are believed to be inland, in areas north of the breeding and fall staging grounds (Campbell et al. 1990). Thousands of males molt on the Old Crow Flats and Yukon Flats in Alaska and the Yukon, although band recoveries from these sites come from birds breeding in Alaska (King 1963, Mossop and Hayes 1977, van der Wetering 1997). The molting locations of males and females breeding in British Columbia have not yet been identified.

Winter Range
Winter range is also poorly known but primarily covers the Pacific coast from Alaska to California (Campbell et al. 1990) with higher densities believed to exist in Puget Sound (Savard 1987). Individuals banded in British Columbia have been reported as far south as Arizona (Campbell et al. 1990). Band recoveries suggest that wintering sites do not correspond to specific breeding areas (Savard 1987).

Abundance

Estimates are sparse over most of the western population's range, especially outside of British Columbia, and often accuracy and precision of the estimates are unknown.

Breeding Grounds
Savard (1987) and Eadie et al. (unpubl.) suggest that the western population supports approximately 100,000-180,000 birds and may account for 60-90% of the world's population. The center of abundance of the western breeding population is in the central Aspen Parkland of British Columbia and consists of 70,000-126,000 birds (Bellrose 1976, Munro and Goodchild 1981) based on the Canadian Land Inventory System. Other estimates include 45,000 in Alaska, 2,400 in Washington, and 300 in Oregon (Bellrose 1976). There are no official estimates for the Yukon but Barrow's Goldeneye is ranked as the fourth most abundant waterfowl species in the Territory (Savard 1987). Small breeding populations have been reported in California and in Yellowstone National Park but no estimates have been recorded.

Staging Areas
No data are available for abundance at spring and fall staging areas. The birds are believed to congregate in large numbers on large inland lakes (Savard 1987) and may also use portions of their wintering areas.

Molting Areas
The only known molting site for the western population is on the Old Crow Flats and Yukon Flats of Alaska and the Yukon where 'thousands' of males molt but no estimate is provided (King 1963, Mossop and Hayes 1977, van der Wetering 1997).

Wintering Grounds
Winter abundance has been poorly documented, except for some crude estimates for British Columbia and Alaska. Bellrose (1976) estimated that 1200 birds winter in British Columbia and up to 5000 in some years. Audubon Christmas Bird Counts estimate the British Columbia population at 1600 (Campbell et al. 1990), whereas Eadie et al. (unpubl.) and Boyd (unpubl.) estimate there to be more than 3000 birds wintering around the city of Vancouver alone. Alaskan winter estimates are 66,500 along the Alaskan coast (Conant 1996)

Population Trends

The western population is believed to be stable or decreasing slightly although data are sparse outside of British Columbia (Savard 1987, Eadie et al. unpubl.). For most of the range, estimates about trends are undetermined; particularly in the United States where monitoring techniques do not distinguish between Barrow's Goldeneye and Common Goldeneye (Savard 1987). Audubon Christmas Bird Counts between 1969-1984 indicate little change in abundance (Savard 1987). Breeding Bird Surveys between 1966-1996 indicate 5% annual increases for British Columbia and Washington (Eadie et al. unpubl.). In Alaska, Hodges (1991) indicates an alarming

downward trend whereas U.S. Fish and Wildlife reports (1999) suggest numbers are stable. Barrow's Goldeneye is currently considered to be a Species of Continental Conservation Concern and have received Status Assessment in the United States.

Harvest

Barrow's Goldeneye is a hunted species in its autumn and winter ranges although most harvesting is from inland autumn lakes. Several harvesting estimates exist for different portions of the bird's range. Western United States estimated average annual harvest for 1971-1980 was 2691 birds/year (Carney et al. 1983). Estimates of British Columbia's average annual harvest are between 1463-2000 birds/year (Mitras 1983, 1984, 1985, Breault 1999, CWS National Harvest Survey 1974-1996). In Alaska the annual average between 1987-1997 was only 750 birds/year (Wentworth 1998). Band recoveries indicate most birds are shot close to their breeding areas (McKelvey and Smith 1990).

Management and Conservation Concerns

Concerns for the western Barrow's Goldeneye relate to the impacts of forest harvesting on nest sites as the species is believed to be limited by nest site availability (Savard 1987). Wintering populations are also vulnerable to petroleum spills on the coast. As 60-90% of the world's population breed in British Columbia, activities in this province could affect the future of this species (Savard 1987).

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Bufflehead

(*Bucephala albeola*)

Population Delineation

The breeding population of Bufflehead extends across North America's boreal forest and Aspen Parkland with wintering grounds along the Pacific and Atlantic coasts. Little is known about exchange between these wintering populations but birds breeding in Alberta are known to migrate to either coast (Gauthier 1993). Birds breeding west and east of Alberta are believed to be philopatric to the Pacific and Atlantic coasts, respectively. No genetic work has been done between the two wintering populations.

Distribution

Breeding Range

Bufflehead breed across boreal North America from interior Alaska to western Quebec, southwards to Wyoming, Oregon, and California (Erskine 1972, Bellrose 1980, Gauthier 1993). Ninety percent of the population is believed to breed from Manitoba westward.
Bufflehead are absent from high mountainous areas, preferring elevations between 300-1430m.

Migration Routes

Fall migration for birds breeding west of the Rocky Mountains is westward to the Pacific coast traveling through interior British Columbia and the Pacific Northwest, or southward along the Alaskan coastline (Erskine 1972). Birds breeding in the Northwest Territories and east of Alberta migrate east to the Atlantic and south to the Gulf Coast traveling over the Midwest and Great Lakes (Gauthier 1993). Alberta breeders migrate east (47% of band recoveries, n=211), west (35%), and southwest (18%). Birds migrating southwest travel through the Central Flyway (Gauthier 1993). Spring migration routes are the reverse of those in fall.

Spring and Fall Staging Areas

Little has been documented about the spring and fall staging areas of Bufflehead but they are believed to congregate on large lakes or in major river systems until freeze-up in the fall, or immediately after thaw in the spring (Erskine 1972, Bellrose 1976, Gauthier 1993).

Molting Areas

No published information is available for molting areas although in central British Columbia molting birds are being banded on inland ponds of the Chilcotin-Cariboo region (unpubl. data). Banding efforts between 1997-1999 indicate large numbers of molting birds, none of which appear to be breeding on these lakes.

Winter Range

Most of the N.A. Bufflehead winter along the Atlantic coast from the Maritime Provinces south to Mexico. Birds breeding west of the Rocky Mountains winter along the Pacific coast from Alaska to Baja, California (Campbell et al. 1990).

Abundance

Breeding Grounds
The continent-wide population estimate for 1992 was 1.4 million (Gauthier 1993). Ninety percent of breeding Bufflehead are believed to be located from Manitoba westward. (Gauthier 1993). Although no estimates are provided, highest densities of breeders between 1955-1992 were located in the Athabasca River delta in northern Alberta (Gauthier 1993).

Staging Areas
No abundance data are available for staging areas.

Molting Areas
No abundance data are available for molting areas.

Wintering Grounds
Although no estimates exist, it is believed that most of the 1.4 million Bufflehead winter along the Atlantic coast from the Maritime Provinces south to Mexico. Birds breeding west of the Rocky Mountains winter along the Pacific coast from Alaska to Baja, California (Campbell et al. 1990). The densest Pacific population is thought to be around southern Vancouver Island, British Columbia (Vermeer 1982, Gauthier 1993). Conant (1996) estimated 45,000 birds wintering off the coast of Alaska.

Population Trends
Although no reliable estimates exist, Bufflehead population numbers are generally considered to be stable or increasing (Gauthier 1993). Bufflehead numbers were severely reduced by over-hunting at the turn of the century (Erskine 1972) but protection under the Migratory Birds Convention has allowed steady increases over much of the bird's range. Audubon Christmas Bird Counts between 1927-1966 showed population increases, especially in the east (Erskine 1972). Breeding Waterfowl Surveys between 1955-1992 show Bufflehead increasing at a rate of 13,200 birds/year (Gauthier 1993). However, population declines have been reported in Alaska since 1979 and in the Prairie Provinces between 1980-1989 (Gauthier 1993).

Harvest

Bufflehead are hunted on their autumn and winter ranges although most harvest occurs at inland autumn lakes. Several harvest estimates exist for different portions of the bird's range. Across the entire range, Bufflehead numbers were severely reduced by over-hunting at the turn of the century (Erskine 1972). Between 1988-1991 the annual harvest in North America averaged 111,084 birds, with 72% of the harvest being in the United States (Martin et al. 1990, 1992, Levesque et al. 1993). Harvest estimates for British Columbia between 1974-1996 averaged between 2406-2678 birds/year (Breault 1999, CWS National Harvest Survey 1996). Estimates from Alaska between 1987-1997 averaged only 291 birds/year (Wentworth 1998). In general, harvest rates have declined in Canada since the 1970's and increased only slightly in the United States, particularly in the east.

Management and Conservation Concerns

Concerns for breeding Bufflehead relate to the impacts of forest harvesting on the availability of suitable cavity trees for nest sites. Breeding populations are also threatened by agricultural expansion across the prairies. Wintering populations are vulnerable to petroleum spills on the coast.

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Common Merganser

(Mergus merganser)

Population Delineation

No geographic variations of the Common Merganser have been documented within North America (Mallory and Metz 1999). Worldwide, three subspecies are recognized, one in North America, and two across Eurasia (Johnsgard 1979). However, no detailed genetic studies of the species have been done in North America.

Distribution

Common Mergansers breed throughout the forested boreal portion of the Holarctic region.

Breeding Range

In Canada, Common Mergansers breed in every province and territory. They are common in southeast Alaska. West of the Great Plains, in the continental U.S., they breed from the Canadian border to northern California, throughout Montana, Wyoming, and central and western Colorado. Eastward, they breed from Northern Minnesota and Wisconsin to Maine (Mallory and Metz, 1999).

Migration Routes

There is significant overlap between breeding and wintering ranges, and they migrate short to intermediate distances. They migrate overland at night and along watercourses in the daytime (Bellrose 1980). They are one of the last migrant waterfowl to move south in the fall and one of the first to move north in the spring. Immature birds are apparently the first to appear at the wintering areas (Anderson and Timken, 1972).

Spring and Fall Staging Areas

Common Mergansers often gather on available open waters in the early stage of spring migration. They can also concentrate in fish spawning areas.

Molting Areas

The molt migration is not well documented and the molting areas are poorly known. Common Mergansers are thought to molt on large northern lakes (Mallory and Metz, 1999).

Winter Range

Adult males are thought to winter farther north than immature birds (Anderson and Timken 1972). They prefer to winter on fresh, rather than salt, water. Major winter habitats include large lakes, reservoirs, rivers, estuaries, and harbors of the Atlantic and Pacific coasts (Mallory and Metz 1999).

Abundance

The Common Merganser population is not reliably known (Mallory and Metz, 1999). Because the species is usually only taken incidentally by hunters, it has not been adequately surveyed.

Breeding Grounds

Bellrose estimates the continental population at 641,000 birds. May aerial waterfowl surveys yielded a combined estimate of 1,502 000 birds for the three species of Mergansers (CWS 1986). It is the third most abundant breeding waterfowl in Ontario where the population is estimated at 220 000 birds (Mallory and Metz 1999). Another source yields an estimate of 100 000-200 000 birds for Ontario, Quebec and the Maritimes (CWS unpublished data in Mallory and Metz,1999). Breeding density estimates are available for a few areas : 7.2 pairs/100km^2 for the Clay Belt region, 10.5/100km2 for the Precambrian Shield habitats of Ontario (Ross 1987). Higher breeding densities were found in Northwestern Ontario (26-28 pairs/100km2, Cadman et al. 1987). In Atlantic Canada, breeding densities (pairs/100km2) ranged from 0-81 in Newfoundland to 10 in Cape Breton Island, Nova Scotia (Mallory and Metz 1999). In British Columbia, densities range between 0.4-1.4 pairs/km with higher densities on streams with more fish (Wood 1986). Densities of 0.5-4.7 birds/km were found throughout the year on California rivers (Foreman 1979).

Staging Areas

No data available on the location of major staging areas and of the number of birds using these areas.

Molting Areas

No estimate available for molting sites.

Wintering Grounds

The estimated winter population of 165 000 birds (USFWS 1998), is possibly an underestimate.

Population Trends

Population trends vary regionally. CWS waterfowl surveys indicate declining populations in Québec and Newfoundland and stable populations in Ontario and New Brunswick (Hyslop 1996). Breeding Bird surveys indicate an overall positive trend, but with declines in Oregon, British Columbia, and Quebec (Sauer et al. 1997). However, the reliability of this survey for sea ducks is doubtful.

Harvest

Hunters do not favor Common Mergansers. However an estimated 13 000 birds are shot annually in the U.S. (Carney et al. 1983) and about 19 600 in Canada (Lévesque et al 1993). Returns of bird bands indicate that 56% of birds shot are females (Mallory and Metz 1999). Total harvest is estimated at only 5% of the population but local over hunting may occur in some regions (Mallory and Metz 1999). Large culling programs exist on some rivers where there are concerns regarding their impact on fisheries and aquaculture operations. This “harvest” is poorly quantified. Besides birds killed under kill permits, many are also killed illegally or special efforts are made during the hunting season to kill them.

Management and Conservation Concerns

Interactions of mergansers with fishery activities on some rivers are of concern. The position of Common Mergansers at the top of the aquatic food chain makes them particularly vulnerable to pesticides and contaminants (Braune et al. 1999). In some local areas, concentrations of mercury in mergansers are a source of concern for human health and for the reproductive success of the birds themselves (Vermeer et al. 1973, Annet et al. 1975). In heavily fished rivers, lead poisoning

from ingestion of fishing sinkers has also been identified as a source of mortality (Scheuhammer and Norris 1995). Declines in habitat quality have occurred in several parts of their breeding range due to acid rain (loss of fish populations for food) and logging activities (loss of suitably-sized trees for nesting, McNichol et al. 1990). On migration and wintering grounds river channelization and dredging, increased sediment loads from industry and agriculture, loss of coastal and interior wetlands, and increased pollutant exposure may all decrease habitat quality (Mallory and Metz 1999).

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Red-breasted Merganser

(Mergus serrator)

Population Delineation

Nothing is known on the population delineation of the Red-breasted Merganser. There are likely several isolated populations, as the species occurs on several North American coastlines (Arctic, Pacific, Atlantic) as well as in Europe (Titman 1999). One subspecies has been recognized (Salomonsen 1949, Godfrey 1986) but has been contested (Palmer 1976, Cramp and Simmons 1977).

Distribution

Red-breasted Mergansers are widely distributed. Their extensive Holarctic distribution indicates that this is a boreal subarctic species that has expanded into the arctic in postglacial time.

Breeding Range

Red-breasted Mergansers are abundant from the Aleutian Islands of Alaska eastward to northern Labrador and southward to northern British Columbia, Alberta and Saskatchewan. They are common in all eastern Canadian provinces and breed locally in northern Minnesota, Wisconsin, Michigan and Maine (Titman 1999).

Migration Routes

Red-breasted Mergansers are late migrants and late breeders. Migration starts in March and intensifies in April. They migrate along coastal areas as well as overland. Large flocks move throughout the Great Lakes in April and May. The fall migration peaks in late October and early November. Large flocks are seen on the Great Lakes during October and November.

Spring and Fall Staging Areas

Little is known about spring and fall staging areas. The species is abundant locally on the Great lakes and in marine coastal areas. Areas of concentration are poorly documented and the length of stay at these sites is not known. They can concentrate in large numbers at fish spawning sites.

Molting Areas

Males leave females in early incubation to move to molting sites. Nothing is known about the location or characteristics of these sites.

Winter Range

Red-breasted Mergansers winter from Alaska to Baja California on the Pacific coast and from the St. Lawrence estuary to south Texas on the Atlantic coast. They also winter on the Great Lakes.

Abundance

Breeding Grounds

The breeding population is estimated at 237,000 birds in the North Pacific Rim but the reliability of this estimate is unknown (Goudie et al. 1994). In eastern Canada, the breeding population has

been estimated at 1,400 individuals in Quebec, 2,200 in Newfoundland, 2,400 in Nova Scotia and 4,800 in New Brunswick yielding a total of 249,000 for Canada and Alaska (Anonymous1996). However the precision of these estimates is unknown.

Staging Areas

Poorly known. Several thousands sometimes recorded on the Great Lakes (Titman 1999).

Molting Areas

Nothing known.

Wintering Grounds

Bellrose (1976) reports wintering populations of 38,000 in the Atlantic Flyway, 14,000 in the Mississippi Flyway, 1,100 in the Central Flyway and 6,000 in the Pacific Flyway.

Population Trends

Few reliable data on trends. Breeding bird survey data indicate a decline from 1966 to 1989, but this is not a very reliable survey technique for waterfowl (Downes and Collins 1996). Christmas bird counts compared between 1959 and 1988 indicate local decreases in Maryland, North Carolina and Oregon and local increases in Colorado, Georgia, Indiana, Maine, Massachusetts, Nova Scotia, Ontario, Ohio, Pennsylvania, Texas and Wisconsin (Titman, 1999). More recent analysis of Christmas Bird Counts and more reliable surveys are needed.

Harvest

Red-breasted Mergansers account for only a very small proportion of waterfowl shot annually (Carney et al. 1983). Native harvest has yet to be quantified. Harvest estimates are thought to be as unreliable for this species as for most sea ducks.

Management and Conservation Concerns

Cases of Red-breasted Mergansers drowning in fishing nets have been documented in Iceland (Bengtson 1971, 1972). This is likely a problem in North America too, but no quantitative data exist. The principal management concern with Red-breasted Mergansers has been to reduce their impact on commercially important fish (Titman 1999).

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Hooded Merganser

(*Lophodytes cucullatus*)

Population Delineation

The Hooded Merganser is the smallest of three mergansers breeding in North America and the only one restricted to this continent at all seasons (excluding vagrants to & from Europe).

Distributio*n*

Breeding Range

The main (but discontinuous) breeding range is in southeastern Canada and eastern U.S.A. (E of 100°W and S of 50°N), excluding Newfoundland and Labrador and the Gaspé peninsula (Dugger et al. 1994). Highest breeding densities occur from central Ontario and Quebec to Minnesota (Bellrose 1976; Cadman et al. 1987; Gauthier and Aubry 1996). Like other waterfowl, its breeding is in or near wetland areas, and is also restricted to suitably forested areas (for nest-cavities, though nest-boxes are used freely). Breeding also is regular in patchy wetland habitats of coastal and intermountain areas from north California to south British Columbia. Only scattered breeding has been documented across intervening regions (western Boreal forests, Prairies, Great Plains, Cordillera, Great Basin), where densities are much lower and occupancy intermittent.

Migration Routes

Explicit information on migration is scanty and anecdotal, summarized briefly by Bellrose (1976) as mostly using Atlantic and Mississippi Flyways, supported by a few band recoveries. Although (low-density) breeding and winter ranges overlap to some extent, Bellrose's map shows the 'primary breeding area' and 'primary winter areas' as well separated. Most northward migrants apparently reach breeding range in the first half of April, and southward migration thence occurs in November. Bellrose noted some northward (molt?) migration post-breeding; this extends beyond breeding range into Labrador, central Quebec, and north Manitoba (CWS wing collection; Gauthier and Aubry 1996; AJE, pers. obs.; respectively).

Spring and Fall Staging Areas

Not known; most migrants are noted in very small groups.

Molting Areas

None known, but some (all males?) molt north of breeding range (see above). Females, perhaps, molt individually, scattered in breeding range.

Winter Range

Bellrose (1976) described and mapped 'primary winter areas' in the lower Mississippi basin, and near coasts (lagoons, estuaries), from Texas to Massachusetts and from southern California to southern British Columbia. Others pass the winter widely scattered across the southern U.S.A.

Abundance

Breeding Grounds
Dugger et al. (1994), from hunter kill and survival estimates, suggested fall flights of 270 000-385 000 but this is believed to be a substantial underestimate. Bellrose (1976), from MWI & CBC data, estimated only 76 000 (less than recent estimates of hunter kill). Rose and Scott (1994) gave no estimate for this species. The Canadian breeding population is thought to be 1/3-1/2 of total.

Staging Areas
Probably not recognizable (see above).

Molting Areas
Probably not recognizable for most of species.

Wintering Grounds
Extrapolating Florida winter counts (from Dugger et al.) across 'primary winter area' (from Bellrose), suggested at least 150 000 in SE U.S.A.; further extrapolation across the entire winter range gives a total of the same order as that by Dugger et al. (1994, above). These are no more than 'ball-park guess-timates', but approximate agreement between independent figures is encouraging. The Hooded Merganser is evidently one of the scarcer species of diving ducks here (compare Bufflehead, est. 800 000-1 100 000).

Population Trends

Little information is available. Dugger et al. (1994) quoted Mallory for Ontario and Zicus for Minnesota (pers. comms.) as to probable increases - in the 'primary breeding area'. [That may result partly from use of nest-boxes erected for Wood Ducks, of which species increase since 1920 is evident to all.]

Harvest

U.S. and Canadian hunter surveys (1970-85, quoted by Dugger et al. 1994) indicated annual kills between 70 000 and 100 000, two-thirds in U.S.A., one-third in Canada. More recent data (1986-93; Legris and Levesque 1991, Levesque and Collins 1999) showed hunter kills of 20 000-30 000/year in Canada, in general agreement with the earlier series. [This species comprises a little over 1% of the total Canadian kill, and the samples of wings on which species composition is based were small, so those estimates were rounded to one significant figure.] Nearly all the Canadian kill occurred in Ontario and Quebec.

Management and Conservation Concerns

This species is hunted only incidentally, 'to fill the bag', or for a trophy. Hunter kill, assessed approximately, was suggested to comprise about one-quarter of the fall flight (Dugger et al. 1994); that proportion is relatively high, and should be monitored. Recurring increases would warrant efforts to reduce kill. Contaminants (PCB, DDE, and Hg) were detected in generally low levels. Loss

of suitable habitat, as well as over-harvest, was believed to be responsible for declines prior to 1920 (Phillips 1926), but habitat loss trends are thought to have been reversed later (Bellrose 1976, Dugger et al. 1994).

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