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AN ARTIFICIAL NEST SITE FOR ARCTIC NESTING COMMON EIDERS

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Abstract.—Artificial structures were placed on a barrier island in arctic Alaska to provide nesting cover for Common Eiders (*Somateria mollissima*). Wooden cross-like nest sites, providing four quadrants with 20-cm high and 61-cm long boards on two sides of each quadrant, were occupied by nesting eiders. Previous research had shown that sites based on the design developed for the eastern Atlantic subspecies (*S. m. dresseri*) were not used by the arctic Alaska subspecies (*S. m. v-nigra*) perhaps due to different predation pressures in the two regions.

ESTRUCTURAS ARTIFICIALES DE ANIDAJE PARA INDIVIDUOS DE *SOMATERIA MOLLISSIMA* ANIDANDO EN EL ÁRTICO

Sinopsis.—Se colocaron estructuras artificiales en una isla de barrera en el ártico de Alaska para dar cubierta de anidaje a individuos de *Somateria mollissima*. Las estructuras en madera en forma de cruz, proveyendo cuatro cuadrantes con maderos de 20 cm de alto y 61 cm de largo en dos lados de cada cuadrante, fueron utilizados para anidar. Estudios preliminares mostraron que estructuras basadas en el diseño creado para la subespecie del Atlántico (*Somateria mollissima dresseri*) no eran utilizadas por la subespecie del ártico de Alaska (*S. m. v-nigra*) tal vez debido a diferencias en la presión ejercida por depredadores entre las dos regiones.

The nearshore waters of the Alaskan Beaufort and Chukchi seas include several barrier island chains that are important nesting areas for waterfowl and seabirds, including the Common Eider (*Somateria mollissima*) (Divoky 1978). Common Eiders are one of the most common breeding birds on the northern Alaska barrier islands. An estimated 2000–3000 Common Eiders nests are present on the Alaskan Beaufort Sea coast (Johnson and Herter 1989) with smaller numbers on the Chukchi Sea coast (Divoky 1978). Island nesting is an adaptation to the high levels of arctic fox (*Alopex lagopus*) predation that can occur on mainland tundra. Fox predation on eggs, chicks and brooding adults is thought to be a major influence on nest-site selection in arctic birds (Larson 1960). In northern Alaska, breeding of the Common Eider is restricted to barrier islands and spits (King 1979). Nesting cover for the Common Eider typically consists of vegetation and/or driftwood and is a major factor in determining the distribution and density of nest sites on an island (Johnson et al. 1987, Schamel 1974). Most of the barrier islands, however, are low (<3 m asl) sand and gravel bars with little vegetation. Driftwood is typically sparse

FIGURE 1. Common Eider nest structure on Seahorse Island showing nest depressions. Only two nesting quadrants are present due to collapse of one of the walls.

on the islands, due to the distance from treeline and the limited ice-free period (approximately 4 mo) when driftwood is deposited. Additionally, storm surges remove driftwood from low lying islands.

Common Eider populations breeding on northern Alaska barrier islands are facing increasing perturbations associated with oil and gas development on the North Slope (State of Alaska 1994). Additionally, erosion is eliminating a considerable amount of suitable Common Eider nesting habitat. Entire nesting islands have disappeared in the past 50 yr (Neakok et al. 1985). Artificial nest sites have been used to increase nesting densities of Common Eiders in Russia, Iceland, Norway, Greenland, eastern Canada and the northeast United States (Belopolski 1961, Clark et al. 1974, Cooch 1965, Palmer 1976). Clark et al. (1974) found that artificial sites were preferred by breeding birds and had higher breeding success than natural sites. The provision of artificial nest sites in northern Alaska for Common Eiders has met with limited success (Johnson 1984, Wiggins and Johnson 1992).

The success of Common Eider nesting habitat enhancement programs elsewhere suggested that the number of Common Eiders breeding on barrier islands in Northern Alaska could be increased through the provision of artificial structures. A program of nest-site provisioning could reduce potential impacts caused by long-term disturbances or catastrophic events. This study assessed the use of artificial nest sites by Common Eiders on a northern Alaska barrier island.

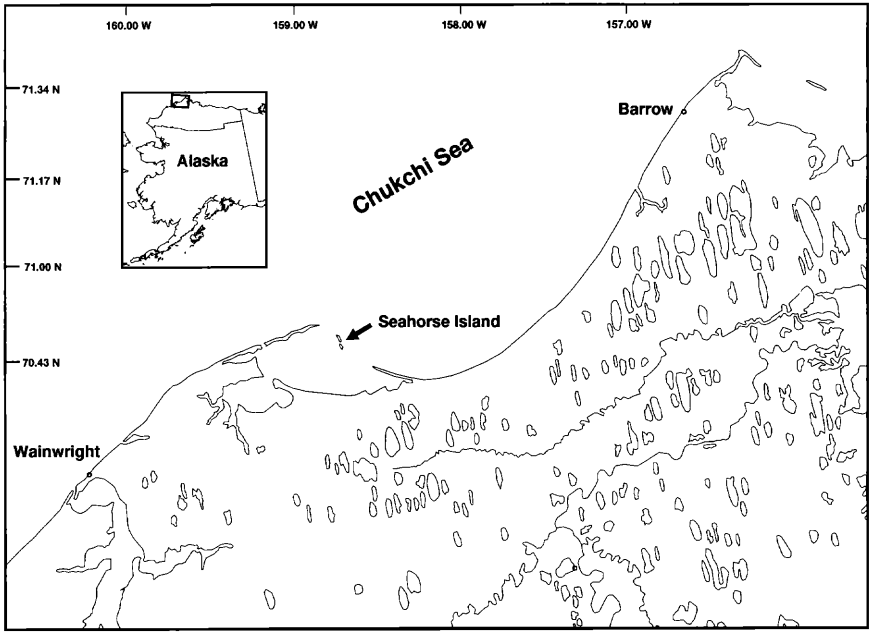

FIGURE 2. Location of Seahorse Island where artificial nest structures were provided for Common Eider.

METHODS

Figure 1 shows a nest site used in this study. It provides four quadrants as potential nest sites and no overhead cover. The design is based on the one used in the northeastern United States (Clark et al. 1974). That site consisted of a 61 × 122–cm piece of plywood supported on three sides by 15-cm boards providing a nest cavity with overhead cover. This design was tested in northern Alaska in early 1983 (Johnson 1984) with the height increased to 20 cm. The subspecies of Common Eider nesting in northern Alaska (*S. m. v-nigra*) is on average larger than the subspecies nesting in northeastern United States (*S. m. dresseri*) (Bellrose 1980). As none of these sites were occupied by eiders (Johnson 1984), we designed a site consisting of four quadrants each protected on two sides by boards 20-cm high and 61-cm long.

Twenty nest structures were placed on Seahorse Island (70°52′N, 158°41′N) 90 km southwest of Point Barrow, Alaska in the Chukchi Sea (Fig. 2) on 26 Aug. 1983. Seahorse Island is approximately 1.5 km long and 100 m wide at the widest point. Most of the island is a sand and gravel bar that is periodically flooded during fall storms. Vegetated dunes, approximately 3 m high, occupy a 200-m section in the middle of the island. The primary vegetation is beach rye grass (*Elymus* sp.). The dunes and associated natural driftwood support breeding Common Eiders, Old-

squaws (*Clangula hyemalis*), Horned Puffins (*Fratercula corniculata*), Black Guillemots (*Cepphus grylle*) and Arctic Terns (*Sterna paradisaea*) (Divoky 1978).

Between August 1983 and July 1984 most of the artificial nest structures on Seahorse Island were either burned or destroyed (R. G. Gill, U.S. Fish and Wildlife Service, Anchorage, Alaska, pers. comm.). As we believed all nest sites had been destroyed, we did not visit the island until 1992.

In August 1991 Seahorse Island was visited in the course of other fieldwork and several of the artificial nest sites were found intact. One contained two Common Eider nest depressions (J. C. George, North Slope Borough, Barrow, Alaska, pers. comm.). In August 1992 and 1993 we visited the island to determine the number of artificial nest structures present and the number of Common Eiders nesting in association with the structures, and elsewhere on the island. Six artificial nest structures were present on the island in 1992 and 1993. All were damaged and none provided potential nesting space in all four quadrants. Two structures were unusable; one having completely drifted in with sand and the other having collapsed. Of the remaining four all had one wall that had collapsed and provided a total of seven quadrants available as potential nest locations.

RESULTS

In August 1991, one of the artificial nest structures on Seahorse Island was found to have two nest depressions (Fig. 1). We determined they were Common Eider nests by identification of the down associated with the nest bowl. Both nest depressions were in the south quadrants of the nest structure. The structure was in a patch of grass.

In 1992 and 1993, we found three nest depressions associated with two nest structures. All three were in south quadrants of the structures. They were identified as Common Eider nests by the down in the nest depression. Egg shell membranes indicated that hatching had been successful in 1993. Besides the three nest depressions associated with the artificial structures, there were at least 30 other Common Eider nest depressions on the island in 1992 and 69 in 1993. In 1993 at least 20 nests were successful, based on the presence of shell membranes. In 1992, recent wind and strong rains had removed any down associated with the nests, precluding determination of nesting success or the species associated with them.

DISCUSSION

The limited information obtained from this study demonstrates that an artificial nest structure can provide suitable nesting cover for Common Eiders on northern Alaska barrier islands. All three nest bowls associated with the artificial structures were on the leeward side of the structures. Prevailing winds at Barrow, Alaska from May through July are from the east and northeast and average over 17 km/h (National Oceanic and Atmospheric Administration 1992). The artificial structures provide wind

protection for nest contents and the brooding female while possibly also creating a microhabitat that allows increased growth of vegetation. Vegetation on barrier islands on the leeward side of structures or structures that offer protection from the wind is higher than surrounding vegetation (Divoky, unpubl. data). Vegetation increases the nest concealment necessary for successful Common Eider nesting (Johnson et al. 1987, Schamel 1974).

Previous studies in northern Alaska have attempted to provide artificial nest structures for Common Eider. As mentioned above Johnson (1984) placed artificial nest structures on Spy Island in 1983. These structures were similar to those successfully used by eiders in Maine (Clark et al. 1974). They were not used in 1983 although recruitment of eiders was high (S.R. Johnson, LGL, Victoria, B.C., pers. comm.). In subsequent years some nesting cavities were found to have drifted in with sand and no nests have been found in those cavities that remain (C. Moitoret, U.S. Fish and Wildlife Service, Fairbanks, Alaska, pers. comm.). The presence of overhead cover and a cavity with only one entrance may be an important factor in reducing attractiveness of this site design to arctic nesting Common Eiders. In the northeastern United States, eiders breed on islands mostly free of terrestrial predators while aerial predators, primarily gulls, are the main cause of egg loss (Palmer 1976). In northern Alaska, gulls also prey on eider eggs (Schamel 1974), but the potential for arctic fox predation is the important determinant of which islands support Common Eider colonies (Divoky 1978). On eider farms in Iceland, artificial sites have been created to facilitate the harvesting of down but nests with overhead cover are typically avoided (R. S. Palmer, pers. comm.). Incubating Common Eiders in northern Alaska maintain visual contact with potential terrestrial predators (Divoky, unpubl. data), allowing females to flush from the nest when in imminent danger (Quinlan and Lehnhausen 1982). In a region where terrestrial predators are numerous, a site with overhead cover and a single entrance could jeopardize the safety of incubating females.

Nest sites have also been created in northern Alaska through the movement and repositioning of natural driftwood. These sites were occupied at a relatively high rate. Of 15 nest sites created on Stump Island, seven were used by Common Eiders and one was used by a Glaucous Gull (Anonymous 1980). Of 81 driftwood structures created on Spy Island in 1983, two were used by nesting eiders (Johnson 1984). More recently, Wiggins and Johnson (1992) placed and repositioned driftwood on the Endicott causeway in the nearshore Beaufort Sea near the Prudhoe Bay oil fields. Three nest depressions were found in this repositioned driftwood although only one nest was built. Wiggins and Johnson (1992) also transplanted *Elymus* on portions of the causeway and one nest was placed in these transplants. Supplementing and repositioning natural driftwood provides the advantage of a natural setting when compared to sites created from finished lumber. The limited availability of driftwood on many barrier islands provides a major disadvantage. The placing of artificial

nest sites eliminates the difficulty of a shortage of driftwood and may allow for possible colonization of islands not previously inhabited by Common Eiders. The Black Guillemot (*Cepphus grylle*), a cavity nesting species, has been able to expand its range and numbers in arctic Alaska by breeding in manmade structures on barrier islands (Divoky 1978, Divoky et al. 1974).

Evidence from extensive nest shelter programs in northern Newfoundland and Labrador suggests that females breeding for the first time were more likely than experienced birds to use artificial sites (Goudie and Ryan 1992). Annual breeding success in Common Eiders can be highly variable (Milne 1974) resulting in high annual rates of recruitment. In those years of increased recruitment rapid occupation of nest sites may occur (I. R. Goudie, Canadian Wildlife Serv., Delta, B.C.).

Human activity in the nearshore waters of northern Alaska has the potential of causing local reductions in the number of Common Eiders nesting on barrier islands. Causeways have increased the potential for fox predation on a number of islands and drilling activities near many of the barrier islands have increased the level of disturbance. Provision of artificial nest structures could be used to increase nesting on undisturbed islands and minimize the reduction of the regional population. Additionally, nest site provisioning could be used as a restoration technique following reductions caused by chronic or episodic impacts. The utility of artificial nest sites in increasing a population will depend on the extent that the population is limited by prey availability and/or predation not related to the type and number of nest sites. The results of this study, although only qualitative, show that Common Eiders will use artificial nest structures in northern Alaska.

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