BREEDING OF THE BLACK GUILLEMOT IN NORTHERN ALASKA

GEORGE J. DIVOKY[1]

GEORGE E. WATSON
National Museum of Natural History
Smithsonian Institution
Washington, D.C. 20560

AND

JAMES C. BARTONEK
Bureau of Sport Fisheries and Wildlife
1412 Airport Way
Fairbanks, Alaska 99701

Ornithologists have frequently recorded the Black Guillemot (*Cepphus grylle mandtii*) at Barrow, Alaska. Most records are for the winter months when birds are present in leads in the ice, with fewer birds seen in summer (Gabrielson and Lincoln 1959:483). Breeding in the area has been suspected by Bailey (1948:257) and Gabrielson and Lincoln (1959:483). Although Barrow has been the site of rather intensive ornithological collecting and investigations since the 1880s, the first breeding record was not obtained until 1966 when two pairs were found breeding near Point Barrow (MacLean and Verbeek 1968). The only other known nesting record for the species within Alaska is at Cape Thompson where an estimated eight pairs were believed to be breeding in 1960 (Swartz 1966). In view of the paucity of breeding records, we were surprised to find a total of 17 nests in 1972 at three separate localities within 85 km of Barrow. The data we gathered on nest site selection, nesting success, and other aspects of breeding biology during the breeding seasons of 1972 and 1973 illustrate many of the problems faced by breeding Black Guillemots in northern Alaska.

NESTING LOCALITIES AND NEST SITES

Nests were found on Seahorse, Cooper, and Igalik islands, three of the many barrier islands occurring in the Chukchi and Beaufort seas off the north Alaskan coast (fig. 1). The barrier islands are mostly low bars of sand or gravel that parallel the coast and lie within 24 km of the mainland. They typically have little if any vegetation. Ice surrounds the islands until early or mid-July. In August and September waves are sometimes high enough to wash over the islands. The water surrounding the islands usually freezes in late September or early October.

Seahorse Island, visited on 6 and 31 July, is approximately 1.8 km long and 0.2 km wide. The island is somewhat atypical for a barrier island since 5-m high sand dunes are present on approximately a hectare of the island (fig. 2a). The dunes support a cover of low grass, primarily beach ryegrass (*Elymus arenarius*) and secondarily an alkali-grass (*Puccinellia* sp.). The protection offered by the dunes has allowed a large pile of driftwood to form on the landward side of the island (fig. 2a). While driftwood is common on the barrier islands, it usually is not concentrated into piles. Of the six nests found on the island, four were in crevices in the driftwood pile; the eggs were placed in spaces between the logs (fig. 2b). Another nest was found in a small depression in the grass on top of a dune and another was in a natural burrow formed by the erosion of sand from under the layer of sod (fig. 2c). Such burrows were common in the area of the dunes and Black Guillemot footprints led into many of them though only the one nest was found.

Cooper Island was visited on 8 and 18 July, 1 and 31 August, and 5 and 10 September. It is 4.5 km long and is wide for a barrier island (0.8 km at its widest point). The island had by far the greatest amount of man-made debris of any of the islands visited. It is the first large island east of Barrow and apparently much of the debris carried from Barrow by the strong easterly current is deposited there. All of the 10 nests on this island were under man-made debris. Six nests were located under portions of 8-ft wallboards (fig. 2d). These structures consist of plank siding supported by 2- and 4-inch studs placed 16 inches apart. Nest placement under these structures varied from the end of a 2.5-m runway to the open end of the structure where the eggs were almost fully exposed. Of the four other nests, two were under inverted boxes, the third was under the collapsed end of a Jamesway hut, and another was under a piece of plywood.

Footprints in the sand indicated that guillemots had investigated much of the debris on Cooper Island. Only structures offering a well-protected nest cavity were utilized. Cargo pallets were common on the island and, except for having spaces between the overhead planks, were similar to the walling used by the guillemots. The lack of complete cover was apparently the reason why no nests were found under pallets.

Cooper Island had an excess population of adult birds that were apparently prevented from breeding by lack of sites. Storer (1952:193) suggests that guillemot population size is limited by nest-site availability. On 18 July we created a nest site by turning over a wallboard so that overhead protection was provided. On our next visit, 1 August, two eggs were found beneath the wall. Preston (1968) also found that nest sites created late in the breeding season were readily adopted by breeding pairs. Other evidence of lack of suitable nest sites was observed. Two pairs were seen entering and squabbling over a structure that contained a single nest. Another nest that contained one egg on 8 and 18 July contained two eggs on 1 August, strongly suggesting that two females had contributed to the nest. The maximum time recorded between the laying of eggs in a two-egg clutch for this species is 6 days (Preston 1968).

Igalik Island was visited on 10 September. Igalik is 3.8 km long and as wide as 0.4 km. A single unattended egg was found under a beached barge.

NESTING CHRONOLOGY

Five of the six nests on Seahorse Island were present on 6 July. The other nest was found on 31 July

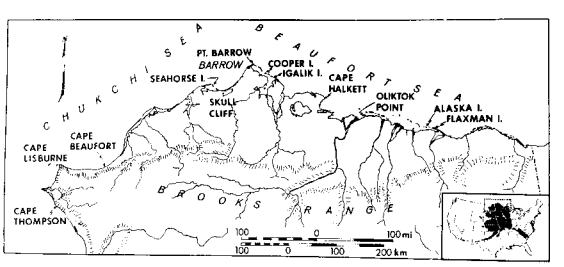

FIGURE 1. Northern Alaska, showing localities mentioned in text.

[1] Present address: Bureau of Sport Fisheries and Wildlife, 1412 Airport Way, Fairbanks, Alaska 99701.

FIGURE 2a.

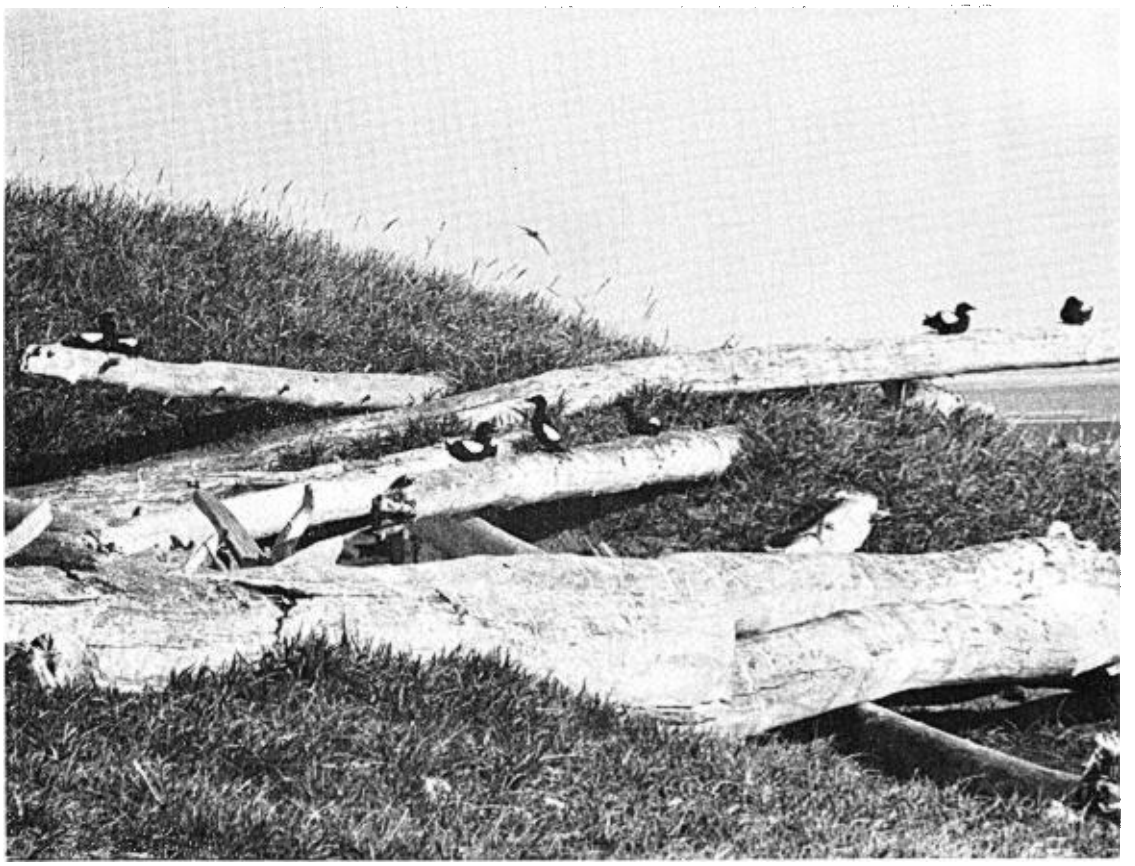

FIGURE 2b.

FIGURE 2c.

FIGURE 2d.

FIGURE 2. a. Seashore Island, showing grass covered dunes and driftwood pile used as nest site (arrow). b. Black Guillemots on driftwood pile on Seahorse Island. c. Nest of Black Guillemot in burrow on Seahorse Island. d. Black Guillemot nest site on Cooper Island.

and may have come from a pair renesting after having their first breeding attempt disrupted by predators. Eight of the 10 nests on Cooper Island were present on 8 July. New nests were found at that location on 18 July and 1 August. In addition, between 18 July and 1 August, an egg had been added to a nest with a one-egg clutch. That most laying on Cooper Island occurred in either late June or early July was demonstrated by the presence of seven recently hatched chicks and one pipping egg on 1 August. The incubation period of this species is known to be approximately 28 days (Winn 1950). Five more chicks had hatched by the 31 August visit.

Chicks fledged between 35 and 40 days after hatching. Four chicks left the nest between 31 August and 5 September. One more had fledged between 5 and 10 September. On the 10 September visit to Cooper Island, a chick was still in the nest. It had hatched from an egg laid after 18 July and would not be ready to leave the nest for another 2 weeks.

PRODUCTION

Four of the 17 nests (23%) contained single eggs, while the remainder each had two eggs. Our observed occurrence of one-egg clutches approximates the 19% found by Winn (1950) and Preston (1968). At least one of the two-egg clutches was the product of two females. Some of the one-egg clutches we found may have been due to predators removing one egg from a two-egg clutch.

Nesting success was lowest in natural nest sites. The nest in the beach ryegrass on Seahorse Island had its eggs broken before our first visit. The eggs had been preyed upon by either a gull (*Larus* sp.) or a jaeger (*Stercorarius* sp.). By the second visit to Seahorse Island, all eggs in the woodpile had been removed. Two dead adults were found next to the woodpile, and a recently abandoned campsite was located nearby. While it is almost certain that the two adults were killed by Eskimos, the fate of the eggs is not known. Human predation probably accounted for much of the egg loss, but some of the eggs may have been taken by avian predators since the eggs had been visible from above.

Of the 18 eggs on Cooper Island, 12 hatched and 5, or possibly 6, young fledged. Loss of three eggs was apparently due to their placement near the open end of a nest cavity and thus partly exposed. Gulls or jaegers probably accounted for this egg loss. Two nests were completely destroyed when wind overturned their covers. Two eggs, though fully incubated, did not hatch. Examination of four chicks found dead in the nests showed that three had died within the first week after hatching. The chicks were aged by the use of measurements presented by Winn (1950). Other studies have found a similar high proportion of deaths among young chicks (Kaftanovskii 1951; Preston 1968). Preston (1968) suggested this early mortality was due to prolonged chilling and lack of thermoregulation. The fourth dead young had died approximately 35 days after hatching because a 15-cm-long four-horn sculpin (*Myoxocephalus quadricornis*) was lodged in its throat. All four dead chicks had otoliths of arctic cod (*Boreogradus saida*) in their stomachs.

Eskimos visited Cooper Island at least twice during the breeding season but no disturbance can be attributed directly to them. A dead, adult Black Guillemot was found near one of the nest sites, but the cause of death was not determined.

The egg on Igalik Island failed to hatch, apparently due to waves washing into the nest site.

DISCUSSION

Black Guillemots typically nest in cavities in rock cliffs and crevices in talus slopes. Suitable rock cliffs closest to Barrow are at Cape Beaufort and Cape Lisburne, more than 380 km to the southwest (fig. 1). The breeding records from Cape Thompson (Swartz 1966) are for typical rock-cliff sites. North of Cape Beaufort, the coast consists of low tundra and no rock cliffs are present. One of the few locations where the coastline is elevated is at Skull Cliff, due east of Seahorse Island. Skull Cliff is as high as 20 m and Bailey (1948:257) suspected Black Guillemots might breed there. On 7 July 1972, we visited Skull Cliff and found no evidence of breeding. The cliff is primarily frozen silt, and while cavities are present at the base and top of the cliff, the constant erosion that occurs in the summer would appear to make nesting precarious.

The apparent increase in the number of Black Guillemots breeding in the Barrow area appears to be due to the increase in man-made debris. The first two nests found at Point Barrow were under man-made debris; one in an empty oil drum, and the other under a collapsed building (MacLean and Verbeek 1968). Of the 17 nests we found, 11 were in man-made structures. More importantly, all of the successful nests we found were in artificial sites.

The Black Guillemot is known to be plastic in its choice of nest sites; the primary requirement is cover (Storer 1952:144). Natural cover such as the drift logs and natural burrows we found on Seahorse Island is not of recent origin and Black Guillemots have probably attempted breeding in such sites in northern Alaska for some time. Rarely, however, would such natural cover offer eggs enough protection from jaegers, Glaucous Gulls (*Larus hyperboreus*), and arctic fox (*Alopex lagopus*). In all situations where we found eggs that were not well hidden in a nest cavity, the eggs were either broken or gone on the following visit. The artificial sites utilized on Cooper Island allowed nesting success similar to that found at typical rock-cliff sites. Hatching success on Cooper Island was 67%. Winn (1950) found 52% and Preston (1968) 53% of the eggs hatching at Kent Island, New Brunswick. If we assume the last chick fledged, 50% of the chicks fledged on Cooper Island, which is the same percentage as that found by Winn (1950) but lower than the 88% found by Preston (1968).

Man-made debris has provided nest sites for the Black Guillemot in northern Alaska, but the accumulation of the debris on the barrier islands may be of critical importance for successful nesting. Disturbance by humans is much less common on the islands than on the mainland. Eskimos camp and travel regularly along the mainland beach in summer. While Eskimos visit some of the islands in early summer to collect eggs, the nest sites of the Black Guillemot would probably not normally be disturbed. Barrier islands also offer protection from the arctic fox. Nest predation by the arctic fox is apparently the reason why Oldsquaw (*Clangula hyemalis*), Common Eider (*Somateria mollissima*), Sabine's Gull (*Xema sabini*), and Arctic Tern (*Sterna paradisaea*) breed mostly on offshore islands (Larson 1960).

Nesting soon after inshore waters become open is important for Black Guillemots in northern Alaska

due to the short period of open water and the long nesting period (approximately 68 days) of the species. The chick produced from an egg laid after 18 July would not be able to leave the nest until the last week in September. By mid-September inshore waters can be frozen and snow coverage can be extensive. On the 10 September visit, snow was drifted around the nest structure and the parents had pushed it away to gain access to the nest. An insufficient period of open water is the apparent reason for the absence of breeding Black Guillemots in the western Canadian Archipelago (Storer 1952:198).

East of Barrow the Black Guillemot is uncommon. Though Storer (1952:200, fig. 17) shows the breeding range of the species extending east along the Beaufort Sea coast to Canada, our nesting records are the first from the Beaufort Sea. Pelagic observations show the Black Guillemot to be common in the Chukchi Sea (Divoky 1972; Watson and Divoky 1972), but rare in the Beaufort Sea except near Barrow (Frame 1973; Watson and Divoky, unpubl. data). We visited 20 islands east of Igalik, but while suitable debris was present on many islands, no evidence of Black Guillemot nesting was found. Our only sightings east of Igalik were of a single bird at Alaska Island on 21 July 1971 and two birds were seen at Flaxman Island on 6 August 1972. There are only two other records for the inshore waters of the Beaufort Sea: Fiscus (Gabrielson and Lincoln 1959:484) saw a single bird off Cape Halkett on 22 August 1952, and Hall (1972) saw one at Oliktok Point on 16 July 1971. Human activity on the Beaufort Sea coast has increased greatly in recent years and man's wasteful littering practices may provide nest sites which could extend the breeding range of the Black Guillemot eastward.

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LITERATURE CITED

BAILEY, A. M. 1948. Birds of arctic Alaska. Colorado Mus. Nat. Hist., Popular Ser. 8:1–317.

DIVOKY, G. J. 1972. The pelagic birds and mammals of the Chukchi Sea in fall. Unpublished M.S. Thesis, Michigan State Univ., East Lansing.

FRAME, G. W. 1973. Occurrence of birds in the Beaufort Sea, Summer 1969. Auk 90:552–563.

GABRIELSON, I. N., AND F. C. LINCOLN. 1959. The birds of Alaska. The Stackpole Co., Harrisburg, Pa., and Wildl. Mgmt. Inst., Washington, D.C.

HALL, G. E. 1972. A summary of observations at Oliktok Point-summer 1971, p. 245–275. *In* P. J. Kinney, D. M. Schell, V. Alexander, D. C. Burrell, R. Cooney, and A. S. Naidu [eds.], Baseline data study of the Alaskan arctic aquatic environment, Univ. of Alaska Inst. Marine Sci. Rept. R72-3. 275 p.

KAFTANOVSKIĬ, Y. M. 1951. Chistikovye ptitsy vostochnoi Atlantiki (Alcids of the eastern Atlantic). Materialy k Poznaniĭu Fauna i Flory SSSR. Nov. Ser. Odt. Zool. 28:1–170.

LARSON, S. 1960. On the influence of the arctic fox *Alopex lagopus* on the distribution of arctic birds. Oikos 11:276–305.

MACLEAN, S. F., JR., AND N. A. M. VERBEEK. 1968. Nesting of the Black Guillemot at Point Barrow, Alaska. Auk 85:139–140.

PRESTON, W. C. 1968. Breeding ecology and social behavior of the Black Guillemot, *Cepphus grylle*. Ph.D. Thesis, Univ. Michigan, Ann Arbor.

STORER, R. W. 1952. A comparison of variation, behavior, and evolution in the sea bird genera *Uria* and *Cepphus*. Univ. California Publ. Zool. 52: 121–222.

SWARTZ, L. G. 1966. Sea-cliff birds, p. 611–678. *In* N. J. Wilimovsky and J. N. Wolfe [eds.], Environment of the Cape Thompson region, Alaska. U.S. Atomic Energy Comm. Div. Tech. Inf. 1250 p.

WATSON, G. E., AND G. J. DIVOKY. 1972. Pelagic bird and mammal observations in the eastern Chukchi Sea, early fall 1970. U.S. Coast Guard Oceanographic Rept. 50:111–172, 90a–129a.

WINN, H. E. 1950. The Black Guillemots of Kent Island, Bay of Fundy. Auk 67:477–485.

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SYMPATRY AND INTERBREEDING OF HERRING AND GLAUCOUS-WINGED GULLS IN SOUTHEASTERN ALASKA

SAM PATTEN, JR. AND A. R. WEISBROD

U.S. National Park Service Resource Group
College of Forest Resources AR-10
University of Washington
Seattle, Washington 98195

Williamson and Peyton (Condor 65:24, 1963) collected a series of specimens intermediate in plumage characters between the Herring Gull (*Larus argentatus*) and the Glaucous-winged Gull (*Larus glaucescens*) from the Cook Inlet region near Anchorage, Alaska. The authors suggested that sympatry between breeding Herring and Glaucous-winged Gulls may also occur in southeastern Alaska. This report presents evidence for interbreeding in another region of sympatry.

We spent the summers of 1971 and 1972 studying the marine avifauna of Glacier Bay National Monument in southeastern Alaska, where we found Herring and Glaucous-winged Gulls nesting together in at least three colonies. Other gull colonies within the Monument have not been investigated. These three colonies are located at Johns Hopkins Inlet, at Tlingit Point, and on North Marble Island. The colonies are found respectively on (1) a near vertical cliff; (2) a flat, low, gravelly island; and (3) sloping grassy hillsides.

During the summer of 1971, suspected intermediates were observed for several hours at the Johns Hopkins Inlet cliff colony. These gulls showed complete integradation from one form to the other in primary feather pigmentation. The following summer, 157 nest sites of gulls were studied on North Marble Island, and examination of the nest sites on North Marble Island revealed the following pairs: 152 apparent Glaucous-winged Gull pairs; 1 Herring Gull pair; 1 "typical" Herring Gull paired with a