# OCCURRENCE OF BIRDS IN THE BEAUFORT SEA, SUMMER 1969

GEORGE W. FRAME

THIS report describes the numbers and distribution of birds sighted along the 1,340 statute mile cruise track of the U. S. Coast Guard icebreaker 'Staten Island' as it penetrated the ice-covered Beaufort Sea on an oceanographic cruise 3–15 August 1969 (Figures 1, 2). My work was primarily chemical oceanography, but opportunity permitted wildlife observations for short periods throughout each 24 hours.

Sea ice 0.2–2.0 m thick was present over nearly all of the Beaufort Sea, except for a small area of open waters (3 percent of the cruise track) north of the Mackenzie River delta (Figure 1). The ship avoided the thicker and more solid ice cover, identified by aerial reconnaissance. Water depths were 1,784–3,624 m in the northern half of the cruise, and 34–920 m in the southern half. Dry bulb air temperatures varied between −2.8 to +7.1°C, and surface water temperatures ranged from −1.6 to +3.9°C. Burrell et al. (1970) reported detailed environmental data from this cruise and Frame (1972) described the mammals encountered.

## METHODS

I made observations during 152 10-minute periods (Figure 1) that occurred whenever I had a break in my other work obligations. Using 7×35 binoculars, I watched from the helicopter flight deck in the stern because more birds were visible from that position than from any other. The flight deck was 8 m above the waterline, and I easily saw birds as far away as 400 m in reasonably good weather. Nights were never completely dark, but the subdued light reduced the effective observation distance to about 200 m. Distances were estimated using the ship's length as a guide.

I continued observations throughout both day and night, counted all birds regardless of whether flying, swimming, or resting, and recorded their activities. Immediately after every period I obtained environmental data from the ship's aerographers and the vessel's geographic position, speed, and direction from the bridge. I based my estimates of the percent ice cover on the amounts in sight during each period.

## RESULTS AND DISCUSSION

I recorded a total of 1,834 birds during 86 (57 percent) of the 152 10-minute periods; no birds were seen during 66 periods. I encountered at least 10 different species, but identified only 8 (Table 1). I saw no birds whatever on 2 of the 13 days, though the bridge watch reported seeing an occasional bird.

The greatest numbers of birds occurred within 50 miles of land along the southern portions of the cruise, beginning about 50 miles east of the

TABLE 1

BIRDS SIGHTED IN THE BEAUFORT SEA DURING 152 10-MINUTE OBSERVATION PERIODS, 3–15 AUGUST 1969

| Common name | Total number sighted | | Percent of total number of birds | Number of days sighted (of possible 13) | |
|---|---|---|---|---|---|
| Pomarine Jaeger, light phase | 251 | | 13.7 | 6 | |
| Dark phase | 19 | | 1.0 | 3 | |
| TOTAL | | 270 | | | 6 |
| Parasitic Jaeger, light phase | 25 | | 1.4 | 4 | |
| Dark phase | 9 | | 0.5 | 3 | |
| TOTAL | | 34 | | | 6 |
| Long-tailed Jaeger | 191 | | 10.4 | 8 | |
| Unidentified Jaegers | 193 | | 10.5 | – | |
| Glaucous Gull | | | | | |
| First winter plumage | 17 | | 0.9 | 4 | |
| Second winter plumage | 1 | | 0.1 | 1 | |
| Subadult | 5 | | 0.3 | 3 | |
| Adult | 44 | | 2.4 | 7 | |
| TOTAL | | 67 | | | 8 |
| Ivory Gull | 2 | | 0.1 | 2 | |
| Black-legged Kittiwake, immature | 549 | | 29.9 | 5 | |
| Adult, winter plumage | 13 | | 0.7 | 1 | |
| Adult, summer plumage | 13 | | 0.7 | 4 | |
| Unidentified plumage | 13 | | 0.7 | – | |
| TOTAL | | 588 | | | 6 |
| Sabine's Gull | 304 | | 16.6 | 4 | |
| Unidentified gulls | 3 | | 0.2 | 2 | |
| Unidentified murre | 1 | | 0.1 | 1 | |
| Black Guillemot, summer plumage | 9 | | 0.5 | 5 | |
| Unidentified charadriiforms | 172 | | 9.3 | – | |
| TOTAL | 1,834 | | 100.0 | | |

Colville River delta and extending westward to Point Barrow. In this area generally 40–60 birds were seen per 10-minute period. Maxima of 139 and 141 birds were sighted during one observation at 71° 16′ N, 151° 20′ W and at 71° 36′ N, 155° 33′ W respectively. Immature Black-legged Kittiwakes (*Rissa tridactyla*) were most common and nearly twice as numerous as the next most abundant gull species, viz. Sabine's Gull (*Xema sabini*). Pomarine Jaegers (*Stercorarius pomarinus*) and Long-tailed Jaegers (*S. longicaudus*) were also common, ranking third and fourth respectively in absolute numbers (Table 1). All birds seen on the cruise were Charadriiformes.

In general, distance from land correlated inversely with the abundance of birds (Table 2). One exception, the Long-tailed Jaeger, was most plentiful 71–100 miles from land (Table 3). Black Guillemots (*Cepphus grylle*) appeared to be far-ranging, but sightings were few.

Time of day had a significant influence on the number of birds sighted.

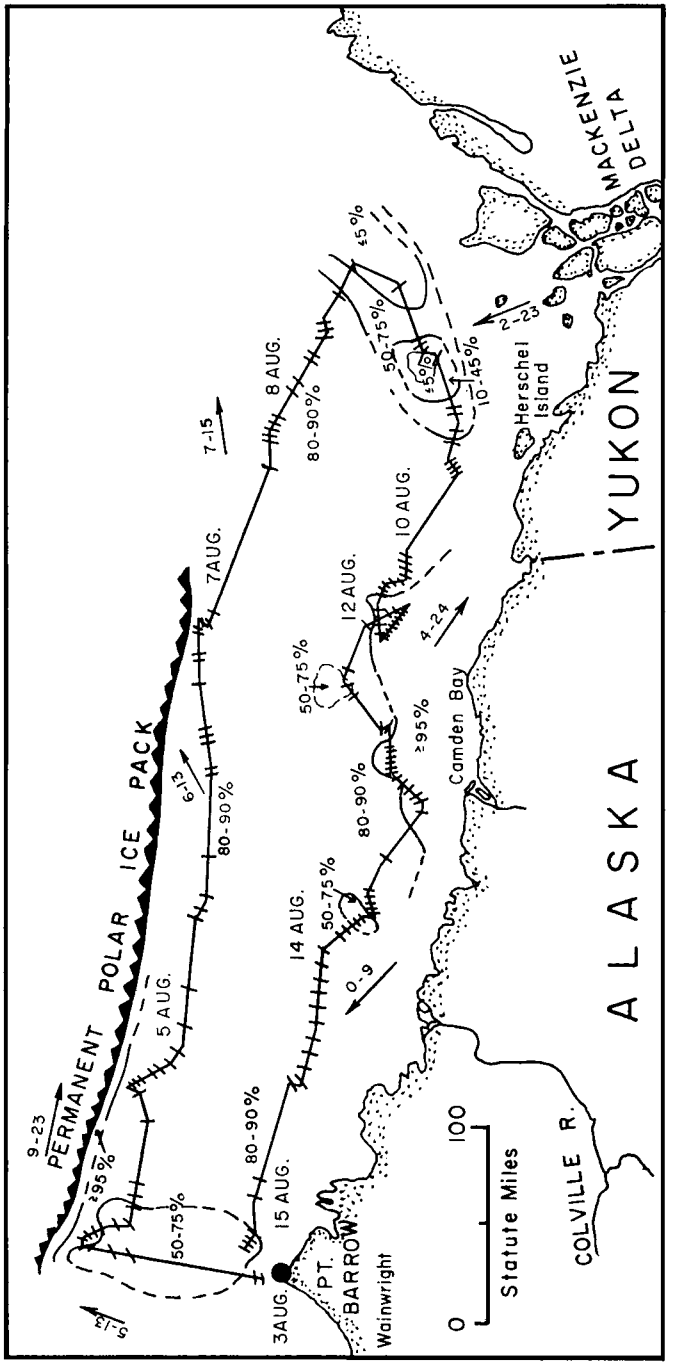


Figure 1. Cruise track of the USCGC 'Staten Island' in the Beaufort Sea 3–15 August 1969. Each of the 152 dashes represents one 10-minute observation. Percentage of ice cover is shown, and arrows indicate prevailing wind direction and speed (knots) at the time of observation.

TABLE 2

ABUNDANCE OF BIRDS COMPARED TO DISTANCE (STATUTE MILES) FROM SHORE

| | Distance from nearest land (statute miles) | | | |
|---|---|---|---|---|
| | 10–40 mi | 41–70 mi | 71–100 mi | 101–131 mi |
| Total number of birds sighted during the 13 days (1,834) | 1,185 | 374 | 249 | 26 |
| Number of 10-minute observation periods (152) | 53 | 37 | 25 | 37 |
| Mean number of birds per period | 22 | 10 | 10 | 1 |
| Number of periods during which birds were sighted (86) | 40 | 18 | 18 | 10 |
| Maximum number of birds sighted during one period | 141 | 79 | 46 | 6 |

More than three times as many birds were recorded during the period of late afternoon and evening (15:01–21:00) than during the twilight period (21:01–03:00); sightings for the rest of the day fell between these two extremes. Table 3 shows the average abundance of each species during the four time periods and indicates a diel behavioral difference between several species.

Sea ice cover ranging from 50–75 percent corresponded to the greatest number of birds seen per period. The fewest birds were met where the ice cover was less than 50 percent (Table 3). As soon the ship entered relatively open waters, most birds following in the wake immediately dispersed. The ice-free waters probably contained more birds per square mile, but it was not apparent because all species except the Glaucous Gull (*Larus hyperboreus*) tended to ignore rather than follow the ship in open water.

No estimates of population densities of gulls and jaegers were attempted because these species often followed the ship for several hours or more. Consequently some consecutive periods included the same individuals. Other species did not follow the ship; these were murres (*Uria* sp.), guillemots, and possibly phalaropes (*Phalaropus* sp.).

Data on air and surface-water temperatures, wind direction and speed, barometric pressure, and relative humidity showed no individual correlation with the distribution or abundance of birds. The greater occurrence of birds seen far at sea off Point Barrow may be a consequence of the peculiar ocean currents there. During heavy snowstorms bird activities altered to the extent that most birds were grounded, and undoubtedly I missed some birds as they rested among the jumbled, broken ice. Only 3 of 23 10-minute observations during snowstorms produced sightings. Although rain, fog, and snow flurries limited visibility nearly as much as snowstorms, 10 of

TABLE 3

MEAN NUMBER OF BIRDS SIGHTED PER 10-MINUTE OBSERVATION IN THE BEAUFORT SEA, 3–15 AUGUST 1969

| | Diel time period (Alaska Standard Time) | | | | Distance from nearest land (statute miles) | | | | Estimated ice cover (percent) | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 03:01 to 09:00 | 09:01 to 15:00 | 15:01 to 21:00 | 21:01 to 03:00 | 10 to 40 | 41 to 70 | 71 to 100 | 101 to 131 | 0 to 45 | 50 to 75 | 80 to 90 | 95 to 100 |
| Pomarine Jaeger | 1 | 2 | 2 | 2 | 4 | 2 | <1 | 0 | 0 | 2 | 2 | 2 |
| Parasitic Jaeger | <1 | <1 | <1 | 0 | <1 | <1 | <1 | 0 | 0 | <1 | <1 | <1 |
| Long-tailed Jaeger | 1 | 2 | 2 | 0 | 1 | <1 | 4 | <1 | 0 | 1 | 2 | <1 |
| All jaegers combined[1] | 3 | 5 | 6 | 3 | 7 | 4 | 5 | 1 | 1 | 6 | 5 | 3 |
| Glaucous Gull | <1 | 1 | 2 | <1 | 1 | 1 | <1 | <1 | 2 | 1 | <1 | 1 |
| Ivory Gull | <1 | 0 | <1 | 0 | <1 | <1 | 0 | 0 | 0 | 0 | <1 | <1 |
| Black-legged Kittiwake | 4 | 2 | 7 | 2 | 7 | 3 | 4 | 0 | 0 | 4 | 4 | 4 |
| Sabine's Gull | 1 | 4 | 1 | 0 | 5 | 2 | 0 | 0 | 0 | 5 | 2 | 2 |
| Murre | 0 | 0 | <1 | 0 | 0 | 0 | <1 | 0 | 0 | <1 | 0 | 0 |
| Black Guillemot | <1 | <1 | <1 | <1 | <1 | 0 | <1 | <1 | <1 | <1 | <1 | 0 |
| All species combined[2] | 10 | 13 | 16 | 5 | 22 | 10 | 10 | 1 | 4 | 18 | 12 | 10 |

[1] Includes Pomarine, Long tailed, Parasitic, and unidentified Jaegers.
[2] Includes all identified and unidentified species.

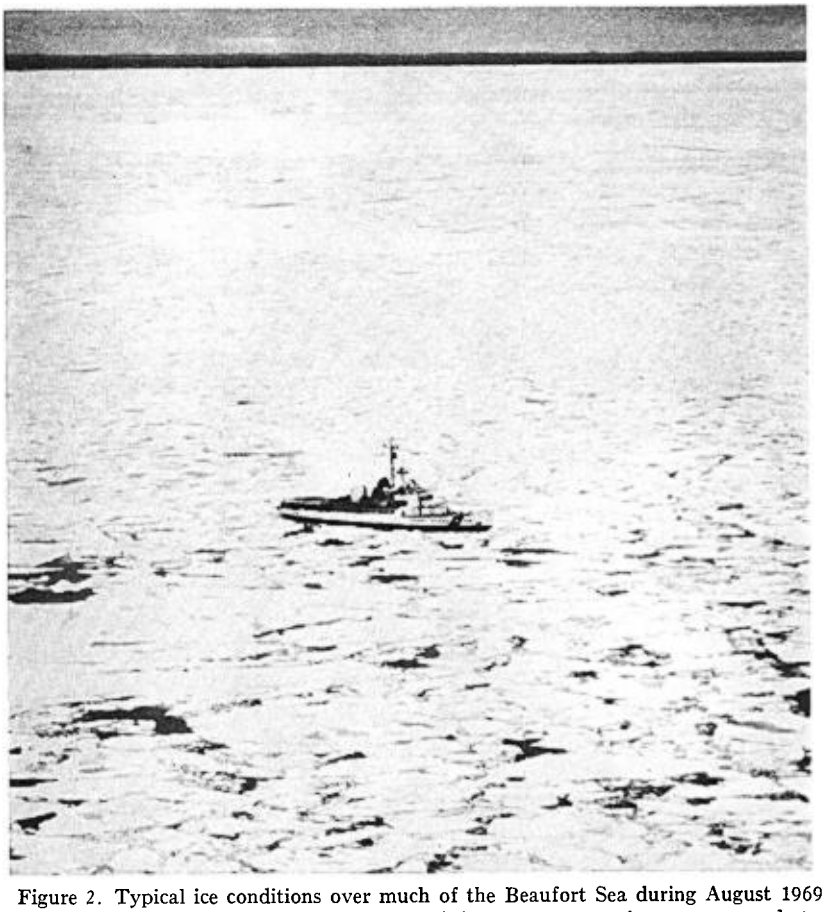

Figure 2. Typical ice conditions over much of the Beaufort Sea during August 1969. The 269-foot icebreaker USCGC 'Staten Island' in 80–90 percent ice cover was photographed by the author from one of the ship's helicopters. The coastline in the background is near Point Barrow.

the 21 observations during them produced birds sightings. Birds were encountered with greater frequency during cloudy weather (48 out of 64 observations) than during sunny conditions (25 out of 44 observations). The mean number of birds sighted per period was 18 in cloudy weather; 13 in rain, fog, or snow flurries; 8 in sunny weather; and less than 1 in snowstorms.

Most unidentified birds were probably gulls and jaegers, but two flocks of unidentified shorebirds (possibly phalaropes), one of 12 birds, the other of 28, were seen together about 47 miles northeast of the Colville River delta at 06:20 on 14 August, within sight of and about 34 miles from

land (70° 50′ N, 148° 24′ W). The flocks flew about 30 m apart in a westerly direction, 2–3 m above the ice, in a linear formation—each bird flying behind and slightly to the left of the one in front of it. A small shorebird flew by about 50 m above the ice in 14 August at 10:30 about 44 miles from shore (70° 59′ N, 148° 36′ W).

Distance or poor visibility prevented specific identification of 28 percent of the 688 jaegers sighted. All the jaegers I saw appeared to be in adult plumage. The color phases of the Pomarine and Parasitic Jaegers (*Stercorarius parasiticus*) are shown in Table 1; I made no attempt to distinguish intermediate phases. Generally two or three jaeger species foraged together in the ship's wake, and when the ship stopped they usually rested on nearby ice.

Pomarine Jaegers were more plentiful than the other two jaeger species combined and accounted for 55 percent of the jaeger sightings that I identified to species (Table 1). Of the Pomarines seen 7 percent were dark phase, compared to Bailey's (1925) 5 percent dark phase at Wainwright during summer and fall 1921. Two-thirds of the Pomarine Jaegers I saw were in groups of 1–5 (Figure 3A). The maximum number together was 35 at 71° 16′ N, 151° 20′ W. Most of these jaegers were undoubtedly non-breeders or unsuccessful nesters because breeding jaegers normally remain close to their nesting territories until at least mid-August (Pitelka et al. 1955a, 1955b; Maher 1970).

Like other jaegers, Pomarines followed in the ship's wake, often for 3 hours or more. Normally they fished for themselves between the broken ice and did not harass or steal from other birds. Jaques (1930) reported that Pomarines constantly harassed kittiwakes in the Chukchi Sea; the only harassment I saw by a Pomarine was when one joined a Long-tailed Jaeger chasing an immature Black-legged Kittiwake with a fish, unsuccessfully. I saw one adult Pomarine picking among trash thrown overboard from the ship, but others of its species ignored the refuse.

Parasitic Jaegers accounted for only 7 percent of the identified jaegers.

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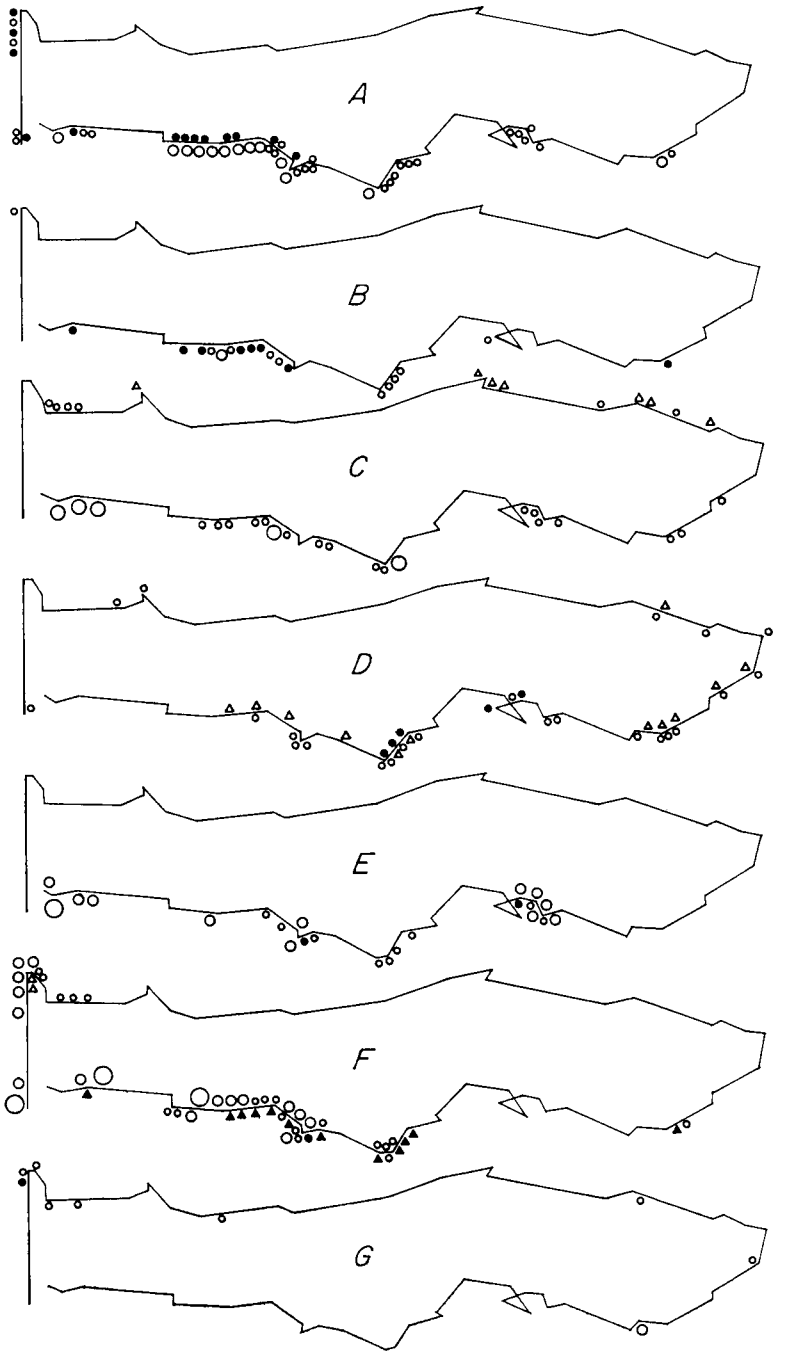
Figure 3. Occurrence of birds in the Beaufort Sea, 3–15 August 1969, during 152 10-minute observation periods. A. Pomarine Jaeger: light phase o, dark phase •, size of symbol indicates number of birds: o = 1–5, O = 6–35. B. Parasitic Jaeger: light phase o, dark phase •, numbers: o = 1–5, O = 6–8. C. Long-tailed Jaeger o, presumed Long-tailed Jaeger △, numbers: o = 1–5, O = 6–44. D. Glaucous Gull: adult o, second-winter plumage •, first-winter plumage △, numbers: o = 1–6. E. Sabine's Gull o, Ivory Gull •, numbers: o = 1–5, O = 6–30, ◯ = 80–100. F. Black-legged Kittiwake: immature o, winter plumage adult △, summer plumage adult ▲, unidentified age class •, numbers: o = 1–5, O = 6–32, ◯ = 50–100. G. Black Guillemot o, murre •, numbers: o = 1, O = 2.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Most often they occurred alone, but occasionally two or three were seen together. The maximum number of Parasitics sighted during one 10-minute period was 8 at 71° 13′ N, 149° 57′ W (Figure 3b). I never saw one harass other birds for food; 26 percent were dark phase (Table 1), compared to Bailey's (1925) one-third at Wainwright during the summer and fall of 1921. In the Chukchi Sea Jaques (1930) reported "light and dark phases in about equal numbers." Snyder (1957) suggested that the dark phase of Parasitic Jaeger is more prevalent than the light phase in the western Arctic.

Long-tailed Jaegers accounted for 39 percent of the identified jaegers. Three-quarters of the sightings consisted of 1–5 birds (Figure 3C), and a maximum of 44 was sighted during one period at 72° 36′ N, 155° 15′ W. I included presumed identifications in Figure 3C because they are of interest in that they occurred in northerly areas devoid of all other birds; but I classified them as unidentified jaegers in Tables 1 and 3. Their behavior was similar to that of the other jaegers in that they seldom attempted to appropriate food from other bird species as they followed the ship.

Black-legged Kittiwakes, the most plentiful species (Table 1), accounted for 32 percent of all the birds sighted. Where the ice cover was 80 percent or more, they flew only over the ship's wake, feeding upon the abundant small fish among the broken ice. Several recognizable individuals followed the ship continually for more than 3 hours. In more open waters (Figure 1), kittiwakes tended to wander away from the wake to forage. Whenever the ship stopped, many Black-legged Kittiwakes rested on the ice in small groups, in contrast to the jaegers, which almost always rested singly.

Of the 588 Black-legged Kittiwakes recorded, 94 percent were in immature plumage (Table 1), and 4 percent were adults, half of which were in summer and half in winter plumage. A remaining 2 percent were unidentified as to age and plumage. Confined to the western and southern legs of the cruise track (Figure 3F), the kittiwakes were never more than 100 miles from shore (Table 3). They breed on islands or cliffs in the Chukchi Sea and in the Canadian Archipelago.

Sabine's Gulls, the second most numerous species (Table 1), appeared to be restricted to within 55 miles of land (Table 3, Figure 3E). Probably these were nonbreeders or unsuccessful breeders from the North Slope. This species is the only one that showed a well-defined diel activity pattern. The greatest numbers were recorded between 09:01–15:00; none was sighted between 21:01–03:00 (Table 3).

Glaucous Gulls accounted for only 4 percent (Table 1) of the total number of birds, and 7 percent of the total number of gulls. They occurred in first-winter (26 percent), second-winter (1 percent), and adult (66

percent) plumages, and in an intermediate plumage—between second-winter and adult—that I termed "subadult" (7 percent) in Table 1. The adults may be either nonbreeders or unsuccessful breeders from the North Slope. Although few in numbers, Glaucous Gulls were sighted on 8 of the 13 observation days, which gives them the distinction of being sighted on more days than any other species except the Long-tailed Jaeger. Swartz (1967) reported that Glaucous Gulls occur frequently as far as 25 miles offshore at Cape Thompson in northwestern Alaska during August, but only occasionally at greater distances. In the Beaufort Sea I saw Glaucous Gulls with about equal frequency at 10–40 miles and 41–70 miles from shore (Table 3). Beyond 70 miles at sea I found Glaucous Gulls only northeast of Point Barrow to 72° 50′ N, and north of the Mackenzie delta (Figure 3D).

Only two Ivory Gulls (*Pagophila eburnea*) were seen during the entire cruise, one on the 8th and the other on the 12th day. Both were within 54 miles of land (Figure 3E), in 80–95 percent ice cover (Table 3), and both followed the ship, feeding with Sabine's Gulls, Black-legged Kittiwakes, Long-tailed Jaegers, Pomarine Jaegers, and Glaucous Gulls. Once two immature Black-legged Kittiwakes chased an Ivory Gull until it dropped the fish it carried, which a Pomarine Jaeger promptly recovered.

The single unidentified murre I sighted was flying northward 95 miles north of Point Barrow over 50–75 percent ice cover (Figure 1).

I recorded 9 summer-plumaged Black Guillemots on 5 of the first 7 days of the cruise (Figure 3G). Two were flying together 34 miles from the nearest land, whereas the other seven occurred as individuals feeding 40–128 miles from shore. Usually they were in the same waters with jaegers, Glaucous Gulls, and Black-legged Kittiwakes, but their behavior differed strikingly in that they did not follow the ship. Two of the Black Guillemot sightings were probably the same individual because both the ship and the guillemot drifted with the ice overnight.

## Conclusion

Little is known of the distribution of birds in arctic waters. Reports from T-3 Ice Island (Paynter 1955, Apollonio 1958) describe occasional sightings from May through September of at least six avian species from 82° 37′ N to 88° 30′ N and 75° 00′ W to 122° 00′ W. I spent 19 days on T-3 during April and May 1969 as the Ice Island drifted erratically northward from 84° 46′ N, 127° 00′ W to 84° 59′ N, 126° 15′ W. During this time of year the ice surrounding the island was as much as 4 m thick, with no open leads. Although the weather was clear and the continuous daylight was often sunny, I saw no evidence of birds or mammals during my

relatively brief visit. Several months later in the Beaufort Sea I met with better success and recorded the data presented in this paper.

The abundance of plankton and, hence, small fishes among the summer ice floes in the Beaufort Sea provided a rich feeding ground for seven regularly occurring species of birds. Areas of nearly solid ice cover were devoid of birds, while the greatest numbers of birds were seen in areas of 50–90 percent ice cover. Expanses of open water probably had higher bird densities, but numbers were not so obvious to ship observers because, not being dependent upon the ship's wake for open water, the birds were widely dispersed. Few birds were seen in the north central portion of the Beaufort Sea near the permanent polar ice pack because ice was thicker and open water scarce.

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## SUMMARY

The distribution and abundance of birds on the ice-covered Beaufort Sea were studied during an oceanographic cruise of the USCGC 'Staten Island' from 3–15 August 1969. A total of 1,834 birds, representing at least 10 species, were counted during 152 10-minute observation periods. Black-legged Kittiwakes were most abundant, but Long-tailed Jaegers and Glaucous Gulls occurred on the greatest number of days (8 of a possible 13 days).

Birds were generally most abundant within 50 miles of land, where ice was thinner and isolated areas of open water more common. A notable exception was the Long-tailed Jaeger, which was commonest 71–100 miles at sea. Most birds were sighted between 15:01–21:00 (AST) and were seen in greater abundance and with greater frequency during cloudy weather. Bird distribution appeared unrelated to water depth and the abundance of plankton. Greatest numbers were encountered in areas of 50–90 percent ice cover, but these numbers reflect birds concentrating in the ship's wake in heavy ice cover to feed on small fishes, rather than actual abundance. Areas of thick and nearly-solid ice cover were devoid of birds.

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*Institute of Marine Science, University of Alaska, College, Alaska 99701. Present address: Cooperative Wildlife Research Unit, Utah State University, Logan, Utah 84321.* *Accepted 31 July 1972.*