

Research note

Marine birds breeding in Penny Strait and Queens Channel, Nunavut, Canada

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Surveys of breeding birds on small islands in Penny Strait and Queens Channel, Nunavut Territory, Canada, were conducted in July 2002 and 2003. Approximately 3600 marine birds were observed, with the most common species being Arctic terns (*Sterna paradisaea*, N=2400) and common eiders (*Somateria mollissima borealis*, N=620). We observed no Ross's gulls (*Rhodostethia rosea*) in either year, and we found ivory gulls (*Pagophila eburnea*) only in 2003, even though these species commonly bred here in the 1970s. This previously unsurveyed region supports numerous breeding marine birds, but reproductive success on these small islands may be dependent on annual ice conditions and consequent movements of Arctic foxes (*Alopex lagopus*).

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Our knowledge of the distribution and abundance of marine birds in the Canadian Arctic remains patchy and incomplete. Many of the early expeditions to the Arctic recorded the distribution of some birds, and more recent extensive surveys or intensive research in some regions have filled in many gaps in our distribution maps (e.g. Nettle-ship 1974; McLaren 1982). In some cases, information has come from geologists who have found colonies where biologists had not visited (e.g. Frisch & Morgan 1979). Collectively, this information has helped identify most of the major sea-bird colonies in the Canadian Arctic (Brown et al. 1975). However, distributions of birds, especially those species that breed in small, dispersed colonies, remain largely unknown.

In 2002 and 2003, we surveyed some of the smaller islands in Penny Strait and Queens Channel of the central Canadian High Arctic, Nunavut. This marine area is relatively shallow with strong tidal currents, and supports recurrent areas of open water (polynyas), making it partic-

ularly important for many types of Arctic marine wildlife (Stirling 1997). Despite this, only a few islands in this area have been surveyed for birds, mostly to the east of the area we covered (Nettle-ship 1974). In general, the avifauna of this region was poorly known and had not been surveyed in over 20 years, but it was previously an important breeding area for the rare ivory gull (*Pagophila eburnea*; Haney & MacDonald 1995) and Ross's gull (*Rhodostethia rosea*; MacDonald 1978). Our goals were to: a) check on the breeding status of Ross's and ivory gulls at these important colonies; b) search for new colonies of these species; and c) document the occurrence and breeding site characteristics of other marine bird colonies in the region.

Methods

Surveys were conducted on 16 July 2002 and 10 July 2003 using a Bell 206 L4 helicopter. During

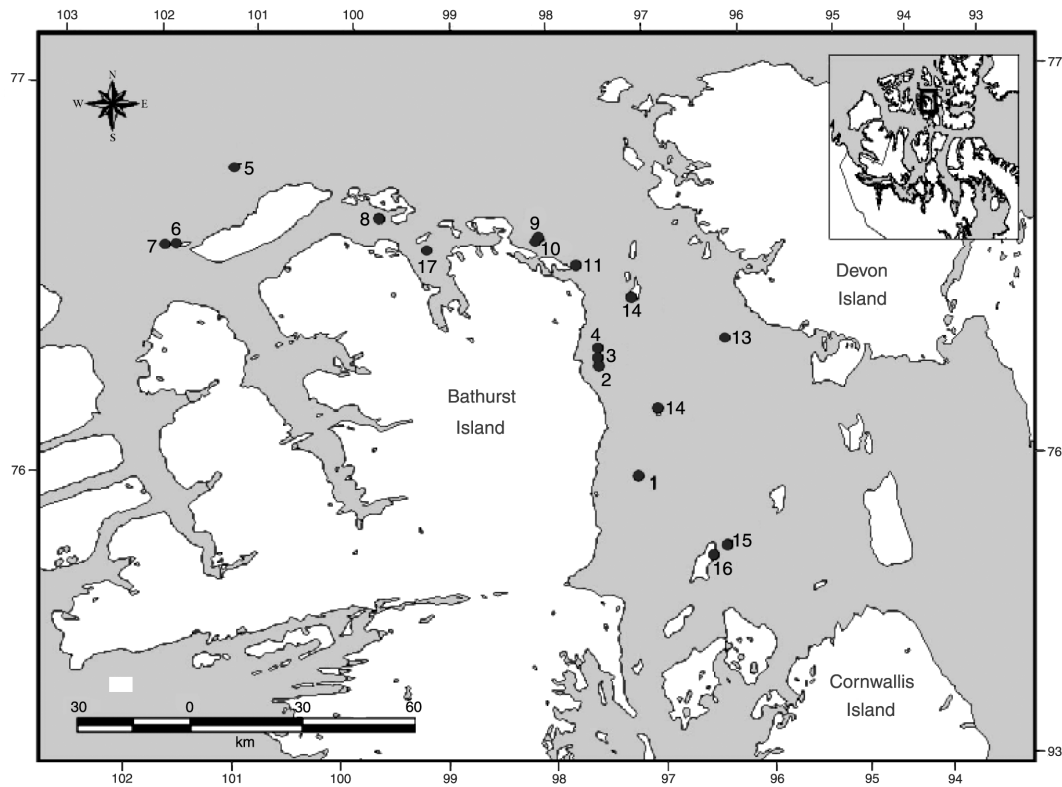


Fig. 1. Map of islands surveyed in July 2002 in Penny Strait and Queen's Channel, Nunavut. Numbers correspond to Table 1.

the surveys in both years, skies were clear (only 10% cloud cover) and there were light northerly wind conditions (approximately 15 km/h). In 2002, 100% ice cover persisted to the north and west (Parker Strait, Young Inlet), but Penny Strait and most of Queens Channel had < 10% ice cover; the choppy water surface suggested strong tides or currents around most small islands. In 2003, ice cover was more extensive, with many islands connected to nearby large islands by ice bridges.

We surveyed small islands in 2002 in the strait between 75° 48' N and 76° 41' N, and bounded in longitude by 95° 39' W and 101° 57' W. We landed on most islands and conducted surveys by foot, but in a few cases islands were very small and barren, and we surveyed while hovering at approximately 10 m altitude. Two biologists divided the islands into sections and counted nests or numbers of birds in each portion, and then tallied totals at the end of each survey. In 2003, we resurveyed Seymour Island, the Cheyne Islands and the small island east of Crozier Island.

Results

We visited 16 islands in Penny Strait and Queens Channel (Fig. 1) and to the north of Bathurst Island in 2002. We found no Ross' gulls and no ivory gulls on any of the islands during the surveys. Moreover, we did not see any evidence that they attempted to breed in 2002; in fact, we could not see any signs of recent or old nests. No individuals of either species were observed anywhere in the survey region. In 2003 we also failed to find any Ross' gulls, but 200 ivory gulls (including some breeders) were observed on Seymour Island, as well as 17 Arctic terns (*Sterna paradisaea*), 4 eastern High Arctic brant (*Branta bernicla hrota*) and 2 king eiders (*Somateria spectabilis*).

In addition to our target species, we recorded numerous new observations of marine birds in the area, as well as physical characteristics of the islands with which they were associated (Table 1). Collectively we found 12 avian species, including Arctic tern, common eider (*Somateria mollissima*

borealis), red phalarope (*Phalaropus fulicaria*), red-throated loon (*Gavia stellata*), glaucous gull (*Larus hyperboreus*), long-tailed duck (*Clangula hyemalis*), parasitic jaeger (*Stercorarius parasiticus*), common raven (*Corvus corax*), black-legged kittiwake (*Rissa tridactyla*), peregrine falcon (*Falco peregrinus*), Sabine's gull (*Xema sabini*) and eastern High Arctic brant.

A few island observations merit particular description. First, South Cheyne Island was notable because of its brilliant green moss associated with an eider breeding colony. In 2002 we found 149 eider nest cups, of which 63 were unoccupied, two had failed and 84 were active and contained eggs. Clutch sizes ranged from one to five eggs, with a mean clutch size of 3.4 ± 0.9 SD (N=84). In 2003, only 36 active nests were observed, with a

mean clutch size of 2.5 ± 1.0 SD (N=36), and 36 failed nests were observed. Interestingly, Middle Cheyne Island, about 2 km north, was also covered with moss and appeared to have supported a large bird colony, but held few birds in 2002 or 2003 and did not appear to have been active for some time. We found 30 old eider nest cups at this site. The unnamed island east of Crozier Island was also covered in moss and herbaceous growth. Skeletons of seals and bears suggested that Inuit had used this as a campsite in the past. The island supported the highest diversity and abundance of breeding birds among all islands surveyed, with many birds associated with the scattered freshwater ponds. Arctic terns had breeding colonies at both ends of the island, with a small Sabine's gull colony associated with the south-western

Table 1. Locations, characteristics and numbers of individuals of species observed on islands in Penny Strait and Queens Channel, Nunavut, July 2002. The "Ice" column indicates the presence or absence of sea ice connecting the island to the nearest shore. Species codes are: Arctic tern (AT), common eider (CE), red phalarope (RP), glaucous gull (GG), Sabine's gull (SG), red-throated loon (RTL), long-tailed duck (LTD), parasitic jaeger (PJ), Arctic fox (fox), common raven (CR), peregrine falcon (PF) and High Arctic brant (HAB).

No.	Name	Lat (°N)	Long (°W)	Distance to shore (km)	Size (km)	Vegetation >30%	Elevation (m)	Ponds	Ice	Species observed						
										AT	CE	RP	GG	SG	Other	
1	Reid	76.01	97.16	10	0.15 × 0.05	no	3	0	yes	100 ^a	14	70				
2	South Cheyne	76.29	97.52	5	0.3 × 0.1	yes	3	1	no	600 ^a	164		6 ^a		RTL (2), LTD (10)	
3	Middle Cheyne	76.31	97.52	5	1.5 × 0.1	yes	3	9	no	212 ^a		11			RTL (2), PJ (2)	
4	North Cheyne	76.34	97.52	7	0.75 × 0.1	no	3	1	no	16 ^a	2 ^a	50	2 ^a		fox	
5	Seymour	76.80	101.27	11	2.5 × 1	no	9	0	yes							
6	unnamed	76.60	101.83	1.5	3.5 × 1	no	10	0	yes							
7	unnamed	76.60	101.94	5	2 × 0.5	no	10	0	yes							
8	Harwood	76.68	99.74	2	2 × 1	no	>10	0	no	2						
9	Hooker 1	76.63	98.11	5	0.75 × 0.5	no	>10	2	no	11 ^a					CR (1)	
10	Hooker 2	76.62	98.13	3.5	2 × 0.3	no		0	no	100 ^a	13 ^a	2			LTD (3)	
11	Irving	76.55	97.72	2	0.5 × 0.5	no	5	1	no	140 ^a	12 ^a		24 ^a			
12	Hyde Parker	76.47	97.17	13	6 × 3	no		1	no	8 ^a	34 ^a					
13	Assistance	76.36	96.24	10	0.5 × 0.1	no	3	0	no	240 ^a	4 ^a					
14	Des Voeux	76.18	96.94	12	2.5 × 1	no	10	0	no				2 ^a		PF	
15	unnamed	75.82	96.31	16	3 × 1	yes	10	>5	no	900 ^a	375 ^a	100		30 ^a	HAB (6), RTL, CR (3)	
16	Crozier ^b	75.80	96.44	23	10 × 4	yes	15		no						fox, HAB (60)	
17	Young Inlet ^c	76.60	99.25						yes	60					HAB (120)	

^a Breeding was confirmed, though not all birds were necessarily breeders.

^b This island was partially surveyed.

^c Composite of birds counted along beaches of this inlet.

tern colony. In 2003, similar numbers of gulls and terns were observed on the island, but only 91 eiders were found. Finally, in 2002 we saw two Arctic foxes (*Alopex lagopus*) trapped on islands for the summer, and three islands with no birds were still connected to the mainland by ice.

Collectively, surveys of small islands in this region yielded counts of approximately 2400 Arctic tern, 620 common eider, 230 red phalarope, 200 High Arctic brant, 60 Sabine's gull and 40 glaucous gull in 2002. The partial resurvey in 2003 yielded observations of ivory gulls at Seymour Island, but lower numbers of eiders on other islands.

Discussion

Approximately 3600 marine birds were observed on or around 16 small islands in Penny Strait and Queens Channel. The extent to which we can extrapolate these numbers is unknown because our sample was not random. Larger islands may be more suitable for year-round habitation by some key predators on marine birds, notably Arctic fox, so the small islands we censused may in fact be the most suitable habitat in this region for these species, particularly for terns and eiders. Islands that remained locked in ice in July tended to support few birds, perhaps because they could be reached by foxes when the birds attempted to breed. This hypothesis was supported by the lower number of eiders observed on the resurveyed islands in 2003, a year when considerably more ice connected islands in Penny Strait.

Our survey revealed disturbing information on rare species previously known to nest in this region. The ivory gull colony at Seymour Island, a former research site (Haney & MacDonald 1995), was not occupied in 2002, and in 2003 supported only about half the number of gulls that previously bred there in the 1970s. The decline of birds from Seymour Island is consistent with other reports of ivory gull declines across the Canadian Arctic based on Inuit ecological knowledge (Mallory et al. 2003), ship-based surveys (A. J. Fontaine, unpubl. data) and other colony surveys (Gilchrist & Mallory, unpubl. data). The lack of any birds on Seymour Island in 2002, but the presence of four breeding species in 2003 suggests that a predator may have destroyed all avian nests in 2002. Interestingly, in 2002 we saw no ivory gulls anywhere in this region, so if

they failed to breed then they apparently moved out of this area. Presumably mammalian predators had not reached the island in 2003, even through regional ice cover was heavier than in 2002. Despite the variation in breeding numbers, the salient point is that fewer ivory gulls appear to inhabit Seymour Island now than in the past.

We failed to observe any Ross' gulls in this region in either year, nor any evidence of recent nesting on the Cheyne Islands. MacDonald (1978) found up to six pairs of this species breeding on these small islands in 1976 and 1978, making this the largest known colony of Ross' gulls in Canada. Birds were also observed in the area in 1974, but none were found nesting in 1977 or 1979. If this species skipped or failed breeding in both 2002 and 2003, it is odd that breeding conditions (e.g. weather, predation) were apparently suitable in both years for nests of other gulls, terns and eiders on these islands. It may be that Ross' gulls no longer nest on the Cheyne Islands.

Another surprising find was the large, verdant Middle Cheyne Island that supported virtually no breeding birds. The presence of so much vegetation on this site suggested considerable nutrient input, and hence that the island once hosted a large bird colony, probably eiders (since there were freshwater ponds on the site). Why any substantial bird colony was absent during our recent surveys is unclear, given that eiders and terns were nesting by the hundreds at the well-established colony on South Cheyne Island, 2 km away. There were only about half as many eiders observed at the two main colonies in this region in 2003 compared to 2002, perhaps in response to increased sea ice cover and corresponding enhanced ability of mammalian predators to move among islands. Nonetheless, the observation of at least 600 common eiders nesting in the region is new and important information for monitoring this species in the eastern Canadian Arctic (Goudie et al. 2000).

Although much of the survey information suggested declines or absence of some species, we did record many new observations of breeding marine birds in this region. In particular, our surveys confirmed the suspected breeding of Sabine's gulls in this area (Blomqvist & Elander 1981), and also supported the observation that this species often nests in association with Arctic terns (Day et al. 2001). The abundant tern colonies were scattered across the low, gravel islands of Penny Strait, and the preponderance of these

types of islands suggests that this marine region is an important breeding area for this species.

Our surveys provide a baseline for future comparison of populations in this region, and in particular the roles that island characteristics, annual ice conditions and movements of Arctic foxes play on breeding site selection and reproductive success of gulls, terns and eiders. Moreover, the unnamed island east of Crozier Island appears very suitable for future studies of species ecology and interactions between Sabine's gulls and Arctic terns.

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