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NESTING BY POMARINE JAEGERS NEAR BARROW, ALASKA, 1971

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Abstract.—An estimated 5.7 pairs of Pomarine Jaegers km^{-2} (14.8 mi^{-2}) nested near Barrow, Alaska, in 1971. Hatching success of 67 eggs (34 nests) was 57%. Fledging success of 44 nestlings (26 nests) was 32%. An estimated 0.4 young survived to 25 d of age per nesting attempt. Low fledging success is explained by an abrupt decline in lemming abundance.

ANIDAMIENTO DE *STERCORARIUS POMARINUS* EN ALASKA

Sinopsis.—Aproximadamente 5.7 parejas de *Stercorarius pomarinus* anidaron por Km^2 (14.8 mi^{-2}) en Barrow, Alaska durante el 1971. El éxito de eclosionamiento de 67 huevos encontrados en 34 nidos, fué de 57%. El 32% de 44 pichones (en 26 nidos) pudieron volar. Hasta la edad de 25 días sobrevivieron 0.4 de los pichones. Se sugiere que el bajo éxito de anidamiento sea el resultado de un descenso abrupto en las poblaciones de lemingos (*Lemmus trimucronatus*), y por consiguiente de alimento disponible para las aves.

Studies of avian predators in the Arctic are limited because of the unpredictable occurrence of the species' nesting. For example, over a 9-yr period (1952–1960) Pomarine Jaegers (*Stercorarius pomarinus*) near Barrow, Alaska, did not nest in 3 yrs, were less than 0.1 pair km^{-2} in 2 yrs, were 1.5 pairs km^{-2} in 1 yr, and were 7.0–7.9 pairs km^{-2} in 3 yrs (Maher 1970, 1974). Consequently, those who study avian predators in the Arctic must either be patient or employ an opportunistic approach as was done in this study.

For Pomarine Jaegers near Barrow in 1952 and 1953, Pitelka et al. (1955a) summarized incubation period, clutch size, and nesting behavior and (1955b) their breeding density, territoriality, and nesting chronology. In addition, breeding densities and nesting success near Barrow for 1952–1960 are given by Maher (1970, 1974).

During a study of breeding Lapland Longspurs (*Calcarius lapponicus*) near Barrow, Alaska (Custer and Pitelka 1977), Pomarine Jaegers nested in 1971. This study documents the breeding density, nesting chronology, and nesting success of Pomarine Jaegers and compares these data with information available in the literature.

METHODS

Pomarine Jaeger nests were monitored near Barrow, Alaska, (Fig. 1) from 27 June to 12 August, 1971. Nests were checked daily and prior to hatching were enclosed by a screen fence 8.8 m long and 31 cm high making an enclosure 2.7 m in diameter (see Maher 1970). Young were

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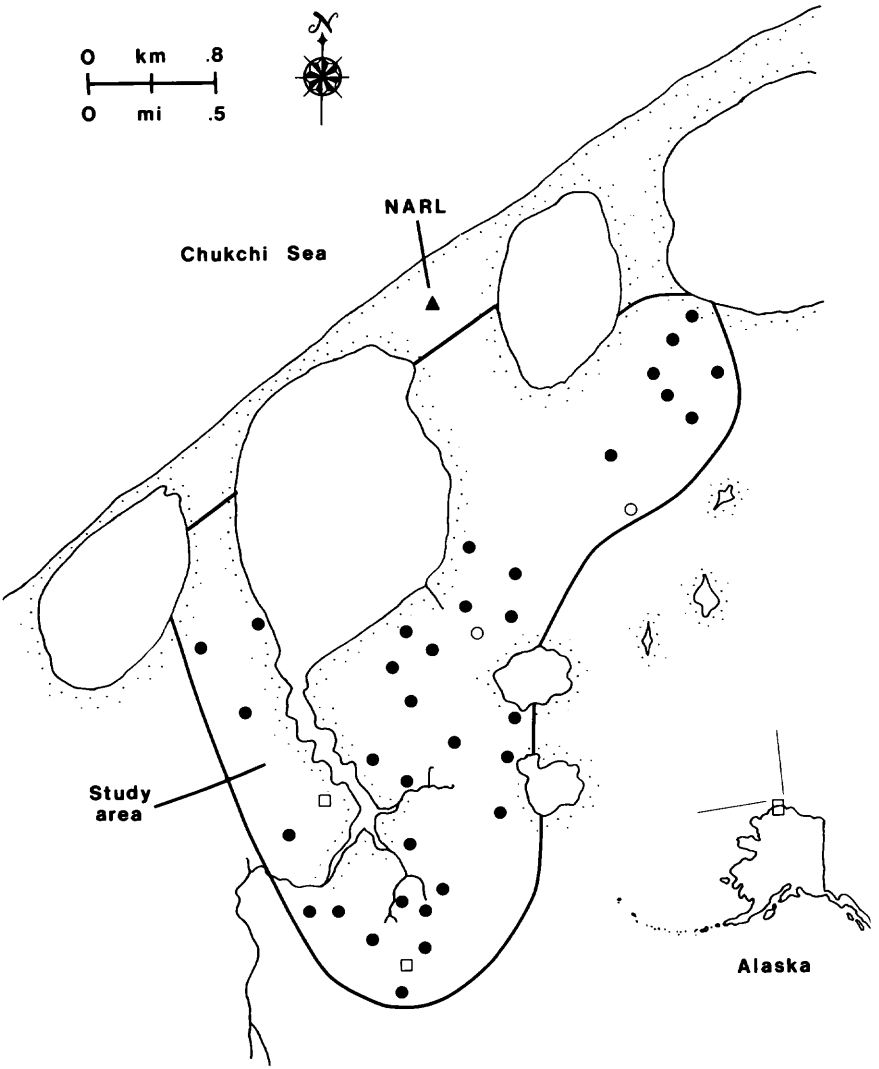

FIGURE 1. Breeding populations of Pomarine Jaegers (solid dots), Snowy Owls (open circles), and Short-eared Owls (open squares), Barrow, Alaska, 1971. The Naval Arctic Research Laboratory (NARL) is identified by a solid triangle. Stippling surrounds water.

toe clipped for identification, weighed daily, and banded at about 20 d of age. Young were monitored in the enclosure to 25 d of age. After 25 d of age, young were capable of escape from the enclosure but still not capable of flight.

Four nests were not enclosed and movements of the young were mon-

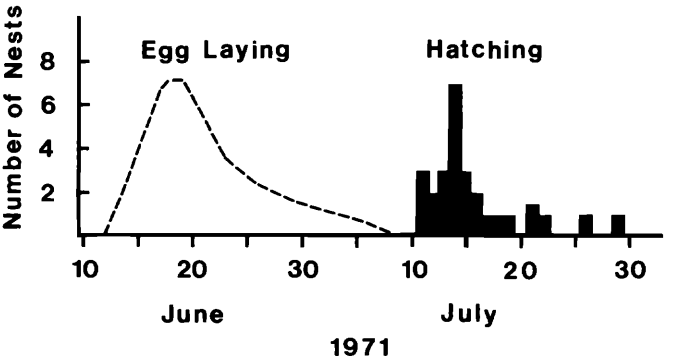

FIGURE 2. Nesting chronology of marked Pomarine Jaeger nests near Barrow, Alaska. Histogram shows date of hatching for the first egg laid. Egg laying curve is estimated from hatching data.

itored to 25 d of age. A 10 cm^2 piece of white plastic was attached with a string to one leg of these nestlings within 4 d after hatching. The plastic was easily dragged by the young bird and allowed the investigator to detect these free-roaming young. Because of the low herbaceous cover on the tundra, especially in years of lemming abundance and jaeger nesting, the string trailer did not interfere with movement.

Nesting success was calculated using the Mayfield method (Mayfield 1961, 1975). This method relies on days of nest exposure and minimizes the bias resulting from nests not found early in incubation. In calculating egg success, an estimate of 26 d was used for the time from egg-laying to hatching (Maher 1974).

RESULTS

Thirty-four Pomarine Jaeger nests were located on approximately 6 km^2 of tundra (5.7 nests km^{-2}, Fig. 1). In addition, there were 2 nests of Snowy Owls (*Nyctea scandiaca*) and 2 of Short-eared Owls (*Asio flammeus*), on the study plot.

Hatching of first eggs occurred from 11–29 July (Fig. 2). By 14 July over 50% of all nests had at least one hatched egg.

Of 34 nests examined, 33 had 2 eggs and one had 1 egg. Eggs hatched asychronously over 2–4 d. Of 18 2-egg clutches, none hatched both eggs on the same day, 7 hatched 1 d apart, 10 hatched 2 d apart, and one clutch hatched 3 d apart.

Of 67 eggs laid, 20 (29.9%) did not hatch (Table 1). Most of the losses (19.4%) were due to eggs missing from the nest. Other losses occurred when chicks died in pipped eggs (6.0%), when eggs were infertile (3.0%), or fertile but failed to hatch (1.5%).

Of 44 eggs hatched, 29 (65.9%) young did not live to 25 d of age (Table 1). Over 36% of the young were discovered dead, 21.5% were

TABLE 1. Pomarine Jaeger egg and young losses near Barrow, Alaska, 1971.

	Number of eggs or nestlings	Percent
Eggs laid	67 (34 nests)	
Losses		
Missing	13	19.4
Pipped didn't hatch	4	6.0
Infertile	2	3.0
Fertile didn't hatch	1	1.5
Total losses	20 (7 nests)	29.9
Young hatched	44 (26 nests)[1]	
Losses to 25 d of age		
Dead	16	36.4
Missing	9	21.5
Snowy Owl	2	4.5
Dog	2	4.5
Total losses	29 (13 nests)	65.9

[1] Three young and 1 nest were not included in nestling losses because of human disturbance.

missing, and 2 individuals (4.5%) were eaten by a dog. Two young may have been taken by Snowy Owls based on owl feathers in the enclosures.

Using the Mayfield method, about 57% of the eggs hatched and 32% of the nestlings survived to 25 d (Table 2). Reproductive success to 25 d, the product of these two percentages, was 18.4%. When reproductive success was multiplied by mean clutch size (1.97 eggs/nest) an estimated 0.36 young per nest attempt were raised to 25 d of age. Using the traditional method of calculating reproductive success, an estimated 24.6% of the eggs survived to 25 d of age and 0.49 young per nest attempt were raised to 25 d of age.

DISCUSSION

Pomarine Jaegers nest in relation to Brown Lemming (*Lemmus trimucronatus*) abundance (Maher 1970, 1974). Between 1967 and 1973, only 1971 had sufficient lemmings to permit jaeger nesting (for years 1967–1971, Pitelka 1973; for 1972–1973, Pitelka, pers. comm.).

Nests of Pomarine Jaegers near Barrow are highly synchronous. In 1956 and 1960 over 50% of clutches were begun (Maher 1974) within 6 d of the first egg laid. In our study, 50% of the clutches hatched within 4 d.

Pomarine Jaegers near Barrow generally lay 2 eggs, although one egg clutches occur. In 1952 all nests had 2 eggs and in 1953 5–10% of nests had one egg (Pitelka et al. 1955a). In 1956 and 1960, 5 of 91 (5.5%) nests and 7 of 118 (5.9%) nests had one egg. In this study, one of 34 (2.9%) nests had one egg.

The low survival (32%) of young to 25 d of age in 1971 seemed related

TABLE 2. Estimated reproductive success of Pomarine Jaegers near Barrow, Alaska, 1971.

	Mayfield method	Traditional method
Nest success to hatching	66.0%	79.4%
Egg success to hatching (A)	57.4%	69.1%
Nest success hatching to 25 d	45.0%	50.0%
Young success hatching to 25 d (B)	32.1%	35.7%
Egg success to 25 d (A × B)	18.4%	24.6%
Mean clutch size (C)	1.97	1.97
Number young to 25 d per nest attempt (A × B × C)	0.36	0.49

to the abrupt decline in lemming numbers over the summer (Pitelka 1973). With the decline of lemmings, avian predators started to include small birds in their diet. Of 180 Lapland Longspur young lost to predators from 1967–1973, 84 (47%) died in 1971 (Custer and Pitelka 1977). Heavy predation on sandpiper nests was also recorded in 1971 (U. Safriel, pers. comm., D. W. Norton, pers. comm.). In 1971, a Snowy Owl was recorded on film preying on young in a longspur nest (Custer 1973).

Snowy Owls also prey on jaeger nestlings. In two instances in 1971, jaeger nestlings were found missing and Snowy Owl feathers were found inside the enclosure. Maher (1974) also recorded a Snowy Owl carrying the remains of an immature jaeger.

Reproductive success to 25 d of age (18–25%) and young produced to fledging (0.4–0.5 young per nesting attempt) are intermediate to other reports. During 1952, 1953, 1956, and 1960, 30–35%, 20–25%, 4%, and 55%, respectively, of eggs laid were estimated to survive to fledging (Maher 1974). In 1956 and 1960 less than 0.1 and 1.0–1.4 young per adult were estimated to fledge per female (Maher 1974).

Thus, nesting attempts of Pomarine Jaegers over the years considered here range from zero to a high of 7.9 pairs km^{-2}, reflecting abundance of their primary prey, the Brown Lemming, at the onset of the season. In years of attempted nesting, success also varies widely, reflecting both early seasonal densities and rate of decline of prey as the season progresses. Success in 1971 was intermediate. It should be noted that the implication of relatively low overall reproductive success at a given location such as Barrow by a predator exploiting a cyclically varying prey species is misleading. The fluctuations in prey numbers are not synchronous over the arctic Alaskan coastal plain, and in successive years, jaegers settle and breed locally according to the availability of prey. For example, jaegers nested near Barrow in 1956 and not in 1957, while at Wainwright, 130 km to the southwest of Barrow, they were absent in 1956, and nested in 1957. This nomadism of the regional nesting population in the coastal plain is characteristic also of Snowy and Short-eared owls. The result is that per annum nesting success is higher than monitoring at one location reveals, but there are no geographically extensive data to estimate this success.

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