

Growth of the Northern Fur Seal Colony on Bogoslof Island, Alaska

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ABSTRACT. Northern fur seal, *Callorhinus ursinus*, pups were first observed on Bogoslof Island, southeast Bering Sea, in 1980. By 1988 the population had grown at a rate of 57%·yr⁻¹ to over 400 individuals, including 80+ pups, 159 adult females, 22 territorial males, and 188 subadult males. Some animals originated from rookeries of the Commander Islands, whereas others are probably from the Pribilof Islands. In 1983 and 1985 over 50% of the females were estimated to be > 6 years of age, based on vibrissae color. The rookery is in the same location where solitary male fur seals were seen in 1976 and 1979 and is adjacent to a large northern sea lion rookery.

Key words: Bogoslof Island, northern fur seal, *Callorhinus ursinus*, northern sea lion, breeding colony

RÉSUMÉ. Des bébés otaries à fourrure, *Callorhinus ursinus*, ont été observés pour la première fois sur Bogoslof Island, au sud-est de la mer de Béring en 1980. En 1988, la population avait augmenté à un taux de 57 %·an⁻¹ et dépassait les 400 individus. Parmi eux, on comptait 80 bébés ou plus, 159 femelles adultes, 22 mâles possédant un territoire et 188 jeunes adultes mâles. Certains animaux venaient des colonies des îles du Commandeur, alors que d'autres venaient probablement des îles Pribilof. En 1983 et 1985, on a estimé que plus de 50 % des femelles avaient plus de 6 ans, en se fondant sur la couleur de leurs vibrisses. La colonie se trouve au même endroit où des otaries à fourrure mâles ont été aperçues en 1976 et 1979, et elle se trouve à côté d'une importante colonie de lions de mer nordiques.

Mots clés: île Bogoslof, otarie à fourrure nordique, *Callorhinus ursinus*, lion de mer nordique, colonie reproductrice

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Резюме: Детеныши северных морских котиков, *Callorhinus ursinus*, были впервые замечены на острове Богослова, в юго-восточной части Берингова моря в 1980 г. С тех пор популяция возросла до более, чем 400 особей, в том числе более 80 детенышей, 159 взрослых самок, 22 территориальных секачей, и 188 холостяков. Коэффициент годового роста численности детенышей - 57,2 процента. Некоторые из животных, составляющих колонию, происходят с лежбищ в СССР, а другие, наверно, происходят с островов Прибылова. Более 50 процентов самок по цвету усов были субъективно оценены старше 6 лет. Лежбище находится в том самом месте, где единичных самцов котиков наблюдали в 1976 и 1979 г., и рядом с большим лежбищем сивучей.

INTRODUCTION

Bogoslof Island, Alaska (53°56'N, 158°02'W), began forming in 1796, the result of a volcanic eruption, and grew in size through 1823; since then it has become smaller through erosion (Zeusler, 1936). It is about 1.6 km long and 0.8 km wide and extends in a northwest-southeast direction (Fig. 1). Bogoslof Island is uninhabited by humans and lies about 105 km north of Umnak Island in the eastern Aleutian Island chain (Byrd *et al.*, 1980). Nearby Fire Island was formed in 1882 and Ship Rock, formed in 1768, had fallen back into the sea by 1890 (Morris *et al.*, 1936; Byrd *et al.*, 1980).

Three species of pinnipeds occur on Bogoslof Island, including northern sea lion (*Eumetopias jubatus*), harbor or hair seal (*Phoca vitulina*), and northern fur seal (*Callorhinus ursinus*). Northern sea lions were probably the first pinniped to occupy the island and were hunted there and at Ship Rock before 1800 by Aleuts from Unalaska and Umnak islands (Merriam, 1910). Zeusler (1936), discussing his visit to Bogoslof Island on 18-19 August 1934, reported over 1000 sea lions present; in 1985 the population included over 1200

adults and 1100 pups (Merrick *et al.*, 1987). Zeusler (1936) also reports that "whales were seen hovering around the island, and also some seals which were found on the rocks in the wake of Fire Island and McCullough Peak. The seals appeared to be fur seals, being limited in number." Positive identification of fur seals on Bogoslof did not occur until 1976 (see below). Six harbor seals were seen in 1979 by Fiscus *et al.* (1981), although the date when harbor seals first occurred on the island is unknown.

C.H. Fiscus and G. Baines visited Bogoslof Island on 26 August 1962 and saw no northern fur seals there (Fiscus, 1983). The first documented report of northern fur seals (*Callorhinus ursinus*) on Bogoslof Island was on 23 October 1976, when one adult male was seen (Fiscus, 1983). The first evidence of breeding was on 20 July 1980, when two pups were observed associated with two adult females and three adult males (Lloyd *et al.*, 1981). In this paper we summarize our recent visits to Bogoslof Island to assess the status of the northern fur seal population and describe the growth of the colony from 1976 to 1988. We also discuss future growth of the colony and its possible impact on the large northern sea lion rookery on the island.

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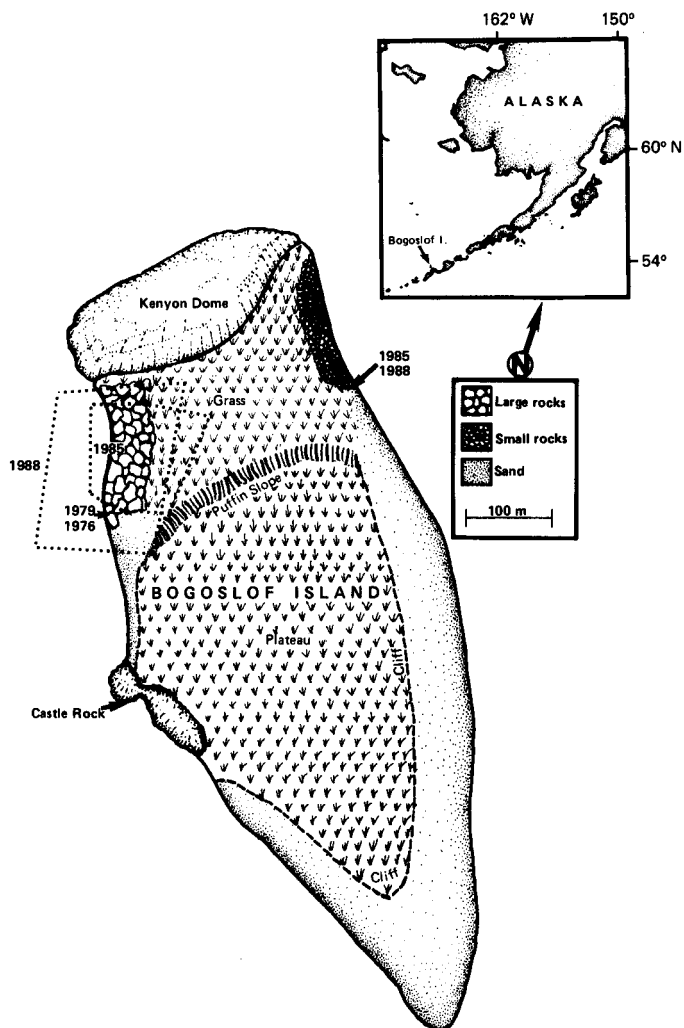


FIG. 1. Bogoslof Island, showing the location of male northern fur seals seen in 1976 and 1979 and the area occupied by the fur seal rookery in 1985 and 1988. The northern sea lion rookery occurs on the sandy beach sections of the island. (Modified from Byrd *et al.*, 1980.)

METHODS

We landed on the island to count northern fur seals in 1982, 1983, 1984, 1985, 1986, and 1988. The small size of Bogoslof Island facilitates complete surveys of the island to count pinnipeds in 2-4 hours. The counts were made by eye or sometimes using binoculars. In 1983, 1984, 1985, and 1988 all adult and subadult fur seals were herded into large groups and then counted (Fig. 2). Pups were counted by walking among the large boulders within the rookery beach. Many more pups were probably present but were not counted because they were hidden among the large rocks.

The rookery beach is located on the west side of the island among the large boulders between Kenyon Dome and Castle Rock, and it extends from the shore inland to the level area covered with rye grass, *Elymus arenarius* (Byrd *et al.*, 1980; Lloyd *et al.*, 1981; Figs. 1 and 3). Because of time limitations and the small size of the scientific party in 1982 and 1986, adults and subadults were not herded into groups but were counted from different vantage points on Kenyon Dome or on the beach near Castle Rock.

The rate of growth of the pup population was derived through a regression of the natural logarithm of pup counts on year. Values used were pup counts in July or August of the count year. The regression equation used for calculation was $\log \text{ pups} = -35.3 + 0.449 (\text{year})$.

During our 1983 and 1986 visits female fur seals were aged by the color of their mystacial vibrissae, with white vibrissae principally on animals >6 years old, a mix of white and black vibrissae on animals 3-5 years old, and black vibrissae on animals 1-3 years old (Scheffer, 1962).

RESULTS

Counts of northern fur seals on Bogoslof Island have increased from one adult male in October 1976 to over 400 animals in 1988, including 80+ pups, 159 adult females, 22 territorial males, and 188 subadult males (Table 1). There was variability in the number of adults seen from 1980 to 1988, due principally to the month of the counts and effort. Nonetheless, an increase in the number of pups born during 1980 through 1988 and in the number of adult animals is apparent. The high count of 1- to 2-year-old animals in October 1982 indicates that the island also serves as a resting location for young animals while they are in the Bering Sea, perhaps migrating from the Pribilof or Commander Islands, the only other breeding sites for fur seals in the Bering Sea.

The first documented evidence of pup production on the island was in 1980. Since 1980 the pup population has grown at a rate of $57\% \cdot \text{yr}^{-1}$ to over 80 pups in 1988 (Table 1). Pup growth, however, is unlikely to continue at this level over a long time period unless immigration continues at a high rate. The rate of increase for *Callorhinus* on the Pribilof Islands has never exceeded 8.0% and since 1975 has been decreasing or stable (York, 1987).

During 1983 and 1985 we found females of all age groups present; at least 50% of all females had white vibrissae and were probably >6 years old. This indicates that many of the females originally colonizing the island were old enough to be sexually mature and, because average age of first reproduction for female fur seals is age 5 (York, 1983), many of the females giving birth on Bogoslof Island may have given birth previously at another location.

In 1983 and 1985, we tagged adults and pups by attaching blue plastic tags to the front flippers (39 animals in 1983 and 65 in 1985). On subsequent surveys we recorded animals seen with the flipper tags. We also sighted adult fur seals of both sexes that had monel tags on their front flippers. These animals had been tagged as pups on rookeries in the Soviet Union (the Soviet Union was the only country using monel tags on fur seals, although the United States began using monel tags again in 1987). In 1983, we sighted one female that had been tagged as a pup in 1976 at Medney Island, Commander Islands. Two adult males with monel tags were also seen in 1983 but the numbers on the tags were not readable and thus we could not determine the Soviet island of origin. In 1985, three females and one male that had been tagged on Bogoslof Island in 1983 were sighted, and the female seen during the 1983 survey was resighted. In 1988, one large male with a monel tag was observed on territory. This male was probably of Soviet origin because it was too old to have been tagged by U.S. scientists. We also observed



FIG. 2. Photograph showing a group of juvenile and adult northern fur seals on Bogoslof Island during 1983. The animals were sexed, counted, and released. Castle Rock is visible in the background.

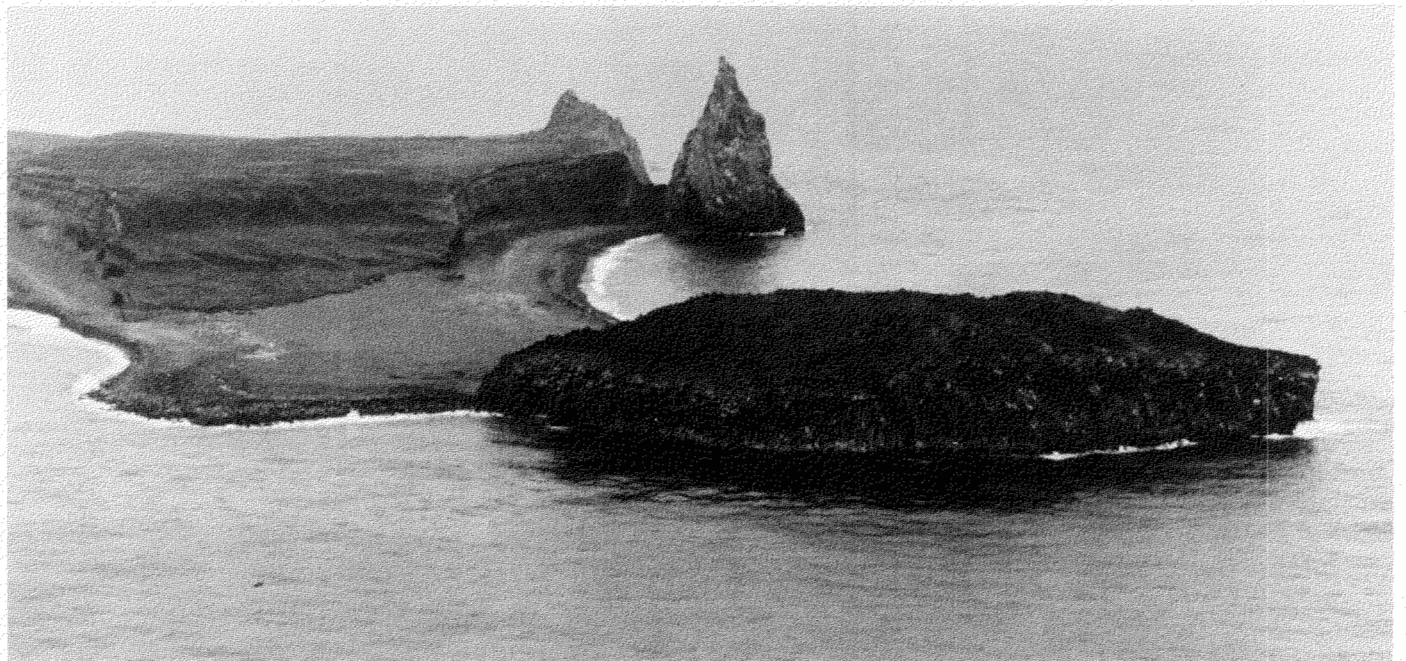


FIG. 3. An aerial photograph of Bogoslof Island in July 1975 looking south.

TABLE 1. The number of northern fur seals (*Callorhinus ursinus*) by sex observed at Bogoslof Island 1976-89

Date	Pups	Adult females	Males		Juvenile/unknown	Total
			Adult	Subadult		
23 Oct. 1976 ¹	0	0	1	0	0	1
15 July 1979 ²	0	0	1	1	0	2
20 July 1980 ³	2	2	3	0	0	7
7 July 1982 ⁴	3	3	2	0	0	8
7 Oct. 1982 ⁵	nd ⁶	12	6	9	40 ⁷	67
11 Aug. 1983 ⁵	11-13	18	11	36	0	78
31 Aug. 1984 ⁵	14	14	8	6	0	42
18 Aug. 1985 ⁵	9+	37	27	39	0	112
2 Aug. 1986 ⁵	yes ⁶	30	nd	nd	15	45
2 Aug. 1988 ⁵	80+	159	22	188	0	449
22 July 1989 ⁸	99	132	29	459	0	719

¹Fiscus, 1983.

²Fiscus *et al.*, 1981.

³Lloyd *et al.*, 1981.

⁴Personal communication from L. Morgan to T. Loughlin, 23 August 1982.

⁵This study.

⁶nd = no data; yes = pups present but no count.

⁷Probably 1- and 2-year-old animals.

⁸Data added in proof; provided by R. Merrick and J. Baker.

a tagged female with a pup; the female had been tagged on Bogoslof Island as an adult and could have been tagged either in 1983 or 1985. No tags were seen from the Pribilof Islands.

The growth of the rookery on Bogoslof Island has occurred at the same location on the island. As mentioned in Lloyd *et al.* (1981), the rookery is located in large boulders just south of Kenyon Dome at the west end of Bogoslof adjacent to a sandy beach that contains part of the northern sea lion rookery (Fig. 1). Fewer than 100 northern sea lions frequently occur along the shore on the large rocks of the rookery (i.e., the seaward side of the fur seal rookery). This is the same location where one fur seal male was sighted in 1976 and two males in 1979. Only in recent years (1985 and 1988) were fur seals seen on other beaches of the island. On those occasions they were seen among the small rocks on the beach directly east of the main fur seal rookery beach. In 1988, >100 immature males were in the grass and sand area that is the eastern part of the rookery.

DISCUSSION

Baker (1978) suggested that yearling and juvenile pinnipeds extend their nomadic range over a wide area and perform "removal" migration from one breeding colony to another, implying that they were the dominant age groups most likely to colonize new areas. His suggestion was based principally on information in Peterson *et al.* (1968) that described northern fur seals (re)colonizing San Miguel Island, California, and on other pinniped species starting to breed on islands that previously had not supported breeding colonies for some time (Radford *et al.*, 1965). For Bogoslof Island, Baker's (1978) suggestion is not valid. Animals that we aged, based on vibrissae color, were of all age groups and both sexes, and more than half of the females were >6 years of age. The animals originally came from rookeries in the Soviet Union (the nearest Soviet fur seal rookeries are the Commander Islands, about 1000 km west of Bogoslof) or the Pribilof Islands (about 210 km north of Bogoslof). We have no definitive data indicating the Pribilof Islands were

a source of fur seals for Bogoslof Island because no tagged animals were resighted there from the Pribilof Islands. However, Bogoslof Island is adjacent to the major pelagic feeding area used by fur seals from the Pribilof Islands and is situated along the migratory path to and from the Pribilof Islands (Lloyd *et al.*, 1981; Kajimura, 1984). Interestingly, a subadult male tagged at Bogoslof in 1983 was resighted in 1984 at St. George Island, one of the Pribilof Islands.

As the Bogoslof Island fur seal colony increases in abundance it may reduce numbers of northern sea lions on the island. Such an effect has been documented in the Kuril Islands, where fur seals reestablished breeding colonies and at the same time sea lion numbers declined. Kuzin *et al.* (1977) hypothesized that fur seals competitively excluded northern sea lions from the islands where both breed and forced reproductive sea lions to relocate to other sea lion rookeries. DeLong (1982) documented the interspecific interaction between northern fur seals and California sea lions (*Zalophus californianus*) on San Miguel Island, California. In DeLong's study, male fur seals exhibited boundary displays toward intruding California sea lions, resulting in the sea lions being displaced 95% of the time. As the Bogoslof Island fur seal colony grows and requires more rookery space, it will be important to document the interaction between northern fur seals and northern sea lions and the abundance trends of both species.

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