

Research on the Polar Bear in the USSR

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The polar bear, in one way or another, attracted the attention of Russian researchers even in the last century. Interesting information is contained in early geographic papers and reports on fauna. In the 1930s, a period of intensive study and the economic assimilation of the Soviet Arctic into the USSR brought about research on the taxonomy of polar bears and on the ecology of separate geographic populations. In the post-war years, interest in the polar bear in the USSR increased even more, as shown by a significant number of publications on general questions of the biology of the species and on analyses of distribution, ecology and numbers in several regions of the Soviet Arctic. As in a number of other arctic countries, in the USSR the greatest attention has been paid to the polar bear during the last 10-20 years. The immediate stimulus for research, in a practical sense linked with protection of the species, was the resolution of the Soviet Ministers of the Russian Soviet Federated Socialist Republic in 1956 for total prohibition of hunting. The Polar Bear Specialist Group of the International Union for the Conservation of Nature has also been helpful in stimulating research.

Systematic study of the polar bear in the USSR started in the middle 1950s. This included study of distribution, numbers, population dynamics and structure, ecology, morphology, phylogenesis, parasitology, and measures for preservation. The present report provides new information.

Research on polar bear ecology is conducted by the Central Laboratory for the Preservation of Nature on Wrangel Island, an area set aside as a game reserve. Since this island is the largest known denning center for pregnant females, polar bear reproduction is studied intensively.

The general number of maternity dens on Wrangel Island was determined to be 150-200 in 1960 (questionnaire reports), 150-200 in 1970 (surface count), 180-200 in 1970 (air and surface count) and roughly 250 in 1973 (air count). Considering the relative stability of the number of dens on different parts of the island which have been observed for 7 or more years, it is possible to conclude that Wrangel Island served as a maternal home for a definite population of polar bears, the number of which in the last 10-15 years has not undergone sharp changes. It can also be concluded that pregnant sows have relatively rigid requirements for the places chosen for dens, and major factors appear to be depth and density of snow cover.

Beginning in 1969, animals have been marked annually in birth dens in one part of the island. Standard metal and plastic ear tags are used, and some adult animals have the tag number duplicated on their rump with large figures in indelible red paint. The number of animals marked thus far is 82, of which, 49 are adult sows and 33 are cubs of the year (Table 1). No bears previously marked on Wrangel Island or elsewhere in the polar basin have yet been recaptured on Wrangel Island. Although the number of marked bears is not great, this may either be interpreted as showing that females do not repeatedly den

in the same location or that tags are short-lived and the marking technique needs perfecting.

TABLE 1. NUMBERS OF POLAR BEARS MARKED ON WRANGEL ISLAND, 1969-1974.

	1969	1970	1971	1972	1973	1974
Adult females	5	6	8	6	7	17
Cubs		1	1		12	19

Experiments lasting many years were conducted on Wrangel Island, primarily in the area of greatest concentration of dens, the Drem-Khed mountains in the north-west part of the island. In this generally square area of about 20 km², 25-50 dens are counted annually. Summarizing the results of these experiments, one can observe that during years of normal arctic conditions, a basic number of sows hibernate on the island in dens during October. In case of late formation of coastal ice, the arrival of females on land and their denning is delayed until the end of November and later. Observations show that the sow generally chooses freshly fallen snow for a den, although use of snow drifts of the previous winter is not excluded. The uneven distribution of snow drifts during the fall causes dens to be unevenly distributed. In the study area, the density of dens sometimes reaches one den per 50 m² (data from 1970 and 1973). Denning females tolerate one another. In 1969, two dens 50 cm apart had a tunnel between them providing the possibility of association between occupants of the two dens.

Most dens are located close to the sea coast on sides of hills with a slope usually of 15-25 degrees. Dens are at various heights but most often on the top third of the slope. The exposure of the slopes on which most dens are constructed changes from year to year, depending on the direction of prevailing winds which in turn determines how snow accumulates.

Dens can consist of an oval chamber about 1.5 m long and wide and 1 m high with a corridor 2-3 m long and 60-80 cm in diameter. However, some dens are more complex with as many as three or four chambers. The greatest length of an observed den was 13 m.

The snow over the denning chamber changes in strength and can be several cm to 3 m and more in thickness. Optimum thickness, apparently, is 50-100 cm.

The corridor, as a rule, has an incline so that the exit is lower than the chamber. This assists in the retention of heat. Females construct and maintain ventilation holes, which apparently play a role in both the regulation of heat and gas exchange. A series of instrument observations completed in 1974 (the instruments were inserted into inhabited, still unopened dens) showed that air temperature in the den varies with external temperature and size of the ventilation opening, although it exceeds the outside temperature (especially under the roof of the chamber) by 5-8 and even 15°C.

The age of the 17 sows with newborn cubs in dens varied from 4 (perhaps even 3) to 12-15 years, with most sows 5-6 years old. Age was estimated from tooth wear. Their weight ranged from 178 to 300 kg. The relationship of the weight of females to their age was not analyzed.

The opening of the den occurs in March-April, most often in the second half of March and the beginning of April. These dates are determined not so much by

degree of maturity of the cubs as by weather conditions and especially by air temperature. As a rule, widespread opening of dens coincides with a rise in the outside temperature to -15 to -20°C and the beginning of a period of stable, windless weather.

The number of cubs coming out per den varies from 1 to 3. The mean litter size for 108 cubs was 1.72. The weight of cubs in newly-opened dens varies from 4-5 to 15-17 kg (average is 10-12 kg). Sexual weight differences at this time are not evident.

Having observed the varying sizes of cubs, we attempted to determine the dates of their birth on Wrangel Island. The period of birth of young extended from early December to late January with most young born during the last half of December and first half of January.

These facts, unavoidably fragmentary here, will cause a series of revisions in existing ideas about polar bear ecology. They can also serve as new proof of the ecological uniformity of the species in the limits of its natural habitat, beyond the dependence on a degree of isolation of separate geographical populations of animals.