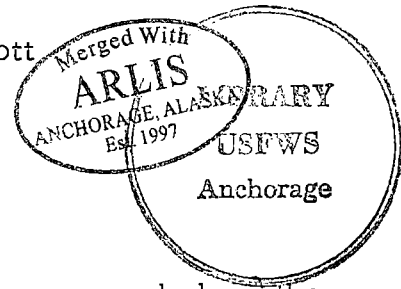


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A PRELIMINARY REPORT ON THE STATUS OF POLAR BEAR IN ALASKA

by
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123



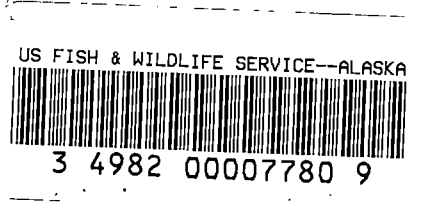
INTRODUCTION

Polar bears (Thalarctos maritimus Phipps) have occurred along the arctic coast of Alaska throughout the span of recorded history. A varying number have been killed annually during this period by both Eskimo and white hunters. Although a polar bear rug is a prize in any trophy room, until recently but few white men hunted them in Alaska due to the rigorous and time consuming nature of a hunt by dog team. In recent years, trophy hunting of polar bears as a sport for white hunters has developed significantly with the introduction of a less rigorous and more efficient method of hunting, using the airplane.

During the early part of the last decade, only a very few people employed light aircraft in the taking of bears on the ice pack. By 1954, however, a few guides and pilots had demonstrated that aircraft could be used successfully to obtain trophies in the spring of the year. Interest in this type of hunting sharply increased thereafter and during the last three years each spring has brought concentrations of aircraft hunters, both guided and not guided, resident and non-resident, to the arctic hunting areas. A great deal of other new activity has also occurred in arctic Alaska concurrent with the construction of Dew Line installations. All of these developments prompted concern over the effects upon arctic wildlife, especially the polar bear, and every spring for the past several years an extensive patrol of the arctic coast has been conducted by Fish and Wildlife Service personnel.

The information obtained pointed up the need for more data regarding the status of the polar bear. In anticipation of the growing management problem, the Alaska Federal Aid in Wildlife Restoration Research Project W3R11 was amended in January of 1957 to provide for a preliminary study of the polar bear along the arctic coast. The senior author, a graduate student in Wildlife Management at the University of Alaska, was assigned to conduct the field work. He had formerly served with the Alaska Native Service for three years on Saint Lawrence Island and it was felt that his knowledge of the people and the area would be of special value on the project.

This report is strictly preliminary in nature. Analysis and processing of field data and specimens is continuing, and additional research is planned.



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PROCEDURE

This preliminary study was designed to: (1) compile and summarize pertinent information available in the literature and from local Alaskan sources, regarding past and present ecology and population status of polar bear in Alaska; (2) obtain biological data and specimens; and (3) evaluate the effects upon the polar bear population of changing patterns of hunting and other activities in Arctic Alaska, for the information of the Alaska Game Commission and other interested agencies and organizations.

All major villages along the arctic coast, from Barter Island near the Canadian border to Nome on the south side of the Seward Peninsula, were visited in the course of the survey, which was carried on during the four months from February through May, 1957. Native and white hunters, guides, pilots and traders were interviewed to obtain personal observations and other data regarding the status of polar bears. An effort was made to obtain an accurate record of all polar bears killed along the coast during the winter and spring of 1956-57, together with biological data and other pertinent circumstances surrounding each kill.

Current observations of bears were obtained from pilots and hunters in the field, and on occasion hunting parties were actually accompanied during their hunt. Measurements and specimens from 41 bears were obtained in this manner. Nearly all those persons contacted in the field showed great interest in the project, and their excellent cooperation assisted materially in its successful completion.

POLAR BEAR BIOLOGY

The most complete and up-to-date publication on polar bears is apparently the monograph by Alwin Pedersen (1945), a Dane, whose field studies were conducted in Greenland. Unless otherwise indicated, the background information presented below is after Pedersen.

Distribution

The polar bears of Russia, Norway, Greenland, Canada, and Alaska are probably segments of one circumpolar population. The drift ice is the polar bear's habitat. As the ice drifts clockwise about the pole, it may be assumed that bears are carried with it in a passive movement from east to west. Whether the bears that appear on the Alaskan coast this winter are the same bears that appeared here last year, or will appear next year, is not known.

Although little information is available on the area nearer the North Pole, it is probable that the ice is heavier, less broken, and therefore fewer seals are available for food. It can thus be assumed that there are normally fewer polar bears in that area. However, it is not known whether any areas exist in the polar basin where bears are not found on occasion. This spring the ice was broken, and polar bears were sighted at the IGY ice island research station which was then located about 600 miles north of Point Barrow. In Alaska, polar bears are found regularly as far south as Nome and St. Lawrence Island in winter. They have been recorded from St. Matthew Island and the Pribilof Islands, and even as far south as Japan, in the 17th century. During the summer, the southern limit of ice, which may be ten to seventy-five miles off the north coast of Alaska, is the southern extent of the polar bear range. Presumably, the active movements of individual bears are the result of a search for food, though mating and parturition habits undoubtedly are a factor.

Food.

Polar bears are apparently as omniverous as other bears when necessary, but their staple and preferred food is seals, primarily the abundant and widely-distributed ringed seal, Phoca hispida.

During the course of this study, three bear stomachs were examined by the investigator, seven others by a guide, and numerous general observations were obtained from Eskimos and other hunters. The stomachs examined contained nothing but pure seal oil, or seal oil and seal hair. It is said that bears eat only the skin and blubber when seals are readily available, but that the meat may also be eaten when seals are scarce. Apparently bones are rarely, if ever, eaten.

Reproduction

According to Pedersen (op. cit.), oestrus occurs between the end of March and the first of May, the period of heat lasting about three weeks. Polar bears are polygamous, copulation being with the older, stronger males. The female's behavior remains unchanged until the end of October or November when she makes an effort to get to land, or stable shore ice, where she digs a den in the heavy snow banks. There is apparently no record of a macroscopic embryo being found in a female polar bear prior to denning. It is likely that delayed implantation is characteristic of gestation in the polar bear, as Asdell (1946) indicates is probably the case with other species of bears.

The cubs are born in January, and are usually two in number, rarely one, and very rarely three. In 23 recorded observations of bears with cubs,

sighted off the Alaska coast this year, 11 sows were each accompanied by 1 cub, and 12 were with 2, for an average of about 1.5 cubs per female.

The female emerges from the den for the first time in March or April at which time the cubs are about the size of a large house cat. The cubs remain with the sow the following winter and may separate the next fall when they are about 21 months old, although many cubs remain with the sow through the second winter and are driven away the following spring when the sow breeds again. Adult female bears normally breed every third year, and are said to be sexually mature at 4 years of age. Males reach their full growth about their eighth year, females a little earlier.

In Alaska, the observations of bush pilots and Eskimos indicate that the females den mostly on the shore ice or in the heavy snow banks along the beach. Very small cubs are seldom seen south of Point Lay, probably because most of the pregnant females must den farther north where the ice comes in to shore early in the fall. The ice may not come in farther south until late November or December, after most pregnant females have already denned.

THE KILL

Historical

It is difficult to determine the magnitude of the polar bear kill in Alaska during previous years. The most significant data are contained in the tabulated annual reports of furs shipped from Alaska, compiled since 1925 by the Fish and Wildlife Service. These figures have continuity, and are useful for comparisons, but they cannot be construed as indicating the total kill for any period because of the many variables involved.

During the 32-year period from 1925 to 1956, the reported number of polar bear hides shipped annually varied from a low of 17 in 1932 to a high of 190 in 1925. One hundred or more hides were also shipped in each of the years 1926, 1930, 1943 and 1946. The 32-year average was 70 hides per year. The estimated total annual kills for the years 1954-55-56 were 100, 128, and 135 respectively. It is interesting to note that furs shipped during these same years averaged only 75 annually. The number of hides shipped annually in many of the years of the 32-year period exceeded this amount, thus probably indicating that large numbers of polar bears have also been taken in years past.

Winter and Spring, 1956-57

The known kill for the winter and spring of 1956-57 totaled 206 bears. There may also have been a few additional kills in some villages following the period of field study. Some of the characteristics of the season's harvest are summarized in Table 1. The data indicate that about 60 per cent of the bears taken were killed by white hunters using aircraft. About one third of these were typical non-resident, guided hunters. The remaining "non-residents" had lived in Alaska less than three years and were therefore required by regulation to purchase non-resident trapping licenses. (The polar bear is listed as a fur animal under present regulations of the Alaska Game Commission, as promulgated by the Secretary of the Interior).

About 60 per cent of the bears taken by aircraft were accounted for by hunters based at Kotzebue, Cape Lisburne and Point Hope. About 25 per cent came from the Barrow area, and the remainder were taken by hunters based at Teller or in the Colville River area. Almost one half of the total kill for which dates could be ascertained was accounted for during the month of March. Another 30 per cent were taken in April.

There was a marked preponderance of male bears in the kill, especially in the take of sport hunters. Of 113 bears, of known sex taken by aircraft hunters, 72 were male and 41 female, giving a sex ratio of 176 males per 100 females. Adult male polar bears are considerably larger than females, and since sport hunters obviously preferred larger bears, this biased sex ratio in the kill is understandable.

There is, on the other hand, no deliberate selection by native hunters, and there was a higher proportion of females and of cubs in the native kill. Of 35 bears of known sex taken by natives, 20 were male and 15 female, giving a sex ratio of 133 males per 100 females. Of 78 bears taken by natives, 14, or about 18 per cent, were cubs. In contrast only 10, or about 8 per cent of 126 bears taken by white hunters were cubs. This was in spite of the fact that of 99 bears reported sighted by sport hunters, 23 were sows with 35 cubs, or about 35 per cent cubs.

It should be stated that the term cub can be applied to young bears at least through their second year at which time the young male may be as large as the parent female. Of the 24 cubs taken in the total kill, 19 were accompanying 11 sows. Eight of these sows had twins, and 3 had 1 cub each. Of 17 cubs of known sex, 12 were male and 5 female. Five "cubs" were not accompanied by sows.

Table 1, Summary of known polar bear kill, 1956-57.

	Bears Taken	Per Cent
Sex of Bear:		
Male	95	46
Female	59	29
Unknown	52	25
	<hr/> 206	<hr/> 100
Age of Bear:		
Adult Bears	182	88
Cubs	24	12
	<hr/> 206	<hr/> 100
Hunting Method:		
Aircraft	121	59
Dogteam	76	37
Other	9	4
	<hr/> 206	<hr/> 100
Type of Hunter:		
Native	78	38
White	126	61
Unknown	2	1
	<hr/> 206	<hr/> 100
Residence of Hunter:		
Resident	131	64
Non-resident	62	30
Unknown	13	6
	<hr/> 206	<hr/> 100

In the native kill there may be an element of "accidental selection" toward sows with cubs or away from large males. In most of the native villages little hunting is done specifically for polar bears. Seals are the mainstay of most of the coastal natives. The most popular rifles for seal hunting are the .222, .220, and .22 Hornet. A native seal hunter will shoot at any polar bear which wanders into range. A large boar may only be wounded by these small caliber rifles if not shot at close range. On the other hand, a wounded sow with cubs is less likely to escape. One large boar which was shot by a sport hunter this spring near Point Hope appeared to be in good condition yet carried three .22 Hornet slugs the wounds of which had healed.

The preponderance of males in the kill, including that by natives, is a most significant feature. When male and female cubs, and sows with cubs, are subtracted from the kill, then the remaining "single" bears total 121, of which 83 were male, and 38 female. This is a sex ratio of 218 males per 100 females, or in excess of 2 to 1. Pedersen (op. cit.) indicates an observed natural sex ratio of 3 to 1 in his experience, but the explanation for this condition in Alaska or Greenland is not clear. Certainly selection by sport hunters can be expected to affect the sex ratio in the kill, but even the native kill contained a third again as many males as females. There may be a differential mortality rate in the sexes, or as with many other large mammals, differential sex distribution during much of the year may be involved, or possibly the denning habits of the pregnant female portion of the population may make them largely unavailable to the hunter. At any rate, a preponderant male kill can be regarded as desirable in a polygamous species such as the polar bear.

Economics

The polar bears of Alaska are important to two different groups of people. First of all, they are of considerable economic value to the Eskimos and, secondly, their importance to the sportsman, and to the Territory, as a big game animal cannot be overestimated.

The natives sell the hide and use the meat for food. The hide, which in the past was used for clothing and similar needs, is now nearly always sold to the local store or to travelers. The average cash value received from the sale of 78 hides this year was about \$80.00 per hide. The importance of the meat to the natives is somewhat over-rated. Caribou or reindeer are preferred to seal or polar bear and seals are usually preferred to polar bear meat. Nevertheless, the indirect value of the meat may be estimated at about 50 cents per pound. At this rate, the average bear carcass could be valued at about \$150. From the 78 hides, the native income totaled about \$6,000.00, and the carcasses had a total indirect value of about \$11,000.00. The average value of each bear taken may be estimated at about \$220.00.

In addition, local investigations revealed that, in the coastal villages natives received more or less directly from sport hunters and guides

approximately \$11,000.00 for fleshing hides, souvenirs, labor, rentals, and the like. In the same area, white businessmen or local traders and lodging establishments received approximately \$18,000.00 as a result of polar bear hunting activities. It is interesting to note, however, that the income from sport hunting goes primarily to villages where the natives do no polar bear hunting. For example, Kotzebue, which is used as a base for sport hunters, receives most of the income, yet most of the bears killed by those sport hunters are taken in the vicinity of Point Hope.

Last winter, about \$121,000.00 was spent in the Territory of Alaska by non-resident polar bear sport hunters for licenses, guide fees and incidentals.

Including his transportation, it costs the average non-resident hunter, paying an average guide fee of \$2,000.00, a minimum of \$2,500.00 (from his home in the states) to get his bear.

THE POLAR BEAR POPULATION

One method of estimating relative abundance of an animal population is by means of a "catch-per-unit-of-effort" index. For this purpose, pilots and guides hunting bears from the air were asked to report bears seen and the number of flying hours spent hunting over the ice, and an index was then calculated. This information is summarized in Table 2.

Table 2. Summary of bears seen per flying hour and per square mile viewed, 1956 and 1957, as an approximate indication of relative density.

<u>Area Hunted</u>	<u>*Flying Hours</u>	<u>**Area Viewed Square Miles</u>	<u>Bears Sighted</u>	<u>Sq. Miles/Bear</u>
<u>Spring 1956</u>				
Point Hope	35	787	15	52
Point Hope	14	314	10	31
Wales	35	787	8	98
Totals & Averages	84	1,888	33	57
<u>Spring 1957</u>				
Point Hope	35	787	26	30
Point Hope	32	720	22	32
Point Hope	20	450	4	112
Wales	45	1,012	35	28
Lisburne	50	1,125	29	38
Lisburne	39	877	59	14
Point Barrow	87	1,598	14	114
Point Barrow	75	1,781	33	44
Totals & Averages	383	8,350	222	37

* Includes only time actually hunting.

** Based on pilot's estimate of 1/4 mile strip effectively covered while hunting (usually tracking or searching for tracks).

In this case, flying hours were converted to square miles viewed on the basis of speed of the aircraft used and assuming a standard one quarter mile wide strip effectively viewed in flight. Only time actually hunting over the ice was used, and since most of this was spent in tracking or searching for tracks, the width of strip effectively covered is probably not underestimated. It is likely, too, that many bears are overlooked even when within viewing distance. On the other hand, the data cannot be used as a direct indication of actual bear density on the ice because the coverage is not a random sample; much of the flying was spent in tracking down individual bears.

Table 2 indicates that in the spring of 1956 there was 1 bear seen per 57 square miles covered, and 1 bear per 37 square miles in 1957. This quantitatively illustrates the assertion, made by some pilots, that bears were easier to find in 1957 than in the previous year.

The average maximum distance aircraft hunters traveled from the shoreline is estimated at about 75 miles. Considering the areas actually hunted from the various aircraft bases used, it appears that aerial hunting was carried on in areas totaling a minimum of about 40,000 square miles--an area about the size of the State of Kentucky. This area then produced an average kill of about 1 bear per 200 square miles. If the entire arctic coastline of Alaska were similarly hunted, the area involved would be about doubled, and presumably twice as large a total kill might have been made. This is speculative, of course, since little is known of possible differences in bear densities along the coast.

Even though such calculations at this stage are purely speculative, it is useful to estimate the possible order of magnitude of the bear population in Alaskan waters and in the entire arctic. A 75-mile wide strip along the Alaska coastal areas where bears occur would contain about 80,000 square miles. If bears were as abundant as 1 per 37 square miles, as indicated by the bears sighted data for 1957, this area might contain as many as 2,000 or more animals. If similar calculations were extrapolated to cover the periphery of the entire polar basin, with a conservative estimate of 600,000 square miles within a 75-mile wide strip, the possible bear population would total 17,000 animals. The 37 square miles per bear figure undoubtedly overestimates average bear abundance, but the other calculations do not include a large portion of the polar basin area, so it is difficult to evaluate the above estimates. It is probably safe to say, however, that bear numbers off the Alaska coast must amount to several or many hundreds, and that they must number in the thousands throughout their circumpolar range.

The life equation and breeding biology of the Alaska brown bear is apparently quite similar to that of the polar bear, and it is interesting to compare what is known of their relative productivity. Kodiak Island contains about 4,000 square miles of bear range, and an estimated brown bear population of about 1,600 animals. The annual kill on this area has averaged about 200 bears for each of the last five years, and it is considered stabilized at this level. The polar bear kill in Alaska has probably not exceeded 200 annually over a considerable period, and it is not difficult to assume that this kill has been drawn from an area containing as many as 1,600 polar bears, especially when the probability of annual recruitment from elsewhere in the arctic is considered.

More detailed information from other arctic areas is needed for proper evaluation of the status of the polar bear. It is known that large numbers have been taken in the region of Spitzbergen, and tourist agencies have recently been advertising polar bear hunts in Scandinavian waters. Spärck (1956) reports that the Norwegian sealing fleet has in some years killed several hundreds of polar bears in the Greenland-Svalbard Sea, and he describes a marked decline of 50 per cent or more in the numbers of bear shot along the coast of Greenland in the last 20 years.

The annual harvest of polar bears in the arctic probably amounts to a surprisingly large total, and it probably is taken from a population that would seem surprisingly large to those who have always considered the polar bear a rare and uncommon animal.

CONCLUSIONS

The circumpolar nature of the population and the international movement of polar bears are significant features of their distribution.

Although use of aircraft has increased hunting pressure and established a new pattern of hunting, the kill in Alaska is probably not yet to be considered excessive. The predominance of males in the kill lessens its effect on the population. Annual variations in the availability of bears are probably due chiefly to regional variations in food and ice conditions rather than to the effects of hunting.

It has been suggested that aircraft hunting is interfering with the availability of bears to the native hunter. Actually, most of the polar bears killed by airplane hunters are taken far beyond the range of native hunters with dogteams, and if airborne parties would avoid the relatively small hunting areas near each native village, the potential conflict would be minimized. The native hunting effort has been greatly reduced voluntarily in recent years, with the advent and growth of wage-earning opportunities

and welfare benefits, and it may be that the combined total of bears killed by both native and sport hunters during the 1956-57 season does not equal the native kill alone of twenty years ago.

Polar bears in Alaska represent an important economic and aesthetic resource which deserves careful management based on adequate and continued research.

RECOMMENDATIONS

The following principal recommendations were offered as a result of this preliminary survey:

1. Legislation should be enacted to provide for adequate control of polar bear hunting by United States nationals outside territorial waters. Any future management measures will depend largely on regulation of hunting, yet many bears are now taken beyond the three mile limit where only indirect control can be effected.
2. Females accompanied by cubs should be protected. This regulation is currently in effect.
3. The kill should be limited to one bear per hunter. This regulation is currently in effect.
4. An adequate method for determining accurately the magnitude and characteristics of the annual kill should be devised.
5. Research should be continued and intensified regarding polar bear distribution, movements, life history, and ecology.
6. International cooperation should be solicited for a program of research and management of polar bears throughout their circumpolar range.

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