

# POPULATION CHARACTERISTICS OF THE JAPANESE BLACK BEAR IN HAKUSAN NATIONAL PARK, JAPAN

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**Abstract:** A population study of the Japanese black bears (*Selenarctos thibetanus japonicus*) harvested by the traditional hunting method was initiated in 1970 in Hakusan National Park and vicinity, central Japan. The hunting season lasts about 40 days from early April until early May during a time of heavy snow cover. A total of 265 bears were killed from 1970 to 1976 and 88 skulls were available for age determination. Their average age was 6.64 years (SD = 5.38 years), and younger bears (1-6 years old) made up approximately 65 percent of the sample. The sex ratio did not significantly differ from 50:50. Age structure and sex ratio are likely to be biased because of the lesser vulnerability of females with cubs to hunting.

The Japanese black bear is the largest game species on Honshu, the central and largest island of Japan. Hakusan National Park is known for its high density of bears, and the natural environment is well preserved in the park. Bear hunting has long been practiced in the park and its vicinity.

The purpose of this study was to accumulate fundamental data on population characteristics such as natality, mortality, sex ratio, and age structure that are necessary for effective management of the bear population. Bear populations cannot be easily studied because direct observation is difficult. However, bear population trends can be analyzed through bear harvest data.

The study was initiated in 1970 and was carried out during every hunting season through 1976. This report deals with the data collected on population characteristics of the Japanese black bear, principally its age structure and sex ratio. As the skulls of hunter-killed bears were obtained, their ages were determined by counts of tooth cementum layers. Longitudinal sections were cut from the root of the upper right canine. After decalcifying, these sections were stained with Mayer's hemalum (Sakurai et al. 1973).

## STUDY AREA

The study was conducted in Hakusan National Park and vicinity (Fig. 1). There are numerous valleys in this area and abrupt changes in elevation from 400 m to 1,840 m at the highest point. The area receives the greatest snowfall in Japan. From November through April, heavy snow covers the area, with the maximum depth reaching 4-5 m every year.

Most of the study area lies in the mountain zone, characterized by deciduous broad-leaved forests in which beech (*Fagus crenata*) is the dominant species. On the steep slopes where snowslides create treeless areas, the tall herb community develops. Such areas are especially important as substantial food reserves for

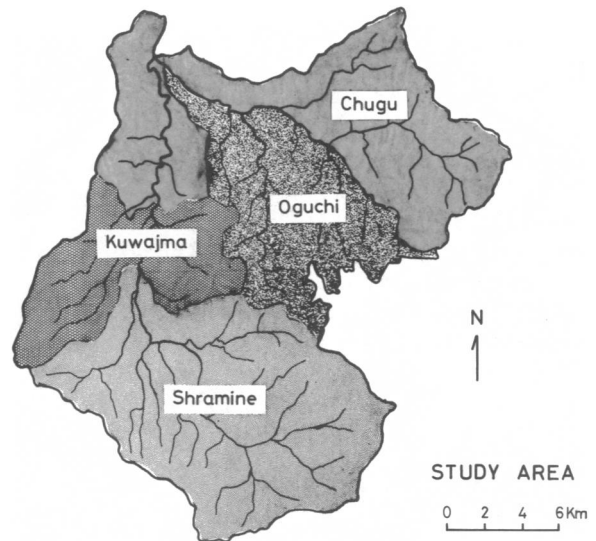


Fig. 1. Locations of the four hunting areas within Hakusan National Park, Japan.

bears immediately after hibernation. The beech forest is replaced at low elevations by secondary forests dominated by oak (*Quercus mongolica*) and by plantations.

## DESCRIPTION OF HUNTING

Bears have been hunted in the study area for at least 150 years and the traditional way of hunting is still employed. It is a sort of grand hunt. Five to 10 skilled hunters and beaters compose 1 group that surrounds the resting sites of bears. As the beaters drive the bears from cover, the hunters shoot.

The study area is divided into 4 hunting areas, and each area is covered by 1 group. The hunting season generally begins in early April and usually lasts about a month. It may start earlier or later, depending on snow conditions. The bears emerge from their dens about this time to feed on herbs, beech buds, or other plants and are then harvested. Hunting effort during the season varies among the 4 groups.

**HARVESTED BEARS**

The total number of bears killed by the 4 groups from 1970 through 1976 was 265 (Table 1). The number of bears killed by each group differs every year. Annual fluctuations in the total number of bears killed reflect the numbers harvested by the groups

(Table 1). They represented 20-40 percent of all harvested bears in each hunting season. On the average, only 33 percent of the skulls of all killed bears could be collected each year. The remainder were sold as trophies or the skeletons were simply abandoned at the kill sites.

Table 1. Number of bears harvested by each hunting group, sex ratio, and number of skulls collected for age determination, Hakusan National Park, Japan, 1970-76.

	Area (km <sup>2</sup> )	1970	1971	1972	1973	1974	1975	1976
Hunting group								
Shiramine	155.3	26	6	5	16	24	6	9
Chugu	124.6	13	16	5	21	25	19	11
Kuwajima	61.7	8	5	7	7	10	8	0
Oguchi	82.6	4	2	0	0	8	3	1
Total	424.2	51	29	17	44	67	36	21
Sex ratio (male/female)		27/27	5/7	9/7	19/23	33/26	14/15	8/21
No. of collected skulls		20	6	4	12	26	13	7

having the larger hunting areas. Fluctuations cannot be avoided, for hunting effort of the groups is not the same every season. However, since the total number of bears killed varies with the snow depth in a given hunting season, hunting effort is not the only factor causing annual fluctuations (Fig. 2).

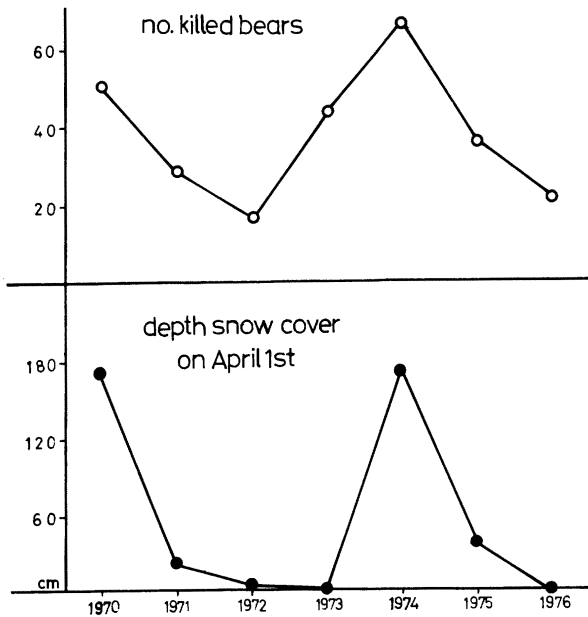


Fig. 2. Comparison of the annual harvest of bears to snow depth as measured on April 1, Hakusan National Park.

**Age Structure**

Ages of 20, 6, 4, 12, 26, 13, and 7 skulls were determined each year from 1970 to 1976, respectively

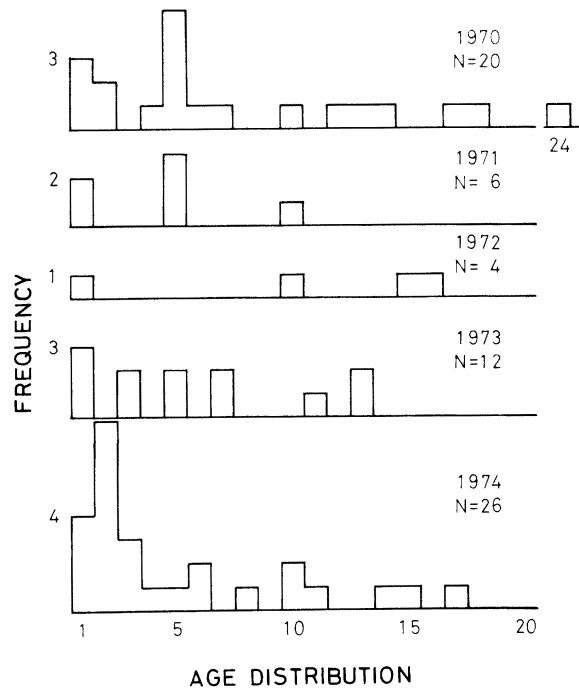


Fig. 3. Age distribution, determined from skulls, of bears killed in Hakusan National Park and vicinity, 1970-74.

Fig. 3 shows the age distribution determined from the skulls collected during 5 hunting seasons, 1970-75. The oldest bear was a 24-year-old male killed in 1970. Fig. 3 shows the larger ratio of younger animals (yearlings and subadults) to adults. If the bear population in the study area is assumed to be stable, age frequencies for 5 hunting seasons can be estimated. The age structure presented in Fig. 4 was obtained by

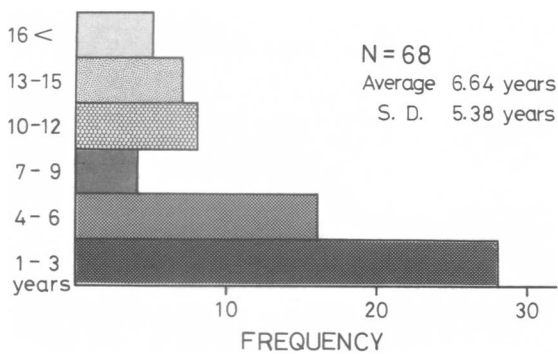


Fig. 4. Age structure of bears killed in Hakusan National Park and vicinity, 1970-74.

grouping the bears into 3-year age categories. The youngest group (1-3 years old) constituted 42 percent of the total sample. If the next group (4-6 years old) is added, these younger bears make up approximately 65 percent of the harvested bears. Ages were determined for 68 of the bears harvested in 1970-74. The average age was 6.64 years (SD = 5.38 years). Females with cubs, however, are less vulnerable to hunting than other segments of the bear population, because they seldom emerge from their dens during the hunting season. Therefore, it is suggested that the average age of bears in this population is actually slightly greater than presented here.

**Sex Ratio**

Table 2 shows the sex ratio of the harvested bears in each hunting season. The difference in number be-

Table 2. Sex ratio of harvested bears in each age-class, Hakusan National Park, Japan.

Age-class	Male	Female	Total	Years
Cub	7	8	15	1970-76
Yearling	25	24	49	1970-76
Subadult (2-5)	14	14	28	1970-74
Adult (>6)	26	33	59	1970-74
Total	72	79	151	

tween males and females is rather slight, although more males may be harvested in one season and more females in the next. The chi-square test indicated that the sex ratio of killed bears did not significantly differ from 50:50 except in 1971, 1972, and 1976 when harvests were smaller. If the sex ratio of the natural bear population in the study area is assumed to be 50:50, males and females can be considered equally vulnerable to the gun.

The sex ratio of cubs and yearlings harvested during the study period was approximately 50:50 (Table 2). Likewise, that of subadults (2-5 years old) and adults (greater than 6 years old) was also about 50:50. These results indicate that the sex ratio of the natural bear population in the area was 50:50. However, adult females constitute a higher proportion of the population because, as mentioned before, females with cubs emerge from their dens later than other bears.

**DISCUSSION**

McIlroy (1972) pointed out in his study of the black bear (*Ursus americanus*) in southern Alaska that older bears were harvested in the area where hunting had recently begun. He also stated that the average age of harvested bear populations tends to become younger the longer they are hunted. The age structure of the harvested bear population in the present study shows that younger bears outnumber older bears. Therefore, it can be assumed that hunting pressure in this area is quite heavy. The senior hunters of the area say that fewer bears were harvested before rifles came into use but that those bears were larger. This statement implies that hunting pressure has become heavier in recent years.

Annual fluctuations in numbers of bears harvested can be attributed to changes in hunting effort and depth of snow cover rather than to changes in the natural population. The fact that the number of younger bears in the harvest exceeds the number of older bears in every hunting season suggests that younger bears are dispersing from nearby unharvested areas to the hunting area. Jonkel and Cowan (1971) reported that dispersal is more common in younger bears. Some areas near the current study area and the remote parts of the hunting area are not covered by the hunters.

Sex ratios of the Japanese black bear in other areas are reported by Torii (1974) and Watanabe (1974). According to them, more males than females are harvested by trapping, with sex ratios of 2.04:1 and 1.25:1, respectively, whereas the sex ratio in the present study was 1:1. The difference seems to have arisen from different methods of hunting. In general, more males than females are trapped because of the greater mobility of males. The discrepancy in sex ratios between the natural and the harvested population is thought to be smaller in shooting than in trapping, since all members of the natural population tend to be under equal hunting pressure in the case of shooting.

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