

On the Ecology of the Brown Bear in the Southern Urals

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This paper relates the investigational data of more than three years of observations on the ecology of the brown bear (*Ursus arctos*) in the region of the Bashkir State Forest Preserve, U.S.S.R. The Preserve is situated in the southern spur of the Ural-tau and Southern Krak ridges.

The sharply delineated relief, distance from the sea, and the high elevation above sea level have a dramatic effect on the local climate. The area has the rather harsh winters (temperatures down to -50°C) and hot summers (maximum $+40^{\circ}\text{C}$) characteristic of a continental climate. Aerial convection currents and significant heating of the southern unforested parts of the mountains cause an irrotational mosaic microclimate. The forests of the Preserve are not confined to these particular climatic zones. The mountain ridges stretching far to the south preserve forest lands in a steppe zone.

The trees in this Preserve are principally conifers. On the southern and south-eastern slopes are mixed steppe pines and unforested areas. In the north and north-west the cover is pine forest and scrub with bilberry predominating. In the ravines pines grow mixed with a great number of larger herbs and grasses. Bird cherry, raspberry and currant are located along the rivers.

The distance of the Preserve from populated centers (hamlets, villages, towns), the presence of a rich assortment of plant cover and high relief, the general inaccessibility combined with abundant rivers and streams constitute excellent conditions for animal habitats in general and for bears in particular.

We found the most practical censusing method under the conditions of the Bashkir Forest Preserve to be simultaneous tracking and recording of bears according to age, usual territory and body size (e.g. fatness).

The determination of the habitat of the brown bear and the determination of their distribution on the area are favored by methods of calculation during the morning hours when the dew is on the plants. Counts were undertaken simultaneously throughout the Preserve wherever feeding locations of the bears had been determined; that is, a 'dew count' was undertaken. It has been established that in the summer the bears gather near the rivers and streams in places with copious green cover consisting of angelica, cow parsnip, etc. The daily lair of the bears, as a rule, is located in these places. The trail through their usual range is 12 to 16 km long, is traversed from day to day, and is particularly defined in the morning hours. Therefore, in consequence of the above, a method of making morning bear counts was established.

Additional signs included logs which had been turned over and trees which have been used for scratching, which also often involves bark stripping.

As a result of extensive mapping and analysis of data on the distribution of individuals, it was established that there is similarity in the composition of diets of individuals.

Under the mountainous conditions of the Ural-tau and the Southern Krak, the

bears live in the vicinity of each other, in small groups, forming a defined location in which they spread over an area about 5 to 7 km from each other. The few really solitary bears encountered consisted of young animals.

As a result of many years of study, it was noted that the number of bears in the Preserve is increasing. The average dimension of the feeding area in 1971 was about 2000 ha. In that period, approximately 35 bears lived on the Preserve.

Favorable living conditions and the presence of a rich food base resulted in a decrease in the home range to approximately 1700 ha, thus an increase in the population density of bears. In 1972, 38 animals were recorded. In 1973, 45 bears lived in the Uzyansk part of the Preserve; the average home range decreased to 1500 ha. In 1974, no significant increase in the population was noted; only one additional animal was added.

Recently there has been a decrease in the number of bears at the periphery of their range. In our view, a deciding factor is one of safety. The territory of the Southern Urals is subject to intensive agricultural activities, lumber operations and land clearing near the forests; this causes bears to move to more secluded places. Presently the territory of the Preserve has a bear population consisting of a majority of females with cubs.

The division of the total feeding grounds among the bears is also of practical and theoretical interest. As a rule, females with cubs choose the part with the richest food supply. The dimensions of each female's feeding area are not great and do not exceed 500 to 1000 ha. In comparison with the range of solitary bears, that of females and their cubs is 2 to 2.3 times smaller. In the above connection one can guess that this is the area of the Preserve quietest and least disturbed by man; it contains the richest food supply and becomes, by its nature, a natural 'nursery' for bears. In the above situation, the bears change their form of behavior with respect to humans. Therefore one can see that the natural ecology is transformed into an anthropogenic ecology.

An important aspect of the life of the bear on the area is hibernation. The most important determinant of den location is its angle of southern exposure. The den is constructed, as a rule, close to a ridge crest. In autumn when settling in for their winter sleep, bears break off branches and boughs to line their dens. In spring the process of breaking off and stripping branches is repeated. The nature of the spring 'stripping' is unclear. Perhaps it is a form of muscle conditioning.

Under the conditions of the Southern Urals in autumn, the bears concentrate in their preferred denning places. In these places there may be ten dens in 1 to 2 km.

There are differences in the construction of the dens. It is notable that 'earthen' dens are built in dry years when the soil under the surface is well dried. In wet years the bears build dens in rock crevices or in small rocky grottoes and caves where the soil stays relatively dry. Such dens, as a rule, are hard for humans to find. The bears spend an average of 5 to 6 months in their dens. The length of the denning period depends on the food supply. In mountain pine stands, hibernation begins with the first snowfall, in oak-linden stands after snowfall. In oak forests when there is a rich harvest of acorns, bears do not spend long periods in their dens. Bears leave their dens simultaneously in all types of forests in April.

In the initial period after leaving the den, bears remain on small, thawed patches on the well-heated sunny slopes. At this time we can count the bears on the ridges and crests.

Stopping on a thawed patch in the spring period, the bears seek out their usual food. An analysis of bear droppings (228 samples) collected in the Preserve in 1973, showed that in the spring plant matter is the primary constituent of the bears' diet (46.5%); of this, leaves and stems made up 11.6%, fruit and berries—18.6%, young leaves of birch and aspen—2.4%, roots—4.6%, and other plant residues—9.3%. The insect component at this period was 37.2%; flies—32.6% and beetles—4.6%. Mammals made up 16.3% of the diet, and of this carrion accounted for 13.9% and rodents for 2.4%. As shown in our study, in the spring period bears feed primarily on plants and ants. The amount of animal food, including carrion, is negligible.

In summer, the bears' diet is more varied. However, plants are still the most prevalent type of food, making up 73.2% of the total; fruits and berries—17.3%, leaves and stems of high-growing cover vegetation—29.9%, birch and aspen leaves—4.7%, roots—0.8%, and other plant residues—20.5%. Insects, especially ants and larvae, made up 22.9% of the diet and mammals—3.9%.

In autumn, the fattening bears consume 74.1% vegetable matter, primarily fruit and berries (48.3%). Stems and leaves of herbaceous plants—6.9%, birch and aspen leaves—3.4%, other plant residues—12.1% make up the other vegetable components. The insect component decreases to 10.9%. The use of mammals as food in autumn increases to 15.5%.

In the annual diet of bears, plants predominate (68.3%), with berries making up 25.4%. Insects account for 22.4% and mammals, including carrion, make up 9.3%.

Climate exerts a great influence on the bears' feeding habits. In the very dry, hot summer of 1972 there occurred in the Preserve a massive proliferation of ground wasps which became a basic article of food in the bears' diet. In 1973, conditions favored growth of rich herbage; in this year the bears were basically 'vegetarians'.

Because of the above results, one can conclude that feeding on the natural food of the biocenosis, especially berries, insects and a variety of plant food, accomplishes the deposition of fat reserves necessary for winter.

The role of the bear as a predator in the Preserve is insignificant. Despite the prevalence of bears, incidents of their attacks on foxes, Siberian stags and domestic cattle are unusual. More significant is the sanitary role bears play in the removal of carcasses of animals killed for various reasons.

It is notable that in the regions surrounding the Preserve, intensive predation of bears on stragglers from animal herds has been noticed. According to our data in 1972, 159 head of cattle, 58 head of other livestock and 13 horses were so attacked. In 1973, the figures were 234, 44 and 13 respectively. Both males and females with cubs were involved in the attacks.

Predation by bears inside and outside the Preserve lands increases in years of unfavorable conditions for the food base. Thus, higher exposition gives a basis for consideration that, in good agricultural management, predation by bears can be kept at a minimum and thus protect this superb animal in our forests for future generations.