Paper 32

The European Brown Bear in the Carpathians

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Data on the ecology of the European brown bear (*Ursus arctos*) were collected on the territory of the state hunting preserve 'Osmoloda', in the central part of the Eastern Carpathians. At the present time, there are an estimated 64 bears occupying this area of 84,000 ha. Seventy percent of the population consists of young animals and the total number is increasing.

The density of European brown bears on the area in the last century was high. As a result of intensive lumbering operations their numbers decreased; in the first third of the twentieth century they were placed under protection. From that time, exclusive of the war years, the number of bears in the Carpathians has increased markedly. If Nezavitovskiy (1933) assumed that 100 individuals had been counted, then in the middle of the twentieth century, according to Tatarinov (1956) there were almost 200 bears in the Transcarpathian, L'vov and Ivano-Frankov oblasts alone. In 1970, there were 1300 in the Ukrainian Carpathians or 0.5 to 0.6 specimens/1000 ha of mountain forests.

To determine the diet of the European brown bear, we analyzed 85 droppings, studied 62 meals at their place of consumption and the contents of two stomachs. The results of the food habits study are presented in Table 1 and characterize the composition of diet of the bears, namely incidence of occurrence and the relative percent composition of various types of food according to the season of the year. The diet of brown bears consists primarily of plant material (61.8%); this is historically supported by the fact that the dentition is more adapted to a plant and not an animal diet (Ognev 1931). Plant and animal food used by bears is extremely varied and depends on the availability of the food and the season of the year. The bears apparently fast in early spring when they leave their dens and do not find sufficient foods available; they frequently prey on wild animals, particularly ungulates, preferring the hind extremities for their spring meals. On 13 March 1972, we found remains of wild pigs (*Sus scrofa*) weighing from 130 to 150 kg. Sixty-five meters from these carcasses we found traces of a fight between a bear and a wild pig. Judging by the signs the bear weighed about 200 kg. In that same month we recorded an attack by bears on two swine weighing 60 to 70 kg, two year-old sheep and one roe deer. There have been cases of livestock attacked by bears, but very rarely.

We found that the diet of brown bears was varied but that they apparently adhered to their individual preferences. They occasionally eat carrion, often in an advanced state of decomposition. In April bears in high mountain territory eat red bilberries. The hypothesis of Bromlei (1965) on the laxative action of bilberries in the digestive process was confirmed by our observations; the contents of the bilberries are of a liquid consistency. When there is insufficient food from the previous year's crop, the bears must subsist on green aspen shoots, willow, and the prior year's twigs. By the second half of April the bears' diet is enhanced by young, green aspen leaves and also those of birch, willow, various herbs (especially the Carpathian dock), forest fungi and other

TABLE 1. NUMBERS OF OCCURRENCES AND RELATIVE PERCENTAGES OF VARIOUS TYPES OF FOODS IN THE NUTRITION OF BEARS.

Type of Food	Spring		Summer		Autumn		Winter		Total	
	No.	%	No.	%	No.	%	No.	%	No.	%
PLANT FOOD	36	15.5	49	22.0	32	14.6	21	9.7	138	61.8
Shrubs and herb-like plants	9	4.0	17	7.6	4	1.8	2	0.9	32	14.3
Nuts, berries, and other fruit	16	6.6	30	13.4	26	11.9	15	7.0	87	38.9
Leaves	6	2.7	1	0.5					7	3.2
Buds	2	0.9					3	1.3	5	2.2
Mosses, lichens, pine cones	3	1.3	1	0.5	2	0.9	1	0.5	7	3.2
ANIMAL FOOD	26	11.4	20	9.2	19	8.6	20	9.0	85	38.2
Mammals	16	7.1	1	0.5	14	6.3	16	7.2	47	21.1
Insects	8	3.4	14	6.5	1	0.5			23	10.4
Birds	1	0.5	5	2.2					6	2.7
Domestic Animals	1	0.4			4	1.8	4	1.8	9	4.0

green vegetation. Along with these foods, our investigations disclosed the remains of various birds of which we identified feathers of *Tetrao* sp.

The diet of bears in the first part of the summer consists primarily of herbaceous plants. Among these one can observe stems and leaves of forest herbs, corymbose plants such as thistles, French willow, Carpathian sorrel and others.

At this time they apparently prefer to scratch the trunks of spruce and firs. In June, 1972, we observed bears strip off sequential pieces of bark, lick the sap and gnaw the exposed bast fiber with their teeth. Based on evidence of excavated ant hills and traces of wasps, it is concluded that in June bears are active in more open spaces where they also find and eat rich greens.

In the second half of the summer the diet of the bears still contains herbaceous matter as well as whortleberries, strawberries, and later bilberries and raspberries. In the event of an insufficient berry supply, the bears will raid gardens, disperse through orchards, where for some weeks they will feed on bullace, plums, apples and pears; in doing this, they cause extensive damage to trees.

Autumn is the most important period for bears since it is at this time that they complete the buildup of their fat reserves. In September plants coarsen, become less palatable and are rarely found in the bears' diet. At this time the bears collect the remaining raspberries and whortleberries; they eat mature blackberries, mountain ash, fruits of wild apples and pears, blackthorn and dog rose. In high mountain regions they migrate to the upper zone of the coniferous forest and subsist basically on whortleberries.

Closer to winter the diet is reduced in variety and the bears consume bilberries, whortleberries, *Sorbus* spp., apples, willow, blackthorn, dog rose, etc.

Some individual animals begin to fatten on horsemeat. There are cases of feeding on wild *Asarum* (asarabacca).

On 14 November 1972, a wild pig skin was found in the stomach of a bear that had been shot. By the end of autumn cases of bears preying on domestic stock are encountered; four such cases were recorded in the last two years from hunting reserves.

In December the bears den for the winter. Occasionally in winters with little snow and a large harvest of nuts (particularly beechnuts) bears in the Carpathians do not sleep deeply in their dens but spend part of the winter period abroad. Some, especially old males, generally do not hibernate, as was observed in the winter of 1971 and 1972. If there is no harvest of nuts as was the case in the winter of 1972-73 (which was also a winter of little snow), the bears had no opportunity to build up a layer of fat and were denned early; however, a few individuals were seen moving about in the first half of the denning season.

Pregnant females always stay in the den. Observations of bears in winter in the Carpathians is generally confined to the southern slopes (Guryanin 1972; Tatrinov 1973). Of all of our observations of dens 58 percent were on the southern slopes and 15 percent on the northern slopes (Table 2). Bears chose natural cover for their winter den site. Most of the dens were constructed in young spruce-beech-fir stands. The elevation of the lowest den was 580 m and the highest 830 m. The dimensions of the den depended on the size of the bear and the type of den. Bears line their dens with dry branches up to 10 cm in width overlaid with herbaceous growth, leaves, moss and fir boughs collected near their dens, generally within a radius of 10 to 15 m. The depth of the bedding is 12 to 18 cm and weight 8 to 12 kg; its composition depends primarily on the availability of natural cover and the exposure of the slope. None of the dens on the mountain slopes were faced into the prevailing winds. The females denned separately from the males.

In the Carpathians during the first part of January the blind, scantily furred cubs are born; they weigh 450 to 500 g. When they leave the den, they weigh almost two kg. The female gives birth to two cubs; one or three occurs rarely, and the birth of four cubs in the Carpathians is extremely rare. Upon encountering humans, the female deserts her den. The cubs left by their mother in heavy frost die within 15 to 20 minutes. Such a case occurred on 22 January 1971, on one hunting preserve.

Some bears in the Carpathians will winter in one den repeatedly over a period of several successive years. New openings in a majority of cases are made by young animals. Frightened out of its den in the winter, one Carpathian bear refused to go back; the next year it proceeded to winter in a different place near the limits of its usual range. The agitated animal did not return to hibernation and traveled approximately 10 km in search of food; it stopped periodically to rest on the snow, breaking off dry branches and some standing trees. If, at that time, there had been a heavy snow (60 to 80 cm) as sometimes occurs in the Carpathians near the end of winter, the bear would likely have been forced to stay in its lair maintaining itself on fat reserves. If the bear remains undisturbed, it will sleep all winter and maintain a positive daily temperature because of the layer of fat. In the Carpathians denning commonly lasts until the middle of March or the first of April; the period of emergence from the dens lasts 5 to 12 days.

It is estimated that the duration of the denning period lasts from 45 to 95 days

TABLE 2. SITE DISTRIBUTION AND DIMENSIONS OF DENS OF THE CARPATHIAN BROWN BEAR LOCATED IN THE SOLOTVIN FOREST PRESERVE OF THE IVANO-FRANKOVSK OBLAST.

No.	Name of forest boundary	Site distribution		Type of den	Forestration conditions	Bedding material	Location of exit	Dimensions in cm			
		exposure	height above sea level					diameter	width	thickness of bedding	dimensions of opening
1	2	3	4	5	6	7	8	9	10	11	12
I.	*Manyavskoye Lechnichestvo*										
1.	Landmark 'Cave zvir'	S.E.: 17	650	hollow	spruce-beech first growth. Density 0.9	leaves, branches of beech to 10 mm in width	S.E.	95	187	16.5	42 × 150
2.	Landmark 'Mlynskaya Hill'	S.E.: 5	680	in pine thickets 4.5 m high	heavy pine forest	conifer boughs, leafy plants	S.E.	118		12	
3.	Landmark 'Waterfall'	S.E.: 16	730	fir thickets 4 m in height	spruce-fir stands. Density 1.0	conifer boughs, moss, leafy plants	S.E.	138		13.5	
4.	Landmark 'Skit'	S.E.: 12	580	fir thickets 4 to 5 m in height	fir, first growth. Density 1.0	conifer, boughs, moss, leafy plants	S.	126		18	

II. Gutyanskoye Lesnichestvo											
1.	Landmark 'Rapid'	W: 18	700	in pine thickets 4-5 m high	spruce-beech-fir, first growth. Density 1.0	boughs to 10mm thick	S.	155		17	
2.	Landmark 'Black'	S.E.: 10	720	beneath roots of over-turned trees	spruce-beech forest, third growth. Density 0.8	moss, leaves, pine boughs	S.W.	122	62	14	85 × 65
III. Syvul'skoye Lesnichestvo											
1.	Landmark 'Burdock'	N: 12	780	hollow	spruce-beech forest, third growth. Density 0.6	rotted wood, moss, leaves, twigs	W.	110	120	16	44 × 103
2.	Landmark 'Kuz'minets'	S.E.: 8	790	hollow	spruce-beech stands, first growth. Density 0.9	rotted wood, leaves, twigs, branches	S.W.	105	126	17.5	48 × 112
IV. Mezherinskoye Lesnichestvo											
1.	Landmark 'Dupdyanka'	S.W.: 16	830	beneath uprooted trees	fir (untrans), first growth		S.E.	138	52	16	112 × 65
2.	Landmark Unnamed	E: 17	780		fir, first growth. Density 0.7		N+S	128	55	15.5	45 × 58 46 × 53
V. Porogov Lesnichestvo											
1.	Landmark 'Plaska'	N.E.: 10	810	beneath uprooted trees	fir, first growth. Density 0.6	boughs	N.W.	126	80	16.5	90 × 85
2.	Landmark 'Plaska'	S.E.: 18	760	beneath over-turned tree roots	spruce-beech-fir. Density 0.6	misc. plant material	S.W.	110	48	14.5	50 × 50

depending on the previous season's food supply, the nutrition of the bear, and the weather.

Females come into heat from the middle of May to the beginning of June. Pregnancy lasts approximately 210 days. Males reach sexual maturity after two years; females breed in their fourth year and give birth to young every other year.

One cannot consider the brown bear a harmful animal except during periods of food shortage in the spring and fall. At this time, they prey upon wild animals and domestic stock, invade cultivated agricultural areas damaging fruit trees and stripping bark from tree trunks. However, the damage to crops is insignificant; cultivated areas on the fringe of the forest near outlying human populations are the only areas affected. Generally only isolated bears prey on cattle. Noise and commotion will usually end their depredations on domestic cattle. Among wild ungulates, only the sick or the injured are the prey of the bear. In this respect bears play a positive role in the health of the wild ungulates of the Carpathians.

The brown bears of the Carpathians are seldom aggressive toward man. In rare cases they will attack a man but only when persistently tracked. In such a case a large and 'experienced' bear may become dangerous. After leaving the den, the female will aggressively protect her young. Upon perceiving danger, the female generally utters a specific noise and the cubs hide. The proximity of man to the family unit at this time can be exceedingly dangerous.

The brown bear is not only an interesting and beautiful animal but a valuable fur bearer. Trade value of the fur stands first among the wild animals hunted in the Carpathians. Its pelt provides beautiful rugs and warm winter clothing. The percent yield of fat and meat from the Carpathian bear is significantly higher than from herbivorous animals. Bear meat possesses excellent taste qualities, and the fat is used in medicinal preparations and is esteemed among the local population. As a subject for sport hunting, the Carpathian bear has no equal. Hunting this animal teaches a man endurance, hardiness, daring and rapid orientation. Under the conditions of the Carpathians the most effective means of hunting the bear is to watch for feeding animals from a tower. It is especially esteemed as a trophy animal.

A study of the growth dynamics and increase in numbers of the brown bear was conducted in Ivano-Frankovsk Oblast. We estimate that the number of bears increases by thirty each year. At present the population density of this species in the forests of Precarpathia is not yet 0.6/1000 ha. Such a density, in our estimation, assuming natural growth, could be reached by 1983-1985.

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