Ann. Zool. Fennici 29:57–68
Helsinki 4 September 1992

ISSN 0003-455X

The brown bear (*Ursus arctos* L.) in the USSR: numbers, hunting and systematics

Igor E. Chestin, Yuliy P. Gubar, Vladimir E. Sokolov & Vladimir S. Lobachev

Chestin, I. E., Gubar, Y. P., Sokolov, V. E. & Lobachev, V. S., Department of Vertebrate Zoology & General Ecology, Biological Faculty, Moscow State University, Leninskiye Gori, Moscow, 119899, Russia

Received 8 December 1990, accepted 3 June 1991

Analysis of data on the number of brown bears in the USSR for the last 30 years shows a dramatic increase from 105 000 to 130 000. The greatest increase could be observed in the northern regions of the European part of the USSR. In most parts of Siberia the number of brown bears did not change significantly. The densest bear populations occur in the Vologda, Kirov, and Kostroma oblasts in the European part of the USSR, the Altay mountains of Central Siberia, and on Sakhalin island in the Far East. Densities in these regions exceed 30 bears per 1000 km^2. The density variation can be explained as a consequence of zonal regularities, while human activities provide intrazonal landscapes. Approximately 3 500 brown bears are legally culled annually in the USSR. Including those poached, the total harvest hardly exceeds 10% of the population. Bears are hunted in the oat fields, on paths, on open areas in the mountains, at their dens and by incidental hunting. There are 8–9 subspecies of *Ursus arctos* L. in the USSR. The systematics of Caucasian and Central Asian bears are the most complicated ones. In addition to subspecies, there are different forms (ecomorphs) of bears within the same territory and this must be taken into account when planning the establishment of a new population.

1. Number and density of brown bears in the USSR

Brown bears (*Ursus arctos* Linnaeus, 1758) inhabit almost all forest zones of the USSR. There are no accurate methods of counting bears on large territories, partly due to the solitary way of life of these animals. Calculation of the bears on the trial areas with the following extrapolation is a rather reliable method. However, it is practically unfeasible over the entire range of brown bears in the USSR because of the expense and lack of social demand. This method is presently being used, mainly in the central oblasts[1] of the European part of the country.

[1] The USSR was divided into union republics. Each union republic is further divided into oblasts and autonomic republics inhabited by certain nations. In RSFSR there are several krays, which are practically equal to oblasts.

The data on annual bear fur recovery have failed to reflect the trends in bear numbers since the end of the 1950s, as hunters then started to keep the fur for themselves. During 1960–1979 some investigators evaluated the quantity of bears by questionnaires, which they sent and received back either from amateur hunters (Vereshchagin, 1972; 1974) or from local boards of the Ministry of Forestry of the RSFSR (Priklonskii, 1967; Polyakova, 1975). In 1979 The Governmental Service of Game Animals' Calculation (Gosokhotuchet RSFSR) was organised. This gathers information from the Oblast Game Boards over all the republic of Russia. The material of Gosokhotuchet RSFSR was the source of recent data on bear numbers in the USSR. The first geographical analysis of these data was made by Sitsko (1983). There are no analogous governmental structures in other republics, so the data were obtained from the Game Services, which are included either in Ministries of Agriculture or in Ministries of Forestry, and accompanied by our own comments.

In spite of the systematic gathering of data, even in the RSFSR with its special services, their precision varies widely. As mentioned above, regular countings are organised in only a few oblasts. In others the main method of evaluation is based on reliance upon the expertise of local game servicemen. In certain cases the data for some oblasts are subjectively corrected by the opinion of a bear specialist working in that region, in the form of a publication or personal communication, when available. The problems connected with the use of official data were mentioned also by Jakubiec & Buchalczyk (1987) in Poland.

The data are presented in Table 1. The superscripts give the source of data according to the list of references at the end of the manuscript. The data for 1989 were recieved from Gosokhotuchet RSFSR and the Game Boards of other republics, so there are no references in this column. The population density was calculated by dividing the number of bears by the area (km^2) of their range inside each administrative unit. For example, the area of Tyumen oblast is 1435200 km^2, but bears inhabit only 70% of this territory. Thus, the area of the bear habitat was assumed as being equal to $1435200 \times 0.7 = 1011600$ km^2.

Unfortunately, there are no standard methods of calculating density on large territories — different scientists use either the forest area, or the area of the whole administrative unit. This leads to over- or underestimation of the index respectively. When a scientist pointed out either the number or density of bears on a certain territory, these data were put into table 1 with references. However, our method of density calculation may not correspond to that of other scientists, so figures for density may not equal ones from other sources, even with the same number of bears. Sometimes investigators mentioned only one of the figures, i.e. number or density. We calculated the lacking figure with our method of area accounting. In such cases references are given only for original data. We avoided calculating density for the territories where the area of the bears' habitat was not clear.

Since the early 1960s the number of brown bears has increased by approximately 25 000 and reached almost 130 000, which is a much higher value than that of Servheen (1990). However, this may be explained not only by the actual increase, but also by more precise counting.

Nevertheless, these data reflect at least the main tendencies of population dynamics. One can see the decrease in bear numbers during the 1960s as pointed out by several scientists (Priklonskii 1969, Vereshchagin 1972), and the subsequent increase up to the present day.

The most dramatic increase is seen in the European part of the USSR. In Kostroma, Vologda, and Kirov oblasts bear population densities are now the highest in the country (for the whole oblasts) — 0.33 per 1000 ha (10 km^2) of range. The disappearance of small villages, decline in human population in rural areas, great reduction in the number of bear hunters, and the aging of previously cut forests are assumed to be the main causes of the bears' well-being. This increase is confirmed also by the increase in the Finnish population of brown bears in the late 1970s to early 1980s due to immigration from Karelia (Petrozavodsk) (Pulliainen 1983). The data used by Verstrael (1988) for Leningrad oblast (500–600 bears) and for Karelia (3000) are obviously outdated, as other scientists and Gosokhotuchet have provided more recent figures (Table 1). Unfortunately, it is impossible to

compare the data of Shevchenko (in press, cited in Servheen 1990) with those of Table 1 because of the unknown borders to the regions used in the above publication.

There were no significant changes in the centre of the European part (temperate and steppe forests), which is practically the edge of the bear range. An increase in bear numbers in certain oblasts was followed by the disappearance of bears in others. However, it is interesting to note the appearance of bears in the close vicinity of Moscow (up to 100 km), inside the former range. The authors observed bear footprints only 50 km from Moscow in Odintsovo district. It was early spring so we consider that bear to be a young migrating individual rather than a resident. There is no satisfactory explanation for the changes in the estimations of bear numbers in regions such as Ural and West Siberia. We consider them a consequence of different methods of calculation. We used the more or less systematised data of local Game Boards, which are spread equally throughout the whole territory, while Vereshchagin (1972, 1974) had to use hunter interviews. This discrepancy occurs primarily in the regions which were practically unaffected by human activity in the 1960s, so information from hunters was necessarily scarce.

There was an obvious increase in the number of bears in the Altay mountains. As there were no visible changes in human activities or other factors which may be important for bears, this seems to be caused by natural population dynamics. There is in any case a healthy population of bears there, with one of the highest densities.

The significant decrease in central Siberia (Irkutsk and Krasnoyarsk oblasts) may be man-caused. The building of the Baikal–Amur Railway attracted many people to the region. The cutting of the forests spread quickly, as did forest fires. Hence, the bear habitats obviously deteriorated. In regard to Krasnoyarsk, we also suspect the previous number of bears to be overestimated. Similar overestimation probably occurred in Khabarovsk kray, which resulted in a reduction of bear numbers in the Far East, while in other oblasts the number was constant or even increased. On the Kamchatka Peninsula there were practically no changes in the estimations of bear numbers or density.

The greatest difficulty associated with the definition of bear status arises in the southern mountain belt of the USSR, including the Caucasus, Kopet-Dag, Tyan-Shan and Pamir mountain systems, as there are no acceptable methods of population estimation in the vast mountain regions.

As there is a qualified specialist in large predators in the Caucasus, A. Kudaktin, we accept his estimation for this region, rather than the official one, though it may be undervalued. In the opinion of Kudaktin (1981, 1985), the number of bears decreased slightly in North Caucasus and remained practically unchanged in the Transcaucasian republics. The figures in the table are nearly equal to those of Shevchenko (in press, cited in Servheen 1990). The main cause of decrease is deterioration of habitat due to forestry operations, overgrazing by livestock in alpine and subalpine zones and impact from recreation. The population figures for bears in Georgia, as received from the Game Board of this republic, can be used to elucidate methodological problems. Game Board Servicemen count bears during their autumn concentrations in the beech and chestnut forests, and then extrapolate the data to cover the entire range inside the republic.

The data on bear numbers in Central Asia are also very contradictory. According to Game Boards, the population increased from 1800 to 5200 in less than 30 years. As we assume these figures need careful checking and correcting, we accept the data from local zoologists as being more reliable. In that region bears survive primarily in mountains in isolated populations, located mainly in reserves. Expansion toward the upper border is limited by livestock grazing, toward the lower by agricultural lands and human settlements. As a whole, there is a tendency toward a reduction of brown bear range in Central Asia due to increased land use by humans.

The brown bears are widespread in the Pamir mountain system, but with a very low density. However, this seems natural for this form, and may be explained by poor quality habitats.

It was supposed that the bears had disappeared completely from Kopet-Dag in Turkmenia (Table 1). However, in 1989 we received a reliable report of contact between a bear and a professional zoologist on the western part of this ridge

(Podolskii 1989, pers. comm.). This information is represented on Fig. 1 by a plus sign to the east of the Caspian Sea.

Probably an insignificant increase took place in the western regions of the USSR (Belorussia, Latvia, Lithuania, Ukraine, Estonia). Taking into account the correction by Vereshchagin (1974) of his own previous data from the Ukraine (Vereshchagin 1972) one can see an increase of approximately 400 bears. For Estonia we accept the data of M. Kaal instead of official figures. According to these data there was a dramatic tenfold increase in bear numbers in the republic over 25 years.

Thus, in spite of a general increase in human activities, the number of bears in the USSR has significantly increased. This testifies to the real possibility of reinstating bear populations in areas from which they have been eliminated.

Most likely this increase took place not only in the USSR but in all European countries. According to Verstrael (1988), brown bear numbers have increased in Fennoscandia, and in the Appenine and Cantabrian mountains. Exactly the same trend was found in Poland (Jakubiec & Buchalczyk 1987) and Slovakia (Hell & Bevilaqua 1988). Only in small and hardly viable populations like the Pyrenian population was there no increase in bear numbers (Rousseau 1988). While the bear populations of Fennoscandia, Poland and the European part of the USSR might be connected, permitting growth in one part to cause the same trend in others, the populations of the Appenine and Cantabrian mountains are undoubtedly isolated. Thus, it may be proposed that the observed growth was caused by some common factors which cannot be explained by the changes in one particular population. The increase first seemed to occur primarily on the western slopes of the Ural mountains and then in the West through the European part of the USSR, Northern, Central and South-Eastern Europe to Italy and Spain. This hypothesis corresponds to the data on bear populations in the Soviet Union (Table 1) and abroad (Pulliainen 1972, 1983, Jakubiec & Buchalczyk 1987, Verstrael 1988). If so, the conclusion of Pulliainen (1983) that the increase in bear numbers in Finland may be completely due to the immigration from Karelia and Leningrad oblast must be reconsidered in the light of the possible increase in the resident Finnish population according to the all-European tendency.

The scheme (Fig. 1) illustrates some regularities in the distribution of bear population densities. Basically, the density is influenced by the natural characteristics of the territory and types and level of human activity. This premise is well confirmed by the scheme.

Fundamentally, the flowing increase of density is observed from the North to the South. It seems to be a zonal regularity, caused by the distribution of natural productivity and variability of the biocenosis. The lowest natural densities are in the tundra and northern taiga, the highest ones in the mountains (except for extremely dry areas) and on the coast of the Pacific Ocean (in the latter case on a great deal of the rivers, where breeding salmon play an important role as a food source). This natural zonal distribution is disrupted by human transformation of landscapes. It is well illustrated by the densities in the central provinces of the European part of the bear's range and in the southern mountain belt.

The status of brown bears in the north of the European part is somewhat of a paradox. These areas have been greatly exposed for centuries to various human activities, among which agriculture and the forest industry have been the most common. As a consequence, the biocenosis is of much greater diversity than is natural in this zone. The well-being of bears depends mainly upon the presence of forests of different age classes and tree species composition with a lot of berry shrubs. Several scientists noted the positive influence of partial forest cutting for bears, which is similar to a "biotechnique" (Rukovskii 1981, Pazhetnov 1977, Slobodyan 1982). Thus, if one plans to reintroduce bears to disturbed anthropogenic flat landscapes, bears from the centre of the European part of the USSR would probably be the best candidates.

The intrazonal influence of human activity also takes place on the edge of the bears' range in the European part, and in localities outside the range, that are indicated by pluses in Fig. 1. People have in practice moved the forest zone border further north together with its faunal complex, including bears. Such small groups of bears are actually remnant and hardly viable.

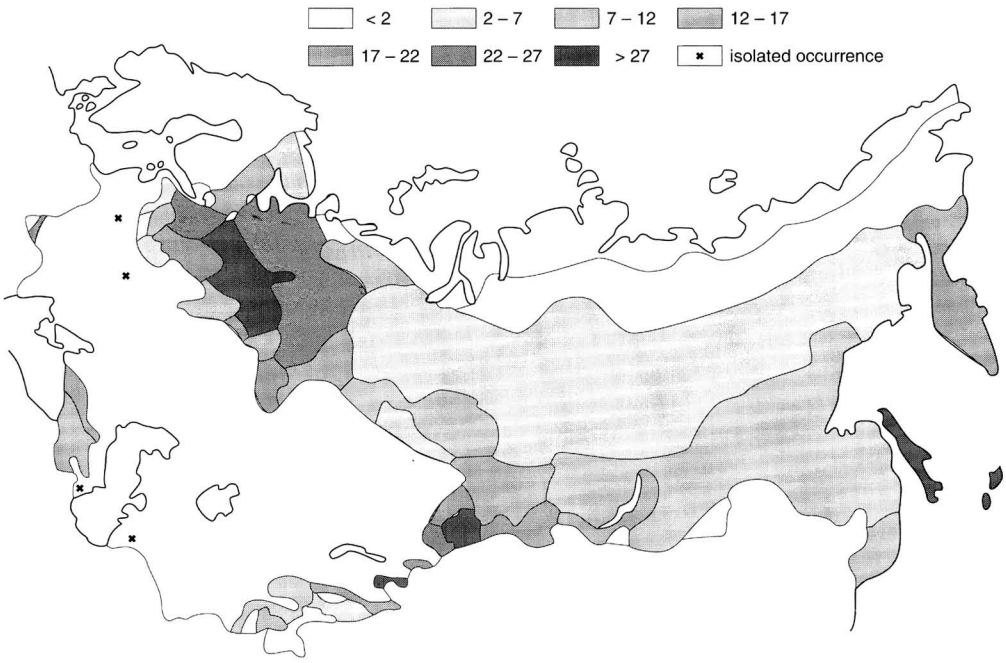

Fig. 1. The distribution and density of the populations of brown bears in the USSR measured as individuals per 1000 km^2 of range area. The crosses mark isolated areas permanently inhabited by bears.

Their existence is assured by the occasional contact with the main population. As a result, the apparent increase in number and density of bears in the European part of the country appears to be the expansion of the bear population from the centre without either extension or contraction of the range. In some oblasts (Vladimir, Orel, Tambov) included in the region bears became extinct because of increased human activity. There are about 10 bears living in Bryansk isolate and about 40 individuals in the Belorussian ones, but there is no information about the areas where they have spread. Major deterioration of mountain forests and alpine and subalpine grasslands has taken place in the Caucasus and Central Asian mountains. This can also be regarded as an intrazonal influence of human beings. The original bear density was found to be very high there. This theory is supported by current bear densities in 260 km^2 of the Caucasian State Biospheric Reserve (Krasnodar' kray). Our original data show that during the breeding season, when bears are mostly evenly spread throughout the territory, density there reaches 1.2 individuals / 1000 ha (= 10 km^2). This is a very high figure indeed, and similar densities were obtained for Sakhalin and some districts in Kostroma and Kirov oblasts.

2. Exemption and methods of hunting

In all republics except Russia brown bears are protected and hunting is prohibited. However, there is a trend towards limited hunting in Georgia and possibly also in some other republics.

In Russia 3600 bears were legally hunted during the 1987–1988 season. This represents a little more than a half of the quota which is annually established by Glavokhota RSFSR, the main game body in the republic. These figures do not vary significantly from year to year, so it may be concluded that approximately 3% of the bear population is annually removed by legal hunting. With illegal hunting, which is common,

especially in the eastern regions of Russia, removal hardly exceeds 10%. This figure corresponds to the recommendations of scientists. Our culling values are fundamentally lower than those of Ovsyanikov (pers. comm., cited in Servheen 1990). Although there may be different subjective opinions on poaching, the data on legal culling are fairly accurate. Therefore, the figures quoted by Obsyanikov for legal hunting (10%, pers. comm., cited in Servheen 1990) definitely overestimate the level of removal[1]. There are regions where the bears constitute a real problem for livestock and human beings, and transmit certain parasites such as *Trichinella spiralis*. These are primarily East Siberia, the Transbaikal region, and the Far East, so hunting there might be encouraged.

The methods of hunting bears differ a lot from region to region. In the European part of the USSR two methods were historically common — autumn hunting in the oat fields, and winter hunting at the dens (Melnitskii 1915). Today the main method is hunting in the oat fields during late August and September, as hunters are mainly city or town dwellers and thus unable to spend enough time looking for dens. During the previous century, locating dens and then selling them to rich hunters was a widespread source of income for peasants (Melnitskii 1915). Hunting in the oat fields usually begins with exploration of the area to determine the places which are used by bears as entrances to the field. Having located such a place, a hunter takes his seat in a tree at approximately 6 p.m. and waits until dark.

Another method was developed in the mountain areas with large open spaces. Hunters explore such spaces and upon locating a bear shoot it with a long-range rifle. This method is very widespread in the Altay mountains by boat, or in Kamchatka on foot. Usually the method is used in early spring, when there is no vegetation and the snow cover helps hunters identify dark animals from a long distance. We also successfully used this method in the Caucasus.

Poachers in the Caucasus prefer to hunt bears at night, sitting by bear trails or near certain trees with a rich crop of nuts (beech, chestnut) which are very attractive to bears. This method requires excellent knowledge of the local area and of bear habits, but it is very successful under these conditions.

Driving in, which is similar to the hunting of ungulates on the plains, is also widespread in mountainous regions as a means of hunting bears. As a rule, bears use very few places for their daytime rest, and if one knows these spots it is possible to organise such hunting.

However, in all regions many bears are hunted accidentally without preliminary aim, especially by professional hunters in the Siberian and Far Eastern regions. In all regions there are hunters who prefer to hunt bears by walking through their habitat. This requires a very brave (as he is always alone to minimise noise) and experienced hunter.

3. Systematics of brown bears in the USSR

In the last review of bear systematics Geptner (Geptner et al. 1967) mentioned 7 subspecies of brown bear: *Ursus arctos arctos* Linn., 1758; *U. a. yeniseensis* Ognev, 1924; *U. a. meridionalis* Midd., 1851; *U. a. syriacus* Hemp. et Ehr., 1828; *U. a. isabellinus* Hors., 1826; *U. a. piscator* Puch., 1855; *U. a. lasiotus* Gray, 1867.

There was no attempt to evaluate the number of different subspecies.

The range of *U. a. arctos* includes all of the European part of the USSR except the Caucasus, West Siberia to the Yenisey river and Altay mountains. The status of this subspecies is the least controversial among scientists. As stated earlier the number of *U. a. arctos* in the USSR is approximately 63 000.

According to Geptner (Geptner et al. 1967), *U. a. yeniseensis* ranges in East Siberia from the Yenisey river to the Transbaikal region, Stanovoy Ridge and Lena and Kolyma rivers, including all Yakutia. It differs from the former in the bigger size of the skull. Ognev (1924) described 3 subspecies for the same area, but other authors group the East Siberian bears with *U. a. arctos* (Stroganov 1962). There are no really strict borders

[1] Note added in proof: Recently, the expansion of the international trade in bear gall bladders has caused a dramatic increase in bear poaching. There is evidence that tens of kilos of dried gall bladders and paws are sold in the black market in Khabarovsk, Magadan and Vladivostok.

between these forms, although the clinal increase in size can be easily seen from the west to the east. About 38 000 bears inhabit this region, so this may be considered as the number of this form.

The systematics of Caucasian and Central Asian bears is the most difficult one. For example, from 4 (Smirnov 1919, Ognev 1924) to 1 subspecies (Adlerberg 1935) were described for the Caucasus, although many authors ignored the age and sex variability and considered the transferal forms to exist between them. Again, the main criterion was the skull size. However, a new parameter, namely the ratio of postorbital constriction to condylobasal length, was suggested. Recent investigations (Lobachev et al. 1988, Chestin 1990) showed that there is a real hiatus in size and ecology. Long-term field research supported the hypothesis of Adlerberg (1935) in regard to a common range, or sympatry, among different forms of Caucasian bears. Thus, these have to be regarded either as species or as ecomorphs. Due to the geographical neighbourhood, one of the forms of Caucasian bears was previously described as *U. a. syriacus*, but measurements of the skulls of *U. a. syriacus* from the Middle East (Harrison 1968) do not support this concept, as actual *U. a. syriacus* are much bigger then Caucasian bears of the corresponding form. The overall number of bears in the Caucasus equals 3300–3500, but the number of particular forms requires more precise estimation.

Only one subspecies, *U. a. isabellinus*, was mentioned for Central Asia (Geptner et al. 1967). However, the series of skulls from Tibet in the Zoological Museum of the Academy of Sciences of the USSR in Leningrad allowed a description of a new species, *Ursus pruinosus* (Tikhonov 1986), probably occurring in the Soviet Union. Moreover, the preliminary acquaintance of the authors with the skulls of Pamirian bears showed nonhomogeneity similar to the Caucasian one. There are approximately 3500 bears in Central Asia, including Kazakhstan.

The subspecies status of *U. a. piscator* from Kamchatka does not arouse any discussion, but according to the material in theriological collections this subspecies ranges only over the Kamchatka peninsula, while Geptner (Geptner et al. 1967) mentioned that the range of this form also included the Chukotka peninsula and the coast of the Okhotskoye sea. The extreme measurements of the skulls from these regions are really very similar to ones from Kamchatka, but the latter have some specific features in the shape of the skull. This subspecies is thus represented by 9000 bears.

Geptner (Geptner et al. 1967) combined two subspecies, *U. a. lasiotus* and *U. a. mandzhuricus*, previously described by Ognev (1924) into one *U. a. lasiotus*. Later these forms were separated again (Tikhonov 1986), which is probably as it should be. However, the author did not offer any data in support of his conclusion. The range of *U. a. lasiotus* occupies the Far East of the USSR to the south of *U. a. yeniseensis*, while *U. a. mandzhuricus* inhabits the regions along the Amur river near the boundary with China. The numbers of these two forms are 9500–10000 and 3000–3500, respectively.

There are thus 8–9 subspecies of brown bears in the USSR, with skull size and geographical distribution as the main criteria for their description. Apparently, they differ not only in morphology, but also in ecological characteristics such as habitat structure and food type. Considering the plans for the reintroduction of bears into the areas from which their populations were previously eliminated it must be stressed that the choice of bear individuals for new populations should be made with careful regard to their systematic status. This may be crucial for creating a sustainable new population. Moreover, the level of demographic and genetic variability of a reintroduced population must preferably reflect the one of the donor population. This is surely of importance to the viability of the new group.

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Table 1. The number (n) and density (d, ind./1000 km^2)of brown bears in different regions of the USSR. Superscript numbers refer to sources numbered in list of references.

Region and centre of administrative unit (republic, oblast or kray)	1930–1960	1960		early 1960s		1969		1970		1970–79		1980–85		1989	
	d	n	d	n	d	n	d	n	d	n	d	n	d	n	d
1. North and middle taiga of European part of USSR															
Arkhangelsk	0.25[6]			2777[57]	0.09			2833[26]	0.09					6500	0.21
Murmansk	0.07[6]			330[57]	0.03					710	0.07[43,44]	300[45]	0.07[45]	500	0.05
Petrozavodsk	0.25[6]			1120[57]	0.06					1600[4]	0.50[4]			3500	0.20
Siktivkar	0.03[6]			2437[57]	0.06							3000[18]	0.07	7000	0.17
Total				66655	0.07									17500	0.18
2. South taiga and north moderate forests of European part of USSR															
Vologda	0.25[6]			2800[57]	0.19			5100	0.35[41]	3500[56]	0.24			4500	0.31
Tver (prev. Kalinin)	0.07[6]		0.22[38]	358[57]	0.04	150[24]	0.02	400[28]	0.11	260[15]	0.03			1800	0.21
								505	0.06[23]						
Kirov	0.25[6]			1166[57]	0.10	2000[24]	0.16	1243[37]	0.10	2000[15]	0.16	3000[33]	0.25	4000	0.33
Kostroma	0.25[6]		0.35[38]	743[57]	0.12	770[24]	0.13	840[37]	0.23	700[15]	0.12			2000	0.33
		770[5]	0.13												
Leningrad	0.25[6]			663[57]	0.08			816	0.16[31]	1804	0.21[4]			1900	0.22
Novgorod	0.25[6]			300[57]	0.05	275[24]	0.05			260[15]	0.05			1350	0.24
										1327	0.24[4]				
Pskov	0.25[6]			122[57]	0.02	145[24]	0.03			145[15]	0.03			700	0.13
										497	0.24[4]				
Yaroslavl	0.25[6]		0.22[38]	192[57]	0.05	160[24]	0.04	400	0.24[37]	145[15]	0.04			700	0.19
								510	0.14[23]						
Total				6344	0.10					8814	0.14			16950	0.26
3. Temperate and steppe forests of European part of USSR															
Vladimir	–	–		40[57]	–	17[24]	–	0[37]	–					0	–
Bryansk	0.07[6]		0.09[38]	13[57]	–	43[24]	–	100[15]	0.04[37]					10	–
Gorkiy	0.03[6]		0.26[38]	424[57]	0.07	150[24]	0.03	863	0.23[37]					600	0.10
Ivanovo	0.03[6]		0.26[38]	98[57]	0.04			253	0.23[37]					200	0.08
Kaluga	0.03[6]		0.09[38]	21[57]	–	8[24]	–	–	0.04[37]					3	–
								10[15]	<0.01[23]						
Yoshkar-Ola	0.25[6]		0.26[38]	185[57]	0.08	135[24]	0.06	386	0.41[37]	145[15]	0.06			400	0.17
Saransk	0.03[6]		0.06[38]	–	–	28[24]	–	–	0.04[37]					20	–
Moscow	0.00[6]		0.03[38]	167[57]	–	0[24]	–	–	0.04[37]					10	–
Orel	<0.01[6]		0.09[38]	0[57]	–	3[24]	–	0[37]	–					0	–
Ryazan	<0.01[6]		0.03[38]	37[57]	–	3[24]	–	4[15]						8	–
Penza	0.03[6]		0.06[38]	0[57]	–									10	–
Smolensk	0.03[6]		0.09[38]	20[57]	0.01	50[24]	0.02	30	0.01[23]					200	0.07
								48	0.02[23]						

Tambov	0.03[6]		0.06[38]	0[57]	–	6[24]	–	–	0.04[37]					0	–
Kazan	<0.01[6]		–	29[57]	–	0[24]	–	1[37]	–					3	–
Izhevsk	0.03[6]		0.11[38]	108[57]	–	14[24]	–	–	0.04[23]					15	–
Total				1141	–									1479	
4. Mountain taiga of Ural															
Ufa	0.07[6]			756[57]	0.11					607[15]	0.08			1500	0.21
Perm	0.03[6]			1197[57]	0.07	375[24]	0.02			260[15]	0.02			4000	0.25
Sverdlovsk	0.07[6]			727[57]	0.04									3000	0.15
Chelyabinsk	<0.01[6]			110[57]	0.04									400	0.15
Cheboksari	0.03[6]		0.35[38]	127[57]	0.03	25[24]	0.01	926	0.22[37]					600	0.14
Total				2917	0.08									9500	0.19
5. Mountain forests of North Caucasus															
Mahachkala	>0.50[6]			224[57]	0.15							200[21]	0.13	150	0.10
Nalchik	>0.50[6]			86[57]	0.09							65[21]	0.07	200	0.20
Krasnodar	0.30[6]			283[57]	0.11					650[20]	0.26	450[21]	0.18	470	0.19
Ordzhonikidze	>0.50[6]			263[57]	0.66							60[21]	0.15	100	0.25
Stavropol	0.30[6]			381[57]	0.24							250[21]	0.16	290	0.18
Grozniy	0.30[6]			–	–							210[21]	0.27	200	0.26
Total												1235	0.17	1410	0.18
6. Taiga of West Siberia															
Kemerovo				512[57]	0.09									900	0.14
Novosibirsk				885[57]	0.17									230	0.04
Omsk				762[57]	0.11									400	0.06
Tomsk				2065[57]	0.07									3000	0.09
Tyumen				2588[57]	0.03									4500	0.04
Total				6812	0.05									9030	0.06
7. Mountain taiga of Altay															
Altay				2042[57]	0.16			5056	0.40[8]	5056	0.40[50]	4000[51]	0.32	5000	0.40
8. Mountain taiga of Middle Siberia															
Irkutsk				7074[57]	0.09					6400	0.08[30]			4000	0.05
Krasnoyarsk				13715[57]	0.07			28266	0.15[63]	30150	0.16[64]			10000	0.05
Kysil				1609[57]	0.14									2500	0.21
Total				22398[57]	0.08									16500	0.06
9. Taiga of East Siberia															
Ulan-Ude	0.13[48]	500[48]	0.02	2510[57]	0.10							1800[48]	0.09[48]	3000	0.12
Chita				1756[57]	0.06							2000[2]	0.07[2]	2500	0.08
Yakutsk				13163[57]	0.04			17500[15]	0.06					12000	0.04
														9000[22]	0.04
Total				17429	0.05									17500	0.05

Region and centre of administrative unit (republic, oblast or kray)	1930–1960	1960		early 1960s		1969		1970		1970–79		1980–85		1989	
	d	n	d	n	d	n	d	n	d	n	d	n	d	n	d
10. Taiga and wet broadleave forests of the Far East															
Blagoveshchensk				2267[57]	0.06									3500	0.10
Magadan				1925[57]	0.02									3500	0.04
Vladivostok				2804[57]	0.17			2225[19]	0.13					2500	0.15
Yuzhno-Sahalinsk				1992[57]	0.23			2000[60]	0.23					2500	0.29
								2500[61]	0.29						
Khabarovsk				15942[57]	0.19	5250[19]	0.06							8000	0.10
Total				24930	0.10									20000	0.08
11. Mountain taiga and tundra of Kamchatka															
Kamchatka				8726[57]	0.18			9000[22]	0.19			8000[15]	0.17	9000	0.19
12. Temperate forests of Western European part of USSR															
Minsk		50[38]		65[57]	–									120	
Riga				25[57]	–	0[58]	–							5	
Kiev				160[57]	–	1090[58]	–							1230	
Tallinn				30[57]	–	115[58]	–							440	
														300[14]	
Total				280	–									1655	
13. Mountain forests and steppes of Transcaucasus															
Baku				1086[57]	–							680[21]	–	2050	
Yerevan				295[57]	–							600[21]	–	620	
												400[52]	–		
Tbilisi				675[57]	–							600[21]	–	8100	
Total				2056	–							1880[21]		10770	
14. Mountain forests and semi-deserts of Middle Asia															
Alma-Ata				537[57]	–					950[52]	–			2100	
Frunze				323[57]	–					300[52]	–			1450	
														425[62]	
Dushanbe				700[57]	–							700[17]	–	1250	
Ashkhabad				160[57]	–	5–6[58]	–	160[52]	–					0	
Tashkent				95[57]	–							133[52]	–	400	
												160[54]	–	235[11]	
Total				1815	–									3460	
Total for USSR				104790										130974	