THE BROWN BEAR POPULATION IN ESTONIA: CURRENT STATUS AND REQUIREMENTS FOR MANAGEMENT

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Abstract: The brown bear (*Ursus arctos*) population in Estonia is a part of the large fragmented Eurasian population, constituting a piece of its northwesternmost branch. The large forested region in northeastern Estonia has been a core area for bears since the Holocene. Although half of the country is covered by forest, suitable habitats for bears are limited. Extensive forest clearance and human disturbance are major threats to Estonia's brown bear population. Counting and measuring of bear tracks have been used to monitor bear population in Estonia, resulting in a minimum estimate of 231 brown bears in 1998. Estimates based on reports from hunting organizations produced a number close to 600. However, a methodology has yet to be developed that will yield reliable numbers. We are currently testing non-invasive sample collection methods, genetic identification, and mark–recapture models to analyze brown bear population size, density, and genetic variability.

Ursus 12:31–36

Key words: brown bear, Estonia, population status and management, *Ursus arctos*

Estonia is northernmost of the 3 Baltic States, bordering Finland, Latvia, and Russia (Fig. 1). The area of Estonia is 45,227 km^2, stretching 350 km from east to west and 240 km from north to south. Approximately 46% of the country is covered by forest. Estonia lies on the southern border of the northern European coniferous forest zone and on the northern border of the deciduous forests typical of central Europe. Pine (*Pinus sylvestris*), spruce (*Picea abies*), birch (*Betula* sp.), aspen (*Populus tremula*), and alder (*Alnus* sp.) are the most numerous tree species in Estonian forests.

There are 3 large carnivore species in Estonia: brown bear, gray wolf (*Canis lupus*) and Eurasian lynx (*Lynx lynx*). These are managed as game animals. The wolverine (*Gulo gulo*) is only an occasional visitor.

This paper briefly summarizes present knowledge and future prospects for brown bears in Estonia.

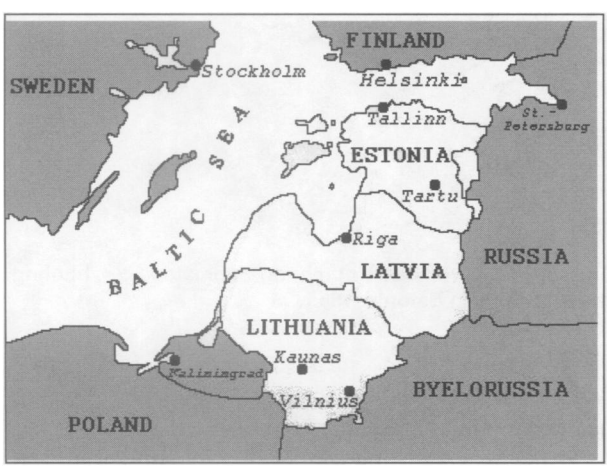

Fig. 1. Map of the Baltic region.

HISTORY OF THE ESTONIA'S BROWN BEAR POPULATION

Brown bears evidently inhabited the territory of Estonia in the early Holocene, more than 11,000 years before present (ybp). Remains of bears have been found distributed throughout the country approximately 6,000 ybp, even reaching the West Estonian islands (Paaver 1965, Kaal 1980). Brown bear bones have been estimated at up to 53% of all carnivore bones found in some archaeological sites, indicating considerable exploitation of brown bears by humans. The bear population has evidently gone through a bottleneck several times in history (Kaal 1980).

Based on mitochondrial DNA analysis it has been hypothesized that the European brown bear population consists of 2 distinct clades: one with an eastern and the other with western distribution. Though based on a very small sample size, Estonian bears appear to belong to the eastern clade, together with bears from Slovakia, Finland, Northern Sweden, Russia and Romania (Taberlet and Bouvet 1994, Kohn et al. 1995).

CURRENT DISTRIBUTION

Harvest data from hunting organizations in Estonia form the basis of a crude distribution map (Fig. 2). It appears that bear distribution in Estonia follows the historic pattern of relative abundance in the northeast (their historical refuge) and less abundance elsewhere. A precise distribution map based on more robust and reliable methods is required. Although habitat type and quality are presumably the key factors influencing the distribution pattern, the relative importance of these factors and human exploitation remains to be investigated.

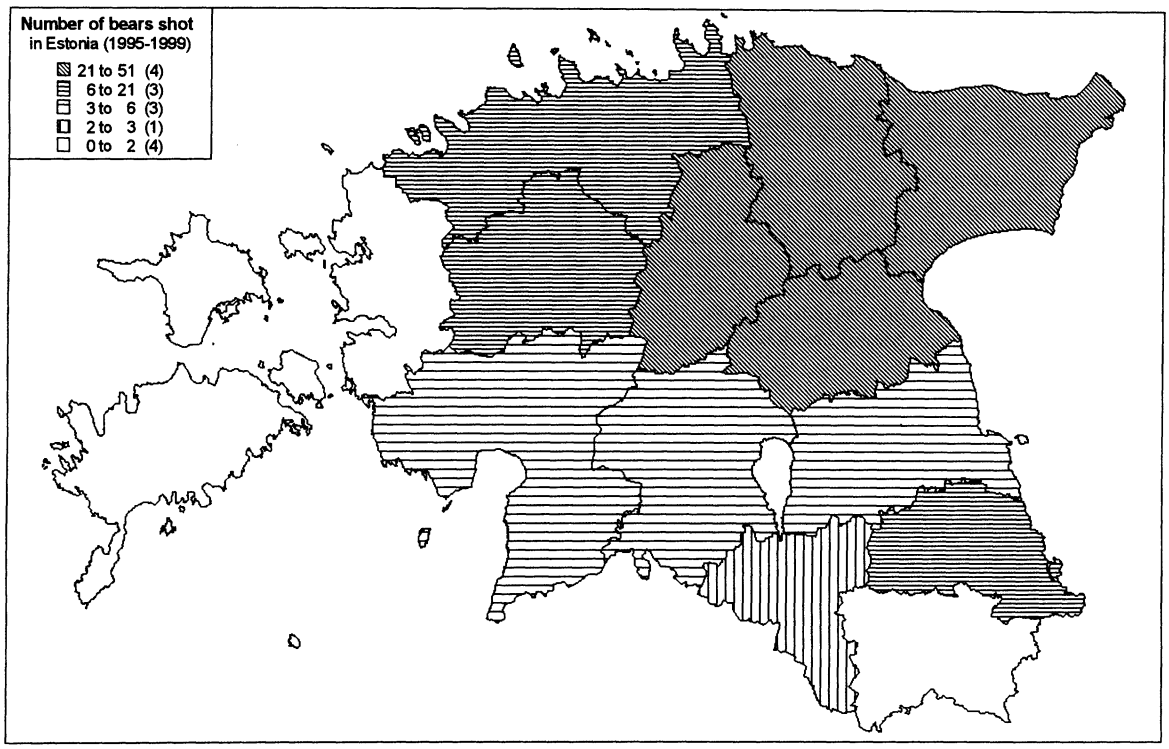

Fig. 2. Distribution of brown bears in Estonia. Numbers represent bears harvested in each of highlighted counties, 1995–99 (excluding other sources of mortality).

POPULATION TRENDS

As generally recognized, bears are extremely difficult to monitor accurately (McLellan 1989, Miller et al. 1997). Since 1954, population trend estimates for brown bear and other game species have been based on annual counts provided by regional hunting organizations from all over Estonia. These counts rely on the general impression of local hunters, rather than any specific methodology. The count data indicate that the bear population started to increase in the 1970s and reached its apex in 1991–93. Since then, count data have suggested a slight decline (Fig. 3). We believe that these counts may reflect major trends, but they cannot be used for precise population size estimation (Swenson et al. 1995).

Bear monitoring (from 1997) has been based on observations by experienced hunters from within the existing hunting system from all counties, excluding islands. Special cards were delivered to register all sightings, including short description of biotope. Whenever bear tracks were encountered, front paws were measured. In areas were bears were known to be numerous (according to shooting data), bears were usually counted directly at the feeding sites. Locations of bears or their tracks, along with descriptions and track sizes, were placed on a map and duplicate countings were subtracted. No telemetry-based distance rules were used for local conditions. Altogether,

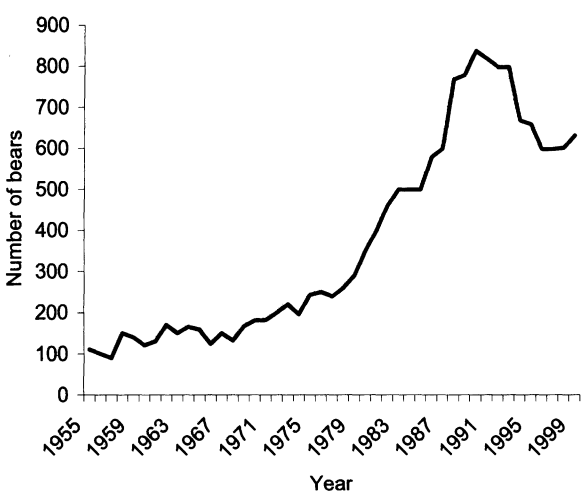

Fig. 3. Brown bear numbers estimated by hunting organizations in Estonia, 1955–99.

305 direct observations and 58 measurements of front paw width were obtained. The monitoring produced 231 brown bears as minimum for Estonia in 1998.

Population estimation with greater scientific rigor and more accurate methodology is an obvious need. We are currently developing mark–recapture estimates using non-invasive hair collecting and genetic profiling as a mark

ing method to estimate the population size of bears in Estonia (Woods et al. 1999).

POPULATION STRUCTURE

In 1980, Kaal reported that of 154 observed family groups, 18.9% consisted of 1 cub, 61.6% of 2, 17.5% of 3, 1.3% of 4, and 0.7% of 5 cubs (Kaal 1980). In 1997–98, the number of cubs associated with their mother was studied in the northeastern part of Estonia. The mean number of brown bear cubs per observed female in family groups was 1.70 (SE = 0.13, n = 16) in 1998 and 1.57 (SE = 0.20, n = 28) in 1997. The male to female ratio of the population is under investigation.

MANAGEMENT

Brown bear management goals in Estonia are not clearly set. According to managing authorities, hunting of bears should be undertaken to modify their behavior and to decrease damage to beehives and grain fields. Bears have traditionally been managed as game animals in Estonia (Fig. 4), but some have also been killed as nuisance animals. Bear hunting is seasonal in Estonia, lasting from 1 August until 31 October and is limited by quota. According to a conservative approach, we suggest the maximum sustainable harvest rate should not exceed 5% of the lower present estimate 11–12 animals each year, until more accurate numbers will be available. In Scandinavia, where the bear population is estimated to have grown 1.5% annually over the past 50 years, sustainable harvest was estimated to be 7% (Swenson et al. 1994)

Hunting quotas are established for all game at the county level. This may be suitable for ungulates, but for large predators with large home ranges, quotas should be set at the national level. To guarantee expansion of the bear population, it is important to have restrictive quotas in areas peripheral to the core region. Female bears are slow to colonize new areas, and high hunting pressure in the periphery can slow their expansion (Swenson et al. 1998a). The mortality rate of adult females is of the utmost importance to the dynamics of bear populations, and consequences of errors in management that lead to overexploitation of females can be severe (Knight and Eberhardt 1985). As new hunting law is currently being developed, these considerations should be taken into account. Moreover, the absence of a wildlife management institution in the country is a significant gap in the entire wildlife management system. To maintain a healthy brown bear population, an obvious need exists to establish a sound management system based on scientific data.

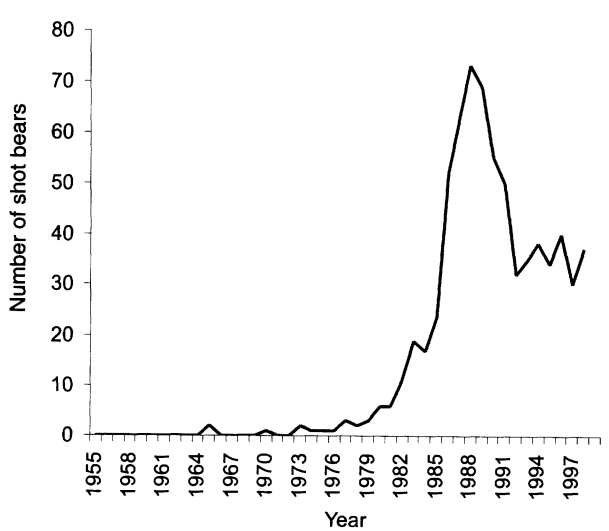

Fig. 4. Bears shot in Estonia, 1955–99 (data from Estonian Ministry of Environment).

ANALYSIS OF THREATS

Habitat fragmentation and loss.— Although about half of the territory of Estonia is covered by forest, suitable habitats for brown bear are limited. In Russia, bears are known to prefer high density forest plots without clearcuts and with minimum human disturbance within an area of more than 10,000 ha (Pazhetnov 1990). Thus, extensive forest clearance and human disturbance could become a major threat for bears in Estonia. If intensive forestry continues, especially logging of climax forest, bear habitats can become fragmented or even eliminated. However, bear population response to intensive forest exploitation has not been specifically studied in Estonia. Therefore, it is very important to investigate brown bear home range and habitat selection to make accurate management decisions. Habitat loss through agricultural and urban area development is not a threat at the moment. However, if the economic situation changes in favor of agriculture, it will take a relatively short period to decrease suitable habitat for bears.

Reduction of food resources.—Oats are an important autumn food for bears in Estonia (Kaal 1980), and a decrease in availability of agricultural crops in most locations could affect brown bear access to pre-hibernation foods. After waking from hibernation bears often use moose (*Alces alces*) calves as a protein source.

Sport hunting.— Sport hunting has not been a threat to large carnivore populations because hunters strongly prefer hunting ungulates. Nevertheless, bears have remained a traditional, highly valued game animal, and some hunting areas specialize in providing bear hunting for hunters from abroad.

Poaching.— According to anecdotal material, bear meat was still a major protein source for several families in

northeastern Estonia until about the 1970s. Currently, wild ungulates are preferred because they are more easily hunted, and bears are not targeted by most poachers. The illegal kill rate is not known, but it is believed that intentional poaching exists on a small scale. Therefore, it has been considered by managing authorities as an insignificant factor and not currently a threat to the bear population.

Loss of genetic variability.— Genetic variability is considered to be an important factor to maintain healthy animal populations. It is not known whether separate bear populations exist within Estonia. The level of gene flow should be studied in conjunction with other important population genetic parameters. It seems reasonable to assume that the Estonian bear population is not separated from Russian and Latvian populations, but the real situation remains to be elucidated.

ORPHANS

In Estonia, several bear cubs are orphaned each year. In 1998–1989, 12 orphaned cubs were found. Abandonment or death of the mother are the 2 main reasons leading to such cases. In a majority of cases, females with cubs have been disturbed during denning by forest logging or by hunting near the bear den. Hunting for wild boar [*Sus scrofa*] with dogs has been the most frequent type of hunting that disturbs bears. When disturbed, females often abandon their young (H. Valdmann, U. Saarma, and A. Karis, unpublished data). The killing of female brown bears with cubs is less frequent than disturbance (one case in 1999). Although female brown bears are not legally protected from hunting while accompanied by dependent young, most hunters avoid shooting them. When orphans are found, people either take cubs into captivity or leave them. In recent years, general attitudes have favored taking cubs into captivity, raising them to the age they can survive on their own, and releasing them to the same area of the forest they were originally found. A special "home" exists for orphan bears where they can be taken after they have been found to be abandoned. With the aid of Pazhetnov's family from Russia, who have developed a methodology for rising lone cubs (Pazhetnov et al. 1999), 9 orphan bears have been raised and released during 1998–99.

Raising young bears in captivity is admirable and hard work, but at the moment we are not confident that this is the best way to help orphaned cubs. Habituation to people can become a problem for orphans. Pazhetnov's method is applicable in areas where human settlements are far from the ultimate release site. Even in the most remote areas of Estonia, human density is higher than required by the above method. Young bears can travel relatively long distances. We know of one instance in which a young bear traveled 32 kilometers from the point of liberation within a few days. In 1999, 3 young bears often visited gardens in a village near the place they were released back into the wild. According to observations by local people, these bears were impudent but not aggressive.

As an alternative to raising bears in captivity, abandoned young bears can be left in the forest and supplied by food up to a certain age. Studies in Scandinavia have shown that brown bear cubs can survive well on their own from as early as 6 months of age (Swenson et al. 1998b). Whether the latter strategy is suitable and superior to the present one in Estonia remains to be investigated.

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