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DISTRIBUTION AND NUMBERS OF THE WILD BOAR POPULATION IN SOUTH EASTERN POLAND

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ABSTRACT.– By using both plot sampling and line intercept snow track index, the population density and numbers of wild boar in Bieszczady Mountains and Bieszczady Foothills was estimated during February 2000. The total number of wild boar inhabiting the study area (140.4 thousands ha of forest) was equal to 655 animals with an average population density of 4.66 wild boar per 1000 ha, ranging from 0.0 (Forest Districts of Cisna and Wetlina) to 23.21 individuals/1000 ha (Krasiczyn Forest District). The low density of wild boar in Bieszczady Mountains is caused by the high wolf predation and overharvest rate. The recomendation is to stop wild boar hunting in Bieszczady Mountains during the next 4 hunting seasons, and to use the harvest rate equal to 30% of the population size in February.

RÉSUMÉ.– En février 2000, nous avons estimé la densité de population et le nombre de sangliers sauvages dans les montagnes Bieszczady et les collines Bieszczady. Pour celà, un index des empreintes sur la neige interceptant une ligne ainsi que des parcelles d'échantillonage ont été utilisées. Le nombre total de sangliers habitant dans la zone d'étude -140.400 ha de forêts- s'élevait à 655 animals; la densité moyenne de population était de 4,66 sangliers sauvages par 1000 ha, chiffre oscillant entre 0,0 (Districts Forestiers de Cisna et Wetlina) et 23,21 individus par 1000 ha (District de Krasiczyn). La très basse densité de sangliers sauvages dans les Montagnes Bieszczady est sans doute la conséquence de la forte prédation par le loup et de la chasse importante. Les auteurs proposent d'arrêter la chasse dans les Montagnes Bieszczady durant les 4 saisons suivantes et de limiter le taux d'extraction à 30% du niveau de la population en février.

RESUMEN.– Durante febrero de 2000, en las montañas Bieszczady y sus estribaciones, se estimó la densidad poblacional y número de jabalíes por medio del índice de intercepción lineal de huellas en nieve y el muestreo de parcelas. Con un total de 655 jabalíes para el área de estudio (140.000 ha de bosque), la densidad resultan-

te fue de 4,66 jabalíes por cada 1000 ha, con un rango desde 0,0 (Distritos Forestales de Cisna y Wetlina) a 23,21 individuos/1000 ha (Distrito Forestal de Krasiczyn). La baja densidad de jabalí en las montañas de Bieszczady se debe a las altas tasas de predación por lobo y al exceso de caza. Se ha recomendado interrumpir la caza del jabalí durante las próximas cuatro temporadas de caza y aplicar una tasa de extracción que represente el 30% del tamaño poblacional en febrero.

1. Introduction

Like in other European countries, the number of wild boar in Poland has increased rapidly in the last two decades (FRUZISKI, 1992). During 2000/2001 hunting season, 95.2 thousand animals were harvested in the whole country. According to official statistic records, mainly based on hunting bags and snow tracking census, the population size of wild boar in March 2001 was equal to 118.3 thousand animals (BRESISKI *et al.*, 2001). The increase of wild boar numbers was recorded mainly in Northwestern part of the country, while the population of this species inhabiting Carpathian Mountains demonstrated a rapid decline.

In Poland, when hunting season is over, the hunting clubs, together with the Forest Service are obliged to count numbers of game animals. The results of this census are used to calculate the harvest quotas for next hunting season. It is generally accepted that the official hunting statistics (data regarding number of game species) be inaccurate causing overharvest or underharvest of wildlife populations. Therefore, the main objective of the present study was to estimate the size of wild boar population in Southeastern Poland by using reliable and objective methods.

2. Study area and methods

The study area is the Bieszczady Mountains and the Przemysl Foothills that are situated in Southeastern corner of Poland (Figure 1). The Bieszczady Mountains is a mountain range, where the highest peak, the Tarnica, reaches 1.346 m a. s. l. The snow cover in the forested zone of 500-800 m a. s. l. stays for 90-140 days per year and the average snow cover depth varies between 40-80 cm. The area is administrated by 6 Forest Districts (Baligrod, Cisna, Komancza, Lutowiska, Stuposiany and Wetlina) which jointly include 94.2 thousand ha of forest, mainly beech *Fagus silvatica* and fir *Abies alba*. The Przemysl Foothills are situated north to Bieszczady Mountains. Part of this

area is administrated by Bircza and Krasiczyn Forest Districts which include 46.0 thousand hectares of upland forest type, where fir, beech and scots pine *Pinus sylvestris* are the dominant tree species. It is hilly country and its elevation ranges between 400-600 m a. s. l. The climate is continental, but winters are milder than winters in Bieszczady Mountains. In the whole study area the wolf predation is an important factor shaping population dynamics of wild boar. Both, in Bieszczady Mountains and Przemysl Foothills the density of the wolf *Canis lupus* populations are similar and was estimated as 1.1 individuals per 1000 ha of forest.

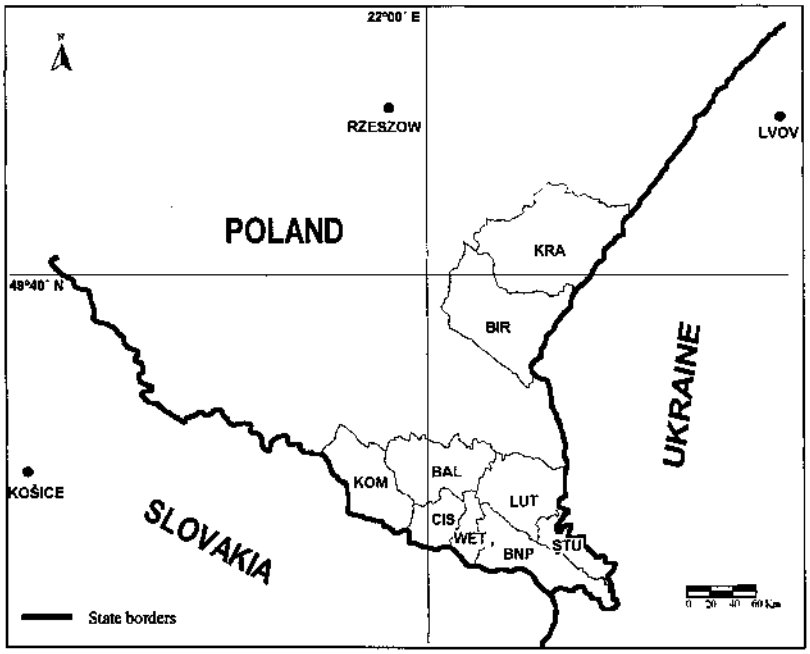

Figure 1. The study area. Forest districts: Baligrod (BAL), Bircza (BIR), Cisna (CIS), Komancza (KOM), Krasiczyn (KRA), Lutowiska (LUT), Stuposiany (STU), Wetlina (WET) and Bieszczady National Park (BNP).

3. Methods

The number and density of the wild boar populations were estimated using so called "Carpathians technique" (BOBEK *et al.*, 1997) which is based

on the relationship between absolute population density (N/1000 ha of forest) as a dependent variable and snow track density index (T/km*day) as an independent variable. In the whole study area 97 line transects were established by systematic placement of the total length of 576 km (Table 1). These were forest roads, accessible by car in winter. During 5 consecutive days fresh snow tracks left by wild boar were both counted and cleared after counting. Then, an index of T/km*day from the line transects separately for each inventory block (3-4 thousand ha of forest each) was calculated. The following formula was used to calculate the wild boar density in the inventory units (BOBEK *et al.*, 2002a):

$$Y = - 0.18 + 30.07\ X \qquad (1)$$

where: Y is density of the wild boar population (N/1000 ha of forest) and X is an average snow track density index (T/km*day)

Using the above relationship and total forest area of the each inventory block, the number of animals per inventory block was estimated. By compiling data from inventory units the number of wild boar in forest districts was obtained.

Table 1. Density and population size of the wild boar in Bieszczady Mountains and Przemysl Foothills. Calculation were based upon snow tracks data (T/km*day) collected along the line transects during present work in February 2000, and the straight line regression between population density obtained from plot sampling (Y=N/1000 ha) and snow tracks density index (T/km*day) in south-eastern Poland (BOBEK *et al.*, 2002a).

Forest districts		Numbers and length of line transects		Mean snow tracks density	Population of wild boar	
Name	Area (ha·10)	N	km	index (T/km·day)	Density (N/1000 ha)	Size (N)
Bircza	28.8	23	118	0.30	6.98	201
Krasiczyn	17.2	27	83	0.86	23.21	399
Foothills total/mean	46.0	50	201	0.58	13.04*	600
Baligrod	21.9	19	111	0.02	0.48	10
Cisna	11.6	6	49	0.00	0.00	0
Komancza	19.2	14	88	0.04	1.17	22
Lutowiska	23.9	4	71	0.02	0.38	9
Stuposiany	9.7	2	38	0.07	2.00	19
Wetlina	7.9	2	18	0.00	0.00	0
Mountains total/mean	94.2	47	375	0.02	0.63*	60
The study area total/means	140.2	97	576	0.16	4.71*	660

* - Weighted mean

4. Results and Discussion

In the whole study area the average population density of wild boar amounted to 4.71 animals/1000 ha of forest (Table 1). There are wider differences in the population densities between Przemysl Foothills and Bieszczady Mountains, i. e. 13.04 versus 0.63 animals per 1000 ha of forest. The total number of wild boar in the study area was calculated as 660 animals, out of which 600 i.e. over 90% are inhabiting the Przemysl Foothills. However the official hunting statistic record have reported number of wild boar as 169 and 575 individuals in Bieszczady Mountains and Przemysl Foothills respectively.

In Bieszczady Mountains the overestimation of wild boar numbers together with lack of data on the population recruitment rate was the main reason of the drastic decline of population size. It is well documented by the analysis of wild boar population dynamics since 1997. In this year during February the population estimate carried out by using the Carpathians method showed 172 wild boars were inhabiting Bieszczady Mountains, while the official hunting statistic records reported the number of wild boar equal to 429 animals (Figure 2). In 3 consecutive hunting seasons the harvest bag was higher than annual population recruitment rate, this resulted in a strong decline of the wild boar population size (Table 2). According to the results of computer simulation the harvest rate became lower than population recruitment rate during last two hunting seasons. It was causing a slight increase of wild boar numbers in Bieszczady Mountains during 2000 and 2001 (Figure 2, Table 2).

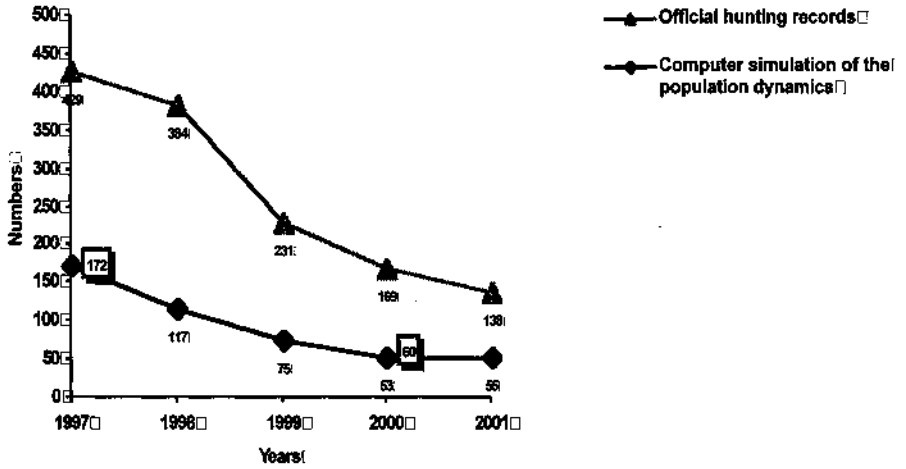

Figure 2. Population size (N) of wild boar in Bieszczady Mountains during 1997-2001. In quadrats, population size estimated by line intercept track index.

Table 2. Harvest rate of the wild boar and influence on the net change of population size in Bieszczady Mountains during 1997-2001. The computer simulation used the initial number of wild boar (n=172) calculated by the line intercept track index in February 1997, official hunting bag data and the annual recruitment rate equal to 33.0% of the population size of the hunting season (February/March) (recalculated from BOBEK *et al.*, 2002b).

Hunting season	1997/98	1998/99	1999/2000	2000/2001	2001/2002
Population size	172	117	75	53	55
Harvest rate (H)	112	81	47	15	10
Recruitment rate (R)	57	39	25	17	18
Net change of the population size (R-H)	- 58	- 45	- 26	+ 2	+ 8

There is no such data for the wild boar population living in Przemysl Foothills. The population recruitment rate in this area is unknown, but because of more mild climate and well-developed agriculture it could be much higher than that one in Bieszczady Mountains. Assuming the recruitment rate is equal to 50% of the population size after hunting season, it seems that harvesting of 387 animals in Przemysl Foothills during 1999 / 2000 hunting season, would have reduced probably the number of wild boar from about 650 individuals (February 1999) to 600 animals that were present in this part of study area in February 2001.

5. Conclusions

One can conclude that the recovery of the wild boar population in Bieszczady Mountains is possible if the hunting of this species is stopped for period of 3-4 years.

In South-eastern Poland the population dynamics of wild boar is shaped by wolf predation (KANZAKI *et al.*, 1998) and recent changes in agriculture systems.

6. Reccomendations

The annual harvest quota of wild boar must be assessed carefully and be based upon reliable population census, including also data on recruitment rate of wild boar. Because wolf predation is oriented mainly to young animals (SMIETANA & LIMEK, 1993), the harvest quota should not include wild boar piglets.

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