

SOME ASPECTS OF THE INFLUENCE OF HABITAT CHANGES ON WILDLIFE IN POLAND.

Fruzinski B.

Department of Game Management, Agricultural University in Poznan, Wojska Polskiego 71 d, 60-625 Poznan, Poland

Abstract - On the bases of the changes in Polish ecosystems the dynamics in number of some species of game and (big) predators is described. Over the last centuries the area covered by forest was systematically diminishing, from about 90% of the country in the 10th century to only 22% in 1946 and about 29% nowadays. The health condition of the forest also deteriorated, especially over the last forty years. This situation it improved the feeding conditions for herbivorous species (mainly deer species) and caused the increasing of their number. The author describes the situation of populations of elk (*Alces alces*), red deer (*Cervus elaphus elaphus*), roe deer (*Capreolus capreolus*), fallow deer (*Dama dama*) and wild boar (*Sus scrofa*) harvested over the last twenty years. This paper also includes data on situation of such species as capercaillie (*Tetrao urogallus*), black grouse (*Tetrao tetrix*) and big predators: brown bear (*Ursus arctos*) and wolf (*Canis lupus*). The landscape has changed. The environmental situation of small game like partridge, pheasant and european hare is in Poland very difficult.

Résumé - Quelques aspects de l'influence des modifications d'habitat sur la faune sauvage de Pologne. En se basant sur les modifications des écosystèmes forestiers et des espaces ouverts en Pologne, l'auteur analyse la dynamique de population de certaines espèces de gibier et de (grands) prédateurs au cours des 25 dernières années, les effectifs actuels et les perspectives de fonctionnement de ces population dans le futur. Au cours des derniers siècles, la superficie des forêts a beaucoup diminué, passant de 90% de la superficie du pays au X^{ème} siècle à à peine 22% en 1946. Actuellement, elle est d'environ 28%. L'état sanitaire des forêts a aussi sensiblement empiré, particulièrement au cours des 40 dernières années. Paradoxalement, cela a enrichi le substrat de pâturage des différents herbivores. La population d'élan (*Alces alces*) s'est accrue de façon dynamique jusqu'au début des années 80 où elle a atteint près de 6000 sujets alors qu'il ne restait plus que quelques sujets sur le territoire polonais après la Seconde Guerre Mondiale. Mais les dégâts qu'ils ont occasionnés dans les zones boisées ont entraîné des chasses intensives et la population a chuté à 2500 individus en 1996 et environ 1800 sujets de nos jours. Il est donc envisagé de protéger totalement cette espèce durant les deux ou trois années à venir. La population de cerfs (*Cervus elaphus*) a augmenté régulièrement jusqu'au début des années 90, jusqu'à dépasser 100000 sujets. Une chasse intensive a fait chuté la population, qui est actuellement de l'ordre de 90000 individus et semble être stable. La population de chevreuil (*Capreolus capreolus*) a augmenté jusqu'en 1992 et a dépassé les 600000 individus. Différents facteurs environnementaux ont entraîné une diminution de la population à environ 500000 individus, chiffre qui semble être désormais stable. La population de sangliers (*Sus scrofa*), de 80 à 90000 individus, reste à peu près stable malgré un taux de chasse variable. L'auteur présente également les données de populations d'espèces telles que le daim (*Dama dama*), le lièvre (*Lepus europeus*), le faisan (*Phasianus* sp.) la perdrix (*Perdix perdix*), le coq de bruyère (*Tetrao urogallus*) et le tétras lyre (*Lyrurus tetrix*), et de prédateurs comme l'ours (*Ursus arctos*) et le loup (*Canis lupus*).

Key-words: Habitat changes, Population dynamics, Harvest, Elk, Red deer, Roe deer, Fallow deer, Wild boar, European hare, Partridge, Pheasant Brown Bear, Wolf.

Mots clés: Changements des biotopes, Dynamique de population, Chasse, Élan, Cerf, Chevreuil, Daim, Sanglier, Lièvre, Perdrix, Faisan, Ours, Loup.

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1. Introduction

The Polish landscape is very diversified: from sandy beaches in the north on the Baltic Sea

coast, through planes in the central part of the country, up to high mountains – the Tatra Mountains in the south (2,444 m a.l.s.).

Like in other European countries, the landscape in Poland has undergone numerous changes over the last centuries. The biggest changes concern the forest ecosystem. In the 10th century 90% of Poland was covered with forests, but as early as the 13th century that percentage was only 50% and the beginning of the 19th century it amounted to about 30-32% of the total area. Activities of countries who occupied Poland in the 19th century and during the two world wars led to the situation in which only 22% of the area was covered with forest in 1946. Due to the intensive afforestation, nowadays the forests covers about 29% area of the country.

At the same time the health condition of the forest has deteriorated, due to insect gradations, fungal diseases and industrial emissions. It is estimated that about 75% of our forests are threatened by biotic and abiotic factors (Paschalis, 1997). About 20% of Polish forests have the stand density below 0.6 and the area of loose or sparse forests has increased from 48% to 53%. The mountain forests are the most affected ones: in some regions only 2% of forests can be considered healthy and 98% is injured by pollution, insects and fungi. The health condition of forests, which is the main cause of the stand density decrease, paradoxically contributed to an improvement of feeding conditions of herbivorous species (*Herbivora*). An increased access of light to the forest floor caused a more intensive growth of herbs plants - the staple diet of the deer species (*Cervidae*). As a result, the populations of these species increased greatly in Poland. The most important ungulate species in Poland are: roe deer (*Capreolus capreolus*), red deer (*Cervus elaphus*), wild boar (*Sus scrofa*), fallow deer (*Dama dama*) and elk (*Alces alces*).

2. The roe deer (*Capreolus capreolus* L.)

It is the most numerous deer species in Poland. At the beginning of the seventies the number of individuals was certainly underestimated. The official evidence showing the increasing of the population size till 1992 was mainly the result of the more precise esti-

imating methods. The population size at the beginning of the '90 was estimated on about 600,000 individuals (both ecotypes "forest" and "field" roe deer). The yearly harvesting was over 200,000 animals. Over the last years however a certain decrease in the number of animals and harvesting figures has occurred and the reasons for that are still unknown. Surely, the intensification of harvesting, as it exceeded 30% of the spring population level played an important role and limited the reproductive capacities of the population (Fig. 1). Other factors are also significant: a substantial increase of the red fox population, who may prey on fawns, and abiotic factors. An almost catastrophic draught in spring and summer 1993 caused a high mortality among the young animals (Fruzinski & Górecki, 1997). As the result, population decreased to 530,000 animals, with the harvesting level of 150,000 animals in the 1995/96 season.

3. The red deer (*Cervus elaphus* L.)

Before World War Two the red deer was not numerous in Poland and it inhabited only some parts of the country. A very strong population inhabited the eastern Carpathians, but that region as a result of the negotiations of the Allied Forces after the war, was excluded from our country. At the same time some regions rich in red deer, like the Mazury Lake District and north western regions, were added to Poland. The expansion of the red deer into other parts of Poland began in the early '50. At the beginning of the '60 a successful introduction of red deer was carried out into the central and southern regions, where the population had been destroyed during the war. Today those regions are inhabited by red deer populations of good individual quality. Now the red deer population in Poland counts near 100,000 animals, and it is a relatively high number. At the beginning of the '90 harvesting intensity (up to 63% of the spring population level) considerably exceeded the reproductive ratio of the population (Fig. 2). The reason for

this high harvesting level was the pressure of foresters who saw the damage done by this species in tree stands (feeding on buds in cultures, debarking in young stands). As a result, the red deer population decreased.

4. The wild boar (*Sus scrofa* L.)

The wild boar is a species for which the changes in the landscape structure, and especially vast fields with crops on them have proved to be the most advantageous. Its number in Poland systematically increased

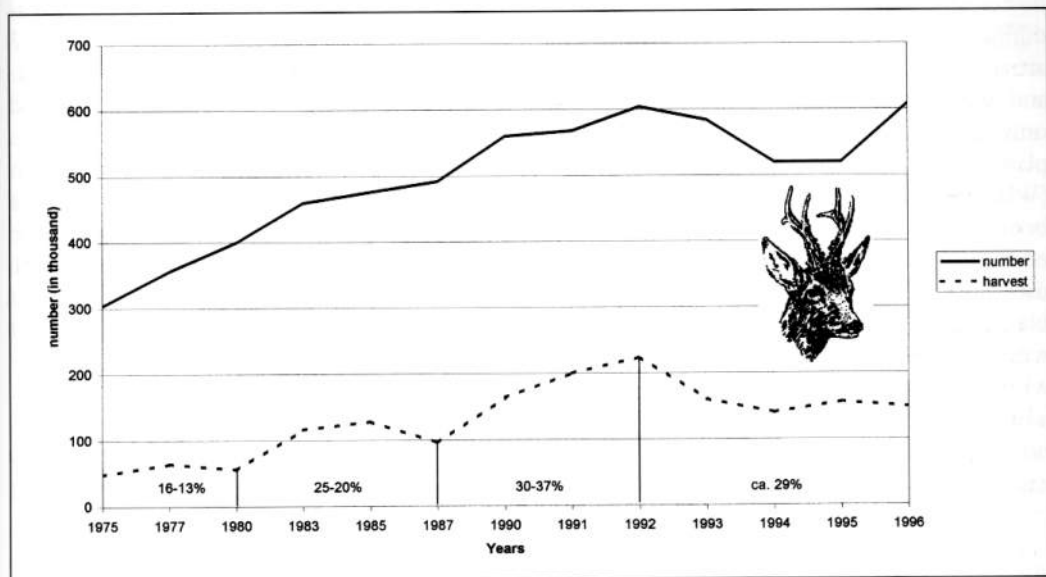


Fig. 1 - Estimated abundance and number of harvested individuals of roe deer in Poland

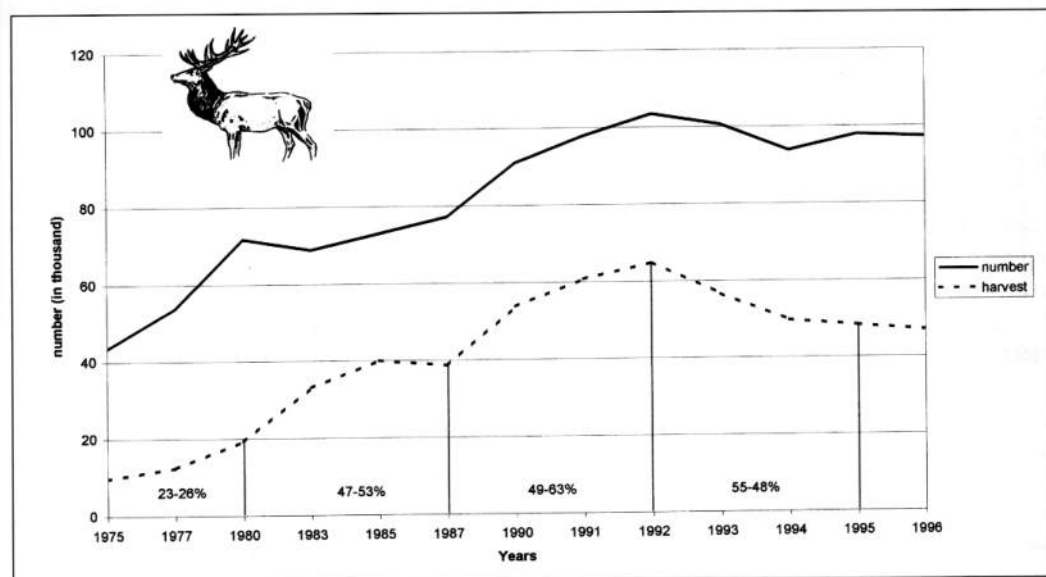


Fig. 2 - Estimated abundance and number of harvested individuals of red deer in Poland

over that last fifty years. Its peak was in 1992 (Fig. 3). Then a small decrease resulted from an intensive harvesting of the population, which in turn was caused by severe damage done to the fields and by local occurrence of pig pest. Wild boars always used fields as their feeding place and the intensification of agriculture created rich food resources for them. Even during the years rich in acorns, which are very attractive food, the participation of acorns and other forest plants in the diet reaches only 53.3%, while in other years the field plants make up 81% of the yearly food (Wlazelko & Labudzki, 1992). The wild boar, from a typical forest animal, became an ecological landscape animal, and alternately uses both forest and field ecosystems. The biggest numbers of animals and the highest wild boar harvesting are reported in areas with relatively little forest, where the woods/field boundaries are long. The north-western part of Poland, however, is an exception here (Fruzinski, 1993).

5.- The fallow deer (*Dama dama* L.)

One hundred years ago, fallow deer occurred very rarely in Poland, usually as a park animal. The fences were destroyed during the last war and the population was decimated. The remaining fallow deer gave however a start to free living populations, the number of which slowly but steadily increased. Although the population grew (over 3 times in the last two decades) the areas inhabited by fallow deer are still scattered and they do not depict a closed range. (Dzieciolowski, 1994) As the fallow deer is an attractive species from the hunter's point of view, a project for further introduction in order to create a wide-spread range, first of all in western parts of Poland was undertaken. In 1996 population size was estimated to about 8,300 individuals. (Fig. 4).

6. The elk (*Alces alces* L.)

Before World War Two this species inhabited only the eastern part of Poland and was not

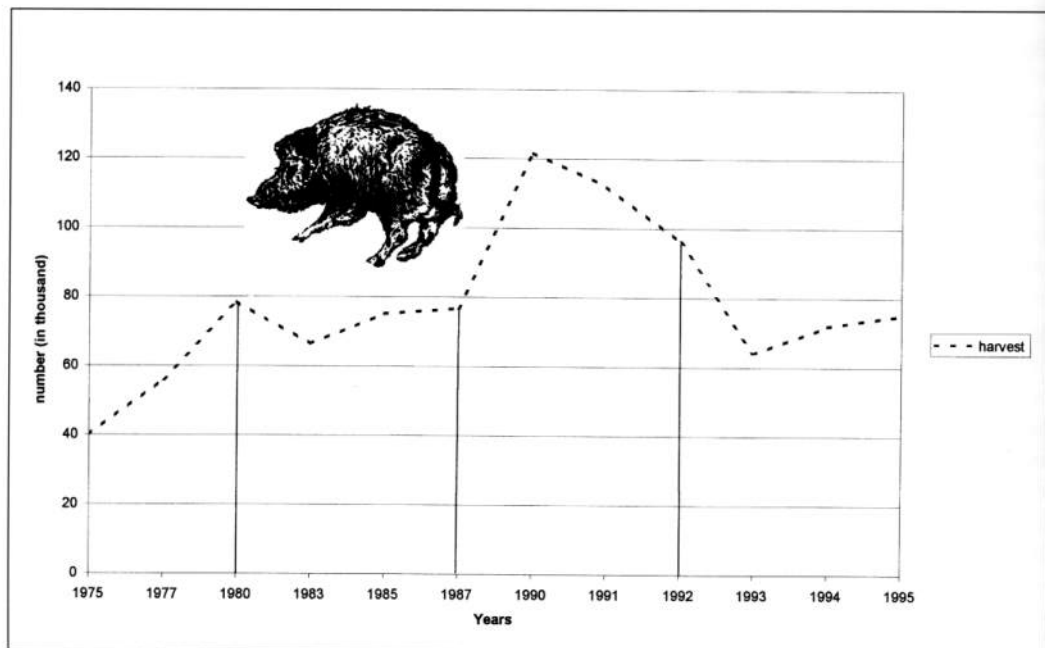


Fig. 3 - Number of harvested individuals of wild boar in Poland

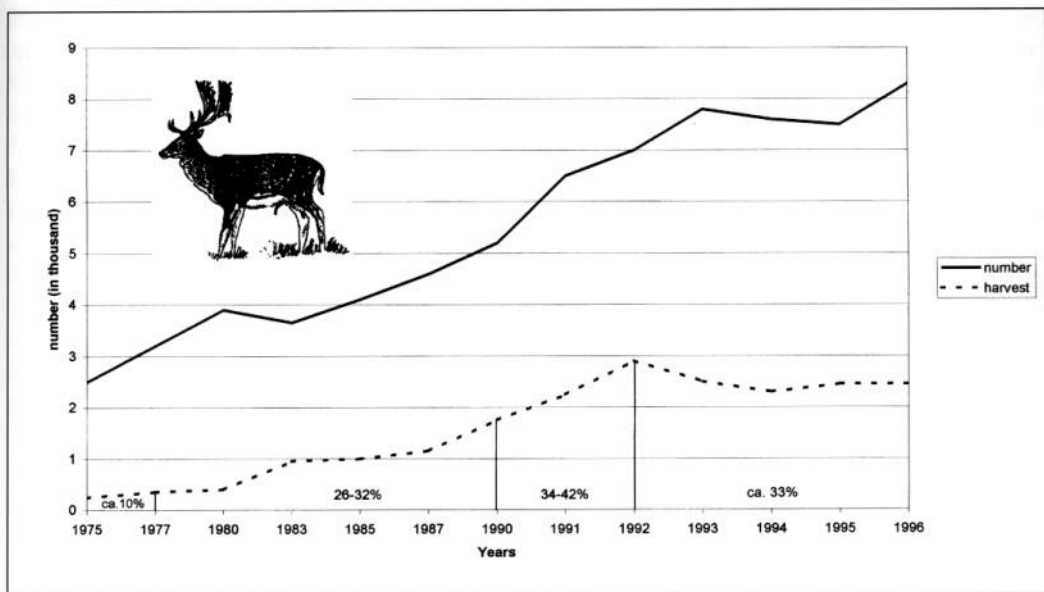


Fig. 4 - Estimated abundance and number of harvested individuals of fallow deer in Poland

numerous. After the war several animals only remained in the Czerwone Bagno (Red Swamp) Forest District. Due to the protection and introduction of elks into the Kampinoski National Park near Warsaw in the '50s, a very dynamic expansion of that species to other regions of the country began. (Fig. 5) The further increase of population was also the result of immigration of some individuals from Lithuania, White Russia and Ukraina (Fig. 5) In 1980 – 1981 the elk population reached nearly 6,000 animals and elks inhabited over 50% of the country. At that time 1,000 to 1,600 animals were harvested during the hunting season. Elks in Poland change their biotopes seasonally. They inhabit swamp areas but move to neighbouring forests in winter. Damage caused by them in the stands (feeding on buds in cultures, debarking in young stands, breaking 20-25 year old trees – especially pines) make the proper forest management impossible. This was the reason for the intensification of elk shooting in forests. The population coun-

ted about 2,400 animals (Fig. 6) in 1996 and nowadays only about 1,500 individuals.

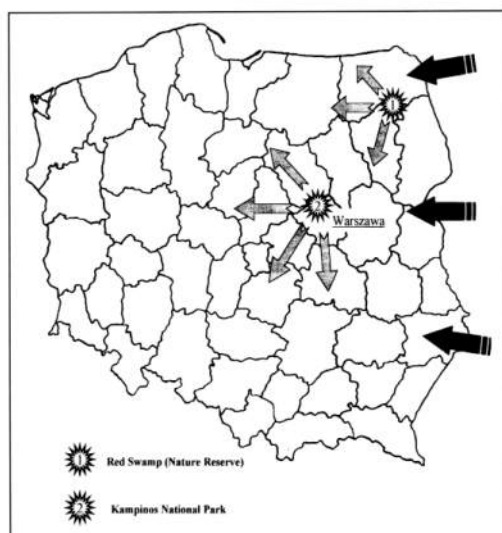


Fig. 5 - Expansion of elk population in Poland

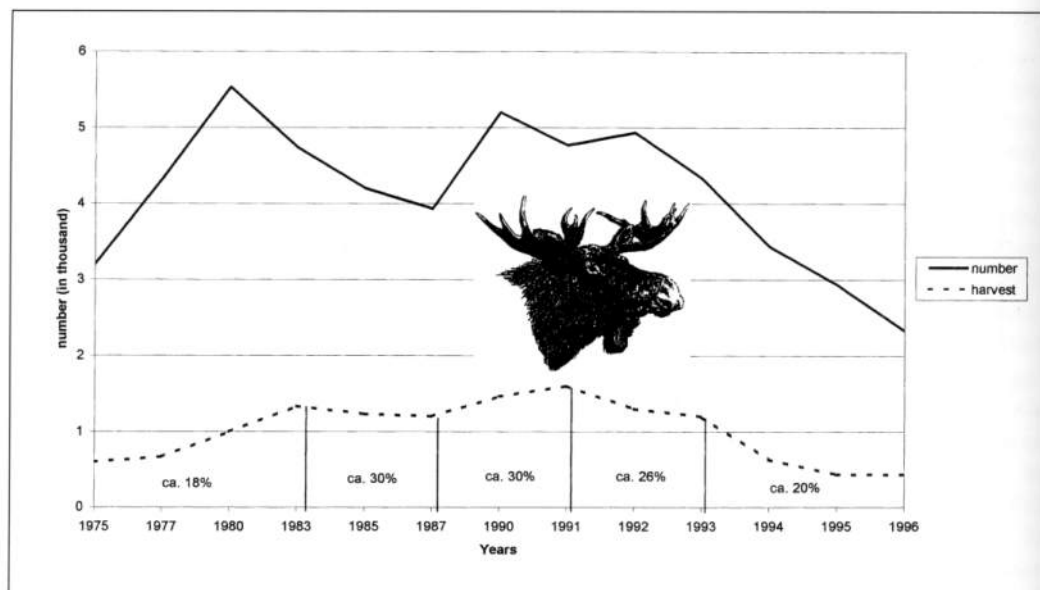


Fig. 6 - Estimated abundance and number of harvested individuals of elk in Poland

7. The European hare (*Lepus europaeus* Pallas)

The hare population size in Poland fluctuates sharply. Until the mid Seventies the average yearly harvest was about 500,000 animals. At that time the biggest decrease in the population size always occurred after severe winters. However, each time the population was rebuilt. A very severe winter in 1978/79 coincided with the falling phase of the population size (Fig. 7) and caused a catastrophic decrease in the stock. After the rising phase a certain stock stabilisation occurred at the end of the '80. Since that time, both the population size and the harvest have systematically fallen. During the latest season (1997/98), hares were no longer hunted in many regions of the country. The stock of the above mentioned species is affected not only by abiotic factors of the environment, but also by other species inhabiting the same biotopes. The red fox population substantially increased recently. The raven, being a species that quickly adapts to humans, reached a big population size. It poses a threat to many game species and also to other animals. Owing

to the opinion of some "fanatic" ornithologists, the raven is still a protected species.

8. Game birds

8.1. The pheasant (*Phasianus* sp.)

The biotope of the pheasant in Poland consists of areas for agricultural use, with a diversified landscape, with small groups of bushes. The presence of streams with shores overgrown with reed or grass formation is very important. The highest numbers of pheasants were noted before Second World War, especially in big private estates. The war and poaching practices decimated the population. In the '60 intensive introduction of pheasants bred in aviaries was carried out. The effects of the introduction were different; they depended on the environmental conditions. Nevertheless at the beginning of the '70 the population reached the biggest size after the war. The severe winter 1978/79 and unfavourable condition during the breeding time in the following spring broke the population size. The recovery was very slow. The effects of introduction were

also limited, as the harvest was often smaller than the number of introduced birds (Fig. 8). Today, in spite of the small population size the situation of pheasants in Poland is better than that of partridges.

8.2. *The grey partridge (Perdix perdix L.)*

To the environmental conditions the effect of severe winters, which occur from time to time, should be added. No wonder that it may be related to a decrease of population size. This pertains especially to partridge. In the '50 about 1 million individuals were harvested. A gradual decrease of population size began in '70 and reached its minimum during the season 1980/81 after a very severe and snowy winter 1978/79. Since that time the harvesting and partridge population size have not achieved the state we had 20 years ago (Fig. 9) Today, in most regions of Poland, partridges are no longer harvested.

8.3. *The capercaillie (Tetrao urogallus L.)*

Changes of the forest landscape, and especially

the intensification of silvicultural activities in the '60, proved to be very disadvantageous for some species of forest game birds. Cutting old stands led in many places to the destruction of display grounds of the capercaillie. At the same time, the draining of swamps and marshes in the forest meant an impoverishment of food resources both for nestlings as well as for the adult birds. As a result, the capercaillie population considerably decreased and in some areas, in north-western Poland, it completely disappeared. Today the capercaillie occurs in small isolated populations, which may badly affect reproduction and genetical heterogeneity.

8.4. *The black grouse (Tetrao tetrix L.)*

Draining vast areas of swamps and meadows situated in or close to the woods, and removing bushes at the same time, led to the destruction of the most precious biotopes for the black grouse. The decrease of the participation of birch in the forest species composition imrove-

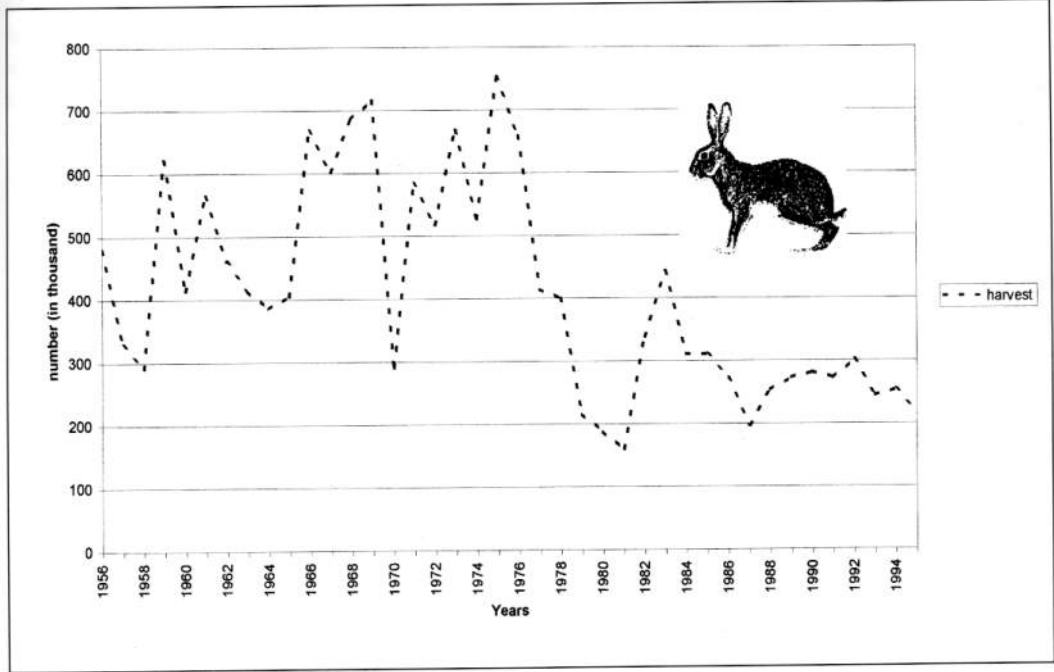


Fig. 7 - Number of harvested individuals of European hares in Poland

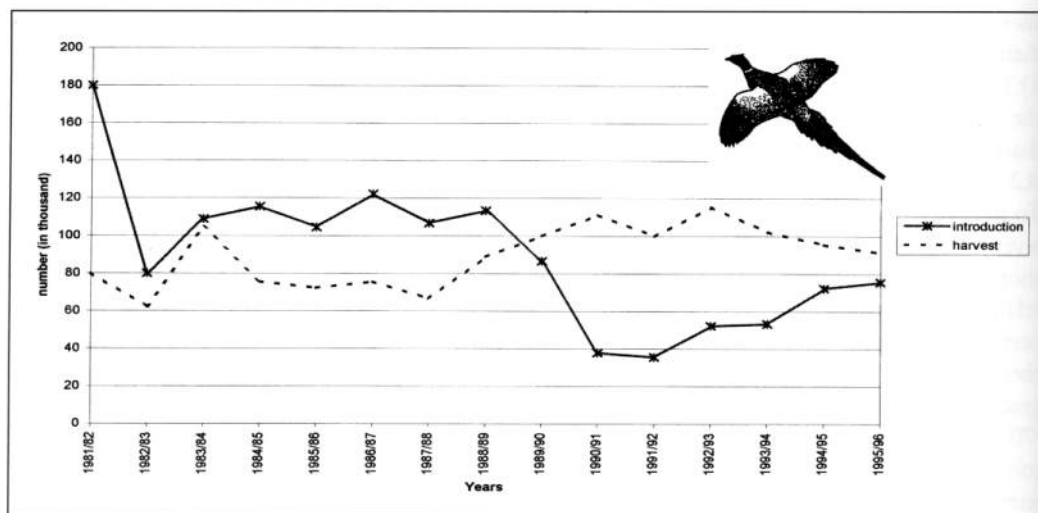


Fig. 8 - Harvested and introduced phasants in Poland

riched the food basis. In such a situation the population diminished almost 10 times in comparison to the '60 (Kamieniarz, 1999).

9. Big predators

Poland is one of the few countries in Middle Europe, where populations of big predators have survived.

9.1. The Brown bear (*Ursus arctos* L.)

Not numerous before the war, Brown bear is slowly but systematically increasing its population. Today about 100 bears live in the Polish Carpathian Mountains. For sure, this is only a part of the population which inhabits the whole Carpathians. This species is under protection even if it causes some

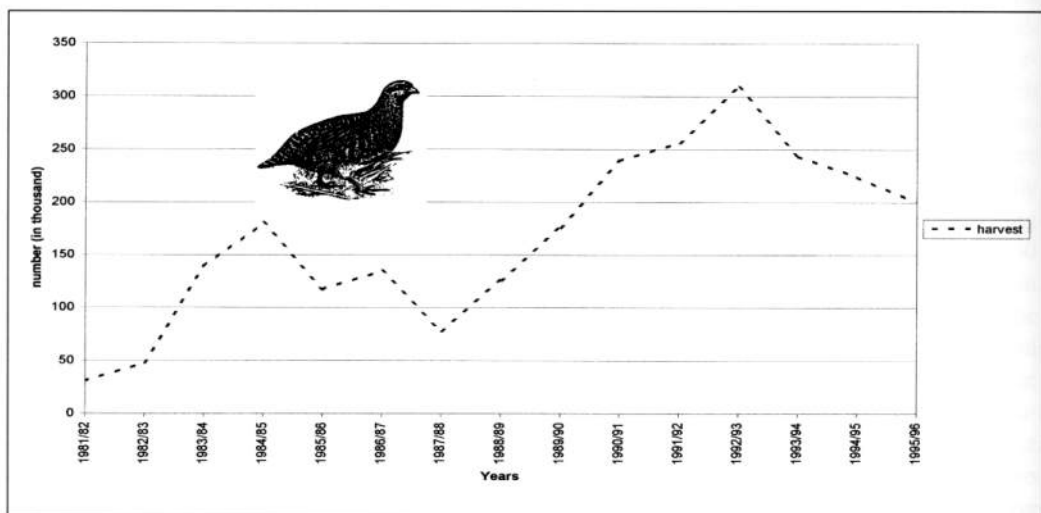


Fig. 9 - Harvest of partridges in Poland

damage among domestic animals.

9.2. *The wolf (Canis lupus L.)*

Over the last 50 years the situation of the wolf (*Canis lupus L.*) has changed.

Numerous in the east of Poland in the '50, it acquired a name of a pest destroying the game and domestic animals and it was intensively reduced. Since it reached the status of a game animal, its number substantially increased.

A limited harvesting level (40-50% of the reproduction rate) has not posed a threat to the population. As a result of the expansion, new populations appeared in western Poland. Nowadays there are about 900-1,000 individuals inhabiting mainly the south-eastern part of the country. This species is now protected all year round.

10. Perspectives for the sustainability of big herbivore populations in the Polish forests.

The Polish landscape also changed. The intensification of agriculture, a change in the crop structure and in the area of monocultures played an important role here. Although Polish agriculture is based on large number of small farms (the average farm is only 7 ha), big farms are also present. They were state enterprises until a few years ago and today they are owned by companies or private people. The structure of the most important cultures is as follows: cereals - 59.7%; potatoes - 10.9%; other plants (vegetables, industrial, orchards) - 24.9%. Vast areas of monocultures present a most monotonous landscape. Groups or strips of trees among fields have disappeared, and crop rotation causes the lack of cover in the spring time - the most important period for animals. In a situation where large maize areas on sugar beet, pheasants or partridges can not build their nests. The situation is still more complicated by the use of mechanical equipment for cultivation and harvesting. Grey partridges and pheasants sitting on eggs, young hare and roe deer in seemingly safe meadows and areas covered with plants meant for green forage, are killed in masses by the blades of modern mowers, as the time of harvest coincides with the breeding season. Although chemical pesticides rarely cause instant deaths,

nevertheless by chronic intoxication they cause a decrease in reproduction. The environmental situation of game inhabiting this ecosystem is therefore very difficult.

The principles of the Polish forest politics aim to make silviculture ecologically oriented to high extent. That means giving up large area clear cutting systems and promoting natural regeneration on smaller areas. After many years of one-species forests, especially coniferous ones, the species composition is dramatically changing. Apart from the main stands building species, on proper sites, also mixing species, playing a biocenothical role, and the deciduous species will be planted. All factors which could make the implementation of the above presented politics difficult, must thus be limited. One of such factors, though not the most important one, is the damage done by the deer to the tree stands. The size of that damage will decide on the success of silvicultural activities.

The game number should therefore be adjusted according to the abundance of the forest feeding potential.

10.1. *The roe deer*

This is the biggest shoot eater among herbivorous species. Apart from shoots it feeds, in a very selective way, on top shoots of mixing species. During the first stage of the forest stand rebuilding programme its number should be reduced. As the experiments done so far show, the optimum population density should be 10-12 animals per 100ha of area. Considering the fact that, due to natural conditions (climate, predators), roe deer populations in the central and in eastern Poland are smaller at present, it may be assumed that the present population of about 700,000 animals is the optimum. (Dzieciolowski & Fruzinski, 1997).

10.2. *The red deer*

As forest specialist estimate, the Polish forests in the process of rebuilding, can offer the food for about 80,000 red deer. However the harvesting rules should be changed in order to increase the average age and to obtain the proper, that means balanced sex structure.

A vast, open landscape and large crop area have created an ideal biotope for some ani-

mals, which did not occur in the field ecosystem before. The first species that adapted to that landscape was the roe deer. A few decades ago a field ecotype of the roe deer appeared. An open landscape is the biotope of that ecotype. In winter, field roe deer from groups consisting of several dozen animals. They never seek protection in the forest. They are most numerous in the central and western parts of the country. In the field landscape of today this is an ecotype with a future.

10.3. The wild boar (Fig. 3)

This is not a typical herbivorous species, but an important game species living in the forest. In forest biocenoses it is a factor limiting the gradations of some harmful insects. By rooting the soil it accelerates the humification process, creating favourable conditions for natural regeneration at the same time. A reduction of the population of that species is not recommended. A factor which can limit the number of animals is damage caused to agricultural crops. Hence, only the financial situation forces an intensive harvesting. It can not, however be done randomly, but it should aim to make the population older. Today, the average age of a wild boar is 18 months (Fruzinski, 1993). This has an effect on the social organisation of the population and on reproduction, and thus indirectly affects the damage extent on fields.

The recommended structure of the total harvest is: 60% of the piglets, 30% of the yearlings and 10% of the older boars (Fruzinski & Pielowski, 1986) or better 75% of the piglets, 10% of the yearlings and 15% of the older ones (Fruzinski & König, in prep.).

10.4. The fallow deer

Because it is an attractive game species in Poland, the program for further introduction in order to create the uniform widespread range in Western Poland has been undertaken. The present state of 8,300 individuals will shortly double.

10.5. The elk

The dramatic decrease of population size is the most important reasons for taking into protection this species for the next 2-3 years.

The achievement state of population on the level of about 4,000 individuals seems to be the most suitable for management of this species and our forests. In general, the changes of the Polish landscape were and are favourable to many big game species and the sustainability of their populations is not threatened. However, the proper managing of these population is necessary.

On the other hand, environment changes are extremely unfavourable to small game. It is a problem to maintain its present number. The stock of these animals can be increased by proper management of their biotopes. The only way here is an increase of areas covered by trees and bushes among crops, which can cause an increase of the population size of partridge, pheasant and hare.

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