

## Factors affecting the level of damage by wild boar in farmlands in north-eastern Poland

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### Abstract

The level of damage caused by wild boar in 33 forest districts was investigated. The study area covered 2.231 million ha including 0.662 million ha of forests. In the last six years (2005-2010) the wild boar population has increased from 15,200 to 24,100 individuals and harvesting from 10,700 to 20,700. In the same period, the area of farmland damaged by these animals increased from 1,470 ha to 2,800 ha. The level of damage results primarily from 5 variables of which the most important are population density ( $r=0.67$ ) and Simpson's biodiversity index ( $r=0.54$ ). The population density of wild boars, however, was affected by 5 variables. The most important was Simpson's biodiversity index ( $r=0.86$ ), proportion of oak and beech trees ( $r=0.80$ ) and amount of cereal food at baiting sites ( $r=0.68$ ). The highest level of wild boar-related damage was recorded in April (on meadows) and in August (in cereals). The financial performance of wild boar management indicates that the income from selling carcasses is lower than the damage compensation. The paper discusses the methods to reduce numbers of wild boars, based on reliable population census data and reproductive patterns.

Keywords: biodiversity index, damage compensation, management strategy, oak and beech proportion, relative population density

### Introduction

Over the last 20 or so years Poland has witnessed an uncontrolled increase in wild boar population numbers. Hunting bags have increased year by year, but according to the hunting statistics the wild boar population levels and the extent of damage to farmland have also risen. In the 2009/10 hunting season the number of wild boars harvested was 217,900 individuals, whilst the estimated population number after the hunting season stood at 249,900, and the compensation payments made to farmers for boar-related damage amounted to 12.4 million €. The aim of study was to learn about the factors affecting the level of damage exerted by wild boars in farmlands in north-eastern Poland.

### Material and methods

The data collected covers 6 hunting seasons (2005/2006-2010/2011) was obtained from 365 hunting districts, whose game management is supervised by 33 forest districts reporting to the Regional Directorate of State Forest in Olsztyn. The total area of all these hunting districts is 2.231 million ha including 0.662 million ha of forest. Data from hunting districts were pooled to obtain the total figures for each forest district. The length of forest-farmland border line was determined for each forest district using digital maps. The data on the structure of forest stands were used to calculate the biodiversity index (Simpson, 1949). In January 2011, the game statistics data regarding wild boar population numbers were verified in 3 forest districts by block count technique (Bobek et al., 2009; Kogenazawa et al., 1995) and a method for analyzing the results of collect hunts (Bobek et al., 2009).

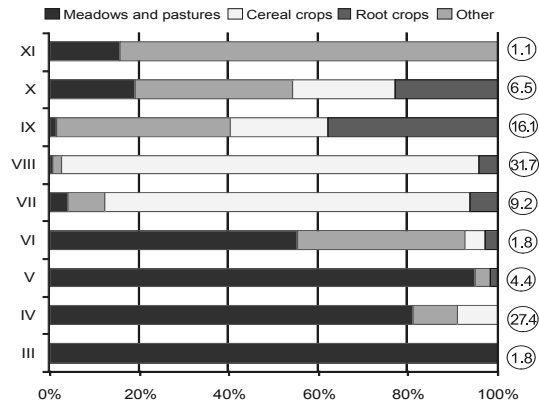
### Results

In 2005, the hunters estimated the wild boar numbers at 15,000 whereas in 2011 it stood at 24,000 individuals. The harvesting figures for the wild boar population increased systematically from 11,000 to 21,000 animals, but the area of farmlands affected by boar damage also increased from 1,470 ha to 2,800 ha. The data from the 33 forest districts show a lack of significant correlation between changes in population numbers and hunting bag ( $r=0.099$ ,  $p=0.607$ ). Verification of wild boar numbers reported by hunters indicated that boar numbers were 20.7-40.4% higher. Our calculations used the number of wild boars harvested per 1,000 ha of forest as a measure of relative population density.

The level of damage by wild boars in farmlands increased in line with the increases in population density of boars ( $r=0.67$ ), the density index in farmland-forest ecotones ( $r=0.51$ ), proportions of oaks and beech ( $r=0.50$ ), the Simpson biodiversity index for dominant tree species ( $r=0.54$ ), and age classes of forest stands ( $r=0.47$ ). However, the impact of the increased density index of feeding strips with corn protecting farmland against wild boar damage was not significant.

There was a significant positive correlation of the relative population density with the density index in the ecotone ( $r=0.47$ ), proportion of oak and beech in the stands ( $r=0.80$ ), the amount of cereal food at baiting sites ( $r=0.68$ ) and biodiversity index for dominant tree species in forest stands ( $r=0.86$ ). The wild boar population density was negatively correlated to the proportions of pine, larch and spruce in the forest stands ( $r=-0.83$ ).

The highest proportions of damage by boars occurred in August (31.5%) and in April (27.4%). The August damage affected mostly cereal crops, whereas in April, the main damage was inflicted in meadows and pastures (Figure 1).



**Fig. 1** Agricultural crops damaged by wild boar in north-eastern Poland. Percent of various crops damaged during every month is given in bars. Data in circles represent monthly distribution (%) of the total area damaged during growing season.

Table 1 shows that the revenues obtained from boar carcass sales did not exceed the damage compensation. Therefore, this shortfall had to be covered by revenues generated from the sale of roe and red deer meat.

**Tab. 1** Fiscal balance of wild boar management in northeastern Poland

Year	2006	2007	2008	2009	2010
Damaged area (ha×103)	1.47	1.47	1.99	2.52	2.82
Value of compensation (Euro×103)	452.5	477.5	712.5	900.0	872.5
Number of wild boar harvested (×thousand)	9.56	9.57	13.53	20.19	20.66
Income from wild boar carcass sale (Euro×103)	335.0	360.0	507.5	757.5	775.0
Fiscal balance (income-compensation (Euro×103))	-117.5	-117.5	-205.0	-142.5	-97.5

## Discussion

An uncontrolled increase in wild boar population numbers has resulted from the fact that objective methods for estimating population numbers have not been applied. The estimations made by hunters are based on guesstimates – estimations whose margin of error can be significant. Because of high population densities, the presence of feeding strips with crops for boars, does not affect the level of damage inflicted by boars in farmlands. Therefore, apart from the expensive and controversial fencing, the only available method of alleviating the damage in farmlands is to reduce boar population densities based on reliable data on population numbers, population net increase and the reproductive pattern of

local populations (Bieber and Ruf, 2005). In Poland, several methods for estimating wild boar population numbers have been already tested (Bobek et al., 2009; Fonseca et al., 2007). However, the implementation of these methods into practice is hampered by the law, which stipulates that all decisions concerning game management rest with the Polish Hunting Association.

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