

Damage to the crops inflicted by European bison living in the Knyszyn Forest

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Abstract: The European bison population of the Knyszyn Forest, counts over 130 individuals. Because of the relatively poor food base in the Forest, animals especially in winter are forced to seek food outside. In period of the year just after the end of vegetation season, animals are leaving the forested area and start feeding on agricultural land, causing damages to crops. Still increasing level of damages makes necessary to undertake some measures aimed at limiting or mitigating the problem. In 2012, winter supplemental feeding was introduced with the goal to prevent movements of European bison in search for food outside the forest. In this paper are presented and analyzed the data on costs of supplemental feeding and compensation for damages paid in years 2008–2014.

Key words: European bison, telemetry, winter feeding, damages, Knyszyn Forest

Introduction

The area of Knyszyn Forest, the largest forest complex of Poland, is about 1050 km². The basic forest-forming species is Scotch pine (about 70% of the stand), followed by spruce 11%, birch – 7%, and oak – 6.5%. In the undergrowth common species are hazel and alder (Perzanowski *et al.* 2013). Due to such composition of tree species and sandy soils, the natural food base for large herbivores of Knyszyn Forest is much poorer than in Borecka Forest or neighbouring Białowieska Forest (Krasinski *et al.* 1994). The Knyszyn Forest is a mosaic of forest and open areas, e.g. river valleys and enclaves of meadows and pastures. Those openings offer a good food base for E.bison and are willingly visited by these animals (Borowski *et al.* 2004). The total area of non-forested grounds would be much larger if not carried out there in the 80s of the last century, the afforestation of grasslands (Bozik 2008). After more than 200 years of European bison absence, the species returned to Knyszyn Forest in 1973, forming a new herd currently counting 134 animals (Perzanowski 2016). Adult wisent needs daily from 40 to 50 kg of biomass, and in vegetative season, spends up to 60% of the day on feeding (Kraśnińska and Krasinski 2004). The basic component of the E.bison diet are herbaceous plants, grasses and sedges, supplemented with shoots and bark of trees and shrubs (Gębczyńska *et al.* 1991). Comparing to other lowland

herds, European bison from Knyszyn Forest spend much more time on searching for feed, which is clearly reflected in the size of home ranges of individual animals and groups, within the Knyszyn Forest are more than twice larger than in other Polish forest complexes (Kowalczyk 2010). During winter, snow cover there generally maintains from the beginning of November to the end of April, although in recent years there were exceptionally mild and almost snowless winters. The growing season lasts about 200 days. Presently, the E.bison roam mainly in the forest districts of Krynki, Waliły and Supraśl. (Hoffman-Kamińska and Kowalczyk 2010; Perzanowski *et al.* 2011). With the end of the vegetation season the amount of natural food available for wisents in Knyszyn Forest drastically decreases. Therefore, the herd is forced to search for food at cultivated fields. This kind of feeding behavior is observed at Knyszyn Forest since the establishment of the herd in year 1973 (Bozik 2008). One of the reasons of such activity pattern was a lack of regular winter feeding inside the forested area. Nevertheless, European bison there are strongly attracted to foraging at fields of winter oil-seed rape which in this season is a valuable source of delicious feed rich in nutrients (Hoffman-Kamińska and Kowalczyk 2010).



Figure 1. European bison at the field of oilseed rape near the village of Ostrówek, January 2014. (Fot. Maria Sobczuk)

Materials and Methods

According to Polish law (the act of nature conservation) the damages caused by E.bison to crops are compensated from the state budget. The inspection and assessment of such damages in the area of the Knyszyn Forest, as well as determination of the size of damage and the level of payment, are performed by the Regional Directorate of Environmental Protection in Białystok. From the same source as well from forest districts we collected information about winter feeding – the amount of offered feed, the costs of feeding and detailed data about localization of feeding points. Both, costs of feeding and amount of compensation were compared for every year of the study.

In this study we used data for years 2008–2014, obtained from the Regional Directorate of Environmental Protection in Białystok on claims for the damages caused by E.bison in agricultural areas to the north and northeast of Krynki Forest District.

Another important source of information for this work was data from telemetry GPS-GSM. Telemetry data are appreciated and widely used as method of monitoring of wildlife population including wisents (Grzegorzek 2012; Perzanowski *et al.* 2013). In years 2012–2013 within the frame of the project “*In situ* conservation of European bison in Poland – the North-East part” in the Knyszyn Forest, 6 animals were fitted with collars. The telemetry data was used to check how often feeding places were visited and used by wisents.

Results and discussion

The herd from Knyszyn Forest does not cause significant damages to forest stands, contrary to population living in Bieszczady (Januszczak 2010). In Knyszyn Forest the farmlands become an area preferred by E.bison in winter time. The daily activity in winter season differs from that of the vegetative season. In winter wisents over 60% of the time spend on resting and only some 30% on feeding (Caboń-Raczyńska *et al.* 1983). At that period animals roam in large groups of typical size starting from 30 to 80 individuals. Due to such large concentration of animals the level of damages at fields of local farmers are considerable (Perzanowski 2016). A significant influence on the increasing level of damages has the dynamic growth of population numbers, particularly noticeable in the years 2009–2012 (Fig. 2). The rate of population growth was limited by eliminations at least twice. Despite this, during the mentioned period the herd grew annually even by 17 individuals (e.g. year 2011). Compensations for damaged caused by E.bison from Knyszyn Forest were paid since year 2004. At the beginning their amount was very small – less than 1000 PLN, but it quickly increased to over 27 000 PLN in year 2006. With an increase of the size of the herd, animals were forming larger

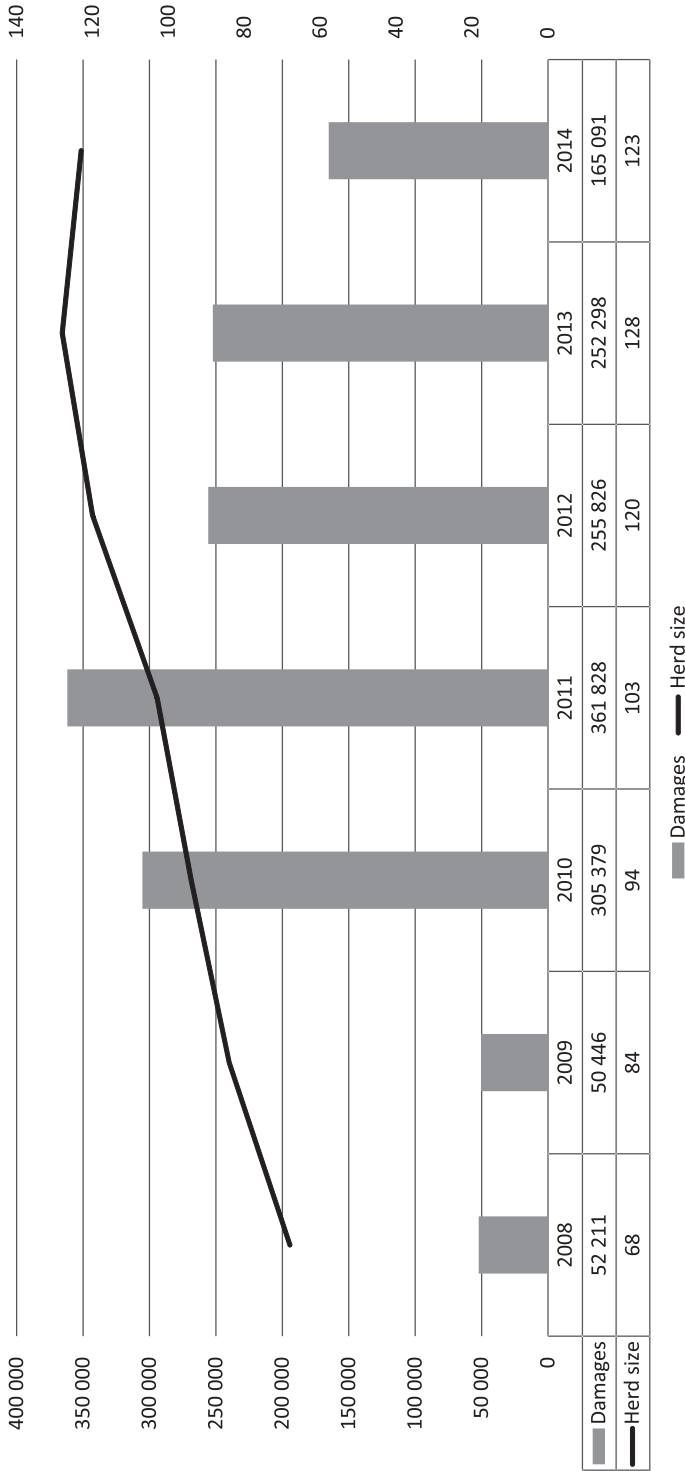


Figure 2. The dynamics of European bison population numbers in Knyszyn Forest and level of damages to agricultural crops in years 2008–2014.

groups so their impact on crops became more serious. In year 2007, the value of damages exceeded 50 000 PLN. A drastic increase in the amount of compensations took place in years 2010 and 2011, reaching respectively the level of 300 000 PLN and 360 000 PLN (Fig. 2). The main areas affected by damages were villages: Słójka-Borowszczyzna, Talkowszczyzna, Szudziałowo, Stoneware, Wierzchlesie, Ostrów Północny, Knyszewicze and Krynki. The problem of damages created dissatisfaction and conflicts with the local society. Destroyed crops meant the loss of income for farmers, for whom the agriculture is the main source of income. In last years, the compensations paid for damages caused by the Knyszyn herd, amounted to 90% of all compensations for wisent related damages in Poland. In order to reduce the impact of this herd on local crops, some preventive measures, including supplemental feeding in winter, have been implemented. Such approach is commonly used method in the management of wild populations of animals. Its aim could be not only to limit or prevent the damages but also to improve the condition of animals in this difficult season (Kowalczyk *et al.* 2010; Perzanowski *et al.* 2013).

In year 2012, the winter feeding of E.bison from Knyszyn herd has been initiated. Based on the migratory routes of animals within the forest 5 sites in Krynki Forest District were selected for ricks and feeders, four of them inside the forest and one rick at forest edge, where wisents use to come out of woods into the fields (Fig. 3) (Piekarski 2012).

The winter feeding of wisents at Knyszyn Forest was possible thanks financial support provided by the RDEP in Białystok, and the project obtained by the War-



Figure 3. The distribution of winter feeding points for European bison organized by RDEP in Białystok (source: Piekarski 2012)

saw University of Life Science with Forest Districts “*In situ conservation of European bison in Poland – the North-East part*”. Under the framework of this project forest districts of the area, improved the quality of meadows and pastures inside the forested area, to make them more attractive for wisents especially in late summer and early autumn, and provided supplemental forage for E.bison during winter. At the beginning of winter feeding, animals were not much interested in forage available at feeding points. On the basis of data obtained from radio-collared 6 animals it was possible to confirm that only part of the herd was interested in using the supplemental food and stay in vicinity of feeding points.

In 2012, only one out of five radio-collared cows benefited from the feeding. Telemetric data were confirmed by direct observations. In the first year of winter feeding, the forage was taken by only 30 animals, i.e. about $\frac{1}{4}$ of the whole herd. The remaining part still migrated into the fields, only occasionally visiting the feeders. The cost of winter feeding in 2012 equaled to 194 000 PLN from the RDEP budget, and 60 550 PLN covered by the Project “*In situ conservation of European bison in Poland – the North-East part*”. Provided funds were used by forest districts Krynki, Supraśl and Waliły to purchase feed for the E.bison, move the meadows and collection of hay. In addition to hay, feeding points were supplied with hay silage, corn silage, fodder beets, carrots and concentrates, 270 tons in total. Although only a part of animals from the herd used feeding points, after the first season could be observed the decrease of amount of compensation for damages caused by E. bison. In 2013 it decreased by over 100 000 PLN in comparison to 2012 (Fig. 4).

In year 2013 the situation even improved. Supplemental food was regularly used by 2 out of 6 radio-collared animals. Also according to direct observations feeding points inside the forest were visited by about $\frac{1}{3}$ of the population. In the winter of 2013, the cost of feeding was about 59% of the amount paid in 2012, exactly 150 thousand PLN (78 000 PLN from RDEP and 72 000 PLN from the Project “*In situ*”). In consequence the level of damages decreased and the amount for compensation was at a level slightly above 250 000 PLN.

Very interesting changes were observed in winter period of 2013/2014 when size of the population was a little above 130 animals. As usual, European bison appeared at fields at the end of September. However in a consequence of changed type of winter crops at fields usually visited by wisents, animals did not stay so much at open area and were more interested in feeding points. The home range of collared animals was significantly smaller than in previous years. In the meantime, unfortunately, some collars were dropped or damaged by animals, one collared animal died, and there were only 3 animals left with active collars in winter 2014/2015. Two of them regularly used supplemental food and one cow with a group of 20–30 animals stayed all winter near the feeding point. This group of animals completely gave up searching for feed at fields and during whole winter benefited from forage available at feeding points. The rest of the herd also spent most of the winter at the border

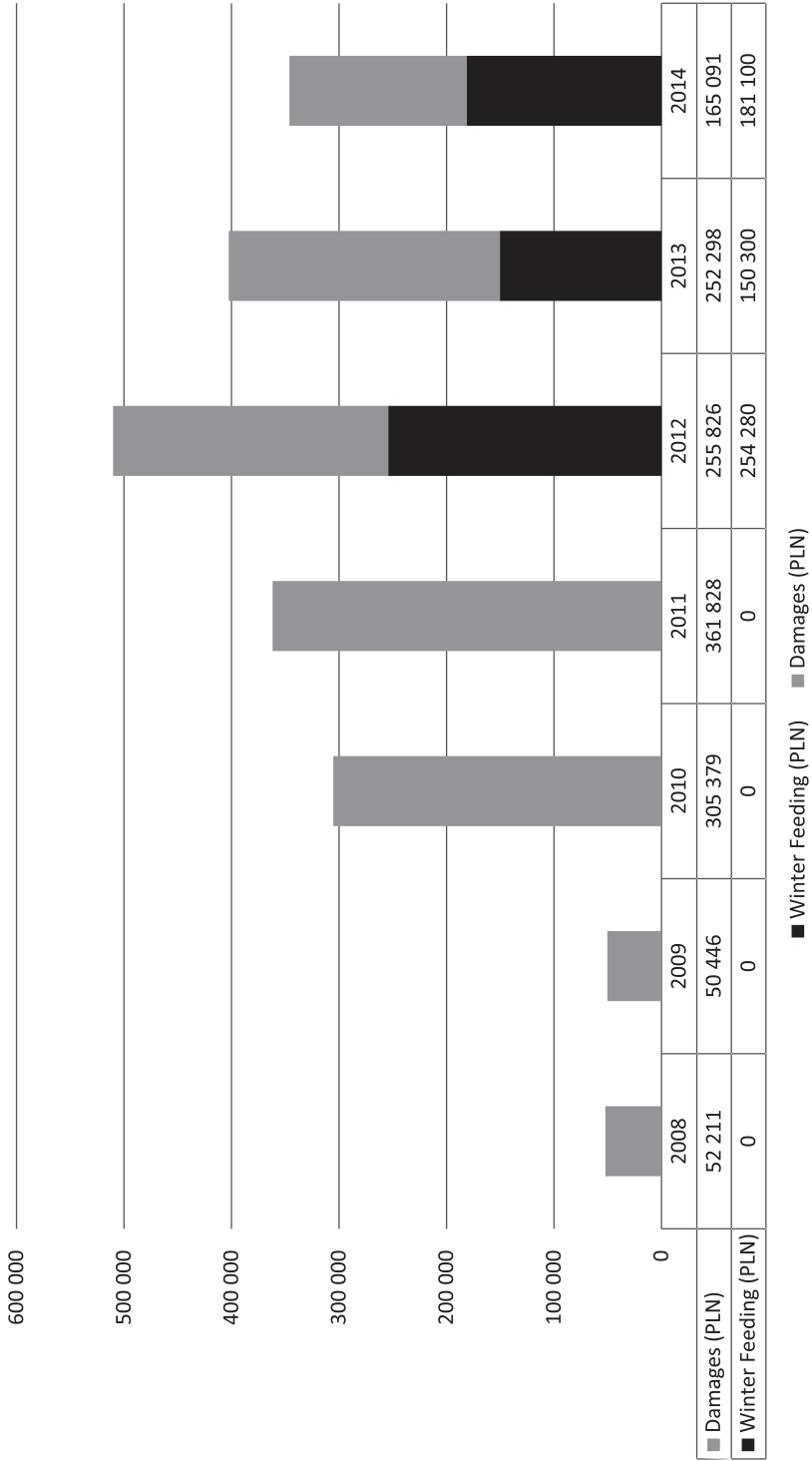


Figure 4. Costs of compensations for damages caused by E. bison and winter feeding in years 2008–2014 at Knyszyn Forest

of forest and fields. Sometimes group of up to 20 individuals moved into the fields trying to search for food, but most of the time they were remaining in a short distance from a feeding point. The cost of winter feeding during this period was equal to 46 000 PLN from the RDEP and 135 000 PLN from the Project "In situ". After this winter the reduction of compensation was at the level of only 85 000 PLN. After three years of feeding program, the level of damages caused by European bison of Knyszyn Forest decreased by twofold.

Conclusions

Presented data clearly show the impact of growing herd size and its density upon an increase of damages caused by European bison in areas used for agricultural purposes, surrounding the Knyszyn Forest. It should be noted, that however the dynamic increase of the population probably could cause higher compensations, especially visible between 2009 and 2010, but in this particular case an increase of population by 10 individuals cannot be related to six fold higher cost of compensations for damages. The most likely it was an effect of growing awareness among farmers, regarding their rights to claims for compensation. Introduction of winter feeding was not simple because that herd was not earlier used to such practices. Results however can be observed in the long period. In first year of feeding it cost was almost 200 000 PLN, while the reduction of compensation costs was at the level of 150 000 PLN. This could be evaluated as not profitable but in following years the total cost was seriously reduced, what can be seen on Fig. 4. Gradually then, the cost of feeding was lower but its effect much larger. Also very important were social profits in reducing the dissatisfaction of farmers, who could observe effects of the involvement of institution responsible for European bison conservation. This kind of activity also improves the attitude of the local community to European bison. In consecutive years noticeable were slow changes in animals' habits. From year to year, the group of animals staying in the forest and not searching for food at fields became larger. Therefore, the consequent improvement of food availability inside of the forest may be considered a method for mitigation of a conflict with farmers. The best option for winter feeding is preparation of hay or establishing so called feeding plots with attractive plant species inside the forest complexes, at openings not used for agricultural production. This may reduce an interest of animals in crops outside of the forest and convince them to remain within forested area. To effectively follow and monitor those tendencies initiated at Knyszyn Forest, it would be necessary to continue routine direct observations of the herd and collection of data on animals' activity patterns and spatial distribution using telemetric collars.

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Szkody w uprawach rolnych wyrządzone przez żubry bytujące w Puszczy Knyszyńskiej

Streszczenie: Na terenie Puszczy Knyszyńskiej bytuje stado żubrów liczące przeszło 130 osobników. Ze względu na stosunkowo ubogą bazę pokarmową Puszczy, zwierzęta okresowo, w szczególności w okresie zimowym, zmuszone są do poszukiwania pokarmu poza Puszcza. Od początku istnienia stada żubry wraz z zakończeniem okresu wegetacyjnego opuszczają Puszcza i żerują na użytkach rolnych, czyniąc istotne szkody w uprawach ozimych. Rosnące z roku na rok szkody spowodowały konieczność podjęcia działań, mających na celu ich ograniczenie. W 2012 roku wprowadzono dokarmianie zimowe na terenach leśnych, mające na celu zahamowanie wychodzenia żubrów na pola. W pracy przedstawiono analizę danych dotyczących kosztów odszkodowań wypłacanych w latach 2008–2012 oraz wpływ na ich poziom prowadzonego od 2012 roku dokarmiania.
