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Movements and habitat use of wisents in intensively managed rural landscape of Slovak Carpathians

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Abstract: Monitored were movements of wisents fitted with radiocollars (2 bulls and 2 cows), released in January 2015 at Komańcza Forest District, Poland. At the end of March 2015, they moved across the main ridge of the Carpathians to Slovakia, over the distance of 32.3 km. Their MCPs in two following seasons (vegetative and winter) were respectively 60.08 and 27.60 km^2. Areas of concentrated use (kernel 50%) were respectively 0.44 and 0.18 km^2. During winter they remained in the vicinity of a collective farm where they fed mostly on beets and hay accumulated there for cattle. During the migration, they were present within all available land cover classes (deciduous and mixed forests and open areas) in similar proportions. After establishing the MCP, they were recorded much more frequently (proportionally in vegetative season 68.5:31.5, and in winter 79.0:23.0) within the forest, than at open areas. Obtained results show that this species may easily adapt to antropogenically transformed habitat, and benefit from easily available supplemental food. However they do not support theory on wisents dwelling in forests as a refugee species in a marginal habitat.

Key words: European bison, habitat use, antropogenic habitat, Carpathians, Slovakia

Introduction

In most cases, for reintroduction site selected are areas possibly similar to natural habitats of the species, and usually situated far from human dominated landscapes, to avoid potential conflicts like damages to crops or traffic accidents. Nevertheless quite often, transferred individuals do not stay at introduction site, but instead select some other area as their new home range (Soorae 2013).

Reintroduction of wisents to the wild, first took place in sites like Białowieska Forest and Bieszczady in Poland or Skolivsky Beskyd in Ukraine. All those locations were selected because of their relative remoteness, and good quality of a habitat, fulfilling requirements of this species in all seasons of the year. However subsequently, for introduction sites were selected also areas, where like in Lithuania or north-eastern Poland, wisents had easy access to agriculture, or suboptimal like in Belarus – where animals soon after the release were trying to migrate out of the

area (Graczyk 1987; Balčiauskas 2004; Treboganova 2012; Krasińska *et al.* 2014; Anisimava *et al*. 2015; Yanuta and Velihurau 2015).

In this study, we were trying to analyse factors that caused wisents released in Polish Carpathians to very good habitat conditions, to move over the main ridge of the range to Slovakia, and stay there in a close vicinity to former collective farm.

Study area, methods

Monitored were movements of the group of five wisents (3 males, 2 females). Four of them (2 bulls and 2 cows) were fitted with GPS radiocollars (ML 931XL). Their position was recorded every hour. Four radiocollared animals were released to the wild on 27.01.2015, and for first three months, they remained close to acclimatisation enclosure at Wola Michowa, Komańcza Forest District. In March 2015, they were joined by an older bull, released to the wild several years earlier, and since then they were following his movements. Between 24–25.03.2015, they have crossed the border between Poland and Slovakia, entering first the area north from the settlement of Osadne, and subsequently moving further south, to the area between settlements of Hostovice and Parihuzovce (Fig. 1).

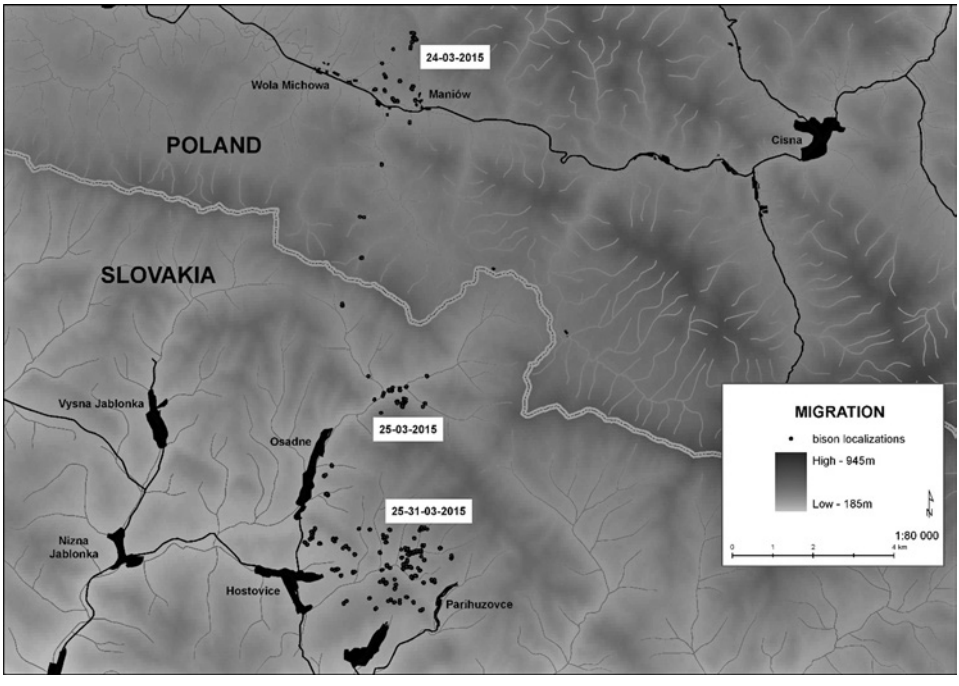

Figure 1. The movement of a group of wisents from Komańcza Forest District in Poland to vicinity of villages of north-eastern Slovakia

Their locations in vegetative season of 2015 (April – October), and winter season of 2015/16 (November – March), were plotted with the software ArcGIS 9.2 as a thematic layer of GIS map, and subsequently calculated were their home ranges as MCP, truly penetrated area as kernel 95%, and areas of concentrated use as kernel 50%.

Results

The total length of the movement between the release site in Poland (Komańcza Forest District) and the new range in Slovakia, covered by this group of wisents in 2 days, was 32.3 km.

The total area of MCP, kernel 95% and kernel 50% in both seasons differed considerably, approximately being larger by twofold in vegetative season. In both seasons they concentrated their activity at very small portion of the home range (0.7% in summer and 0.65% in winter). Especially small was the area of concentrated use in winter (only 0.18 km^2) which can be explained by an access to beets and other feedstuffs (hay) accumulated as forage for cattle by a local collective farm (Tabl. 1, Fig. 2, 3, 4, 5).

Table 1. A comparison of total MCP, truly penetrated area (kernel 95%), and the area of concentrated use (kernel 50%) in vegetative and winter seasons, for a group of wisents that migrated from Komańcza Forest District in Poland to agricultural area in north-eastern Slovakia.

SEASON	MCP	KERNEL 95%	KERNEL 50%
Vegetative	60.08 km^2	8.01 km^2	0.44 km^2
Winter	27.60 km^2	3.53 km^2	0.18 km^2

Different was also the use of forested and open area (mostly pastures, hay meadows and forest openings), during migration and after establishing the home range at Slovakia. While, during the movement they were present within all available land cover classes in similar proportions, in both seasons during their stay in Slovakia, they were recorded much more frequently (in vegetative season by twofold and in winter by threefold) within the forest (Tabl. 2).

Table 2. A comparison of habitat use patterns in vegetative and winter seasons by a group of wisents after migration from Poland to Slovakia

Land cover/Season	% of wisent localisations		
	Migration III. 2015	Vegetative (IV–X. 2015)	Winter XI. 2015 – III. 2016
Deciduous forest	19,12	64,13	67,08
Mixed forest	21,85	4,33	9,90
All forests	40,97	68,46	76,98
Open areas	59,03	31,54	23,02

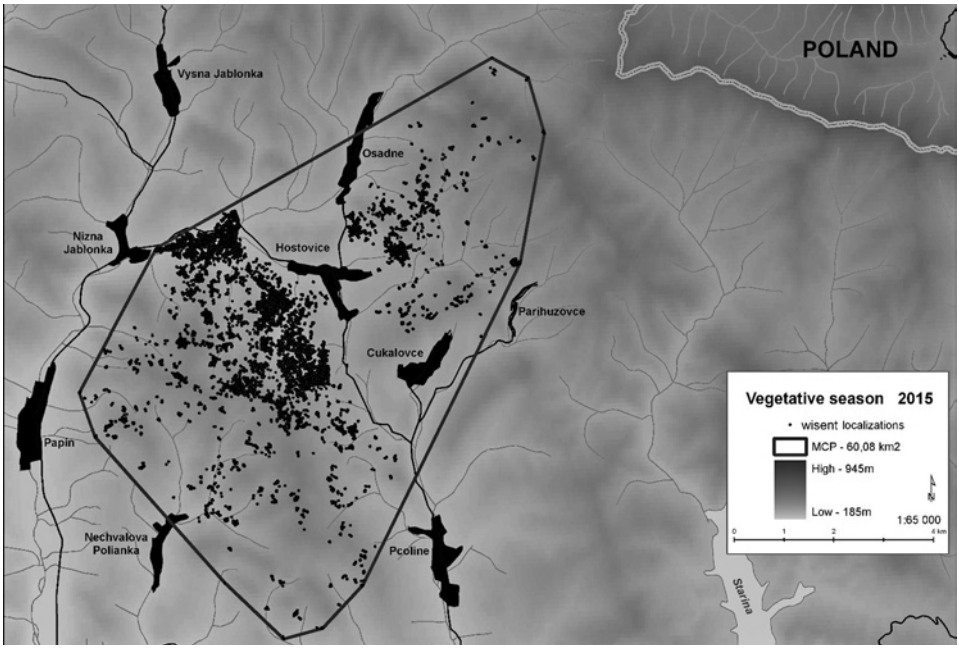

Figure 2. Home range of a group of wisents during vegetative season of 2015, after migration from Poland to Slovakia

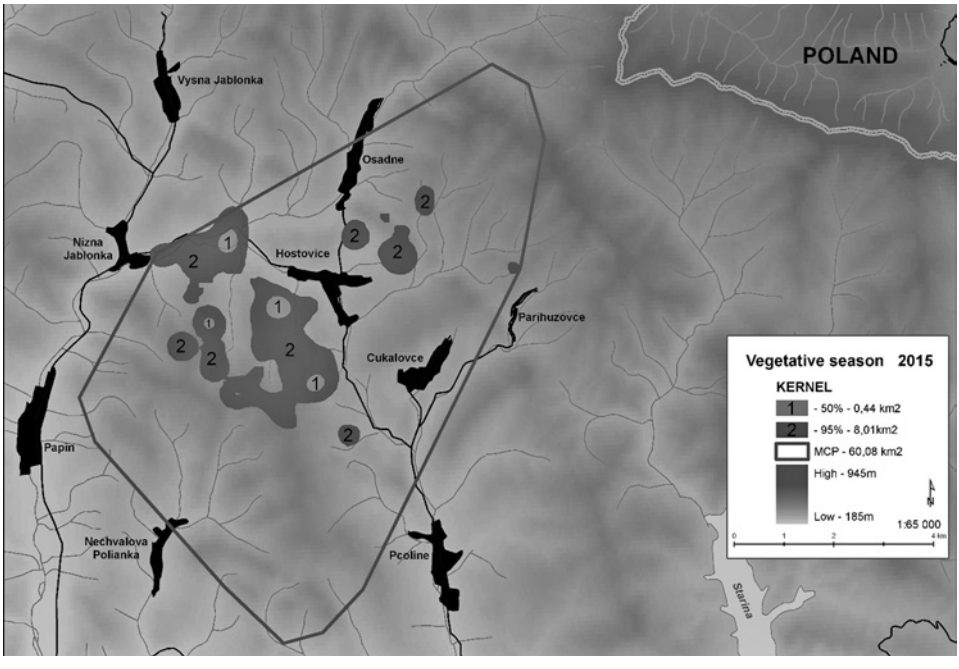

Figure 3. Areas of MCP, actual penetration and concentrated use in vegetative season of 2015, of the group of wisents after migration from Poland to Slovakia

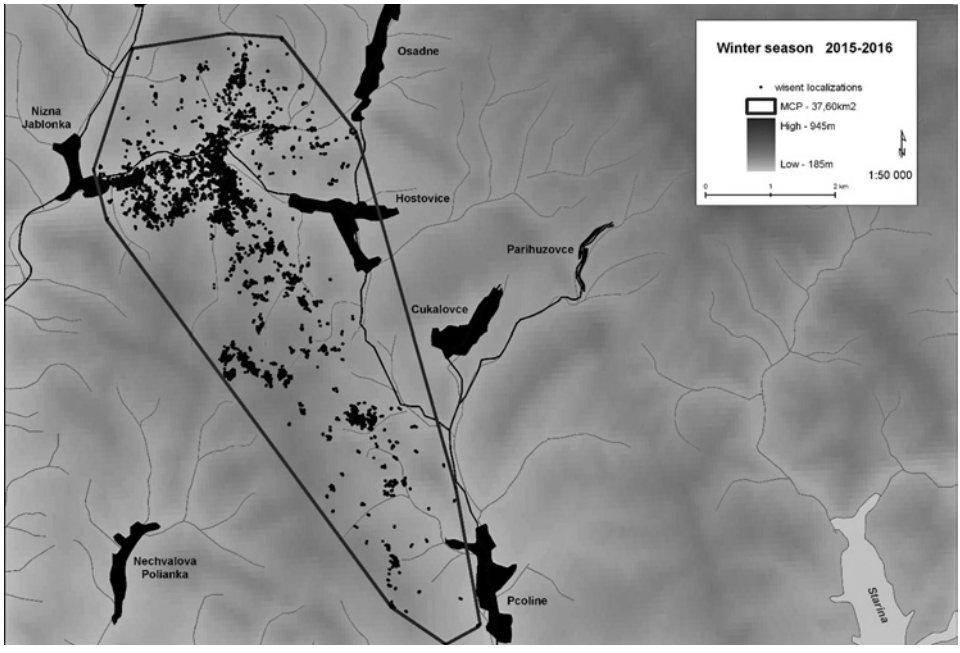

Figure 4. Home range of a group of wisents during winter season of 2015/16, after migration from Poland to Slovakia

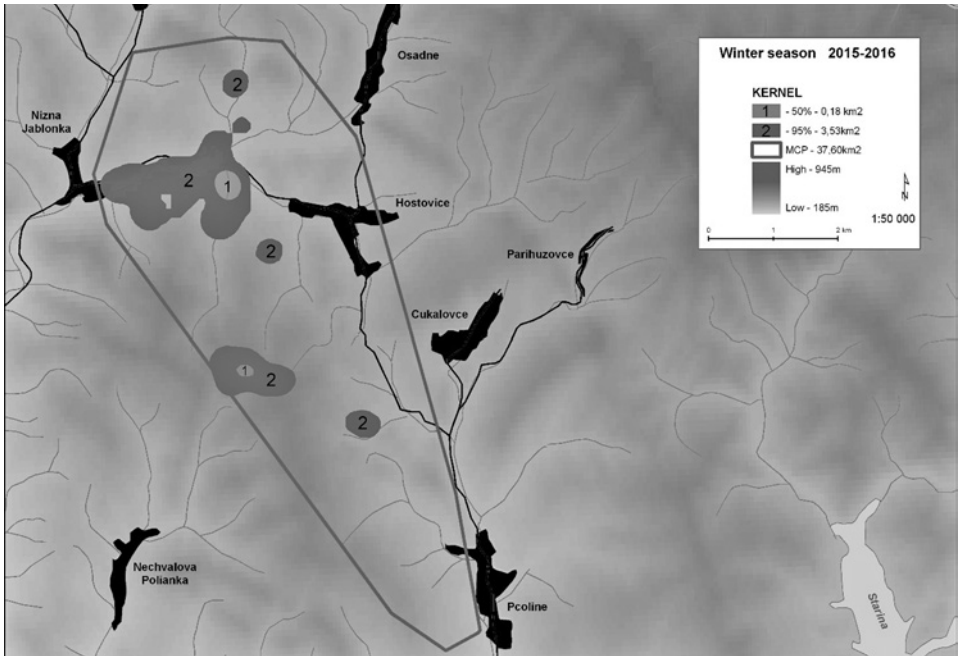

Figure 5. Areas of MCP, actual penetration and concentrated use in winter season of 2015/16, of the group of wisents after migration from Poland to Slovakia

Discussion

First data obtained on patterns of habitat use by wisents that migrated from almost totally forested area (over 85%) towards area quite intensively used for agriculture (pastures, hay meadows, as well as fields with corn and other cereals), with forests covering there 60,10% of their MCP in vegetative season and 47,40% in winter, show that this species may quickly adapt to antropogenically transformed habitat, and benefit from easily available supplemental food.

However, their pattern of area use depends considerably upon the infrastructure. This group of wisents was obviously restricted by the presence of electric fences installed around pastures for cattle, along road number 567 between townships of Medzilaborce and Snina, and side roads: number 3849 leading to Vysna Jablonka, and road number 3887 leading to settlement Osadne. Several observed attempts to cross the road, and move in north-east direction were ending up at those fences.

Despite the fact, that within their home range in Slovakia, the percentage of forests was much lower comparing to the surroundings of their release site in Poland, and the most attractive, anthropogenic source of food was available outside of the forest, wisents also in the new range were present within forested area much more frequently than at open habitats. Even in such peculiar conditions, wisents there maintain similar patterns of habitat use (about 20–30% frequency of presence at open areas), as it was reported in earlier papers from the Carpathians. Therefore these results do not support theory on *Bison bonasus* dwelling in forests as a refugee species in a marginal habitat (Kerley *et al.* 2012; Kowalczyk *et al.* 2013; Perzanowski and Olech 2014; Wołoszyn-Gałęza *et al.* 2016)

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Przemieszczenia i użytkowanie siedlisk przez żubry w intensywnie użytkowanym krajobrazie rolniczym słowackich Karpat

Streszczenie: Monitorowano przemieszczenia żubrów zaopatrzonych w obroże telemetryczne (2 byki i 2 krowy), wypuszczone na wolność w styczniu 2015 w Nadleśnictwie Komańcza. W końcu marca 2015, osobniki te przemieściły się poprzez główną grań Karpat do Słowacji, pokonując dystans 32,3 km. Powierzchnia ich areałów osobniczych (MCP) w dwóch kolejnych sezonach (wegetacyjnym i zimowym) wynosiły odpowiednio 60,08 i 27,60 km^2. W ich obrębie, obszary intensywnie użytkowane (kernel 50%) miały odpowiednio powierzchnię 0,44 i 0,18 km^2. W ciągu zimy, żubry te przebywały w sąsiedztwie fermy hodowlanej, gdzie odżywiały się głównie burakami i sianem przygotowanymi dla bydła. Podczas migracji na Słowację, żubry przemieszczały się przez wszystkie dostępne tam kategorie pokrycia gruntu (lasy liściaste, iglaste i otwarte tereny) w podobnych proporcjach. Po ustaleniu się ich areałów osobniczych były obecne o wiele częściej (proporcjonalnie w sezonie wegetacyjnym 68.5:31.5 i 79.0:23.0 zimą) w obrębie lasu niż na otwartej przestrzeni. Dane te świadczą, że gatunek ten jest zdolny do łatwej adaptacji do siedlisk przekształconych antropogenicznie i może korzystać z łatwo tam dostępnego dodatkowego pokarmu. Nie podtrzymują one natomiast teorii, jakoby żubry żyły w lasach będących dla nich refugium i suboptymalnym siedliskiem.