Living on the edge – The predicted impact of renewed hunting on moose in national parks in Poland

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Abstract

Protected areas are the foundation of biodiversity conservation. However, due to their limited size, unfavourable shape, and isolation they often rarely provide sufficient protection. This problem particularly concerns large mammals, which play the role of key-species and usually have high spatial demands. Since 2001 the moose has been under a hunting ban in Poland after the species experienced a sharp decline due to overharvesting. As there are plans to reopen moose hunting in eastern Poland (excluding national parks and nature reserves), we analysed the potential impact of renewed hunting in areas neighbouring Biebrza and Polesie National Parks (eastern Poland) on moose populations inhabiting these protected areas and investigated the suitability of the existing buffer zones to provide additional protection to moose outside the park boundaries. Analyses were based on the tracking data derived from 33 GPS collared moose (24 – Biebrza NP and 9 – Polesie NP). All of the tracked moose utilized areas both inside and outside national parks. In the Biebrza PN, moose spent 46.9% of their time in areas surrounding the national park, whilst in Polesie NP the proportion was 64.5%. The highest utilization of areas outside both study sites occurred in autumn and winter (October–March), a period that considerably overlaps with the planned hunting season. The southern part of Biebrza NP and its official buffer zone covered 96.2% of all moose fixes, while Polesie NP, its official buffer zone and neighbouring landscape park covered 60.3% of moose records. The buffer zones proposed in this paper, whose widths were calculated on the basis of moose tracking data, would protect from 90.5 (Polesie) to 91.2% (Biebrza) of moose fixes. Proper delineation and adequate management plans in buffer zones would prevent the negative impacts of moose hunting, which has the potential to significantly influence ecotourism in national parks and their vicinity.

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Keywords: Protected areas; Key species; Hunting impact; Buffer zone; GPS tracking; Conservation management

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Introduction

Protected areas are the foundation of biodiversity conservation at local, regional and global levels. They also serve as core areas for animal populations; however, due to their limited size, high perimeter–area ratio and spatial isolation, protected areas only partially protect target communities or species (Woodroffe & Ginsberg 1998; Newmark 2008). In small populations this can lead to extinction or to loss of genetic diversity through genetic drift (Frankham 1995, 1996; Furlan et al. 2012). In such cases, the effectiveness of conservation measures depends on the intensity of human-induced threats in the periphery of the reserves (Chape, Harrison, Spalding, & Lysenko 2005). Humans negatively affect surrounding areas through the destruction of crucial habitats, disease transmission, as well as legal and illegal hunting (Hansen & DeFries 2007; Wittemyer, Elsen, Bean, Burton, & Brashares 2008). Thus, peripheral areas can become population sinks (Sinclair 1998; Woodroffe & Ginsberg 1998). To mitigate the transition between protected to unprotected areas managers often design buffer zones around conservation areas. The buffer zones aim to provide an extra protection for targeted species or habitat outside conservation areas. Yet, their effectiveness is often low due to a lack of or inadequate legal protection (Gaston, Jackson, Cantu-Salazar, & Cruz-Pinon 2008).

Large mammals are particularly vulnerable to inadequate protection of buffer zones, because their home ranges are typically much larger than the protected areas themselves. For example, the mortality of large carnivores inhabiting protected areas is strongly affected by poaching and trophy hunting at reserve borders (e.g. Woodroffe & Gisnberg 1998; Loveridge, Searle, Murindagomo, & Macdonald 2007; Balme, Slotow, & Hunter 2010). This problem also affects migratory herbivores that seasonally change habitats in search of forage supplies (e.g. large herbivores in the Greater Serengeti: Serneels & Lambin 2001, pronghorn (*Antilocapra americana*) in Yellowstone National Park: Berger 2004). Among large mammals, the impact of human disturbance is species-dependent. Tame species that usually habituate to the presence of humans in protected areas are the most sensitive. The level of individual habituation depends on hunting pressure. With decreasing hunting pressure animals become less vigilant (Stankowich & Blumstein 2005; Sönnichsen et al. 2013; Sreekar, Goodale, & Harrison 2015). This shortens the flight initiation distance and makes individuals more prone to being trapped or shot (Stankowich 2008; Tarakini, Crosmary, Fritz, & Mundy 2014). Therefore, the beginning of hunting in protected areas or their buffer zones may lead to substantial behavioural changes, making animals shyer and more difficult to approach and observe which can have a substantial negative impact on the tourism attractiveness and local economy.

In Poland, since 2001 there has been a ban on hunting moose (*Alces alces*) throughout the whole country. The ban was introduced in response to overhunting over the previous 20 years which led to significant shrinkage of the species' range and population collapse at the end of the 20th century (Raczyński & Ratkiewicz 2011). By the beginning of the 2000s, the population size had decreased by over 70% to not more than 1500 individuals (Gębczyńska & Raczyński 2004). The moose's range was restricted to northeastern and eastern Poland, where the species mostly survived in national parks (Biebrza and Polesie NPs), which served as refugial areas. Since 2001 the species has increased its range and numbers (Raczyński & Ratkiewicz 2011). The moose range has extended into central and southern Poland; nevertheless the species is still rare in western Poland where it used to be common in the period prior to the population decline (in the 1970s) (Gębczyńska & Raczyński 2004). According to official data (Środowiska 2016) there were ca. 28,000 moose in Poland in 2016. In the areas of high moose densities, moose gave rise to conflicts, mainly due to damage to forest plantations, tree stands and farm crops (Wawrzyniak 2016). The elevated conflict between timber production and moose presence often occurs in close vicinity to national parks.

In August 2017, Polish Ministry of Environment published a planned directive that would reinstate the moose harvest across eastern Poland (east of the Vistula river), excluding national parks and nature reserves. As the planned hunting would predominantly concern the regions with the highest population numbers, mostly located in the close vicinity of national parks, in this study, we have tried to assess its potential impact on moose populations inhabiting national parks in eastern Poland – Biebrza and Polesie NPs. This task is the highest priority because both national parks are the most important refugia of the species in Eastern Poland and Biebrza NP protects a genetically relic population (Biebrza valley) (Świsłocka, Ratkiewicz, Borkowska, Komenda, & Raczyński 2008; Świsłocka et al. 2013; Świsłocka, Czajkowska, Duda, & Ratkiewicz 2015). Moreover, over the past decade moose have become the iconic species and greatest attraction of these national parks, generating substantial income for local communities.

We presumed that hunting, despite being planned outside NPs, will influence the number and behaviour of moose in the protected areas, and thus the economy of those areas. Hence, on the basis of animal track data, we aimed at assessing potential impact of renewed hunting in the parks' surroundings on moose populations inhabiting the Biebrza and Polesie National Parks. We evaluated the usefulness of existing official buffer zones of both national parks to provide additional protection for the park populations of the species. We also proposed and evaluated an alternative approach, where national park buffer zones were calculated on the basis of animal movement data. We assumed that park populations would be efficiently protected if at least 90% of moose fixes laid within national park and considered buffer zone. Finally, for each study site, we compared official buffer zones of