



Regulating wild boar populations is “somebody else’s problem”! - Human dimension in wild boar management



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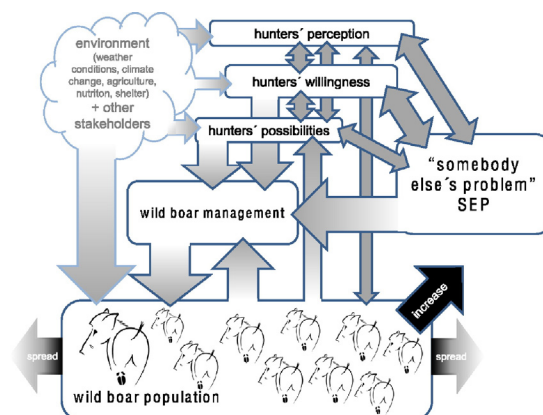
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HIGHLIGHTS

- Wild boar population still spread due to agricultural changes and high reproduction
- Understanding of hunters attitudes is important for conducting of wildlife management
- Hunters know the necessity to reduce wild boar numbers at supra-regional scale
- Hunters are not aware of their individual responsibility for population regulation
- Regulation of wild boar is “somebody else’s problem” in hunters’ sensation!

GRAPHICAL ABSTRACT



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ABSTRACT

As a part of the ongoing game survey of the German federal state of Lower Saxony (WTE), we conducted inquiries into wild boar management and distribution, as well as hunters' attitudes, in order to determine the reasons for the increase of wild boar populations and to inform our game management strategy.

According to hunters' reports within the WTE, increases in distribution and population continue and a reduction of the wild boar population has been deemed necessary on a large scale. In the home region, however, it seems to be “somebody else’s problem” (SEP), according to hunters' opinions. The majority of hunters are not able to regulate the population and this could be a reason that wild boar numbers continue to increase. Cooperation and comprehensive hunting with efficient hunting methods seems to be the most promising solution, as non-hunting methods are unpopular amongst hunters.

The hunters seem to be aware of the problems, solutions and contributing factors; however, most hunters do not feel responsible and see the management of wild boar, again, as a SEP.

Regional conditions, as well as hunters' willingness and capacity to manage wild boar will have to be incorporated into management concepts.

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1. Introduction

What does “human dimension” in the case of wild boar mean?

Human dimension comprises the role and impact of humans on wild boar. This may be by directly feeding (influences on movements, habitat usage, reproduction; Cellina, 2008; Prévot, 2010) or hunting (impact on population and movements; Keuling et al., 2013; Keuling et al., 2008b). It also includes direct impact by agriculture, providing food and shelter (changed landscape structure or intensified agriculture may lead to an increase in population and spread in distribution; compare Frauendorf et al., 2016), or more indirectly by changes in the intensity of hunting due to hunters opinions.

Wild boar *Sus scrofa* hunting bags are at a very high level in Germany, the rest of Europe and possibly worldwide (Keuling et al., 2013; Massei et al., 2015; Saito et al., 2012a); populations are increasing and dispersing into agrarian landscapes which leads to economic problems (e.g. Frackowiak et al., 2013; Goedbloed et al., 2014; Gortázar et al., 2007; Lagos et al., 2012; Saito et al., 2012b; Sakurai et al., 2014; Schley et al., 2008). Due to many factors, such as high reproduction rates, adaptability of wild boar, legal restrictions on hunting, as well as hunting strategies aiming for sustainability, harvest rates seem to be insufficient (Keuling et al., 2013; Massei et al., 2015; Massei et al., 2011). In addition underestimation of population densities and reproductive potential significantly add to the problem (Keuling et al., 2013; Massei et al., 2015; Massei et al., 2011). For ecological and economic reasons a sound hunting management strategy is important to the regulation and reduction of wild boar populations (Briedermann et al., 1986; Keuling et al., 2013; Massei and Cowan, 2014; Massei et al., 2011). This has become especially germane, as recently African swine fever (ASF) has reached the EU (WAHID, 2014; Wieland et al., 2011).

While a lot of research on wild boar biology has been done in the last four decades (see Ballari and Barrios-García, 2014; Briedermann, 2009; Keuling et al., 2014b; Morelle et al., 2014), there is still a lack of knowledge on movement ecology (Morelle et al., 2014), habitat use (Segura et al., 2014), dispersal mechanisms (Keuling et al., 2010; Prévot and Licoppe, 2013), group structure and social hierarchy (Podgórski et al., 2014), population ecology and yearly reproduction (Frauendorf et al., 2016; Gethöffer et al., 2007; Macchi et al., 2010; Veeroja and Männil, 2013). The human dimension of wildlife is a relatively new topic in Europe, especially Germany (compare Glikman and Frank, 2011; Keuling, 2013; Sakurai et al., 2014; Treves et al., 2006), and needs further investigation (but compare Frank et al., 2015; Keuling, 2013; Massei et al., 2011; Saito et al., 2011; Sakurai et al., 2014; Ueda et al., 2010).

One of the most significant and disturbing factors affecting the success of wildlife management is the management itself. Wildlife managers, and especially the hunters, have a big impact on the efficiency of population regulation (Keuling et al., 2013; Massei et al., 2015; Massei et al., 2011; Milner et al., 2006; Toïgo et al., 2008).

Some authors describe different models to accomplish regulation of wild boar populations by specifically hunting different proportions of age classes (Bieber and Ruf, 2005; Braga et al., 2010; Keuling et al., 2010; Servanty, 2008; Sodeikat et al., 2005). It is widely accepted that biased sex and age ratios, along with high hunting pressure (Servanty et al., 2011; Servanty et al., 2009) cause higher reproduction rates, the primary cause for a rise in reproduction is often food availability (Cellina, 2008; Gethöffer et al., 2007). However, the hunting bag and the number of hunters are seldom linked to each other (Massei et al., 2015; Ueda et al., 2010). Recreational hunting is not efficient enough to reduce or even regulate a wild boar population (as it seems for many others species) as long as the interests (trophy hunt, sustainable harvest) of the hunter do not agree with management aims (Massei et al., 2015; Massei et al., 2011). For conducting an efficient management (i.e. regulation or even reduction) of ungulate game species – especially wild boar – as well as for the management of the subsequent damages (Massei et al., 2011) or diseases (Anczikowski, 2009) a combination of different management methods in addition to hunting is needed. However, additional management measures, especially with non-hunting methods, are extremely unpopular amongst hunters.

For the acceptance and success of management programs, the following requirements are needed (Massei et al., 2011; Treves et al., 2006): 1) evaluating the opinion and attitudes of stakeholders, hunters, and the general public as well as legal restrictions and behavioural changes of game species (Blumstein and Berger-Tal, 2015); 2) incorporating scientific background, social needs, and social attitudes; and 3) monitoring of success.

Public opinion of wildlife depends on the species, its origin (native or exotic), the dimension of damages or impact, and on the locality (in “nature”/close to humans; see Sakurai et al., 2014). Opinion also varies based on the interests, social situation, origin, and location of the person involved (Ueda et al., 2010). The acceptance of a management campaign depends on these opinions (e.g. which species) and the methods used (e.g. nonlethal versus lethal, natural versus chemical; see Bremner and Park, 2007), and may be useful in understanding problematic issues and in assessing the feasibility of a population regulation effort (Massei et al., 2011; Ueda et al., 2010).

If the problems are significant enough and the public is aware of this, a population regulation of wild boar may be possible (as mentioned before with additional management tools besides hunting; Massei et al., 2011; Saito et al., 2012a).

We aimed to learn whether or not hunters were willing and able to effectively regulate a population and if there are any other management actions that may be accepted by hunters.

Within the general game survey in the federal state of Lower Saxony (Wildtiererfassung in Niedersachsen WTE) we conducted inquiries on knowledge, spectrum of opinion, as well as “willingness” and abilities of hunters. This knowledge needs to inform management decisions/concepts and recommendations for hunters.

2. Methods

2.1. Study area

The federal state of Lower Saxony is situated in north-western Germany and is 47,624 km², making it the second largest in area of the German Federal States. Lower Saxony borders the Netherlands in the West, the North Sea in the north-west and nine other federal states (one of those is enclosed in Lower Saxony: the smallest Federal State in area, the “Freie Hansestadt Bremen”, of which the data of the hunting grounds are also incorporated in the section on distribution, see also Fig. 1) in the north-east, east and south. The states administration is structured into 427 municipalities that form 46 districts. Human population density is 160 inhabitants/km². The society's attitudes towards nature and its management are as diverse as the landscape. The landscape is formed by several different macrochores: three quarters of the area are formed by the north German lowlands with landscapes like the intertidal sand and mud flats of the Wadden Sea and marshes in the north, agricultural landscapes with crop fields and grassland, heath, moor and bushlands, as well as smaller forests on flatlands with gentle hills in the north-west with low wild boar population densities (densities indicated by HI = hunting index = shot wild boar / km², on districts scale < 1, compare Fig. 1) and more forested areas on the gentle hills of the Luneburg Heath in the east (HI > 1–3). The remaining quarter (HI > 1–4) is formed by forested areas, also containing agriculture, on the low mountain ranges up to the Harz mountains in the south (Wurmberg 971 m ASL). Agriculture forms 60% of the area of Lower Saxony, 22% is forested, 2% is fresh water, and 16% are of anthropogenic origin (settlement, industry, traffic etc.). 29% of the forests (7% of the total area) are managed by the Forestry Offices of Lower Saxony, which contribute 15% of the total annual hunting bag of Lower Saxony. The climate is temperate on the transition zone between Atlantic in the northwest and continental climate in the east. The average annual temperature is around 8 °C. The rainfall ranges from 500 mm per year in the east, to 800–900 mm in the northwest and up to 1000–1600 mm at the western slopes of the Harz mountains (climate data:

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