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MONITORING WILD BOAR (*Sus scrofa*) POPULATIONS

MONITORING POPULACJI DZIKA (*Sus scrofa*)

Abstract: The aim of the study was to assess the size of wild boar (*Sus scrofa*) population with reference to its age and gender structure. The population size was monitored using camera traps. The observations were conducted between May 2015 and June 2016 in western Poland, Opole region, Proszkow Forest District, hunting ground No. 48. Seasonal variations in the frequency of detecting individuals representing specific age and gender classes were reflected in the composition and size of observed sounders. Annual observations with the camera traps allowed for a prediction of changes in the population size in future seasons. The prediction was based on the number of squeakers observed over consecutive months.

Keywords: monitoring, camera traps, wild boar, population size, age and gender structure

Introduction

Management of wild populations within hunting grounds largely depends on the results of an inventory used for development and implementation of hunting management plans. Although driving census and year-round observations are commonly used methods of population assessment, their reliability is often questioned. Widely reported disorders of food preferences and behaviour of the animals indicate there is a need for new monitoring methods providing more options than the standard models of population size assessment. Therefore, new approaches are needed that offer more accurate evaluation of species development dynamics and take into account food and habitat relationships and daily activity of animals. These factors determine population distribution and affect research results. They also influence further activities aimed at counteracting unfavourable relationships between humans and animals occurring within agricultural domain.

The use of camera traps as tools for fauna observation seems an attractive methodological alternative. This way the changes in the populations and their causes may be determined also for corpuscular or nocturnal species and also those preferring hardly accessible habitats [1].

The aim of the study was to assess wild boar populations with focus on their age and gender structure using camera traps.

Study area

The monitoring of wild boars was carried out within a hunting ground No. 48 called "Zimnice Wielkie". The hunting ground belongs to Proszkow Forest District and game management is implemented by a Military Hunting Club No. 8 called "Zubr" in Opole. Its area is 5319 ha, of which 3020 ha are covered by forests comprising an integral part of the Bory Niemodlinskie protected landscape area. The monitored zones included five forest divisions: 183, 186, 218, 233 and 235, entirely covered with mixed fresh forest with

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dominant species of Scots pine (*Pinus sylvestris* L.) of first and second bonitation class and sessile oak (*Quercus petraea* Liebl.) of second and third bonitation class. Individual research sites differed in the share of interspersed species such as European larch (*Larix decidua* Mill.), Norway spruce (*Picea abies* (L.) Karst) or silver birch (*Betula pendula* Roth). Considerable part of the grounds is covered with large-scale crops, mainly corn (*Zea mays* L.), triticale (*Triticum secale*) and a mixture of barley (*Hordeum*) and oat (*Avena*). North-western part of the hunting grounds is covered with former grasslands now transformed into wetlands and overgrown with species typical of lowmoor peatlands, i.e. common reed (*Phragmites communis* Trin.), cattail (*Typha*), and water horsetail (*Equisetum fluviatile* L.). This habitat serves as a natural reservoir and harbors the Proszkowski stream that is a left tributary of the Odra.

An important element of the habitat is A-4 highway crossing the forest complex and preventing animal migrations. The problem was partially solved by a construction of three overground passages for free migrations and crossing of forest animal populations.

Material and methods

The monitoring was conducted from May 2015 till June 2016. Wild boar population size was assessed based on images from camera traps Suntek HT-002LI, coupled with passive PIR motion sensors and infrared LEDs that allowed for taking pictures at night. The cameras were located at five sites by attaching them to a tree trunk, at a height of 1.0 m from the ground, near roofed look-outs, which facilitated comparison of direct observations with the camera images. The camera traps were equipped with external memory cards replaced on average every seven days. Each research site was additionally equipped with seven metal poles with known dimensions attached to the ground that were within the camera field of vision. Age and gender of individual animals were determined based on their body build, coloration and height to the withers assessed with sizers.

To improve baiting efficiency, the bait stations were regularly supplied with corn kernels, corn silage, barley and oats mixtures, fodder beets, carrots and apples.

The longest observation cycle of 13 months was conducted at the site 1 (division 183), where recordings from 304 days were collected and analyzed. The data collected from the remaining four camera traps were treated as control material considering irregular and variable recording time, which was due to reasons out of researchers' control (the camera traps were stolen).

Results and discussion

One year long monitoring of wild boars at all sites allowed for identification of 2318 individuals. In the forest division 183 (site 1), there were 1605 individuals. At other research sites, where the monitoring was irregular, the following number of animals was detected: 172 individuals in the division 186, 277 individuals in the division 218, 136 individuals in the division 233, and 128 individuals in the division 235.

Compared to traditional inventory methods that usually only assess standard density of populations, camera traps allowed for quantitative and qualitative analysis of the recorded materials with reference to age and gender of the animals. The study was a pilot and its results should not be treated as reflecting actual size of wild boar population on the

investigated area. Using camera traps for assessing population density, particularly in free range area of a forest complex, requires a different strategy. The inventory should involve a greater number of cameras and a greater area, which would improve reliability of the obtained data. Moreover, the monitoring should last long enough and begin at the same time for all research sites. Only then a comparison of recorded footage would allow for more accurate estimation of the actual size of the populations.

Active monitoring of the site 1 over 304 days recorded in total 17 solitaires (1%), 146 adult females (9%), 434 subadults (27%), 727 piglets (45%) and 281 squeakers (18%) (Fig.1).

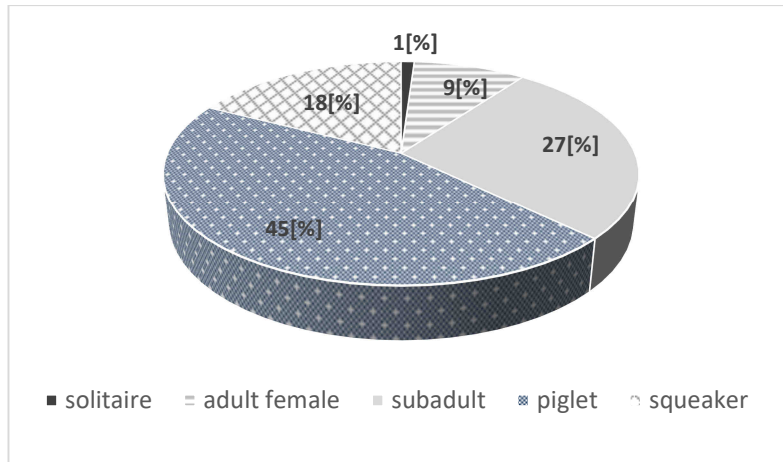


Fig. 1. Percentage share of age groups

This is not the actual population size but the data provide enough information on its age and gender structure. Given the culling and the population growth assumed to be 100% of the spring size, these numbers were in agreement with permissible hunting limits, which indicated proper management of wild boar populations by lease-holders of this hunting ground (Fig. 2).

The frequency of wild boar detection at the bait station was used to analyse their abundance and activity. An analysis of all images (304 days of active monitoring) confirmed that the group most often detected at the bait station were piglets (40.13%), followed by subadults (32.24), adult females (26.32%), squeakers (10.85%), and solitaires (4.93%). Mean abundance of individuals per detection was 1.00 ± 0.24 and 1.82 ± 0.98 for adult males and females, 5.97 ± 3.27 for piglets, 4.33 ± 2.65 for subadults, and 8.30 ± 4.36 for squeakers. Increased frequency of solitaire presence was observed between November and first half of February. Usually, there was only one, or in rare cases two individuals per detection event. This was a tiny share of the general population. Individuals most often recorded over the year included single female adults, sounders comprising six piglets, squeakers in groups of six to fourteen and subadults in groups of four. The greatest group of wild boars observed at the bait station included 4 female adults, 18 piglets, and up to 14

subadults and squeakers. At the turn of April and May 2016, no female adults were detected at the bait station, which might be due to farrowing period.

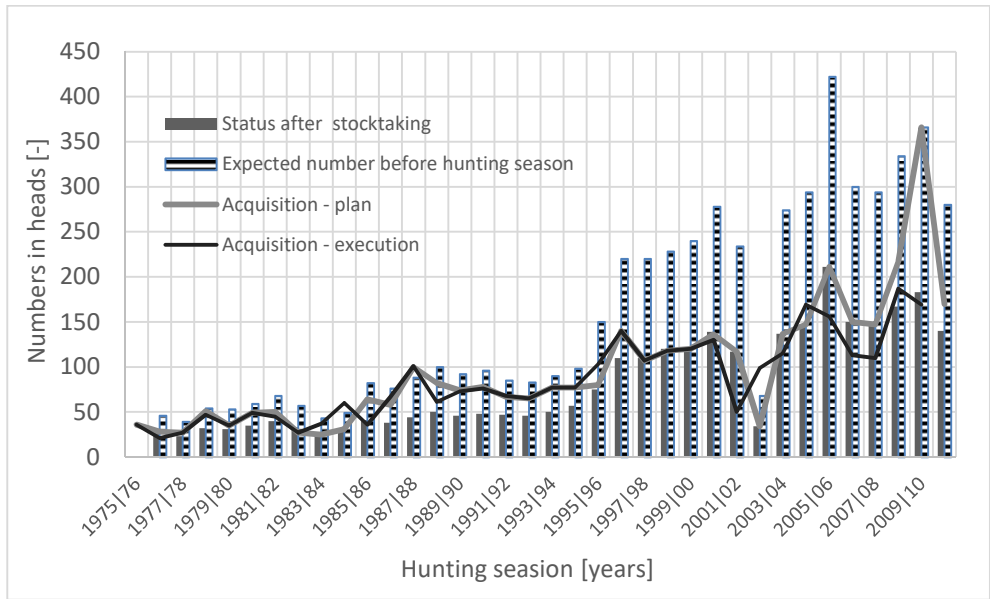


Fig. 2. Implementation of hunting plans by the hunting circle no. 8 "Zubr" in Opole for the hunting ground No. 48

Seasonal variations in the frequency of detecting individuals representing specific age and gender classes were reflected in the composition and size of observed sounders. In the summer, average size of detected groups was 8.42 ± 5.60 animals and they comprised mainly squeakers and two, three or four female adults. In the fall, the groups included 7.24 ± 4.21 animals with much higher frequency of piglets (5 to 13 individuals). The lowest number of wild boars was observed in the winter (4.98 ± 2.39) but with an increased share of solitaires. In the spring, the sounders were dominated by subadults (2 to 10 individuals) and group size reached 6.11 ± 3.48 individuals. Alterations in the activity and abundance of wild boars over the year were associated with their reproductive cycle, of which the crucial periods were the rut and rearing of piglets by sows.

Annual observations with the camera traps allowed for a prediction of changes in the population size in future seasons [2]. The prediction was based on the number of squeakers observed over consecutive months. Our analysis revealed three whelping peaks differing in litter size. The first peak occurred in May and June (84.04%, litter size 6-14), the second in July and August (14.33%, 1-9 piglets), and the third in September (1.62%, 1 piglet). We found out that the "second peak" that referred to successive generations of piglets was very common. Studies on reproductive capabilities of wild boar females conducted in Bory Dolnoslaskie forest complex and focused on animal age and morphological changes in reproductive organs showed that in areas with large share of farmlands, contrary to those covered with forests, the reproductive cycle was dominated by piglets and subadults.

Thanks to easy access to protein-rich food they grew much faster and attained sexual maturity considerably earlier but outside proper rut period, which resulted in more often fall farrowing [3-6]. Wild boars feeding on corn consume also a mycotoxin (zearalen) that affects their reproductive cycle as it is one of the strongest nonsteroidal estrogens [7-9].

Conclusions

1. Population size estimated for a given area with camera traps may be treated as reliable on the following conditions:
 - there is a well-defined monitoring procedure,
 - the monitored area is equipped with a sufficient number of cameras,
 - beginning and duration of the monitoring is the same for all sites.
2. The analysis of recorded detections allowed us to determine the age and gender structure of the investigated wild boar population in its specific habitat.
3. The use of camera traps for wildlife surveillance facilitated prediction of trends in the size and structure of animal groups in future hunting seasons.
4. The time of first appearances of squeakers allows for determining the number of piglets per an adult female and the farrowing peak. These values can be then spatially and temporally compared, e.g. over a few years.
5. The presence of squeakers in late summer (August, September) may indicate reproductive disorders.

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Abstrakt: Celem pracy była ocena liczebności populacji dzika (*Sus scrofa*) z uwzględnieniem struktury wiekowo-płciowej. Badania przeprowadzono na podstawie monitoringu z wykorzystaniem fotopułapek. Obserwacje prowadzono od maja 2015 do czerwca 2016 roku w zachodniej części Polski na terenie Opolszczyzny w Nadleśnictwie Prószków, w obwodzie łowieckim Nr 48. Sezonowe wahania częstości bytowania osobników reprezentujących poszczególne klasy wiekowo-płciowe były zauważalne w składzie i wielkościach pojawiających się watah. Prowadzenie rocznych obserwacji za pomocą fotopułapek pozwala przewidywać tendencję zmian wielkości pogłowia w przyszłych sezonach na podstawie liczebności pasiaków. Z kolei zarejestrowane na nęcisku młode pasiaki w okresie późnego lata (sierpień, wrzesień) świadczą o zaburzeniach rozrodu.

Słowa kluczowe: monitoring, fotopułapka, dzik, liczebność populacji, struktura wiekowo-płciowa