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Population dynamics trends of four Artiodactyla species in Sarnena Sredna Gora Mts (Bulgaria) based on hunting statistics

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Abstract. Annual harvest hunting data and counting statistics from 2009 to 2019 were used as methods for assessing changes in four Artiodactyla species population trends. The study area covers approximately 100,000 ha territory from Sredna Gora Mts. The results showed trend for a stable increase in the Red Deer population, because of provided conservation measures. The Fallow Deer could be considered an occasional species. An increase in Roe Deer number was observed, with steeper rising between 2014 and 2018, followed by a strong decline in 2019. The Wild Boar number was changing significantly over the years, reflected in peaks and falls of number shot individuals for the study period. Tracking and comparing the hunting bag statistics data for ungulates in the study area for a longer period would give a clearer picture on their population trends and would help in selecting conservation measures.

Key words: large herbivores, population, Balkans.

Introduction

Hunting bag statistics provide data from different seasons for many years ago, making them suitable and in most cases the only tracking trend in population development. It is the most reliable resource for estimating the hunting mammals abundance and for comparing it by regions in Europe (Cretois *et al.* 2020), giving information about: the species demographic attributes (Aebischer 2019, Massei *et al.* 2015) and the impact of multiple drivers of population change (Hagen *et al.* 2014, Reimoser *et al.* 2014). Despite that the hunting data available in the official statistics are often incomplete, dispersed and heterogeneous in different European countries (Consortium *et al.* 2018) they are applicable in a local scale. In Bulgaria the game counting is an obligatory hunting event under the Law for hunting and protection of the game. Until now, enough data have been accumulated for the Sredna Gora region to investigate the population dynamics of some game species. Tracking trends in their population number changes will help in creating appropriate management programs.

Material and Methods

In the present study, the Red Deer (*Cervus elaphus*) and Fallow Deer (*Cervus dama*) counting statistics, as well as the Roe Deer (*Capreolus capreolus*) and Wild Boar (*Sus scrofa*) hunting bag statistics were used. The Red Deer and Fallow Deer hunting is not intense and only 1-2 individuals yearly were shot, motivating the usage of their counting statistics. The

data were extracted from the information system of the Executive Forest Agency for the region of the Hunting Fishing Association "Stara Zagora" for eleven years period from 2009 to 2019. The area covers approximately 100,000 ha territory from Sredna Gora Mts.

Results

The results showed trend for a stable increase in the Red Deer population (Fig. 1). It is concentrated around the State Game Breeding Area "Monument", with coordinates N 42°32′08″ E 25°43′09″. At this territory comprising approximately 22,000 ha the number of Red Deer keeps high due to the efective conservation measures and timely provided hunting events such as: feeding, improving game habitats, reducing predators and etc. Moreover, the oak forests spotted with meadows, as well as cornfields for the game represent a suitable habitat for the Red Deer. Last but not least, of great importance is the calmness of the game due to the remoteness of the area from large settlements, as well as the lack of agricultural activity. The graph built on the basis of the Red Deer counting data showed a rapid and stable increase in its number with low variations, because of provided conservation measures (Vc= 15.64).

During the last decade of the 20th century, there were several groups of Fallow Deer in Sredna Gora Mts that disappeared in the early 21st century due to poaching (Raichev's personal observation). Nowadays, the Fallow Deer could be considered an occasional species, as a group of 4-5 animals in the area of village Lyaskovo from 2011 to 2016 had been observed. Their origin is unknown, assuming that they were escaped from the zoo in Stara Zagora or from private zoos close to the area. Sredna Gora Mts region is a suitable habitat for the Fallow Deer, provided that strict protection measures are applied.

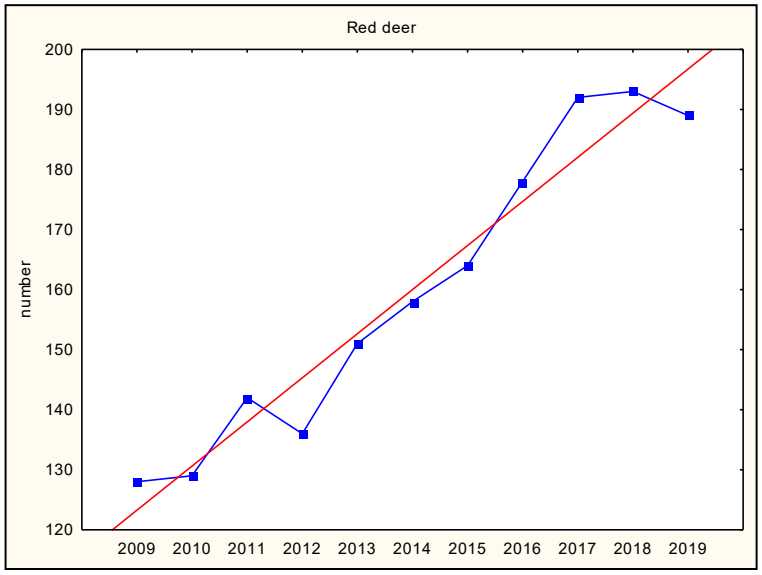

Fig. 1. Red Deer population dynamics trends in Sredna gora Mts (Bulgaria), according to annual counting statistics of the Hunting Fishing Association "Stara Zagora" for 11 years.

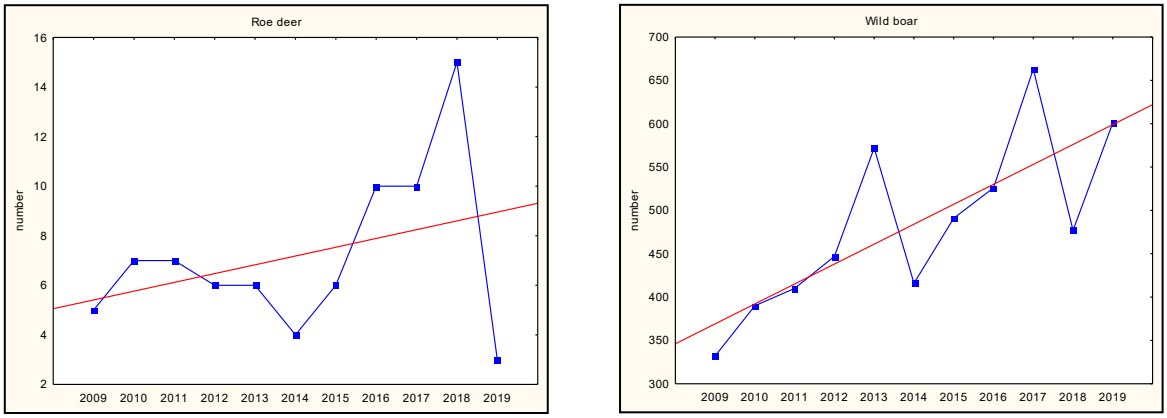

Fig. 2. Roe Deer (left) and Wild Boar (right) population dynamics trends in Sredna gora Mts (Bulgaria), according to hunting data base obtained from Hunting Fishing Association "Stara Zagora" for 11 years.

Some authors consider that the Roe Deer shooting data does not give the most accurate information for population number (Velevski *et al.* 2003). Despite this statement, an increase in its number was observed from the data provided, with steeper rising between 2014 and 2018 (Fig. 2). A strong decline of the Roe Deer number was observed in 2019. It is difficult to point out certain reasons for the changes in its number. Although the Roe Deer is one of the most common victims of poaching, the proper hunting events conducted in recent years, as well as the effective control over them by the Regional Forest Directorate Stara Zagora were a prerequisite for increasing its number. These two counteracting factors induce variations in its number during the study period (Vc = 46.94). Overall, the trend of increasing Roe Deer numbers in the region is in line with that over the last few decades across Europe (Valente *et al.* 2014).

Two significant peaks in the shot Wild Boars' number were observed - 572 in 2013 and 663 in 2017 (Fig. 2). What is noticeable is that they were followed by sharp declines - 416 in 2014 and 477 in 2018. According to these data, the Wild Boar number was changing significantly (Vc = 20.53) over the years, reflected in peaks and falls of number shot individuals for the study period. This observed trend correlates with the steady increase in Wild Boar population throughout Europe since the 1980s (Massei *et al.* 2015).

Tracking and comparing the hunting bag statistics data for ungulates in the study area for a longer period would give a clearer picture on their population trends and would help in selecting conservation measures.

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