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THE STATUS AND SWOT ANALYSIS OF ROE DEER POPULATION MANAGEMENT IN THE HUNTING GROUNDS OF CENTRAL SERBIA

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SUMMARY

The purpose of this study is to examine the status of roe deer population in the hunting grounds of Central Serbia, and perform a SWOT analysis of its management. The data used herein on the number of roe deer individuals and culling events were obtained from the Ministry of Agriculture, Forestry and Water Management - Forest Administration and the Statistical Office of the Republic of Serbia. Moreover, the Law on Game and Hunting was used for analysis purposes. The status of roe deer population in the hunting grounds of Serbia is quite unsatisfactory, depending on the geographical area and wildlife management practices. In 2021, a total of 86,755 individuals were recorded in the area of Central Serbia, which accounts for 97.54% of the optimal population. However, the number of roe deer in the individual hunting grounds of the Central and Eastern hunting areas was above the optimal density, whereas the number of roe deer accounted for 88.58% and 89.12% of the optimal density in the individual hunting grounds of the Southern and Western hunting areas, respectively. The largest number of individuals per unit area (km²) was recorded in the Eastern (2.06) and Belgrade (2.02) hunting areas, whereas the smallest number of individuals per unit area (km²) was recorded in the Southern (1.02) and Western (1.34) hunting areas. The following issues were identified as major impediments to the management of roe deer population in the hunting grounds considered: legislative and regulatory instruments, non-compliance and non-enforcement of a large number of regulations, roe deer monitoring issues, poor hunting ground control, inapplicability of certain regulations in the field of veterinary medicine, environmental protection, unresolved issues of trophy and game meat export, lack of strategic planning (namely the hunting development strategies of the Republic of Serbia), lack of deer habitat monitoring methodology and rating methodology, and unprofessional planning and development of hunting ground management plans. The SWOT analysis performed emphasized the strengths, weaknesses, opportunities and threats of roe deer population management in Serbia.

Key words:

Capreolus capreolus
L., Management,
SWOT analysis

INTRODUCTION

The hunting in Serbia is legally regulated in such a manner that the State owns all the wildlife species, the management of which is under the responsibility of hunting ground users. The hunting grounds in Serbia cover almost the entire territory of the country (Lavadinović et al., 2017).

According to the Law on Game and Hunting (2010), the roe deer (*Capreolus capreolus* L.) is classified as a large game animal protected by a limited hunting season. Roe deer are very adaptable and inhabit almost all of Europe and parts of Asia. In our country, the roe deer lives in a large number of different habitats from the Pannonian lowlands to mountain massifs, but the population density varies depending on habitat conditions (Gajić & Popović, 2010).

The roe deer (*Capreolus capreolus* L. 1758) is an autochthonous game species, widespread in Europe (Marcon et al., 2019). It is the most numerous representative of wild ungulates in Serbia (Popović et al., 2015). Although considered a forest species (Gill et al., 1996; Latham et al., 1999; Hemami et al., 2004), the roe deer often inhabits agricultural land (Cimino & Lovari, 2003; Marković et al., 2017), which indicates a wide distribution of this species in different habitats. The quality of a habitat suited for the roe deer depends on various factors and is often limited by anthropogenic factors (Marković et al., 2017). The presence of roe deer entails a need for harmonizing hunting management and other industries. Krejči & Dubrovac (2004) believe that the presence of roe deer negatively affects the regeneration of pedunculate oak seedling stage, whereas roe deer can be a cause of damage in agriculture (Putman, 1986). In their research, Ristić et al., (2011) pointed out the importance of the roe deer for the development of hunting tourism, which is attractive to hunters not only because of the trophy (Popović & Bogdanović, 2004; Popović et al., 2020) but also because of its delicious and nutritious meat (Ivanović et al., 2020). As such, the roe deer is considered an important species for domestic hunting. Nevertheless, the number of roe deer is not at a satisfactory level in Serbia (the Hunting Development Strategy of the Republic of Serbia - Draft, 2014). In the period 1964/65–1993/94, the culling of roe deer varied from 1.35% to 6.45% in relation to the parent number (Gajić et al., 1997). In 2000, the culling was 3.24% and 4.69% in Vojvodina and Central Serbia, respectively (Šelmić et al., 2001), which is significantly below the potential. In 2004, the breeding stock of roe deer in Serbia amounted to 94,533 animals, with only 4,391 animals killed (Tomić et al., 2005). Such a small percentage of use is greatly influenced by losses in the Serbian hunting grounds, which are mostly caused by anthropogenic factors (Popović & Bogdanović 2001; Popović, 2006). According to Popović et al., (2015) excessive hunting pressure is responsible for such a condition. Therefore, the purpose of this study is to examine the status of roe deer population (as the most numerous indigenous species) in the hunting grounds of Central Serbia, and perform a SWOT analysis of its management for achieving the sustainable use of roe deer in Serbia.

MATERIAL AND METHODS

The data used herein on the roe deer population in the hunting areas in Serbia were obtained from the Statistical Office of the Republic of Serbia (the Official Gazettes of the Republic of Serbia, 2020a). The data on the established hunting grounds in Central Serbia and the state of roe deer population in 2021 were obtained from the Ministry of Agriculture, Forestry and Water Management - Forest Administration (the Official Gazettes of the Republic of Serbia 2012c; 2020b).

The Law on Game and Hunting (the Official Gazettes of the Republic of Serbia, 2010), regulations resulting from this law, and a number of other hunting regulations were used for analysis purposes. A total of 204 Central Serbian hunting grounds, established and assigned to hunting ground users, were enrolled in this study, and classified according to the hunting area in Central Serbia, the optimal number of roe deer, and the actual roe deer number in 2021. A SWOT analysis of the roe deer population management in Serbia showed the advantages, disadvantages, opportunities and threats of roe deer population management in the Republic of Serbia.

RESULTS AND DISCUSSION

The hunting in Serbia is based on a legal system according to which the State owns all the wildlife species, the management of which is granted to hunting ground users, i.e. local hunting associations. The hunting grounds in Serbia cover almost the entire territory of the country (Lavadinović et al., 2017), and, until recently, their users were state representatives or state-associated organizations (Fig. 1).

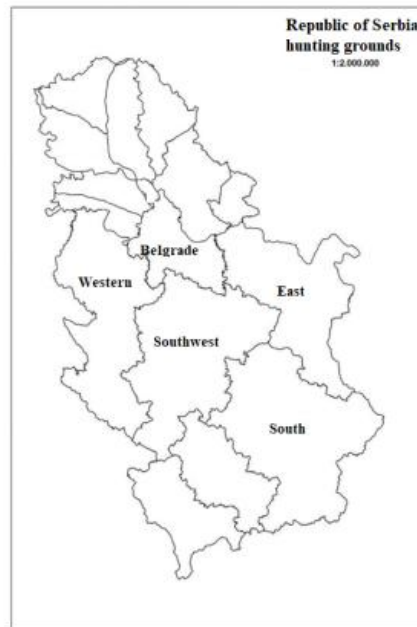


Figure 1. Established hunting areas in the Republic of Serbia (the Official Gazette of the Republic of Serbia, 2020a)

Table 1. Overview of the optimal and actual number of roe deer in the established hunting grounds in Central Serbia in 2021/22

No.	Hunting area	Area size /ha/	Optimal number of roe deer	Actual number of roe deer 2021/22	Males	Females and offspring	Optimal number per km ²	Number per km ² 2021/22
1	BELGRADE	442,220.93	9,550	8,912	3,388	5,524	2.16	2.02
2	WESTERN	1,188,869.39	17,870	15,926	5,923	10,003	1.5	1.34
3	SOUTHWEST	1,362,951.99	22,208	24,532	9,258	15,274	1.63	1.8
4	EAST	1,046,462.97	21,440	21,554	8,121	13,433	2.05	2.06
5	SOUTH	1,551,366.01	17,872	15,831	5,840	9,991	1.15	1.02
Σ		5,591,871.29	88,940	86,755	32,530	54,225	1.59	1.55

As seen in Table 1, the number of roe deer in Central Serbia amounted to 86,755 individuals in 2021, which accounts for 97.54% of the optimal number. However, the number of roe deer in the individual hunting grounds of the Central and Eastern hunting areas was above the optimal density, whereas the number of roe deer accounted for 88.58% and 89.12% of the optimal density in the individual hunting grounds of the Southern and Western hunting areas, respectively. The largest number of individuals per unit area (km²) was recorded in the Eastern (2.06) and Belgrade (2.02) hunting areas, whereas the smallest number of individuals per unit area (km²) was recorded in the Southern (1.02) and Western (1.34) hunting areas. The results obtained could lead to a false conclusion that the management of roe deer population in Serbia is more than good, which is not the case in reality. However, a comparison of the number of roe deer in Serbia and that in some other European countries cannot confirm this, especially in light of a significantly lower percentage of roe deer population use in Serbia.

Significant differences are notable between the official and actual field data on the number of roe deer in Serbia. Accordingly, there is an urgent need for a new approach to collecting and processing the actual and accurate data on roe deer number in Serbia, which would enhance the management of roe deer population in the country. The present status of roe deer population in the hunting grounds in Serbia varies depending on the area and hunting ground conditions, but it is quite unsatisfactory overall. In some hunting grounds, the main population density of roe deer is within the limits of the habitat carrying capacity, so the entire annual increase is successfully used through the planned and organized hunting practice. However, in a significantly larger number of hunting grounds with comparable natural conditions, the breeding stocks of wild animals are far below the habitat carrying capacity, almost approximating to the biological minimum. The consequence of this is the unsatisfactory roe deer population growth and small or lacking economic effects of its use. The following issues were identified as major impediments to the management of roe deer population in the hunting grounds considered:

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- legislative and regulatory instruments providing insufficient protection and improvement of wildlife and its habitat [namely, a number of regulations stipulated in the Law on Game and Hunting (the Official Gazettes of the Republic of Serbia, 2010), have not been implemented to date],
 - non-compliance and non-enforcement of a large number of regulations directly and indirectly related to the management of roe deer population (the Official Gazettes of the Republic of Serbia, 2012a; 2012b),
 - non-issuance of all ordinances arising from the adopted Law on Game and Hunting from 2010, which are within the competence of the relevant ministry,
 - roe deer monitoring is not carried out, or is not functional, at the state level so that hunting ground users could react at any time,
 - monitoring of the hunting grounds and determination of the roe deer number are performed exclusively according to the submitted reports of hunting ground users, without any external field control,
 - inapplicability of certain regulations in the field of veterinary medicine, environmental protection, weapons and ammunition, traffic and criminal law (the marking of wild game at the shooting site and veterinary control of the game shot, hunting grounds often include populated areas, game damage to the roads outside the hunting grounds are attributed to hunting ground users, transport of weapons through the hunting grounds, very difficult to prove and sanction poaching),
 - unresolved issues of trophy and game meat export (the export ban on game meat in skin or feathers, and fur and trophies of the game red-listed in Serbia),
 - non-existence of strategic planning in hunting (such as the Development Strategy of Hunting in Serbia),
 - lack of deer habitat monitoring and rating methodologies as a basis for the systematic number determination and planned hunting of roe deer,
 - unprofessional planning and development of a deer population management plan according to the situation on the ground or at the request of hunting ground users, but not according to the existing habitat conditions,
 - unprofessional and irresponsible attitude towards wildlife and hunting grounds by hunting ground users,
 - poor technical equipment for monitoring the deer population available to hunting ground users and the insufficient computer literacy of a large number of hunting workers,
 - low income of hunting ground users and inability to invest in the hunting grounds,
 - poor organization and lack of modern hunting ground management,
 - lack of interest in the professional development of both hunting workers and hunters,
 - lack of interest of hunting ground users in the scientific research on the deer population in their hunting grounds,
 - lack of user discipline in managing the deer population in their hunting grounds,
 - poor work organization and insufficient workforce in the hunting grounds, and
 - poor education of the wider public on wildlife, habitats, etc.

A SWOT analysis of the roe deer population management in Serbia

Advantages:

- game is a common good under the ownership of the State,
- favorable natural conditions and habitat for deer breeding, but poor assessment and calculation of the optimal roe deer number in a vast majority of the hunting grounds considered,
- different natural conditions and types of hunting grounds offered to hunters and tourists,
- favorable location and connection to hunting and tourist markets,
- introduction of professionalism and higher education through the chamber of hunting workers,
- protection instruments in case of wildlife stock destruction,
- improved conditions for better planning and control of hunting grounds by the legislator,
- funds for the development of hunting in the Republic of Serbia can be allocated to various projects aimed at improving the management of roe deer population in the country.

Disadvantages:

- small number of roe deer population in a vast majority of hunting grounds in Serbia (hunting ground users report that the spring number of roe deer almost approximates to the optimal number, but the culling is below 10%, which indicates huge losses and a decrease in the roe deer number),
- low roe deer population density and uneven density distribution across ecologically similar habitats,

- unfavorable age structure, sex ratio and trophy value of roe deer population in most hunting grounds in Serbia,
- small number of roe deer culling events and unprofitable management,
- significant losses in roe deer management, mostly unrecorded and caused by biotic factors,
- issues with a large number of hunting ground users,
- incompetence of a large number of professional hunting workers in managing the deer population in their hunting grounds,
- inadequate technology for roe deer population management in the hunting grounds considered (inadequate hunting practices and establishment of productive hunting areas in the hunting grounds, poor grading of hunting grounds and determination of habitat capacity, inaccuracy and unreliability of elementary data on the state of roe deer population in the hunting grounds, pronounced differences in the roe deer number between individual parts of the hunting grounds, unreliable estimates of the roe deer parent number, age and sex structure, and incorrect estimates of the population development dynamics and shooting quotas leading to the inadequate management of the hunting grounds),
- lack of wildlife monitoring in Serbia and a central database on the state of roe deer population at all times,
- lack of adaptive deer population management in Serbia,
- underdeveloped hunting tourism and inability to sell roe deer according to the market price list,
- complicated border-crossing procedure for the entry of foreign tourist hunters into Serbia, and issues with export bans on game trophies and meat,
- weak financial power of hunting ground users to invest in their hunting grounds,
- inability of the line ministry to respond to the hunting ground users' requests,
- unregulated insurance policy on wildlife traffic damage (namely, an isolated harmful event can close the business of a hunting ground user), and
- implementation of the penal provisions of the Law on Game and Hunting (the Official Gazettes of the Republic of Serbia, 2010) for poaching.

Opportunities:

- enhanced control and supervision of the hunting grounds,
- possibility of increasing the roe deer parent number and improving the age, sex structure and quality of game trophies,
- training of professional hunting workers in deer population management,
- introduction of professionalism and higher education in roe deer population management,
- prevention of deer damage in the hunting grounds,
- use of incentive funds of the relevant Ministry responsible for hunting,
- using financial funds of international institutions and organizations,
- increasing hunting and tourist attractions of the roe deer hunting grounds, and
- increasing the hunting ground revenue from deer breeding.

Threats:

- significant losses in the roe deer number due to illegal hunting,
- absence of foreign tourist hunters in Serbian hunting grounds due to various border-crossing restrictions on hunting weapons and game meat and trophy export,
- reducing the employment of hunters in the hunting grounds,
- lack of interest of hunting workers and hunters in education on roe deer breeding and hunting,
- reducing the number of hunters and increasing the number of poachers due to various legal processes and procedures,
- pressures from anti-hunting organizations,
- financial blockades and bankruptcy of hunting ground users due to deer damage to traffic infrastructure and agriculture, and
- reducing the employment of hunters for the habitat management and monitoring of the status of game populations in the hunting grounds.

CONCLUSION

The status of roe deer population in the hunting grounds in Serbia varies depending on the area and hunting ground conditions, but it is quite unsatisfactory overall. The number of roe deer in Central Serbia amounted to 86,755 individuals in 2021, which accounts for 97.54% of the optimal number. The largest number of individuals per unit area (km²) was recorded in the Eastern (2.06) and Belgrade (2.02) hunting areas, whereas the smallest number of individuals per unit area (km²) was recorded in the Southern (1.02) and Western (1.34) hunting areas.

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Conflict of interest: The authors declare that they have no conflict of interest.

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