Quantitative Evolution of the Wild Animals Populations for Hunting from 20-Bara

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Abstract
After Romanian integration into European Union the hunting populations need special attention. The observed size of an animals' population, which is opposed to the genetic size, is given by the number of the individuals from all categories and also by the total number of males and females participating in the production of the descendant generation. The study presented in this paper aimed to analyze the quantitative evolution of 13 wildlife populations and environmental conditions, on the background of hunting 20-Bara, between 2018 and 2021, thus contributing to the knowledge of the hunting heritage in Timiș County, for a sustainable management and conservation. Thereby, this study recommends the revival of the existing population on this hunting area, through "blood refreshing" actions, as well as the permanent monitoring and limitation of populations from the *Canidae* family, especially of the Jackal (*Caniș aureus* L.) species, and the Red Fox (*Vulpes vulpes* L) species.

Key words: observed size, hunting animals, hunting population, hunting area

1. Introduction

After Romanian integration into European Union, the hunting populations need special attention. The hunt was always a spring of richness in our country, not only by a large number of animals but also by the variety of species. The hunt represents the oldest occupation, before all others humans were hunter and gatherer. As old as man, the hunt evolved with the humans and with the development of the society. In this domain, man-made the first observations, research, and discoveries, also the first inventions. After an extended study of the paleolithic hunters, it was proven that there were domesticated animals [1]. The discovery of the spear, bow with arrows, perfecting the tools and hunting methods were the first and most important inventions of the primitive era, which lead to an increase of the success of the hunt [2].

Romania is one of the few countries in EU, that still has pools for aquatic hunting, a large forest for roe deer, bears and other big game. The duty of hunters is to know the environmental requirement of the game and to contribute to its preservation. The hunting terrain with the constructions makes up the hunting patrimony [3].

Starting from the year 1948, all over our country, the hunting terrain becomes state propriety. From that date, since there was no private propriety, large hunting terrain could be established. The management measures applied to a hunting terrain depends on the species that populate it. Presently, in Romania, after the institute of the Law 103/1996, the number of the hunting domains is 2.227 [2]. Main developmental conditions for a

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hunting domain and existence are: food, shelter and quiet. There is considered that the hunt density is optimal when a sufficient number of individuals exist according to biogenic capacity [4]. Exceeding the optimal density can cause damage to other economical arias and also can affect the specie in the cause, through lack of food, shelter and rapid expansion of diseases and other detrimental factors [5].

The aim of the present study was to study the quantitative evolution of the hunting populations for 13 animal species, from the 20 Bara aria in the period of 2018-2021.

2. Materials and methods

The hunting terrain taken into study has a total surface of 10,889 ha, and is bordered North by Paniova- Secas-Radmanesti, at East by Budurani – Cutina local road, at South by Cutina local road– Bodo – Balint, and at the West by Balint local road Targoviste-Paniova. In table 1 is presented the total surface of the hunting ground of the hunting ground studied divided in categories.

Table 1. The surface of the hunting terrain 20 Bara divided into categories

	The cynegetic productive surface for:						
	Aquatic animals land		Other hunt species				
UM	Water length	Forest	Agricultural land	Grazing field	Total	Unproductive land	Total
Ha	370	370	7,502	2,173	10,045	474	10,889
%	3.4	3.4	68.9	20	92.3	4,3	100

From table 1 it can be seen that from the total surface of the land studied (10,889 ha) the terrain occupied by the Aquatic animals represents 370 ha (3.4%) while other species have 10,045 ha (92.3%) from which agricultural land 7,502 ha (68.9%), grazing field 2,173 (20%) and forest land 370 ha (3.4%). The cynegetic non-productive surface is 4.3% respective 474 ha [6].

The study presented in this paper is aiming to evaluate the population of animals from this hunting ground in the period 2018-2021 because without this information a rational hunt of the animals would not be possible. Knowing the number of animals serves for evaluating the annual population of animals that can be hunted and for calculate the complementary food requirements for the winter, and it also helps maintain the sex ration [7]. The number of animals is crucial for achieving an optimal density and prevent de degradation of the trophies and the damages in forest an agricultural cultures. This is why this action to be made with responsibility by the persons that know well the terrain and the biology of the hunted animals [8].

3. Results and discussion

In table 2, we presented the evolution of the spring population by species and number of individuals during the whole studied period.

From the analysis of table 2, it can be noticed that from the 13 species studied, 3 were not identified on this hunting ground: Fallow Deer (*Dama dama L*), Wildcat *(Felis silvestres L*), and Muskrat (*Ondatra zibethica L.*).

Red Deer (*Cervus elaphus* L) species is identified in 2019, with a population of 14 individuals, identical to that of the reference year 2018. But in 2020 the species registers a significant increase, reaching the value of 29 individuals, respectively an increase of 15 individuals, which in relative terms represents 107%. The increase of the observed population size takes place in 2021, the number reaching a value of 31 individuals, in relative values this being 10.3%. During the whole period studied, respectively 2019-2021, the increase of the population of Red Deer (*Cervus elaphus* L) species, was 17 individuals, which in relative values represents 121.4%.

Roe Deer (*Capreolus capreolus* L.) species, registers in 2018 a number of 124 individuals, a number that will increase in 2019, respectively to 150 individuals, which represents in relative values an increase of 20.9%. In the next period, the species registers an increase of the herd to 160 individuals in 2020, so an increase by 6.66% and 168 individuals in 2021 (5%). During the entire period studied, respectively 2019-2020, and compared to the reference year 2018, there is an increase in the number of Roe Deer (*Capreolus capreolus* L.) species, with 44 individuals, which in relative values represents 35.48%.

Wild hog (*Sus scrofa* L.) species, registers a significant decrease of the population at the level of 2020, respectively if in 2018 and 2019 the species had a number of 60 individuals, in 2020 there were 40 individuals, and so a decrease of 20 individuals, which in relative values represents 33.33%. In 2021, the observed population size of Wild hog (*Sus scrofa* L.) species increases to 50 individuals (25%). Over the entire period studied (2019 - 2021), the decrease was 10 individuals, respectively 16.66%.

Table 2. The evolution of the spring effectives from the 20 Bara hunting terrain, in the period 2018-2021

Specie	2018	2019	2020	2021
Red Deer (*Cervus elaphus L*)	14	14	29	31
Fallow Deer (*Dama dama L*)	-	-	-	-
Roe Deer (*Capreolus capreolus L*)	124	150	160	168
Wild hog (*Sus scrofa L)*	60	60	40	50
European hare (*Lepus europaeus P*.)	656	632	630	697
Wildcat *(Felis silvestres L*)	-	-	-	-
Common Pheasant (*Phasianus colchicus L*)	713	620	180	120
Grey Partridge (*Pedrix pedrix L*)	161	150	100	40
Quail (*Coturnix coturnixL*)	695	720	700	580
Red Fox (*Vulpes vulpes L*)	30	10	16	25
Jackal (*Canis aureus L*)	5	4	6	10
Sitar of the forest (*Scolopax rusticola L*)	50	50	50	50
Muskrat (*Ondatra zibethica L*.)	-	-		

The wild rabbit species (*Lepus europaeus* P.) records the following evolution of the herd, 656 individuals in 2018, a herd that decreases in the next 2 years, respectively to 632 individuals in 2019 (3.56%), 630 in 2020 (0.3 %), and increases to 697 individuals in 2021 (10.63%). If we report the number of European rabbit species (*Lepus europaeus* P.) from 2021 (697 individuals) to the reference year 2018 (656 individuals), we find that this species has increased its population by 41 individuals, which in relative values represents 6.25%.

The Common Pheasant (*Phasianus colchicus* L.) species, starts in 2018 with a population of 713 individuals and records a decrease in population until 2021 (2019 – 620 individuals, 2020 – 180 individuals), when it reaches the value of 120, so a decrease of 593 individuals. At the end of the studied period, respectively the year 2021, we find that the species registered a significant decrease in the number compared to 2018, with 593 individuals, respectively 83.16%. Gray Partridge (*Pedrix pedrix* L.) species, recorded a significant decrease in population between 2018 and 2021, so if at the level of the reference year, respectively 2018, the inventory population was 161 individuals, in 2019 it decreases to 150 , so a decrease of 6.83%, in 2020 the number was 100 individuals (-33.33%).

At the end of the studied period, 2021, there was again a drastic decrease of 60%, the number reaching the value of 40 individuals. If we report the number of Gray Partridge (*Pedrix pedrix* L.) species, from the level of 2021, respectively 40 individuals, at the level of the reference year 2018, 161 individuals, we find a significant decrease of this species in terms of observed size, with 121 individuals, which in relative values represents 75.15%. We consider that the significant decreases in the observed size of these two species, namely the Common Pheasant (*Phasianus colchicus* L.) species, and the Gray Partridge (*Pedrix pedrix* L.) species, are due to the increase in the number of Jackal (*Canis aureus* L) species, on this hunting background.

Quail (*Coturnix coturnix* L.) species, also recorded a decrease in numbers between 2018 and

2021, so if at the level of the reference year, respectively 2018, the number of inventories was 695 individuals, in 2019 it reaches the observed size of 720 individuals, so an increase of 3.59%, in 2020 the number will decrease to 700 individuals (-2.77%). At the end of the studied period, the year 2021, there was a significant decrease of 120 individuals, which in relative values represents 17.14%, the number reaching the value of 580 individuals. Over the entire period studied 2019-2021, the decrease in the number of Quail (*Coturnix coturnix* L) species was 140 individuals (- 19.44%). We consider that also for this species, the decrease of the observed size is due to the increase of the number of Jackal (*Caniș aureus* L.) and Red Fox (*Vulpes vulpes* L).
Canidae Family, which includes elongated buttocks and slender limb carnivores, is represented on this hunting fund by two species, namely Red Fox (*Vulpes vulpes L*), and from 2013 to 2014, there appears a new species, namely Jackal (*Canis aureus L*).
Red Fox (*Vulpes vulpes* L) species, registered a significant decrease in the size observed in 2019 (10 individuals), this compared to the reference year 2018 (30 individuals), being 20 individuals, which in relative values represents -66.66%. Starting with 2020, this species begins to return, registering an increase of 6 individuals (60%), and in 2021, the observed size reaches the value of 25 individuals, so an increase of 9 individuals, which in relative values represents 56.25%. During the 2019-2021 study period, the Red Fox (*Vulpes vulpes* L) species recorded an increase of 150%.
Jackal (*Canis aureus* L) species, was inventoried on this hunting ground in 2018 with a number of 5 individuals, and in 2021 reaching 10 individuals, so an increase of 100%.
It is noteworthy that both Red Fox (*Vulpes vulpes* L) species and Jackal (*Caniș aureus* L.) species, in the period 2019-2021, recorded significant increased number.
We also notice on this hunting fund, the presence of a bird species, considered especially by the Italian hunters a special trophy, namely Sitar of the Forest (*Scolopax rusticola* L.) species, with a population of 50 individuals per year.
We also specify that our study did not identify the presence on this hunting background, individuals of Wildcat (*Felis silvestres* L) species and Muskrat (*Ondatra zibethica* L.) species.

4. Conclusions

Following the study on game dynamics, for 13 populations of wild animals, respectively Red Deer (*Cervus elaphus* L.), Roe Deer (*Capreolus capreolus* L), Fallow Deer (*Dama dama* L.), Wild hog (*Sus scrofa* L) , Common Pheasant (*Phasianus colchicus* L.), Gray Partridge (*Pedrix pedrix* L.), Quail (*Coturnix coturnix* L), Jackal (*Canis aureus* L.), Red Fox (*Vulpes vulpes* L), European hare (*Lepus europaeus* P.), Wildcat (*Felis silvestres* L), Muskrat (*Ondatra zibethica* L.) and Sitar of the Forest (*Scolopax rusticola* L), in the period 2019 - 2021, using as reference year 2018, on the hunting background 20-Bara, Timiș County, can conclude the following:
Cervidae Family, which includes deciduous ruminants, is represented by the species Red Deer (*Cervus elaphus* L.), Roe Deer (*Capreolus capreolus* L), the other species - Fallow Deer (Dama dama L.) not being identified. Both species recorded population increases during the study period. During the entire studied period, respectively 2019-2021, the increase of the population of Red Deer (*Cervus elaphus* L.), was 17 individuals, which in relative values represents 121.4%.
During the entire period studied, respectively 2019-2020, and compared to the reference year 2018, there is an increase in the number of Roe Deer (*Capreolus capreolus* L), by 44 individuals, which in relative values represents 35.48%.
Wild hog (*Sus scrofa* L), for the period 2019-2021, registered a decrease of the observed size by 10 individuals, respectively 16.66%.
We consider that the significant decreases in the observed size of the following species, Common Pheasant (*Phasianus colchicus* L.), -83.16%, Gray Partridge (*Pedrix pedrix* L.), -75.15% and Quail (*Coturnix coturnix* L), -19.44%, are due to the increase in the number of Jackal (*Canis aureus* L.), +100% and Red Fox (*Vulpes vulpes* L), +150%, on this hunting background.
All of these findings led us to the conclusion that on a hunting ground there is a good relationship between the number of individuals and the biogenic of the hunting terrain at all 10 species identified.
All of these findings led us to the conclusion that on a hunting ground there is a good relation between the number of individuals and the biogenic of the hunting terrain at all 10 species identified.
We recommend the revitalization of existing populations by increasing the number of

individuals and "refreshing the blood" - Common Pheasant (*Phasianus colchicus* L.), Gray Partridge (*Pedrix pedrix* L.), Quail (*Coturnix coturnix* L), and granting special attention and the control of the populations of the *Canidae* Family, respectively Jackal (*Caniș aureus* L.), and Red Fox (*Vulpes vulpes* L), on this hunting background.

We recommend the implementation of real and consistent management measures that will increase the productive hunting potential of this hunting fund. The most relevant problems are related to the intensification of agricultural activities, the use of pesticides on a large scale, etc.

We also recommend actions to restoring the biogenic potential of the hunting fund by reintroducing some vanishing wildlife species of hunting interest or by introducing new game species that can harness the free ecological niches.

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