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THE DYNAMICS OF WILD BOAR HERDS IN THE CONTEXT OF THE APPEARANCE OF A DISTURBING ECOFACTOR

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Abstract

Environmental factors define an ecological potential that ensures a certain biological productivity of the hunting management fund. A first step in establishing the ecological potential of game management funds is to direct efforts to qualitatively and quantitatively assess all factors that influence biological productivity. Monitoring the dynamics of wild boar herds is important because it is necessary to understand the relationships and correlations that are established between different species of animals in the same territory (prey-predator), but also between the studied species and the existence of an optimal ecological factors: biotic, abiotic and anthropogenic, to ensure the viability of the population. In this paper, was made an evaluation of wild boar herds dynamics, recorded between 2015 and 2020, using data from the Ministry of Environment and according to the assessment keys for hunting territories. Statistical elements were established in order to have a more accurate calculation of the wild boar population trend. It is necessary to know the wild boar herds evolution, in order to develop a long-term strategy, in which hunters also have a key role to play in conserving biodiversity.

Key words*: environment, herd dynamics, wild boar.*

INTRODUCTION

The wild boar (*Sus scrofa attila* L.), due to its high breeding potential in a relatively short time, is a large game species that can be a potential danger to both agricultural crops and forest vegetation within the hunting grounds (Cotta et al., 2008.).

The work of developing the ecological diagnosis keys for wild boar took into account this aspect, but also took into account a number of factors that contribute to the differentiation of ecological conditions for this species, given the results of research conducted in a number of European countries, which highlight the importance of climatic factors, the existence of predators, food sources, the occurrence of diseases, human activity (Dardaillon & Beugnon, 1987)

A first group of factors, with the highest score, which have a high influence on the ecology of this game species consists of game culture factors: fields for winter food, distribution and managing food administration, natural numerical ratio predators/wild boar, and number of stray dogs per 1000 ha, as well as from negative abiotic factors, represented by grazing and poaching.

The analysis of this group of factors highlights the fact that the management of hunting funds can have an extremely high influence on the change of wild boar numbers, all the factors listed above can be changed in the desired direction, by appropriate measures.

In the group of factors with average influence on the ecology of wild boar populations we find a series of abiotic factors, represented by: average temperature during calving, average thickness of the snow layer and the size of the snow period, as well as biotic factors, represented by: afforestation percentage, vegetation outside the forest and accessible biomass in winter. This group of factors is characterized by a reduced ability to react to changes that may occur in the management of those hunting funds.

The third group of factors, respectively the factors with relatively low influence, consists of abiotic factors (the average altitude of the land, the amount of precipitation during calving and the hydrographic network), biotic factors, (the percent of classes age of the trees and bushes, existing forest formation, coppices and agricultural crops), as well as negative abiotic factors (the growth of domestic pigs and the

density of the road network). Within this third group of factors, a special situation is represented by the breeding activity of domestic pigs, which can be a source of disease spread among wild boar populations, which can lead to a dramatic reduction in the wild boar number (***Order M.M.A.P. no.393/2002)..

Thus, this factor, of relatively low importance, may take a special importance under certain specific conditions (high densities of wild boar populations, along with the growth of unvaccinated domestic pigs, which can feed on the productive area of hunting funds

The evolution of livestock is influenced by changes in determinants ecological factors, in the geographical distribution. The dynamics of wild boar populations suppose, first of all, an appreciation of the quality of environmental factors as a support for biological productivity, especially if we take into account the fact that the specie is dependent on the existence of balanced ecosystems. The ecosystems have to ensure, in addition to food requirements also the vital spaces necessary for sheltering, breeding and growing piglets.

Ecological environmental factors define, in fact, an ecological potential that ensures a certain biological productivity of the hunting management fund. A first step in establishing the ecological potential of game management funds is to direct efforts to qualitatively and quantitatively assess all abiotic factors that influence biological productivity. Thus, the ecological potential of game management funds must be analyzed in the light of the following components: geology, relief, climatic characteristics, hydro-geomorphological and hydrological elements and soil particularities (Micu, 2004)

MATERIALS AND METHODS

In this paper, was done an analysis of the situation of wild boar herds, in Tulcea County, based on official evaluations, using data from the Ministry of Environment. These evaluations take into account the reports made by the administrators of the hunting funds from Tulcea county, the data being centralized at the ministry level.

Monitoring the dynamics of studied wild boar herds, is important because it is necessary to understand the relationships and correlations that are established between different species of animals in the same territory (prey-predator), but also between the species studied and the existence of an optimal ecological factors. biotic, abiotic and, of course, of an anthropogenic nature, in order to ensure the viability of the populations.

Statistical calculations (mean, standard deviation, mean error, coefficient of variability) necessary to establish the evolution of wild boar numbers were also performed.

RESULTS AND DISCUSSIONS

In Tulcea county, the numbers of evaluated animals, in the period 2015-2020, fluctuated between 269 and 2277 heads (Table 1, Figure 1 - official data taken from the website of the of the Ministry of Environment, Waters and Forests).

Table 1. Total wild boar herds evaluated, in the period 2015-2020, in Tulcea county

Year	Animal number (heads)
2015	1875
2016	1775
2017	1992
2018	2277
2019	334
2020	269
Mean	1420,33
Standard deviation	883.04
Mean error	360.50
Coefficient of variability	62.17

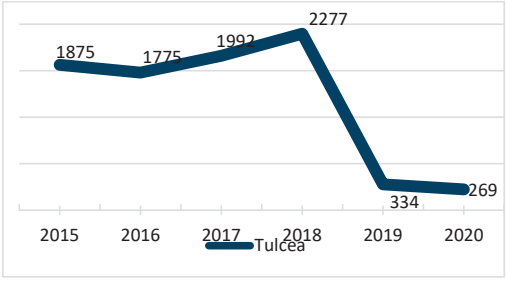

Figure 1. The evolution of wild boar herds, in 2015-2020, in Tulcea County

Statistical analyzes highlight the existence of a high coefficient of variability. This is due to the drastic decrease of the value of the herds evaluated in 2019, the trend maintained in 2020 (269 heads, compared to the highest value, registered in 2018-2277 heads).

Out of the total number of wild boar flocks in Tulcea County, only those registered by the fund managers that appear constantly in the hunting activity, with evaluated and harvested flocks, during the years 2015-2020, were studied (RNP, AJVPS Tulcea, Trei Stejari Association, AV Predeşti Habud, AV San Rafael, AVPS Crângul Slava Rusă and AVPS Mioriţa)

In terms of numbers, as expected, RNP and AJVPS Tulcea dominate, followed by AVPS Mioriţa. The fewest specimens can be found at AVPS Crangul Slava Rusa (Table 2. and Figures 2, 3)

Table 2. The evolution of the wild boar herds, evaluated between 2015-2020, by the main managers of hunting funds from Tulcea county

Year	Manager hunting fund (AJVPS/Association/AV)						
	RNP	Tulcea	Trei Stejari	Predeşti Habud	San Rafael	Crângul Slava Rusă	Mioriţa
2015	1010	202	8	33	25	45	55
2016	978	250	8	35	35	42	60
2017	1097	291	10	40	45	44	65
2018	1128	368	10	40	100	62	70
2019	33	8	10	21	30	15	72
2020	31	16	10	10	25	9	58
Total	4277	1135	56	179	260	217	380
Mean	712.83	189.16	9.33	29.83	43.33	36.16	63.33
Standard deviation	530.21	147.66	1.03	11.95	28.75	20.13	6.80
Mean error	216.45	60.28	0.42	4.88	11.73	8.21	2.77
Coefficient of variability	74.38	78.06	**11.06**	**40.07**	66.35	55.66	**10.73**

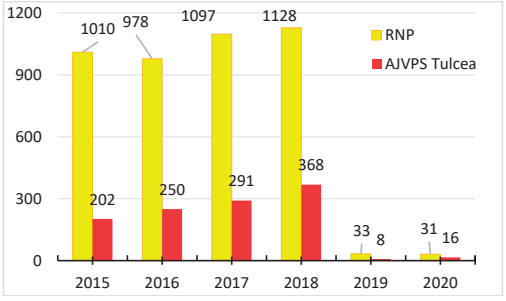

Figure 2. The evolution of the wild boar herds, evaluated between 2015-2020, by the biggest managers of hunting funds from Tulcea County

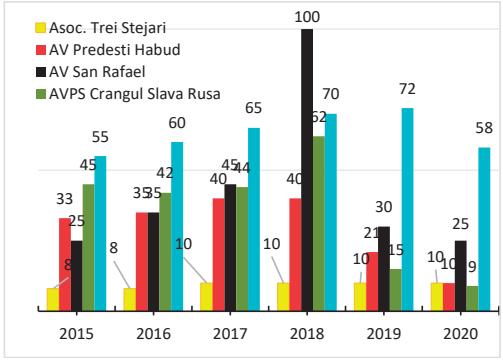

Figure 3. The evolution of the wild boar herds, evaluated between 2015-2020, by the main managers of hunting funds from Tulcea County

Most wild boar specimens were evaluated in 2018, but in 2019 the number of evaluated specimens decreased drastically, in most managers, the same trend being maintained in 2020. At the Trei Stejari Association the number of evaluated specimens remained constant (10 heads) in the last 4 years. At AVPS Miorita, the number increased from 70 heads in 2018 to 72 heads in 2019, and then decreased to 58 heads in 2020.

For the Association of Three Oaks and AVPS Miorita, the coefficient of variability was up to 15% (11.06% and 10.73%, respectively), the evaluated numbers remaining relatively constant throughout the years 2015-2020.

The statistical analyzes highlight the existence of a high coefficient of variability (over 55%) for the herds registered by RNP, AJVPS Tulcea, AV San Rafael and AVPS Crângul Slava Rusă. This fact is due to the decrease of the animal number, established for evaluation for 2019 and 2020, from 1128 to 33 heads and respectively 31 for RNP, from 368 heads to 8 heads, for AJVPS Tulcea, from 100 to 30 heads and respectively 25 for AV San Rafael and from 62 to 15 heads and respectively 9 for AVPS Crângul Slava Rusă.

For AV Predeşti Habud, there was a coefficient of variability of 40.07%, the difference

between the numbers evaluated in 2018 (40 heads) and those in 2019 (21 heads) being 50%, as for those evaluated in 2019 (21 heads) and those of 2020 (10 heads).
This decrease in the evaluated herds in 2020, compared to 2019 and 2018 in particular, is probably due to the rapid spread of swine fever in Tulcea County, which led to a drop in the number of animals existing in this county.
Depending on the evaluated herds there were established over the years the harvesting quotas for wild boar. This were approved and achieved in Tulcea County (Tables 3 and 4. and Figures 4-11).

Table 3. Wild boar quotas approved and achieved in Tulcea County, for the hunting seasons from 2015-2020

Herd size (no.)	Harvest quotas (pcs)				
	2015/2016	2016/2017	2017/2018	2018/2019	2019/2020
Approved	280	339	394	746	286
Achieved	197	232	213	253	66

Table 4. Wild boar quotas approved and achieved in Tulcea County, for the hunting seasons from 2015-2020, for the main hunting fund managers (RNP, AJVPS Tulcea, Asociaţia Trei Stejari, AV Predeşti Habud, AV San Rafael, AVPS Crângul Slava Rusă and AVPS Miorița)

Hunting fund manager	Harvest quotas (pcs)									
	2015/2016		2016/2017		2017/2018		2018/2019		2019/2020	
	Approved	Achieved	Approved	Achieved	Approved	Achieved	Approved	Achieved	Approved	Achieved
RNP	48	30	50	36	43	42	119	100	35	18
AJVPS Tulcea	67	41	87	71	105	71	185	44	28	18
Asociația Trei Stejari	3	0	3	2	5	1	5	0	5	2
AV Predești Habud	10	10	10	8	14	12	24	2	11	0
AV San Rafael	6	2	17	14	23	19	67	21	15	13
AVPS Crângul Slava Rusă	15	4	15	10	15	10	30	24	15	6
AVPS Miorița	24	18	25	24	25	4	46	1	72	2

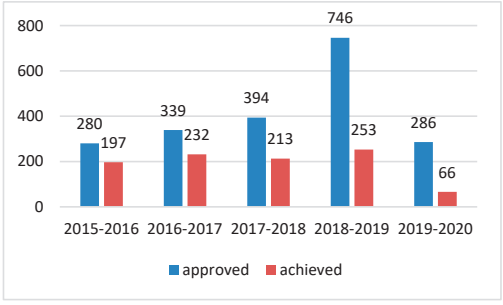

Figure 4. Wild boar quotas approved and achieved in Tulcea County, for the hunting seasons from 2015-2020

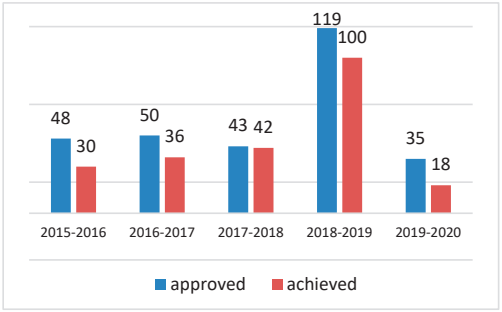

Figure 5. Wild boar quotas approved and achieved by RNP, for the hunting seasons 2015-2020

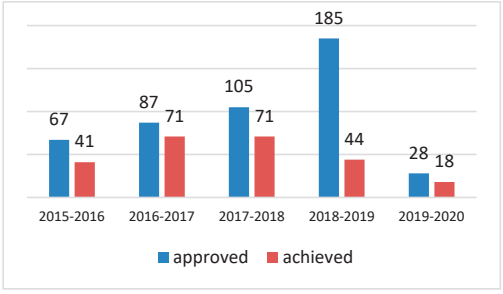

Figure 6. Wild boar quotas approved and achieved by AJVPS Tulcea, for the hunting seasons 2015-2020

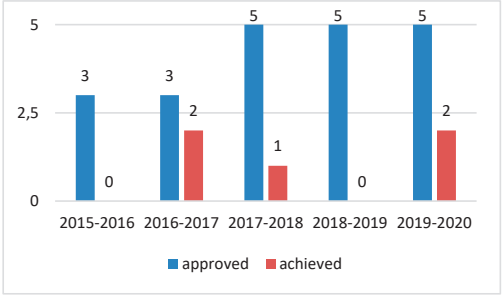

Figure 7. Wild boar quotas approved and achieved by Trei Stejari Association, for the hunting seasons 2015-2020

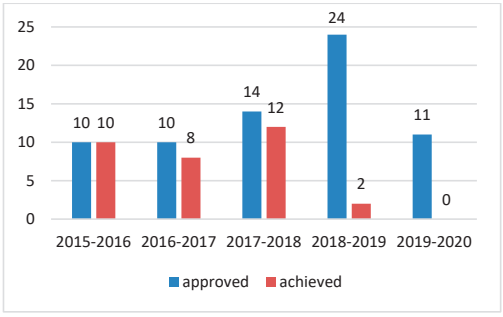

Figure 8. Wild boar quotas approved and achieved by AV Predești Habud, for the hunting seasons 2015-2020

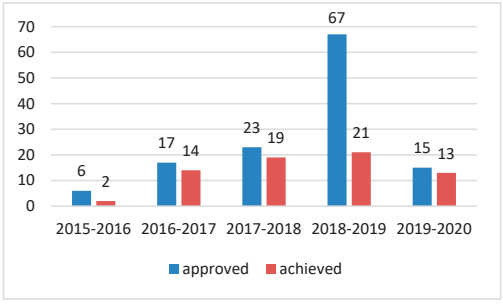

Figure 9. Wild boar quotas approved and achieved by AV San Rafael, for the hunting seasons 2015-2020

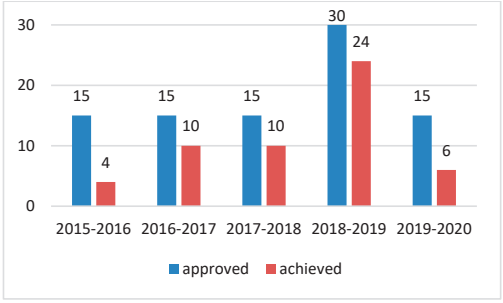

Figure 10. Wild boar quotas approved and achieved by AVPS Crângul Slava Rusă, for the hunting seasons 2015-2020

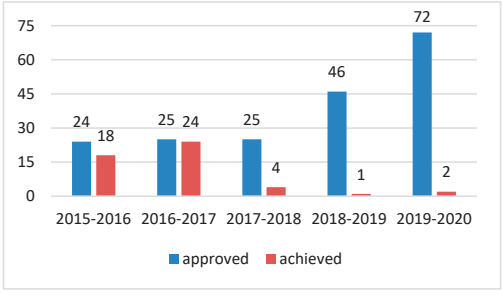

Figure 11. Wild boar quotas approved and achieved by AVPS Miorița, for the hunting seasons 2015-2020

From the analyzed data, it is observed that, both in Tulcea County as a whole, and in the case of each manager taken under discussion, the approved quotas were in a constant increase since 2015, with a significant increasing in the 2018-2019 season, possibly due to the appearance of swine fever. (issuance of Ministerial Order No. 827/23.08.2018 on the approval of measures to control African swine fever, which refers to the "Intervention quota ... is additional to the harvest quota for wild boar species approved by Order of the Minister of Waters and Forests No. 540/2018 regarding the approval of the harvest quotas for some species of hunting interest species, where hunting is allowed, for the hunting period May 15, 2018 - May 14, 2019").

However, it is observed that, for the 2019-2020 season, the approved quotas were drastically reduced compared to the 2018-2019 season for most managers, probably due to the significant reduction of the evaluated herds. The most significant reduction (of 84.86%) is found at AJVPS Tulcea, followed by RNP with 70.58%. The exception was AVPS Miorita, where a higher quota was approved in 2019-2020 compared to 2018-2019.

Regarding the achieved quotas, in none of the analyzed seasons they did not reach the level of the approved quotas, there being managers who had a very low degree of accomplishment. Thus, in 2018-2019 a share of 0% was achieved by Trei Stejari Association, 2.17% by AVPS Miorita, 8.33% by AV Predesti Habud, 23.78% by AJVPS Tulcea, 31.34% by San Rafael. The highest part was achieved in 2018-2019 by the RNP manager, with 84.03%.

In 2019-2020, the lowest quotas were achieved by AV Predesti Habud (0%) and AVPS Miorita (2.77%). The other managers achieved higher quotas than in 2018: 40% at AVPS Crângul Slava Rusă and Asociatia Trei Stejari, 51.42% at RNP and 64.28% at AJVPS Tulcea. The manager of AV San Rafael had the highest share of achievement in 2019-2020, with 86.6%.

CONCLUSIONS

It is certain that in the field the herds remained constant until 2019, when they suffer a dramatic decrease in the number of wild boar

specimens, in some areas of the county, the trend being maintained in 2020. This situation is signaled by most of those who follow the evolution of this species.

An explanation for the low values of quotas achieved in 2018-2019 and 2019-2020 seasons, may exist in the manifestation and rapid spread in Tulcea County of African swine fever, which has decimated a large part of the wild boar herd.

African swine fever (ASF) is a devastating, usually fatal, infectious disease of pigs and wild boars for which there is no vaccine (Popescu & Nicolae, 2020).

Hunters can change things, for better or worse, because they can increase or reduce the spread of the disease.

Hunters can contribute to the spread of the disease by any contact with infected animals and dead bodies (carcasses), contact with any object contaminated with the virus (e.g. clothing, vehicles, other equipment), feeding animals with meat or meat products from infected animals (e.g. unprocessed meat) or scraps containing infected meat (e.g. kitchen waste, pig feed, including eatable offal).

EU and national authorities in the affected countries need to take a wide range of measures to combat and eradicate African swine fever. Cooperation with hunters and their associations is vital. Hunters can and should monitor the health status of wild animals and play a key role in protecting the health of animals, including domestic animals.

REFERENCES

Cotta, V., Bodea, M., & Micu, I. (2008). *Hunting in Romania.* Bucharest, RO: Ceres Publishing House [in Romanian].

Dardaillon, M., & Beugnon, G. (1987). The Influence of some Environmental Characteristics on the Movements of Wild Boar (*Sus scrofa*). *Biology of Behaviour*, 12, 82-92.

Micu, I. (2004). *Ethology of wild fauna*. Bucharest, RO: Ceres Publishing House [in Romanian].

Popescu, A., Nicolae, C.G. (2020). Study on the models of evolution of the African swine fever of wild boars in Romania. *Scientific Papers. Series D. Animal Science, LXIII*(2), 447-451.

***The M.M.A.P. no. 393/2002 on the approval of vouchers and optimal densities for species of red deer, fallow deer, deer, black goat, wild boar, bear, rabbit, pheasant, partridge, capercaillie, lynx, wolf and wild cat and for determining the optimal numbers, on the hunting grounds, for these species of wild fauna of hunting interest.

***MMAP Order, no. 540/2018, regarding the approval of harvest quotas for some species of fauna of hunting interest.

***MMAP Order, no. 827 / 23.08.2018, on the approval of measures to combat African swine fever.