

THE WOLF (*CANIS LUPUS* L., 1758) IN BULGARIA

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Summary: The wolf (*Canis lupus* L., 1758) is widespread in the forests and mountains of Bulgaria. More than 130 years it was not protected under the law of the country and its population was the regulated by hunting. The population size was increasing in the past 10 years and the wolf expanded its range, as evidenced by hunting statistics. The harvest of wolves in the period 2000 - 2010 was 2-3 times higher compared to the 70s and 80s of the last century.

The wolf is becoming a species of great economic impact in Bulgaria due to its increasing numbers and the influence on big game. However, its population size and increasing rate are poorly known in Bulgaria. Understanding the main factors that caused wolf expansion is crucial for the management and conservation of the species. Changes in forests and their structure for more than 50 years favored the wolf population by extending habitats and creating natural links between different locations. After 1990 there were prerequisites for the formation of the Balkan population of wolves with a relatively high density.

Key words: wolf, population size, game management, conservation

Introduction

The wolf (*Canis lupus* L., 1758) inhabits permanently the territory of Bulgaria. According to the current information and statistic data, the species has never disappeared from the territory of the country, although it has never been protected and at certain periods, it has been extensively chased. Unlike other European countries, the wolf has not been ruthlessly exterminated despite the damages and accidents it caused to humans. Public interest in the wolf can be seen from the available data of killed wolves for more than 120 years of chasing in different ways, methods and means. In fact, it is the only species of which there is comparatively complete and accurate official data for such a long period of time in Bulgaria. The greatest number of wolves was harvested at the end of the 19th century, i.e. 1300 and 1650 wolves were shot in 1895 and 1896 respectively. In the middle of the 20th century from 1950 to 1955 between 600 and 800 wolves were shot and in 1954 itself – about 1050 wolves. During these periods poisons (strychnine baits), strong barbiturates (veronal, luminal), different traps, killing of young wolves in their dens by fumigation, etc., were used as the main hunting methods for regulation of the number of wolf population. Since 1960, the wolf population in Bulgaria has significantly decreased. In the period until 1980 between 80 and 150 wolves were annually harvested. Since 1980, we can claim, for certain, the only means for regulating the wolf population has been driving, stand and bite hunting, using only shotguns. The use of poisonous baits and barbiturate substances is banned and the factual use of traps is minimized. The number of experienced wolf hunters who could skillfully imitate the wolves' howling and in this way able to find out their dens in the summer in order to kill their offspring has significantly declined. Although the wolf hunting in Bulgaria is allowed throughout the year, the practice of capturing and killing the wolf offspring in their dens or around them is not tolerated. This hunting method has completely lost its application in Bulgaria.

Material and methods

Statistical data about wolf harvest in the last 80 years were analyzed and compared with population size and harvest of main prey species – red deer, roe deer and wild boar. The alteration in forests, cover, age structure, management, new forest plantations establishment, were analyzed and their impact on population size dynamics was estimated. The establishment and development of protected areas network, National Parks and Natural Reserves after 1990 and their influence on the wolf were also analyzed. The harvest of wolves and other game species and their population size was taken from the National Statistics database of the Executive Forestry Agency.

Results and Discussion

Since 1980, the wolf population size in Bulgaria began slowly but steadily to increase and has culminated at the beginning of the 21st century. The tendency became clear from the official annual wolf harvest data (Fig. 1).

However, it is hard to determine the real wolf population size in the country for this period or before it. Statistic information of the predators' population size is not based on scientific methods, practices and organization. Even nowadays at national level in Bulgaria there are no adequately adopted specific methods for wolf census to form a sustainable monitoring system. The official data are mainly hypothetical and very often inaccurate due to different institutional interests. The only reliable, precise and objective data are derived from the annual wolf harvest. The data could be considered correct because of financial and material bonuses paid out by the State for

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every animal shot. We can and should assume that for the period since 1990 hunting pressure in the forest habitats has been comparatively constant maintaining the same organization of hunting, the same hunting methods and the number of hunters as well.

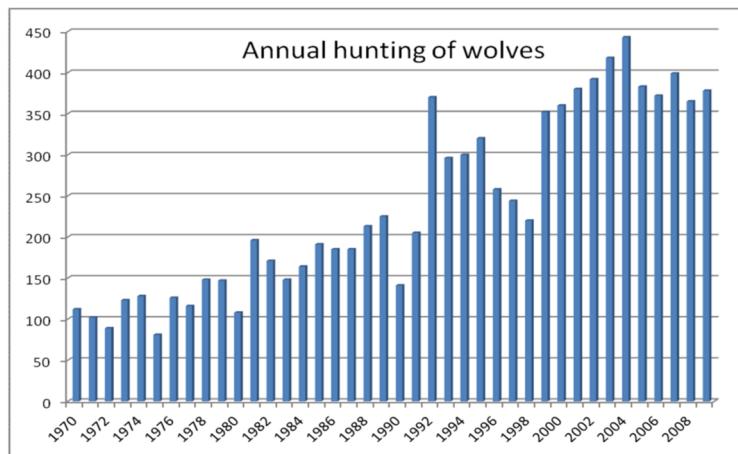


Fig. 1

The wolf harvest data for the last 40 years and their connection with the wolf population size in Bulgaria are shown in Table 1. For the whole 40-year period in Bulgaria 9554 wolves have been shot or on average 239 wolves annually. In the period from 1970 to 1979 in Bulgaria 1172 wolves were shot, or between 80 and 140 annually. In the period from 1980 to 1989 1786 wolves were shot – between 140 and 220 wolves annually. In the period from 1990 to 1999 the total number of 2706 wolves were shot, or between 220 and 370 wolves annually and for the period from 2000 to 2009 a total number of 3890 wolves were shot or between 360 and 440 wolves annually. For the whole 40-year analyzed period the wolf shooting by decades has increased in proportion 1/1.5/2.3/3.3 on a decade basis.

Table 1

Wolf shooting by periods from 1979 to 2009

Period	Total shot by numbers	Average annual shot by numbers	%	Rates
1970-1979	1172	117	12.3	1
1980-1989	1786	179	18.7	1,5
1990-1999	2706	270	28.3	2,3
2000-2009	3890	389	40.7	3,3
	$\Sigma = 9554$	239	$\Sigma = 100.0$	

The maximum harvest for the whole period was realized in 2004 when 440 wolves were shot (Fig.1). It is interesting to point out that this wolf shooting was carried out on the territory of all regional forest directorates that shows that the wolf species has occupied all forest territories, including those where in the previous decades it was not found. The area of the territories, occupied by wolves in Bulgaria, in the last decade has been estimated to about 4.5 million ha (45 000 square km) or about 40% of the total territory of the country. 4 118 000 ha of these territories are forests and about 380 000 ha are agricultural land, including mountain and alpine pastures and meadows.

These data show that since 1990 on average 0.6 wolves/100 square km (10 000 ha) from the occupied territory were harvested annually and since 2000 - 0.86 wolves/100 square km. The absolute maximum was reached in 2004 when on average 1 wolf/100 square km from the total territory of Bulgaria, occupied by the species, was shot. Taking into consideration the hypotheses of Bibikov [1] and Hell [3] for analysis of the wolf shooting as a method to determine the dynamics of wolf population and their relative number and density, we can assume that in the period from 2000 to 2009 the wolf population size in Bulgaria was about 1000-1400 and the density of the wolf population was 2.3-3.0 wolves/100 square km.

Such a large wolf population, especially in the last decade, has threatened the populations of large wild hooved animals such as the red deer, fallow deer, mouflon, roe deer and wild boar, which according to Hell [3] can be considered as wolf's main prey - up to 94 % of its food. According to Shelaru [2] in Romania where the wolf density was more than 2 wolves/100 square km serious economic losses of hooved game were observed. The author recommended keeping the density of the wolf population below 2 wolves/100 square km in the Carpathians. Similar

recommendations were made also by Hell [3], who recommended the density of the wolf population in Slovakia to be kept at about 1 wolf/100 square km at a total population size in the Slovak Tatras about 100 wolves.

This relatively large population size and density in the recent decades, especially since 1990, have shown that the wolf population in Bulgaria is very viable and sustainable. The fully occupied suitable habitats and the tendency for expansion of the geographical range also show stability and development of the population.

Some of the important prerequisites and reasons for this condition and tendencies are:

- The destruction of the border facilities and the free movement of game between Bulgaria, Greece, Serbia, Bosnia and Herzegovina, Albania, Macedonia and Croatia allowed the formation of a common 'Balkan' wolf population. Not surprisingly, since 1990 in most of the Balkan countries a sustainable rate of the wolf population growth has been determined. The recent genetic studies in different countries of the Balkans and Eastern Europe [4] has shown the highest level and rate of genetic diversity, heterozygosity and sustainability, as well as the lowest rate of inbreeding compared with other isolated areas of the wolf geographical ranges in Europe. These are important preconditions for the rapid growth of the wolf population size.
- In the middle of the 90s of the previous century, the population size of the large ungulate game species, which were the main prey for the wolves in Bulgaria, reached their maximum. According to the official data, the forest habitats of the country are occupied by more than 210 000 red deer, fallow deer, mouflons, roe deer and wild boars (Fig.2). In the period since 2000, the wild boar population size has continued to increase considerably, while the population size of the other species has decreased significantly. The wild boar driving chase in Bulgaria is the main and only hunting method in many game management units and is practiced every week during the hunting season. The improper implementation of drive chase and the violation of the selection principles and sustainable hunting of the wild boar in Bulgaria have led to a high percentage of shooting mature sows and extensive rejuvenation of the population. Many sounders with offspring and yearlings are practically without a leader. This makes them extremely vulnerable and an easy prey for the wolf. Not surprisingly, since 2000 the offspring of the wild boar has become the basic food of the wolf in Bulgaria (Nedkov, Iv.; Shipkovenski, V.; Petrov, P., personal communication). Similar data is quoted by Hell [3] about some regions in Slovakia.

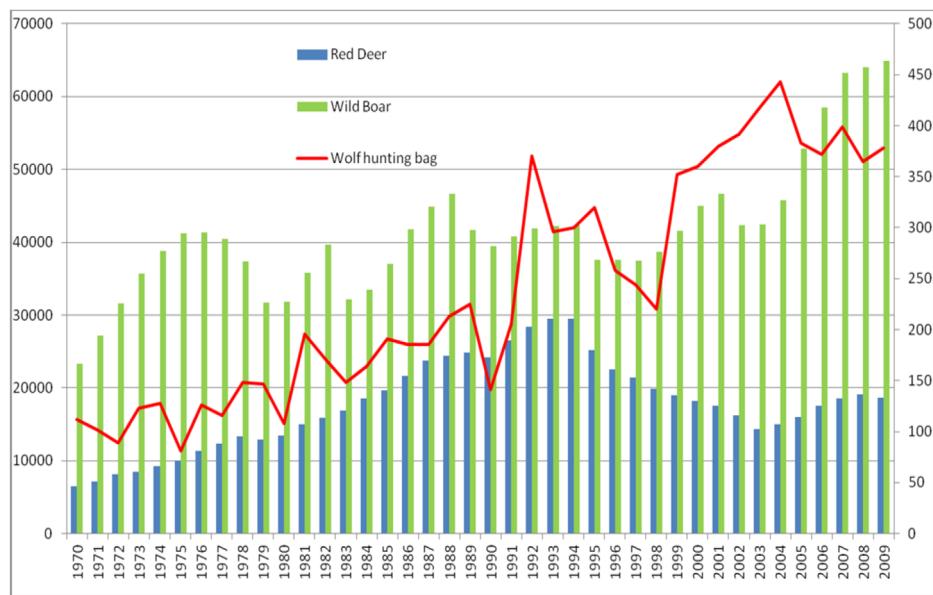


Fig. 2

- Between 1950–1990, in the forest territories of Bulgaria 150 000 ha (1.5 million deca) were afforested – clearings, barrens, meadows and many eroded terrains, mainly with coniferous species. The percentage of the afforested territories has increased. On the periphery of the forest stands many pastures, meadows and abandoned agricultural lands have become self-afforested. At the same time, many felling have been made in mature broadleaved and coniferous forests which were subsequently restored, but the share of the mature natural forests was significantly reduced compared to the juvenile stands. The thick, canopied and non-managed coniferous and mixed stands and artificial forests affected favourably the wolf shelters. Natural corridors and connections between isolated remote populations and possibilities for expansion of the geographical range have been established. (Fig.3)

Thus since 1970 the wolf habitat in the Eastern Rhodopes has emerged being nowadays one of the most stable and sustainable habitats. From there the wolf passes into Sakar and Strandzha mountains. The isolated habitats in Rusenski Lom, Elena-Tvarditsa Balkan range and Ludogorie have been connected. The demographic crisis in Bulgaria has also contributed to this process since 1990. As a whole, the human population decreases, many regions with small population centers – villages and hamlets, especially in the forest regions without means of livelihood, have been depopulated. The human population moved to the cities and the capital, Sofia.

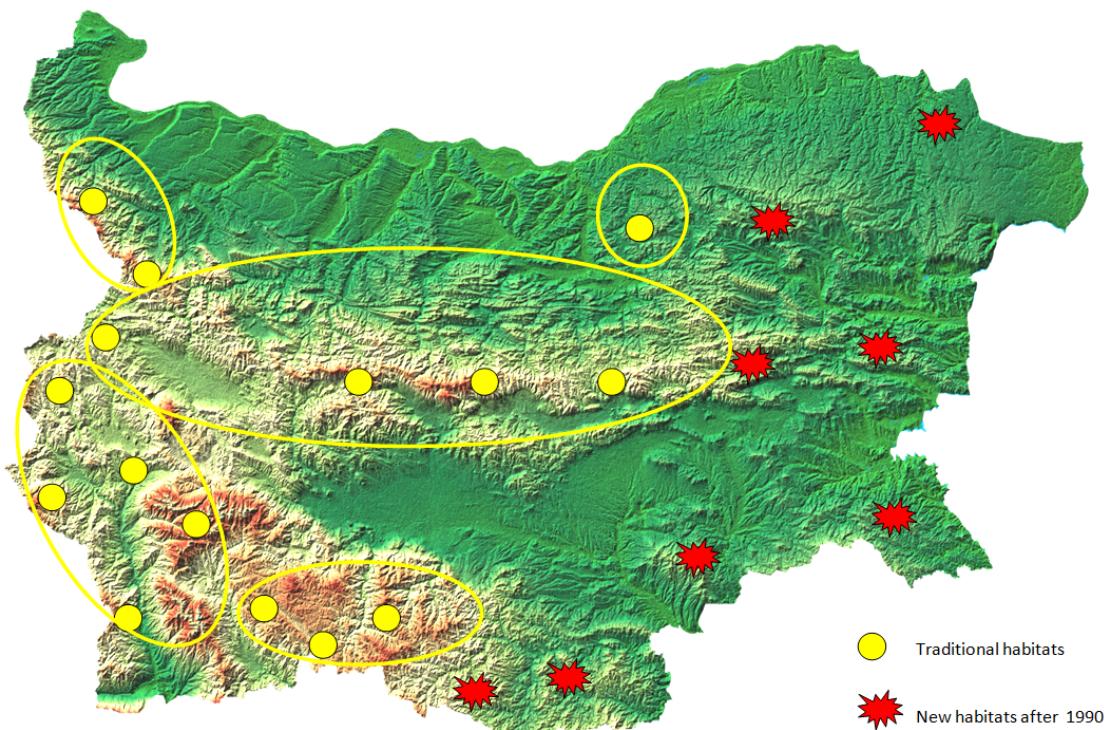


Fig. 3. Grey wolf range expansion in Bulgaria after 1990.

- After the adoption of the Berne Convention by Bulgaria in 1991 the application of a number of means and methods for wolf hunting practices, including the extermination of the offspring in the dens, has been legally and practically put to an end. The number of experienced hunters, specialized in wolf hunting by baits and waylays, has also decreased. The basic wolf hunting method for regulation of the wolf population became the wild boar driving when the highest numbers of predators were shot.
- Since 1990. the national parks Pirin, Rila and Central Balkan have been established and registered. Along with the big game reserves (over 1000 ha) large areas for reproduction of wolves on more than 210 000 ha have been established around the parks. These areas occupy about 5-6 % of the forest territories of Bulgaria and their status, determined by the laws and management plans, ensure the sustainable development of the wolf population.

Conclusion

The specified main reasons for the increase of the wolf population in Bulgaria in the recent decades have a long-term impact. Their impact on the wolf population will continue in the future with different significance and duration. The serious conflicts between the wolf and the livestock farmers and gamekeepers, as well as the serious threat to public health at the high wolf population and density require an active regulation scheme. The only legal and civilized instrument to influence the wolf population can and should be the hunting, carried out in compliance with all conventions and directives as well as respecting the regional characteristics and national traditions. The established sustainable Balkan wolf population imposes a common strategy and joint common measures for sustainable maintenance of the wolf population and achieving balance of interests between the farmers, environmentalists, hunters and society as a whole.

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