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Current Problems in Management of Balkan Chamois (*Rupicapra rupicapra balcanica* Bolkay, 1925) in Bulgaria

Key words: Balkan Chamois, *Rupicapra rupicapra balcanica*, Bulgaria, illegal hunting, census, chamois management, National parks, Rila, Pirin, Central Balkan, Rodopi (Rhodope)

Balkan chamois is determined as a differentiated subspecies *Rupicapra rupicapra balcanica* BOLKAY, 1925. The subspecies is listed in Annexes II of Directive 92/43/EEC of the EU and Annex III of Bern Convention. The chamois is included in Bulgarian Red Data Book as endangered species.

The subspecies nowadays is found only in several isolated localities in the mountains of the Balkan Peninsula. Distribution in Greece is currently restricted to at least six distinct and widely scattered population groups in Rodopi (Rhodope) Mountain near the border with Bulgaria and from the Epirus Mountains in the northwest to Parnassos Mountains in Central Greece (ADAMAKOPOLOUS et al.). The number of animals in Greece is estimated to be between 300 and no more than 500 with populations between 10 to 100 individuals. Numbers are believed to be declining in all populations (ADAMAKOPOLOUS et al.).

The Balkan Chamois inhabits most of the mountain regions in Albania. In the north it occurs in the Albanian Alps; in the eastern regions, in the Dibra highlands, the Librazhd region, Pukë, Mirditë and Mat; in the central region, in Baratand Skrapar; and in the south. Kolomje and Përmett. Numbers were estima-

ted to be around 1,050 individuals in 1990 (GJIKNURI 1997).

In the Former Yugoslavia (FY) Balkan Chamois is found in the mountain massive and river canyons of Bosnia and Herzegovina, Montenegro, Serbia, Kosovo and Macedonia. By the end of 1980-ties the estimated number of chamois in FY was over 14 000 individuals of which 11,800 were in autochthonous populations (KRYŠTUFEC et al. 1997). Reintroduction and Introductions of Balkan Chamois in FY were relatively frequent and successful by 1990, more then 2500



Fig. 1 A chamois in the Rodopi Mountains

Balkan chamois occurred in areas previously unoccupied, but since 1990 conditions have deteriorated drastically and are completely unknown.

Bulgaria is located on Balkan Peninsula with territory of about 111,000 sq.km. Over 1/3 of the country is mountainous. Habitats suitable for chamois are only the sub-alpine and alpine zones of Rila, Pirin, Stara planina (Central Balkan), Vitosha and the deep gorges, valleys and rocky complexes of the Rodopi Mountains.

The data about population size and dynamic of the number of chamois in Bulgaria are received from National Forestry Board for the period 1954-2004. Information for distribution and number of chamois is used from Lovets (Hunter) magazine 1896-1945, Priroda (Nature) magazine 1893-1942 and some other publications from this period, State Archive Smolyan, the Archive of National Natural History Museum – Sofia.

Field observations in chamois habitats have been conducted in Rodopi Mountains during

2003, 2004 and 2005, Rila and Central Balkan 2003 and 2004, Pirin Mountain 2001, 2003, 2004.

The number of chamois in Bulgaria was stable and relatively abundant to the end of XIX century. After 1878 local people obtained the right to carry guns, also they brought back their rifles from the wars (wars were frequent at this time) and as a result uncontrolled hunting started, that led to rapid decrease of wild ungulates. Chamois were even more vulnerable than the other ungulates.

There were no any restrictions concerning chamois hunting in Bulgaria at this time.

A restricted season of chamois hunting from 1st August to 31st December was introduced with the Hunting Act from 1897. In 1898 a 10 years long total ban on hunting chamois was initiated in Stara Planina (Central Balkan Mountain) because the number of chamois there was under 30 individuals (PETKOV, 1898). The next Hunting Act from 1904 shortened the hunting season only to November and December. In the Act

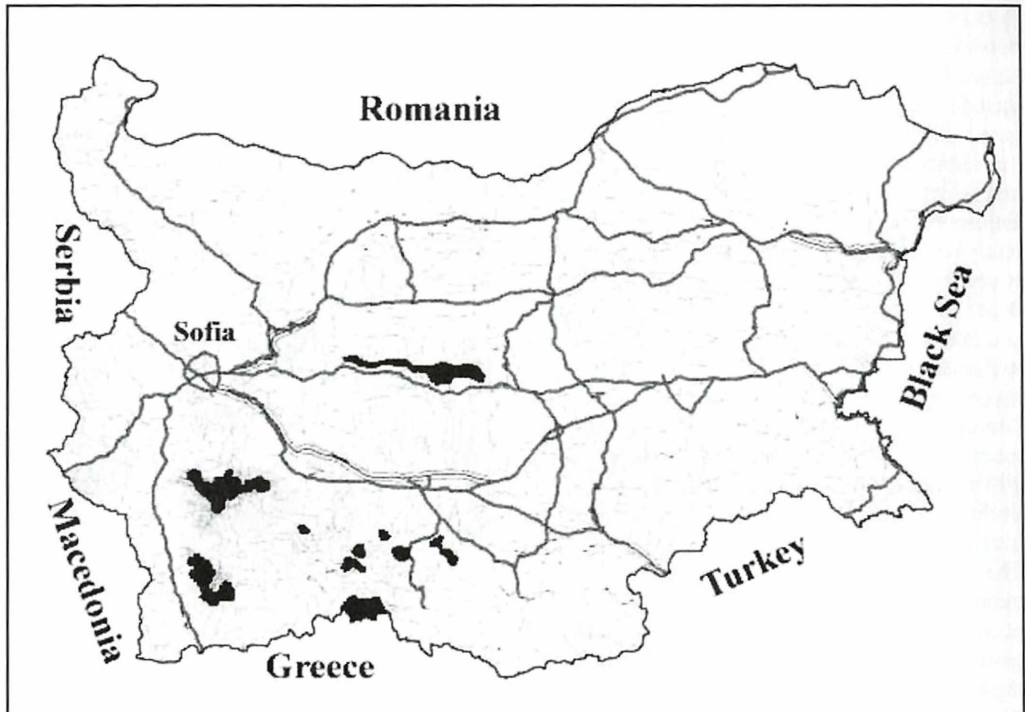


Fig. 2 Territory of Bulgaria and distribution of *Rupicapra rupicapra balcanica*

from 1926 the hunting season is moved to October and November. In 1948 the hunting season is reduced to only one month – October.

Even the improvement of the legislation and the complete ban on hunting in some regions the number of chamois remained insufficient. The most precise information about the number and distribution of chamois in Bulgaria in 1930ies is given by HRISTOVICH (1939). According to him there were about 1000 individuals in Bulgaria: Rila Mountain – 600-700, Rodopi Mountains – 150-200, Pirin Mountain 80-100, Stara planina – around 100. After the Second World War strict control on illegal hunting had been introduced and the chamois started slowly to increase their number and range. According to official estimates (fig. 3, source – National Forestry Board) the number of chamois started steadily to rise in 1965.

The unnatural fluctuation of numbers in fig. 3 between 1954-1957, 1959-1963 and 1969-1973 is due to two main reasons: 1) Lack of census or any number estimation for many of chamois locations in the above mentioned years; 2) Lack of common methodology for conducting the censuses. Obtaining reliable estimates of population size, sex and age ratio of chamois is labour intensive activity, requiring qualified and motivated staff with a good knowledge of the species and habitats. Chamois inhabits mountain ranges which in Bulgaria are politically subdivi-

vided (National Parks, Forestry Units, Hunting Husbandries, etc.). If the timing and methodologies are not standardised among the different units, a reliable data for the whole population is not likely to be obtained. The censuses are conducted by responsible for the unit authorities that are not always interested in estimating and recording the right number of individuals of game species. Because of missing data the numbers of chamois have been interpolated for the years 1960, 1961, 1970 and 1971.

In the 1980ies the game species in Bulgaria were managed according to the game management plans. The habitats suitable for every species were calculated. In order to prevent damages of forest and agricultures so called tolerable stock concentration of game per 100 ha was accepted (table 1). In general in many Forest Units and Hunting reserves at this time if the estimated number of game had been over the tolerable stock it was reported the tolerable stock or a bit higher. In Central Balkan in 1980ies about 270 chamois were reported but their number was much higher in many places herds containing 40-50 individuals had been seen (GANCHEV, 2001). The same practice was common and in the rest of the country.

At the beginning of 1990ies political and socio-economic changes started in Bulgaria. The changes led to political instability which resulted in insufficient control of illegal hunting

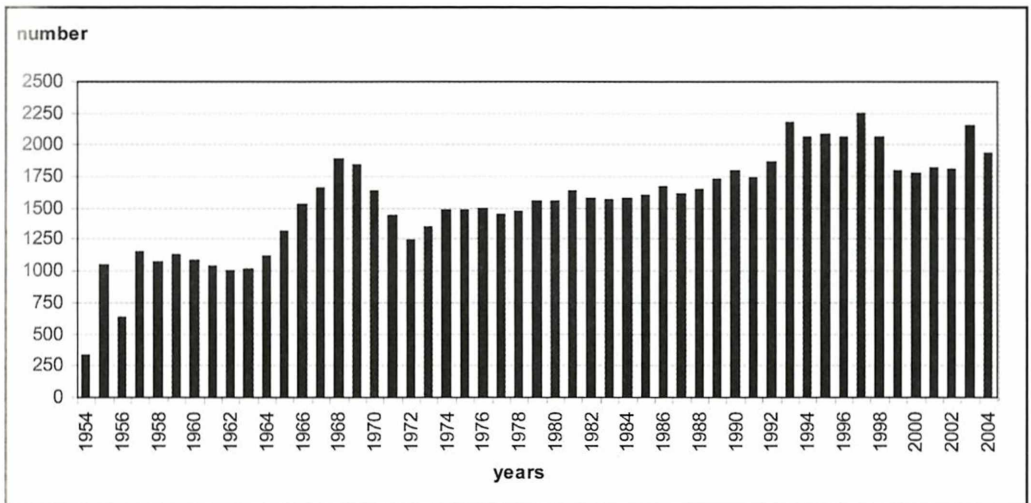


Fig. 3 Dynamic of the chamois 1954-2004 in Bulgaria

Table 1 Tolerable Stock and Increment coefficient

S.Q. Level	Toler. S. sp/100 ha	RR/m.f.	RR/a.f.	RR/t.s.			
				1.3:1	1:1	1:1.2	1:1.5
I	5.0-6.0	0.60	0.50	0.21	0.25	0.28	0.30
II	3.0-4.0	0.50	0.40	0.17	0.20	0.22	0.24
III	1.0-2.0	0.40	0.30	0.13	0.15	0.16	0.18

S.Q. Level Stock –quality level

Toler. S. Tolerable Stock

RR/m.f. Increment coefficient/mature females

RR/a.f. Increment coefficient/all females

RR/a.f. Increment coefficient/total stock

and bad implementation of the country legislation. Some structures responsible for management and guarding of the game such as former Hunting husbandries (reserves), were destroyed due to political reasons. The lack of control and inadequate implementation of law resulted in very high level of illegal hunting in the whole country. At this period on contrary to 1980ies when the number of chamois was underestimated (as mentioned above) in 1990ies the actual decreasing of the game number was often not reported by the managers of the different units. Even though the official estimates (fig. 3) show the highest number of chamois in Bulgaria was reached in mid and late 1990ies due to the above mentioned we believe that the peak of the number of the species had been in 1980-ties. The Dynamic and distribution of the chamois in Bulgaria in the last 15 years will be discussed for the different mountain massifs.

Rila Mountain

Rila Mountain is the highest mountain in the Balkan Peninsula: Musala (2,925 meters a.s.l.). Mountain peaks along the main ridges rise to an average height of 2,700 meters above sea level. Rila contains large meadows, over 140 peaks rising above 2,000 meters, as well as a variety of rocky complexes, precipices, caves, deep canyons, moraines and waterfalls. Its territory is dotted with over 120 glacial lakes. In Rila Mountain is located Rila National Park (80,000 ha) – the biggest national park in Bulgaria, Rila Monastery Nature Park (27,000 ha) as and 4 reserves. Over 40,000 ha treeless area and over 70,000 ha wooded area. The forests are mainly from *Picea abies*, *Fagus sylvatica*, *Pinus peuce*, *Pinus silvestris*, *Pinus heldreichii*, *P. mugo* etc. The number of chamois in Rila Mountain 1980s was estimated to be 600-650 chamois (TUFEKCHIEV, 1983; SPIRIDONOV et al. 1993; GENOV, 1990).

Precise censuses at this time have not been conducted. In 1990ies after the political changes, the level of poaching increased. The chamois have been chased and shot by hunters and persons without hunting licenses like guards of dam lakes, mountain chalets minders, local inhabitants etc. For 30 person days in September - November 1998 in Rila 20 gunshots were registered if every second was successful 10 chamois have been shot (MIHAILOV, 1999). There are many cases when chamois hunting is organized (illegally) in the National park for wealthy hunters or high positioned state employees from the



Fig. 4 The chamois can be easily stalked during the time they ruminate or rest.

Ministry of Internal Affairs and Ministry of Defence, who were led by local guides (MIHAILOV, 1999). Usually poachers shoot the biggest animals (mainly males), which leads to rejuvenation and aggravation of sex and age ratio. The regular poaching and disturbance pushed the chamois to the most inaccessible areas and led to decreasing of the number of the animals and their range.

Their number decreased from over 650 in the end of 1980ies to less than 330 (288 in the National park and 41 out of it) GENOV (in press) after 2000 the number of chamois in Rila NP started to grow reaching almost 400 in 2004.

Pirin Mountain

Pirin is also an alpine type mountain. The highest peak is Vihren (2,917 meters a.s.l.). Pirin contains large meadows, many peaks rising above 2,000 meters, as well as a variety of rocky complexes, precipices, caves, deep canyons and moraines. In Pirin Mountain is located Pirin National Park (40,000 ha).

The chamois in Pirin inhabits almost the whole alpine and subalpine zone of the mountain and also some areas under the tree line. The forests are mainly from *Picea abies*, *Fagus sylvatica*, *Pinus peuce*, *Pinus silvestris*, *Pinus heldreichii*, *P. mugo* etc.

For the period 1955-1989 their number was reported to be between 400 and 550. In the 1990ies due to poaching their number decreased and the sex ratio was aggravated. According to MIHAILOV & GRANCHAROV (1998) between 1995 and 1997 the sex ratio was M:F 1:3.3 (23 mature males to 77 mature females) and reproduction rate of 20 %. Even the relatively high reproduction rate, the number of the chamois was decreasing. The reasons for decreasing are poaching and disturbed sex ratio (MIHAILOV & GRANCHAROV 1998). In the spring census conducted in 2000 by the Pirin NP Directorate about 220 chamois was reported i.e. almost half of the animals counted in 1988 – 425. During the following years the number of chamois in Pirin NP is steady and it is about 270 animals. The autumn census conducted in 2003 and 2004 showed even worse sex ratio than in 1995-1997 (table 2).

Table 2 Sex ratio in Pirin Mountain

year	Males	Fe-males	Off-spring	Un-defined	Total
2003	22	90	33		145
2003 %	15,1	62,1	22,8		100
2004	13	92	36	18	159
2004 %	8,1	57,8	22,9	12.2	100

The census is conducted by the NP Directorate staff in one day on previously set transects. The males are more difficult to be observed because there are often solitary and more cautious, even though the sex ratio is very unfavourable.

Stara Planina (Balkan Mountain)

Stara Planina (Balkan Mountain) stretches in the middle of Bulgaria from Serbia to Black sea. The chamois now is found only on the territory of Central Balkan National Park.

Central Balkan National Park was established in 1991 with area of 71.670 ha, highest peak BOTEV at 2,376 m. many peaks above 2,000 meters a.s.l., as well as a variety of rocky complexes, precipices, caves, deep canyons, moraines, waterfalls and meadows. There are 27,668.7 ha treeless area and 44,000.8 ha wooded area. The forests are mainly from *Fagus sylvatica*, *Carpinus betulus*, *Quercus sessilifrolra* etc.

In the end of 1980ies the number of chamois was reported to be 270 animals but their number was much higher (GANCHEV, 2001). After the political changes the local inhabitants discovered an easy game and started regularly to poach in the National park. The chamois were pushed to the remote areas far from the settlements, roads and mountain chalets. Their number dropped drastically to less than 100 (58 for 2000), which made the population endangered. The population in Balkan Mountains is completely isolated from the other populations in the Rilo-Rodopian massif. The chamois became so rare that at the end of 1990ies the poachers lost interest of hunting chamois in the park. At the same time precautions had been taken and chamois started to recover (GENOV, in press) reaching over

120 individuals in 2004. In the recent years more precise and complete censuses have been conducted and field forms for daily observation of chamois have been introduced.

Rodopi (Rhodope) Mountains

The highest peak in the Rodopi Mountains is Golyam Perilik with its 2191 m. a.s.l. There many peaks around 2000 m a.s.l., deep rocky gorges and canyons, precipices, meadows and forest. Main tree species in the chamois habitats are: *Picea abies*, *Pinus silvestris*, *Pinus nigra*, *Fagus sylvatica* and on the lower altitude *Quercus sp.*, *Carpinus betulus*, *Corylus avellana* etc. The locations of the chamois in the Rodopis are the rocky complexes around Devin River, Mursalitsa Ridge, rocky areas around settlements of Zabardo, Chepelare, Shiroka laka, Sarnitsa, Velingrad, Fotinovo, Krichim etc.

In 1948 a fence along the border with Greece had been built which separated the chamois in Mursalitsa Ridge.

In 1965 for the whole Rodopi Mountains were reported about 30 chamois only 2.62 % from country's population (PETROV, 1965). We think this number is underestimated due to the not proper censuses carried out. The chamois at this time were with very low density pushed to remote and inaccessible areas, there is no alpine and subalpine areas in Rodopi Mountain and the chamois inhabit the rocky areas of the forest which is why many locations with low density had not been reported. In the 1970ies there are 4 locations of chamois in the Rodopis (BOTEV et. al. 1986).

The number of chamois started slowly to grow and the species expanded its range in the Mountain. In 1977 eight alpine chamois (*R. r. rupicapra*) have been introduced in Kormisosh Hunting Husbandry in Central Rodopi Mountain two males from Devin were delivered later. The Kormisosh's location is considered to be isolated from the rest of Balkan chamois in the Rodopis but there is danger of hybridization with local Balkan subspecies.

According to GENOV, et. al, 1990 the number of chamois in the Rodopi Mountains was about 370 individuals (22.5 % from country's population).

During the 1990ies generally in the Rodopi Mountain the chamois population increased its number and expanded its range according to annual estimates from 370 in 1989 to 780 in 2004. Some new locations have been registered such as around Mugla after 1995, around border with Greece in Mursalitsa Ridge, around Fotinovo etc. This is due to the better protection in the hunting husbandries (now called Game-Breeding Stations). Chamois is hunted only in Rodopi Mountain on so called organized (international) hunting tourism. Annual hunting bag is about 20-30 animals (less than 5 %). The level of poaching is much lower than in the rest of the country. Positive impact on population also has the destruction of the border fence with Greece the artificially separated locations for about 50 years finally merged that increased the genetic diversity and led to increasing of the animals in the border area. Our investigation in 2003 and 2004 showed that the highest density of chamois in Bulgaria is along the Devin River.

Vitoshka

Vitoshka is a cupola like mountain with three zones – deciduous forest, coniferous forest and high mountain treeless zone. The habitats of chamois are mostly situated within the treeless south slopes and on the highest parts of the mountain. They include meadows, rock complexes, forests and peat bogs. Almost the whole mountain is within the territory of Vitoshka Nature Park covering about 27,000 ha.

There is no information when Vitoshka deserted from chamois but for sure in the 20th century there were no population of the species here.

In 2002 Vitoshka Nature Park Directorate, BALKANI Wildlife Society and Forestry Unit (State Game Breeding Station) Vitoshko-Studena started a project for reintroduction of Balkan chamois in Vitoshka Nature Park. The project is funded by Frankfurt Zoological Society, National Trust EcoFund and National Forestry Board. In 2002 a 30 ha re-acclimatization enclosure was constructed in Vitoshka Nature Park at altitude 1450-1650 m.a.s.l.

It was decided that the animals for reproducing herd to be provided from the Rodopis' subpop-

ulation due to 1) this subpopulation increased its number and expanded its range in the recent years (GENOV, in press); 2) The habitats of chamois in the Rodopis are similar to those in Vitosha Mountain. By now all together 13 animals have been caught in the wild and transported to Vitosha, one of them died and 3 kids have been born.

Conclusions

Even though the relatively high reproduction rate of 27 % in Pirin 1995-1997 (MIHAILOV et al. 1998) and between 20 and 28 for the three national parks in 2003-2004 (GENOV, in press) the number and the densities of chamois is still low and many suitable habitats are unoccupied. The reasons for mortalities of chamois are:

- Predators – the chamois are evaluated to become the best adapted to the mountain rocky complexes ungulates. The only predators in Bulgaria hunting on chamois are the wolf (*Canis lupus*), the bear (*Ursus arctos*) and golden eagle (*Aquila chrysaetos*). According to MIHAILOV (1999) the losses of wolves do not exceed 5-7 % which are natural and insignificant. The bear particularly has no impact on chamois population. There is no research about the influence of golden eagles that mainly attacks new born offspring. A. OBREtenov found dead a one year old chamois under a golden eagle's nest (fig. 5) he claims that the animal had been pushed by an eagle from a rock close to its nest. It is not clear whether the eagle attacked the chamois to protect its nest, the eagle regularly hunts in this way or it was just an accident;
- Outbreak of any diseases have not been registered in the chamois area in the last 15 years;
- Poaching – as already mentioned the poaching has the most negative influence on the populations of chamois in Bulgaria.

There are three main threats for chamois in Bulgaria:

- 1) Illegal hunting;
- 2) Habitats fragmentation and deterioration. The habitats of the populations in Rila, Pirin and Rodopis geographically are not isolated but there is not good inter-group exchange because the different location often are far from each



Fig. 5 A one year old chamois found close to golden eagles nest

other and are separated by roads, settlements, dam lakes, open planes etc. The population in Stara planina (Balkan) Mountain is completely isolated from the Rilo-Rodopian massif where the other population is found; 3) Hybridisation with alpine chamois in Rodopi Mountains.

Due to decrease in the last over 200 years the Balkan Chamois is not found any more in many previously occupied locations in Balkan Range, Rila, Vitosha and Rodopi Mountains but this potential loss of biodiversity is not only for the species itself. This ecological niche in Bulgarian high mountains is unoccupied. There are no animals like Alpine Ibex or Marmots the other wild ungulates and even livestock are at low number.

Conservation measures proposed:

1) In All National Parks the number of chamois dropped dramatically in the 1990ies. The main reason is poaching. We propose:

- More and well equipped rangers (a person per 1500 ha (MIHAILOV, 1999) who will provide regular checking of the chamois habitat and the roads to them. Special attention has to the rut season (November) when the chamois, especially males are more vulnerable and visitors in the NPs are not many;
- Limiting the access of car access to the NPs by blocking some of the roads and introducing entrance fee on other roads that will provide regular guards presence;

- PR campaign like clear signs in all entrances of the NPs that hunting and carrying rifles are prohibited, and phone number to contact if violation is registered. Promoting the importance of preserving biodiversity and benefits of it for the local inhabitants such as developing ecotourism, labelling local products and crafts in the settlements around National Parks. By now as general the local inhabitants around National parks have negative attitude about the parks and the restrictions of the parks regime, which encourages them to violate the law;
- Limiting the tourist access to the most important areas for chamois in the breeding season.
- Rodopi Mountains are more densely populated than the NPs chamois some times live at the age of large town like Smolyan and Devin. The road network is well-developed many of chamois habitats are managed by local hunting units. There are some bad hunting practises like two hunting groups hunting on the same ground, which creates competition between the who is going to shoot more animals without any difference whether the species is permitted for hunting or not. All this makes chamois much more vulnerable than in the NP. As already mentioned the subspecies

has already disappeared from some locations. In general the only stable and even expanding subpopulation in 1990ies in the Rodopis is due to the legal trophy and selective hunting, which we consider essential for the survival of the subspecies in Rodopi Mountains. The chamois is protected in NPs where are most of its habitats in Bulgaria.

According to Directive 92/43/EEC the subspecies and its habitats should be protected. Total protection of the subspecies like in Greece will lead to increasing of poaching out of the national parks and will have very negative impact on the long term survival of the subspecies.

2) Exchanging of animals. Because of habitats fragmentation some individuals have to be provided for the remotest locations especially in the Balkan range and Vitosha. After the level of poaching is reduced reintroducing of the subspecies in previously occupied locations in Rodopi, Rila, Balkan range will make easier the genetic exchange between the different location and increase the viability of the population.

3) Hybridisation – Collecting data incl. craniometry, DNA to find out the impact of alpine chamois on the local population of Balkan subspecies and if necessary and appropriate elimination of alpine subspecies in Kormisosh.

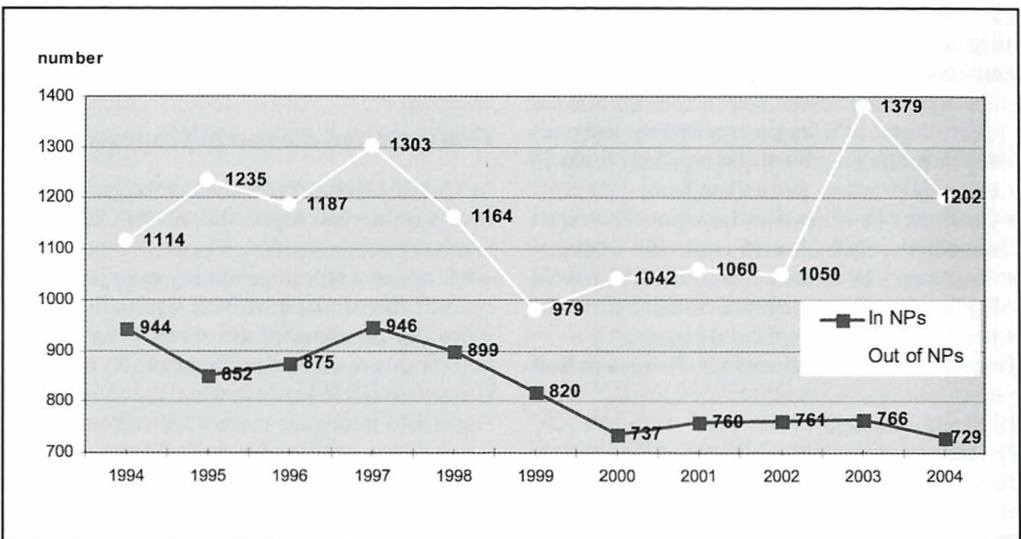


Fig. 6 Dynamic of the number of chamois inside and outside the National parks

Summary

Current Problems in Management of Balkan Chamois (*Rupicapra rupicapra balcanica* BOLKAY, 1925) in Bulgaria

In the present publication the dynamic, current number and distribution of the chamois in Bulgaria are described. There is a difference in dynamic of the chamois in the National Parks and the rest of the territories outside the parks. In all the 3 National parks is registered decrease of the number of the chamois in the last 15 years due mainly to poaching, which has increased after the political change in Bulgaria in 1989. Stable and even increasing its number and range is only the population of Rodopi Mountain where very restricted trophy and selective hunting is allowed.

There are some mortality due to predators and diseases but the main reason for decreasing of the chamois is poaching in the National Parks. Total ban on hunting of chamois will increase the poaching and will have very negative impact on long term survival of the Balkan Chamois in Bulgaria.

Zusammenfassung

Gegenwärtige Probleme im Management der Balkan-Gemse (*Rupicapra rupicapra balcanica* BOLKAY, 1925) in Bulgarien

Es werden Daten zur Populationsdynamik, Anzahl und Verbreitung der Gemse in Bulgarien dargelegt.

Die Vorkommen in den drei Nationalparks Bulgariens sind seit 1989 infolge zunehmender Wilderei rückläufig. Lediglich in den Rhodopen ist eine stabile Populationsentwicklung und eine zurückhaltende Bewirtschaftung zu verzeichnen. Als Prädatoren kommen Wolf, Braunbär und Steinadler im Gearsreal vor. Die Hauptgefahren für den Gemsenbestand in Bulgarien sind illegale Jagd, Fragmentierung des Habitats und in den Rhodopen die Möglichkeit einer Hybridisation mit der Alpengemse.

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