

CURRENT STATUS OF THE NORTHERN CHAMOIS *RUPICAPRA RUPICAPRA* IN PAKLENICA NATIONAL PARK

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In the past, an indigenous chamois population inhabited Velebit Mountain, but the nature of its taxonomic status is unknown. This indigenous population was exterminated at the beginning of the 20th century, probably because of such phenomena as poaching, disturbance by livestock and sheep-dogs, and possibly diseases. The chamois was re-introduced to Northern Velebit twice. The first time came in 1974, when 10 individuals were introduced from Mt Prenj in Bosnia and Herzegovina (*R. rupicapra balcanica*), and a second time in 1978, when 5 individuals were introduced from Kamniške Alpe in Slovenia (*R. rupicapra rupicapra*). A genetic analysis of the recent chamois population on the Northern Velebit showed a hybrid genetic structure, containing genes of both subspecies.

Historical data confirm that the presence of the chamois in the Paklenica National can be traced back to at least the year 1985. The presence of the northern chamois (*Rupicapra rupicapra*) in Paklenica was investigated in the period 2008-2012. The objective was to present the population status and the shift in its distribution since 1985. It is likely that part of the population may move between the Park and the neighbouring hunting areas.

Key words: Chamois, Paklenica National Park, protected area, reintroduction, Velebit Mountain, wild ungulates

Milovac, M., Adžić, I., Marasović, Z. & Lukač, G.: Trenutni status populacije divokoza *Rupicapra rupicapra* u Nacionalnom parku Paklenica. Nat. Croat., Vol. 23, No. 1, 1–13, 2014, Zagreb.

Povijesni podaci govore o prisutnosti divokoza u Nacionalnom parku Paklenica od 1985. godine, iako su ti podaci samo usmeni, jer nema nikakvih pisanih podataka ni bibliografskih izvora koji bi to potvrdili. Jedini pisani podaci o divokozama na području Paklenice datiraju iz 1995., a spominju obitavanje 2 jedinke divokoza unutar područja Nacionalnog parka. Da bismo prikazali trenutni status populacije divokoza na području NP Paklenica izvršili smo direktno istraživanje na terenu te prikupljanje ostalih podataka kao što su objavljeni pisani podaci, lovno-gospodarske osnove okolnih lovišta, usmeni podaci lovočuvara i lokalnih stanovnika.

Prvi put je prisutnost divokoza zabilježena u rujnu 1998. godine. Sustavno istraživanje provedeno je zadnjih pet godina, od 2008. do 2012. Određeno je sedam pješačkih ruta za obilazak terena. Učestalost obilazaka svake pojedine staze nije bila unaprijed određena. Zbog toga su neke rute obilazene češće u odnosu na druge. Glavni cilj istraživanja bila je povrda prisutnosti divokoza na području Nacionalnog parka u svrhu dobivanja informacija o distribuciji i približnoj površini staništa. Nadalje, koristeći podatke iz planova upravljanja okolnih lovišta i usmene podatke lovočuvara, obilazili smo i područja na kojima Nacionalni park graniči s tim lovištima da bismo saznali postoji li mogućnost migriranja divokoza iz lovišta na zaštićeno područje i obrnuto.

Ključne riječi: divokoza, Nacionalni park Paklenica, reintrodukcija, Velebit, zaštićeno područje

INTRODUCTION

Two chamois subspecies inhabit the area of Croatia: *Rupicapra rupicapra rupicapra* (the Alpine chamois) and *Rupicapra rupicapra balcanica* (the Balkan chamois). The total number of chamois in Croatia is estimated to be about 1000-1500 individuals (TVRTKOVIĆ & GRUBEŠIĆ, 2006).

The subspecies *R. r. rupicapra* is listed in Annex V Habitat Directive and Annex III of the Bern Convention, while *R. r. balcanica* is listed in the Annex II and IV Habitat Directive as well as in Annex III of the Bern Convention. *R. r. rupicapra* is included in the Red Book of mammals of Croatia, and listed as RE (*sensu* IUCN). Chamois hunting is allowed from September 1st till December 31st outside the National Park.

Velebit is the widest mountain chain of Croatia, with its 145 km of length spread over 2000 km². In 1978 Velebit was proclaimed part of UNESCO's World biosphere reservation "Man and biosphere" (MaB), and in 1981 it was proclaimed a Nature Park. The massif is oriented NW to SE. Its highest peak is Vaganski vrh (1757 m a.s.l.). Velebit Mountain can be divided into four sectors: North, Central (or Middle), South and South-East.

In the past, an indigenous chamois population inhabited the Velebit Mountain, but the nature of its taxonomic status is unknown. This indigenous population was exterminated at the beginning of the 20th century, probably because of phenomena such as poaching, disturbance by livestock and sheepdogs, and possibly diseases. A small number ($N=15$) of individuals was re-introduced to Northern Velebit in 1974 and 1978 from two different regions: Mt Prenj in Bosnia and Herzegovina (*R. r. balcanica*) and the Slovenian Alps (*R. r. rupicapra*) (FRKOVIĆ, 2009). The recent Velebit population is not native, and shows a hybrid genetic structure (PAULE *et al.* 2012).

The only available data on chamois presence in Paklenica NP report two individuals within the NP borders and date back to 1995, but no detailed information as to the location of such individuals is available (GRUBEŠIĆ *et al.*, 1995).

In general, the annual pattern of habitat use in the chamois shows a seasonal migration from low elevation forests in winter up to subalpine grasslands above the timberline during the warm season (HERRERO *et al.*, 1996, LOVARI & COSENTINO, 1986).

There are some differences in chamois habitat use depending on gender and population age structure (HAMEL & CÔTE, 2007; BRAMBILLA *et al.*, 2006). Chamois ranging areas are often divided between protected areas and hunting grounds. It has been noticed that during the hunting season chamois spend more time in the protected area where the disturbance is minimal (BOSCHI & NIEVERGELT, 2003). Within hunting areas the population density may significantly decrease in comparison with the density found in protected areas (CORLATTI, 2007). The aim of this study was to offer some insights on the current status of chamois in the Paklenica National Park and provide a basis for future, more extensive, research on chamois population demography as well as on the effect of disturbance caused by touristic activities in the National Park.

MATERIALS AND METHODS

Study area

Paklenica National Park (PNP) is located between 44°18'-44°25'N and 15°23'-15°35'E in South Velebit, entirely inside the borders of Velebit Nature Park (Fig. 1). The area of PNP extends over 95 km² and elevations range between 20 and 1757 m a.s.l. It borders

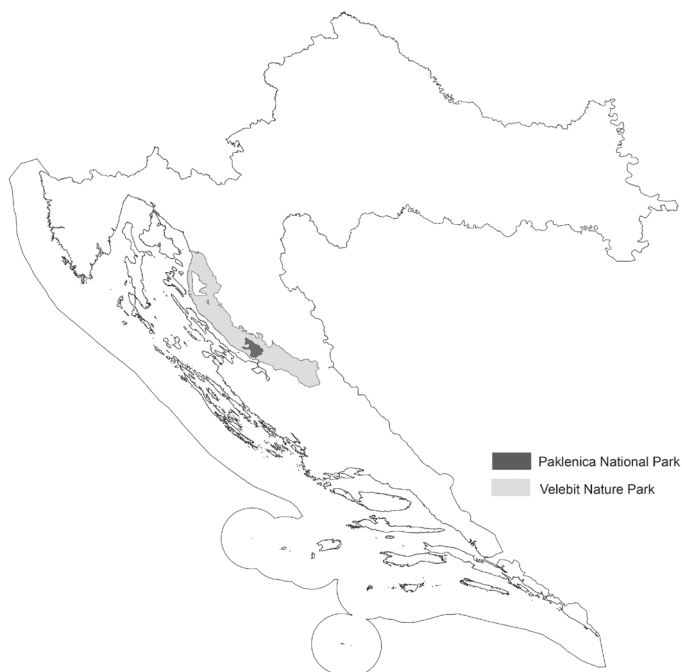


Fig. 1. The position of Paklenica National Park in Croatia.

with three state hunting grounds: XIII/28 Starigrad - Paklenica, IX/22 Visočica and XIII/29 Sveto brdo.

Steep, heterogeneous and rocky terrain alternates with forested areas. The predominant plant communities in the Park are beech (*Seslerio autumnalis-Fagetum*), and black pine forest (*Cotoneastro-Pinetum nigrae*), with smaller oak stands (*Ostryo-querquetum pubescentis*) at the elevation of about 450-650 m a.s.l. The upper zone of the National Park is covered by *Pinus mugo* in *Lonicero-Pinetum mugi* association (RUKAVINA, 1995). The highest zone is free of forests and is dominated by the presence of alpine meadows. A large portion of the Park area consists of talus cones with *Drypetea spinosae* floral community.

Other wild ungulates present in the area are red deer (*Cervus elaphus*), roe deer (*Capreolus capreolus*) and wild boar (*Sus scrofa*).

It is worth mentioning the occurrence of chamois natural predators in the Paklenica National Park such as the golden eagle (*Aquila chrysaetos*) present with one nesting pair (LUKAČ, 2011), wolf (*Canis lupus*), lynx (*Lynx lynx*) and red fox (*Vulpes vulpes*).

The Paklenica National Park is visited by up to 115 000 visitors per year, and hiking is allowed only on the hiking trails. There are no permanent human residents. Only one local shepherd grazes a herd of goats near the easternmost Park border from mid-June to the end of October.

Data collection

The research was carried out using indirect and direct methods. The indirect approach included information gathered by interviews with local residents (hunters, shep-

herds), data from the National Park archive (1998-2007), as well as bibliographical sources.

Direct method consisted in searching for chamois presence in the surveyed area (Tab. 1) using a ground-count approach carried out by foot survey (as in PAPAIOANNOU & KATI, 2007), by walking 7 main paths and combining two or more routes depending on the available time (Fig. 2).

Tab. 1. The number of survey days each year.

Year	Number of days per year
2008	17
2009	36
20010	47
2011	51
2012	57
Total	208



Fig. 2. Foot survey routes. Systematic data collection from 2008 - 2012 was conducted using seven main routes and combining them when necessary.

The aim was to verify the chamois presence in Paklenica NP over the whole year. The frequency of each survey was not predefined because some high-elevation paths were not accessible during the winter due to a deep snow layer, ice and fog, which led to more intense visits of low-elevation paths in this time of the year.

Foot surveys lasted 5-8 hours/day up to 10-12 hours, depending on the path length. The research was conducted by one person per day, on average, with a maximum of 3 persons/day.

The area was surveyed using binoculars (8×42, 10×42, 10×25) and spotting scope (20-75×). In many cases it was necessary to move off the route to find vantage point to allow for better visibility. We observed the chamois from average distances of 100 up to 400 m using binoculars, and up to 1000 meters by spotting scope.

The data recorded by observations were: number of individuals, location and date. The research was conducted mostly during the first half of day, from 7 AM till 3 PM. Only a few observations were made in the late afternoon during the summer.

The study also included borderland areas between the National Park and surrounding hunting grounds to gain more data about chamois presence on those parts.

All geographic points where we confirmed chamois presence were plotted on a map with the use of GIS software Arc Map 10 (Fig. 3), and by enclosing all the points the potential surface area of the chamois habitat was calculated.

Each geographic location mentioned in the results was assigned with the number and showed on the map (Fig. 4).

RESULTS

Interviews with local residents provided us the information about chamois presence inside the NP since 1985, on several sites: two sites in the western part of the Park, and eight sites between the upper parts of Mala Paklenica and Orljača canyons in the eastern part of the Park (Fig. 4, No. 1, 2, 3). Based on this information, the minimum chamois population number was estimated at about 10-15 individuals.

During our surveys, we confirmed the presence of chamois on 47 locations inside the PNP (see Appendix for list of locations, altitudes and dates). Observations of chamois recorded by the NP rangers in the Velika Paklenica canyon go back to autumn 1998, when three individuals were observed on the rock creeps on the foothill of Krivi kuk, 650 m a.s.l. (Fig. 4, No. 4). By that time, several more observations were made mainly in the Velika Paklenica canyon. One herd was frequently observed in the area of Mala Paklenica and Orljača (Fig. 4, No. 2, 3) between 1998 and 2003 (P. KNEŽEVIĆ, pers. comm.). In 2004 a few individuals were observed for the first time in Bojinac, 1110 m a.s.l (Fig. 4, No. 5) and repeated in 2006. Five to six herds were observed in the Velika Paklenica canyon in the autumn of 2005. Over the period 2008–2012 in the Velika Paklenica canyon (Fig. 4, No. 4), chamois were observed throughout the whole year on a regular basis. Our study confirmed their continuous presence in previously mentioned parts of Mala Paklenica and Orljača between 2008 and 2012.

The first recorded chamois presence close to the border area of the National Park and the hunting ground Sveto brdo was on Malovan peak, 1709 m a.s.l. (Fig. 4, No. 6) in summer 2007 and again in 2008. The chamois is seen as a game species in the Sveto brdo hunting ground management plan (SABOLEKA, 2008). According to the data gained by interviewed hunters, the surrounding area of Malovan peak serves as a corridor for

vertical migration of chamois from the NP into the hunting ground located on the northern slopes of the mountain and *vice versa*. In the Sveto brdo hunting ground chamois are mainly spotted on the following sites (Fig. 4, No. 7): Sijasetaska draga, 1150 m a.s.l – Jelovi tavani, 1200 m a.s.l – Paklenica National Park border – Ilin kuk, 980 m a.s.l – Meded, 918 m a.s.l – Ošljak, 950 m a.s.l (M. RAČIĆ & J. BOŽIĆ, pers. comm.). During our surveys we did not directly observe chamois in any of those sites.

Chamois is not a game animal in the management plan of the Starigrad-Paklenica hunting ground but here the presence of chamois has been reported by hunters during the winter (in four sites at different elevations, from 650 to 745 m a.s.l., M. SMOKROVIĆ,

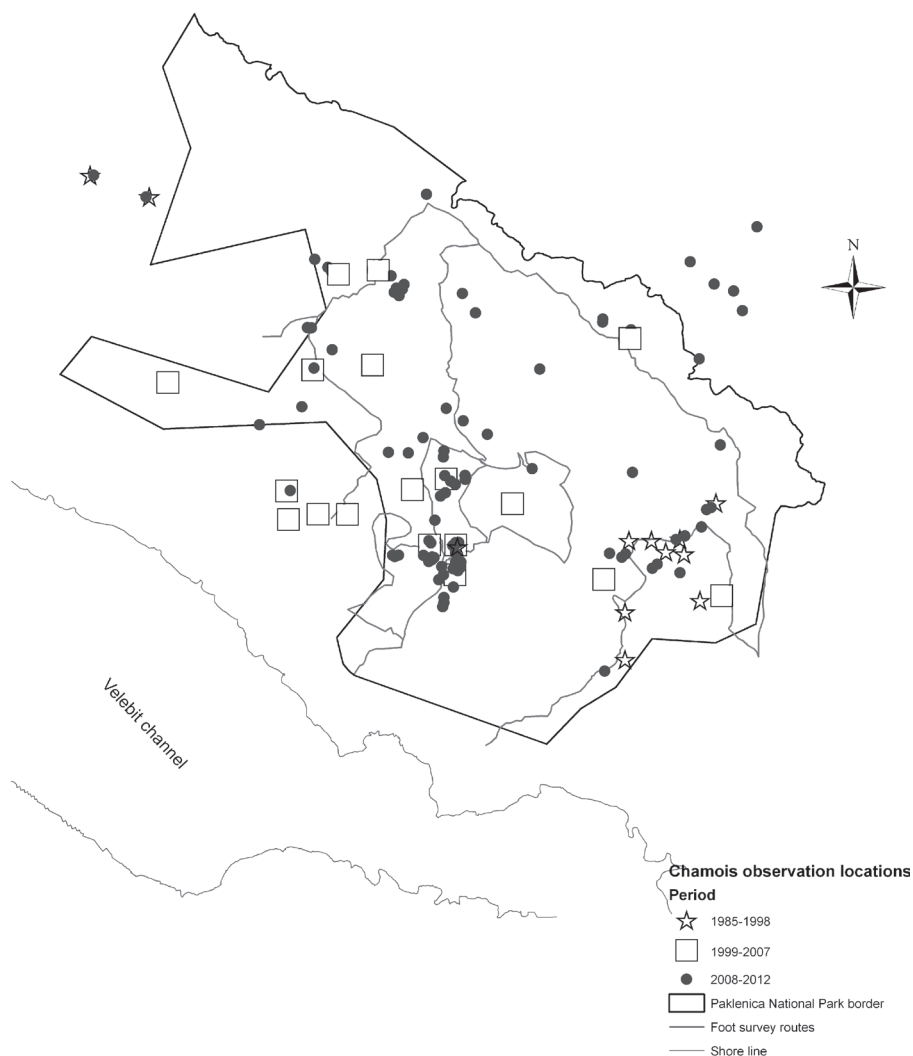


Fig. 3. Chamois observation locations. Graduate colonisation of habitat in the period 1985 - 2012. Locations in the area outside the National park border are the nearest sites where presence of chamois has been confirmed in the surrounding hunting grounds.

pers. comm.). During our surveys we did not observe the chamois in the hunting ground directly (Fig. 4, No. 8), but their presence was confirmed from their droppings.

We confirmed the presence of chamois in the Visočica hunting ground the north-west, on several sites close to the National Park border (Fig. 4, No. 1). There are no data about the total number of chamois in the Visočica hunting ground.

Concerning elevation, preliminary data suggest that chamois use extended habitat from 170 m a.s.l. (Velika Paklenica canyon) to some of the highest peaks of the National Park, e.g. the 1714 m a.s.l. of Malovan and Segestin. The lowest elevation where chamo-



Fig. 4. Simplified map of some observation sites inside the National Park and the nearest sites outside mentioned in the results.

Legend:

- No. 1 – Čelopek and Vilin kuk, on the border of the NP
- No. 2 – Jerkovac, area in Mala Paklenica, between Orljača and Mala Paklenica
- No. 3 – part of the Mala Paklenica canyon, i.e.: from the junction of Orljača creek and Mala Paklenica, downstream to the Kapljarka cave
- No. 4 – Velika Paklenica canyon (Krivi kuk cliff, where in 1998 chamois was recorded here for the first time for Velika Paklenica canyon)
- No. 5 – Bojinac
- No. 6 – Malovan peak area (1700 m a.s.l., the highest zone)
- No. 7 – part of the Sveto brdo hunting ground, bordering the NP; all locality names are given in results (Sijasetska draga, Jelovi tavani, Ilin kuk, Meded, Ošljak)
- No. 8 – part of the Starigrad- Paklenica hunting ground; there are several names under this number: Gradić, Županov dolac, Turska peć, Ercegov vrh peak; it is also a bordering area between the NP and the hunting ground.
- No. 9 – Crljena greda - Pećica, a small and narrow part of the Velika Paklenica canyon, at an altitude of ca 170 m a.s.l.; we state that this is the lowest altitude where chamois was registered.

is were observed was on 170 m a.s.l. in Crljena greda – Pećica (Fig. 4, No. 9) during the winter.

Taking into account all the observations, the minimum population size may be estimated around 60 - 70 individuals, and refers to the individuals counted during our direct survey in one day on 7 different sites along one survey route. There are not enough data for more precise estimates. By enclosing all the geographic points where the chamois presence was confirmed by boundary line, the suitable habitat within the PNP borders covers approximately 46 km², which is almost 50% of the total park surface.

DISCUSSION

The information collected by indirect methods was verified during the direct survey between 2008-2012. We confirmed the chamois presence at 47 sites inside the PNP border (see App.). Observations of chamois at some sites inside the NP, such as Bojinac in 2004 and 2006 were not confirmed by direct survey in 2008-2012.

BOSCHI & NIEVERGELT (2003) suggested the summer home range of females (with juveniles) and males was about 3.6-6 km² for females and 1 km² for adult solitary males outside the mating season. They also confirmed migration out of the Swiss National Park area into surrounding hunting grounds. The chamois present on the hunting grounds surrounding the PNP should be considered part of those hunting grounds' populations, because migration across the borders is very likely to occur.

During the summer, in the Velika Paklenica canyon we noticed the chamois at relatively low elevations (250-500 m a.s.l.), in the early morning and late afternoon hours, on the unforested rocky cliffs in the shadow zones. BAČKOR (2010) reports chamois using parts of ridges (ridge disruptions or plateaus around peaks) in the Western Carpathians, especially during summer, early in the morning and late afternoon, mainly for thermoregulation. Rocky cliffs also allow them to escape predators (VALCHEV *et al.*, 2006). We observed the chamois in the canyon during the whole year but the number of individuals varied. There are a few more individuals recorded during the winter. Terrain configuration, daily migrations of the herds, terrain overgrown with vegetation and other similar factors make them less visible during the summer. Given that the foot survey results may be seen as abundance indexes, rather than population-size estimates, the increase in the number of observed individuals per day as well as the increase in the variety of sites where chamois presence was confirmed during the period 2008 - 2012 may be considered a proxy for positive growth trend. Although some parts of the Paklenica NP may be considered potential chamois habitats, such as the southern part of the Mala Paklenica canyon (300-500 m a.s.l), to date its presence has not been recorded in that area. A possible cause might be the absence of water during the warmer part of the year. Hikers are not likely to be a problem, because there are few of them in Mala Paklenica, and in Velika Paklenica canyon the presence of larger numbers of hikers does not deter them and the chamois is there regularly recorded at that altitude all year round.

However, the impact of hiking on the chamois population in the Paklenica NP has not been studied in detail so far. The chamois reacts to flight activities very strongly (paragliding, helicopters), but not to on the ground activities such as hiking and skiing (BÖGEL & HÄRER, 2002; SCHNIDRIG-PETRIG & INGOLD, 2001). Hiking is allowed exclusively on the hiking trails. During the research, we frequently observed the chamois not far from the hiking trails, at the average distances of 50-200 m from the trail. Based on observations of their behaviour in those occasions during our research, we assume that

hiking as a tourist activity does not have any negative impact on chamois. In the area of Paklenica NP there are no paragliding activities but approximately 10 BASE jumps per year were made. For comparison, impacts of recreation on nesting birds' population have shown that increased intensity of visitor' flows did not make a strong impact on 32 bird species. Only four species, separated as sensitive on climbing activities, *Corvus corax*, *Aquila chrysaetos*, *Falco peregrinus* and *Alectoris graeca*, moved to the inaccessible parts of the Park (LUKAČ & HRŠAK, 2005).

CONCLUSIONS

This research is the first attempt to provide more detailed information about the current status of chamois in the Paklenica National Park.

Results from this study show chamois presence at new locations, possibly implying the expansion of the local chamois population. Without accurate data about the population size, we could only suggest the minimum number of chamois is probably around 60-70 individuals. Further research should include exhaustive censuses, detailed home range analysis, determination of age and gender structure, population growth rate, mortality caused by predation and the potential impact of tourist activities.

In order to improve the protection and management of the entire chamois population on Velebit Mountain, more vigorous collaboration with other institutions is required, especially with Velebit Nature Park as well as with the surrounding hunting ground stakeholders.

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SAŽETAK

Trenutni status populacije divokoze (*Rupicapra rupicapra* L.) u Nacionalnom parku Paklenica

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Izvorna populacija velebitske divokoze istrijebljena je početkom 20. stoljeća. Akcijama reintrodukcije 1974. i 1978. godine na području sjevernog Velebita ponovno je naseljeno 15 jedinki divokoza, ali iz dva područja na kojima obitavaju različite podvrste (*R. rupicapra balcanica* iz Bosne i Hercegovine te *R. rupicapra rupicapra* iz Slovenije). Stoga se genetska struktura recentne populacije divokoza na Velebitu razlikuje od autohtone populacije. Noviji podaci o divokozi (*Rupicapra rupicapra* L.) potvrđuju njenu prisutnost u Nacionalnom parku Paklenica od 1985. godine na nekoliko lokaliteta: Čelopek, Vilin kuk te područje kanjona Male Paklenice i Orljače. Ovim radom prikazan je status populacije od 1985. do danas. Istraživanje je izvršeno obilaženjem terena po unaprijed određenim rutama. Bilježili su se podatci o broju jedinki, lokacijama opažanja i datum opažanja. Lokaliteti na kojima je potvrđena prisutnost divokoza nalaze se u rasponu nadmorskih visina od 170 do 1714 m.

Rezultati iz perioda 2008. – 2012. pokazuju povećanje broja lokaliteta na kojima su prisutne divokoze te moguće migriranje u okolna lovišta. Redovita opažanja u sjevernom dijelu Male Paklenice, kroz cijelo razdoblje 1985. god. do 2012. dokazuju opstanak i stalno zadržavanje divokoza na tom području, dok je prvo opažanje divokoza na većim nadmorskim vi-

sinama, tzv. „vršnoj zoni“ Nacionalnog parka, zabilježeno 2007. god. na Malovanu (1707 m/nv). Prema podacima lovočuvara iz susjednog lovišta „Sveto brdo“, određeni broj jedinki migrira iz područja Nacionalnog parka u lovište i obrnuto. Kanjon Velike Paklenice jedno je od važnijih staništa na kojem obitavaju divokoze unutar Nacionalnog Parka, a ujedno je i turistički najposjećeniji dio Nacionalnog parka.

Ukupna brojnost populacije divokoza na prostoru Nacionalnog Parka nije precizno utvrđena, no prema dosadašnjim opažanjima tijekom pojedinih izlazaka na teren brojnost je grubo procijenjena na 60-70 jedinki. Daljnim detaljnijim istraživanjima trebalo bi utvrditi točnu brojnost populacije, spolnu i dobnu strukturu, godišnji rast populacije te mogući negativan utjecaj turističkih i rekreativnih aktivnosti. Za kvalitetniju i bolju zaštitu potrebna je intenzivnija suradnja s drugim Javnim ustanovama koje upravljaju staništima na Velebitu, prvenstveno Parkom prirode Velebit te okolnim lovištima.

**APPENDIX – LIST OF LOCATIONS, ALTITUDES AND DATES
OF CHAMOIS OBSERVATIONS.**

No of location	location	altitude (m a.s.l.)	2008	2009	2010	2011	2012
1	Crljena greda - foot of Anića kuk cliff	170-230		03.03.	26.01., 03.02., 09.02., 03.03., 06.03., 17.04., 12.12.	14.01., 28.05., 13.09.	08.01., 11.01., 11.02., 14.02., 19.02., 22.02., 18.06., 13.11., 21.11.
2	Debeli kuk cliff	450-500			10.01., 09.02., 08.03., 27.03., 28.03., 07.05., 13.11.	04.01., 16.02., 07.04., 29.05., 05.06., 24.07., 25.11.	15.02., 22.02., 24.03., 02.05., 13.10., 24.10.
3	Visoka glavica - northern slope	650-700			02.11., 23.12.		03.03.
4	Ravni okučak	490-500	03.10.	12.07., 27.09., 06.10., 22.11., 04.12.	06.02., 09.02., 06.03., 30.09., 27.12.	07.06., 25.09.	11.01., 23.01., 31.01., 19.02., 22.02., 03.03., 04.03., 30.03., 07.04., 28.04., 01.05., 05.05., 19.05., 05.08., 11.09., 19.09., 01.10., 15.10., 17.10., 25.10.
5	Kuk od Manite peći cliff	670			18.01., 05.02.	07.08., 03.11.	11.01., 17.01., 11.02., 16.05., 19.05., 24.10., 13.11.
6	Zorin kuk cliff - Klimenta	760-840	24.01.	02.11.	06.03., 12.12.	02.02., 20.04.	15.01., 31.01., 21.09.
7	Kuk od Zagona cliff	660	09.04.	22.11.	26.07.	25.01., 26.06.	08.02., 20.08.
8	Bukovo točilo	660-670		22.11.	12.12.	18.01.	21.11.
9	Njivarska strana - Orlovo gnijezdo	850-900			09.02., 13.11.	13.04., 21.05., 08.10., 03.11.	15.02.
10	Suva draga - big southern screes	850-1000		18.10.		21.08.,	22.05.
11	Grabar	1190				11.9.,	15.02., 22.05.
12	Golić - Borovnik	1160-1265			21.07.	27.04.	
13	Debelo brdo hill - Korovilje	1337-1632	10.09., 16.10.	15.03., 11.05., 26.08., 13.12.	17.10., 23.10.	06.02., 14.03., 20.03., 10.04., 24.09., 30.10., 18.11.	28.01., 29.10.
14	Ribnička vrata - elevation point 1346 (nameless)	1250-1346			28.12.		29.10.
15	Tadina glava	1350-1490		26.08., 13.12.	12.10., 05.11., 20.11., 28.12.	14.03., 18.11.	
16	Buljma - pass	1394		30.08.	28.08., 13.09.		18.05.
17	Rapavac	1000-1220	17.07.	07.01., 02.08., 04.09.	30.03., 28.08., 20.11.	26.05.	19.02.
18	Bukova staza trail - Krceljuša	1250-1450	29.12.				19.02.

19	Crljeni kuk cliff	1200-1650		08.11.	12.08.,		11.01., 19.02., 04.03., 21.11.
20	Lipa staza trail - Ploče	950-1350		08.11.			26.10.
21	Malovan peak	1700	13.08.		25.08., 29.08.		
22	Segestin peak	1650			13.07.		
23	Babin kuk cliff	1430	22.12.			28.06.	
24	Lastve	1350-1500					24.03.
25	Zla ploča - big southern scree	1300-1550					25.05.
26	Čičina dolina valley - Čubavac	1500					25.05.
27	Vlaški grad	1150-1377	09.12.		29.08.	08.05.	14.06.
28	Crljeni brig - Kosirica	1000-1100			22.06.		12.09.
29	Jablanuša	950-1000	07.06.				25.05.
30	Jerkovac	1230		08.09.		02.05., 01.11.	15.01.
31	Vršina - Omari	1050-1240			05.07.		15.01., 26.07.
32	Komić	1008					30.01., 12.09.
33	Palješka draga	800-1050			20.05.	01.11.	26.07., 08.11.
34	Veliki Kom	1000		20.09.	02.05.	01.02., 19.05.	
35	Konjska glavica	620					03.09., 08.11.
36	Runjavica - western slope	550-600					28.01.
37	Kapljarka - Glavica od trapa - western edge of Mala Paklenica canyon	650-700				28.04.	28.01.
38	Njiva Lekina - Jezerina	650-700					28.01.
39	Borovnik - Ravni dolac	950-1056			05.06.	22.11.	09.01.
40	Veliki kuk cliff	772			13.11.		07.02.
41	Kuk od Rujice cliff	963		28.04.,			09.01., 07.02.
42	Donja draga	550-600		06.06., 24.10.		06.04.	31.01., 26.10.
43	Mala močila - southern pass	650	05.05., 08.11.	26.07.	29.01.	17.05., 05.06., 13.08.	01.08., 13.10., 26.10.
44	Orlov kuk cliff	750-865	24.01., 23.03., 03.10., 08.11.	14.05., 28.06., 24.10., 22.11.		27.05., 19.06., 12.11.	28.01., 31.01., 19.02., 30.07., 07.10., 21.11.
45	Katići - houses	400	09.04., 08.11.	19.07.	29.01., 28.02.	04.01., 27.02., 13.04., 27.07., 21.08., 27.08., 03.11.	15.02., 02.03.
46	Krivi kuk cliff	500-636		09.02., 27.02., 15.06., 09.07., 19.08., 14.10.	04.02., 21.03., 12.12.	24.02., 26.06.	15.02., 22.02., 06.10., 24.10., 26.11.
47	Jurasova glava	500-742	26.03., 03.10.	28.01., 29.06., 05.07., 11.08., 19.08., 22.11.	06.03., 16.03., 22.07., 13.11., 24.11., 12.12.	13.11.	11.01., 31.01., 22.02., 02.03., 04.03., 24.03., 30.03., 07.08., 08.09., 13.10., 09.11., 26.11.