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BOARD OF UK WOLF CONSERVATION TRUST

Project report for 2009:

RESEARCH AND MONITORING OF WOLVES AND LYNX IN CROATIA

A)

Progress report

This yearly report is for the period from 10 November 2008 to 31 December 2009.

We continued with capturing and radio-tracking of wolves and lynx, collection and examination of dead carnivores, as well as direct application of our study results in management and protection. We also continued our involvement in the mitigations on new highways through large carnivore habitat in Croatia. The radio tracking of ungulates collared during 2006-2007 was also continued.

Work statistics

In the period from 10 November 2008 to 31 December 2009 (416 days) Josip Kusak spent a total of 134.9 days (32.4% of time) doing field work, checking cases of wolf mortality, performing autopsies of dead wolves, participating on workshops and meetings related to research and conservations of wolves and lynx in Croatia and neighboring countries. Slaven Reljić, PhD student and veterinarian who was primary contracted to work on bear part of our projects, spent 6.6 days, helping on the wolf and lynx work. One park ranger of Velebit Nature Park (Josip Tomaić) and one expert associate from NP Sjeverni Velebit (Irena Krušić), on the voluntary basis and under the contract with NP Sjeverni Velebit, were involved in the field work on the Northern Velebit area for 7.3 and 14.5 days, respectively. We expect the continuation of their contribution to the wolf part of the project.

During the reporting period, five foreign researchers and three foreign students visited the project and stayed for 51.8 person/days. They all came to learn field techniques of work with wolves.

The amount of time spent for field work was in the range of amount during previous years. The time spent for meetings, presentations, lectures, i.e. activities where the results of field work were presented, disseminated and discussed were the same as during the previous period.

The bulk of the field work (134.9 of different days) was done by Josip Kusak. The project leader, Djuro Huber, spent 10.2 days in the field related to this project. Other people that contributed are listed in Table 3. Majority of persons were met during management meetings, and some contributed during field work.

Table 1: Summary table of work activities of Josip Kusak to work on the project in the period from 10.11.2008 to 31.12.2009 (416 day).

Activity	N activities	Duration (days)
Animal mortality found	1	1.4
Animal necropsy	2	0.2
Entering data	1	0.0
Highway survey	1	2.2
LC comity meeting	1	0.2
LC CRO emergency team meeting	1	0.0
Lecture	4	2.8
Natura 2000 GK	1	0.1
Project meeting	1	0.2
Telemetry	10	27.9
TEWN workshop	1	7.5
Trapping	22	90.3
Wolf meeting	2	1.5
Workshop	1	0.6
TOTAL		134.9

Note: It is not entirely possible to accurately count all activities because often 2-3 or more things were done at once (Like: trapping and telemetry, collecting dead wolves, checking wildlife crossings places and telemetry during the same trip).

Table 2: Detailed table of work activities of Josip Kusak related to wolf and lynx work on the project in the period from 10.11.2008 to 31.12.2009 (416 day). Activities marked with green (**61.8 days of field work**) were done with the use of UK WCT funding.

ACTIVITY N	ACTIVITY	START	END	N DAYS
391	Telemetry	10.11.2008 05:36	12.11.2008 21:45	2.7
392	Telemetry	04.12.2008 10:18	07.12.2008 16:45	3.3
393	Animal necropsy	08.12.2008 10:00	08.12.2008 12:00	0.1
4017	Entering data	13.01.2009 10:17	13.01.2009 11:01	0.0
402	Lecture	16.01.2009 09:15	16.01.2009 10:00	0.0
394	LC comity meeting	20.01.2009 10:00	20.01.2009 15:45	0.2
395	Workshop	01.02.2009 04:30	01.02.2009 18:10	0.6
396	Highway survey	08.02.2009 05:35	10.02.2009 11:00	2.2
397	Wolf meeting	12.02.2009 09:00	13.02.2009 17:15	1.3
398	Telemetry	17.02.2009 05:00	21.02.2009 21:00	4.7
399	Animal necropsy	24.02.2009 09:32	24.02.2009 12:32	0.1
400	Lecture	05.03.2009 20:00	05.03.2009 22:45	0.1
401	Telemetry	16.03.2009 07:30	17.03.2009 12:41	1.2
403	Animal mortality found	23.03.2009 06:00	24.03.2009 16:30	1.4
404	LC CRO emergency team meeting	25.03.2009 09:14	25.03.2009 10:14	0.0
405	Natura 2000 GK	30.03.2009 09:30	30.03.2009 12:30	0.1
406	TEWN workshop	01.04.2009 09:08	08.04.2009 20:56	7.5
407	Telemetry	22.04.2009 07:44	23.04.2009 18:21	1.4
408	Trapping	02.05.2009 07:30	04.05.2009 18:15	2.4
409	Project meeting	09.05.2009 10:15	09.05.2009 14:00	0.2
410	Trapping	11.05.2009 08:25	16.05.2009 18:20	5.4
412	Trapping	19.05.2009 07:00	22.05.2009 21:20	3.6
411	Lecture	20.05.2009 18:00	20.05.2009 19:30	0.1
412	Trapping	25.05.2009 07:00	15.06.2009 12:17	21.2
413	Telemetry	21.06.2009 09:00	22.06.2009 17:30	1.4
413	Telemetry	22.06.2009 17:30	02.07.2009 06:30	9.5
413	Telemetry	02.07.2009 06:30	03.07.2009 17:00	1.4
413	Telemetry	03.07.2009 17:00	05.07.2009 16:00	2.0
414	Trapping	14.07.2009 07:00	18.07.2009 18:32	4.5
415	Trapping	22.07.2009 07:30	25.07.2009 21:25	3.6
416	Wolf meeting	04.08.2009 09:24	04.08.2009 12:30	0.1
417	Trapping	12.08.2009 08:30	18.08.2009 09:00	6.0
417	Trapping	18.08.2009 09:00	21.08.2009 17:01	3.3
417	Trapping	21.08.2009 17:01	27.08.2009 16:00	6.0
417	Trapping	27.08.2009 16:00	03.09.2009 20:15	7.2
418	Trapping	07.09.2009 06:30	10.09.2009 06:25	3.0
418	Trapping	10.09.2009 06:25	10.09.2009 19:45	0.6
418	Trapping	10.09.2009 19:45	11.09.2009 08:30	0.5
418	Trapping	11.09.2009 08:30	11.09.2009 15:45	0.3
418	Trapping	11.09.2009 15:45	12.09.2009 16:00	1.0
418	Trapping	12.09.2009 16:00	14.09.2009 16:00	2.0
418	Trapping	14.09.2009 16:00	20.09.2009 15:40	6.0
418	Trapping	20.09.2009 15:40	24.09.2009 05:35	3.6
418	Trapping	24.09.2009 05:35	24.09.2009 13:30	0.3
418	Trapping	24.09.2009 13:30	25.09.2009 21:00	1.3
418	Trapping	25.09.2009 21:00	27.09.2009 19:15	1.9
419	Telemetry	06.10.2009 06:30	06.10.2009 14:59	0.4
420	Trapping	16.10.2009 08:05	22.10.2009 20:55	6.5
421	Lecture	04.11.2009 07:30	06.11.2009 21:45	2.6
	Total			134.8

Table 3: List of persons participating on the project in the period from 10.11.2008 to 31.12.2009. (416 day). During that time a total of 109 different persons participated in project activities, resulting in 392.3 person/days.

Person	N Activities	Duration
Altukhova, Nathalie	3	15.9
Andreić, Doroteja	1	0.0
Bišćan, Antonija	5	3.2
Bosiljevac, Damir	2	0.7
Bračulj, Zoran	1	0.3
Budiša, Branko	1	0.1
Budor, Ivica	2	0.5
Bukovac, Maja	1	0.3
Buzaši, Irena	1	0.3
Cindrić, Marinko	1	0.3
Desnica, Sonja	1	0.3
Dešković, Miljenko	2	0.6
Devčić, Tihomir	2	0.8
Docrat, Mohummed	1	6.1
Domokos, Csaba	1	2.8
Donati, Giuseppe	3	3.8
Dutsov, Aleksandar	1	2.8
Ericson, Mats	1	3.2
Fattori, Umberto	1	0.2
Filacorda, Stefano	1	0.2
Findo, Slavomir	1	2.8
Fremuth, Wolfgang	1	2.8
Frković, Alojzije	2	1.6
Gašparac, Miljenko	2	1.6
Georgiadis, Lazaros	1	0.2
Ghaemi, Ramazanali	1	1.1
Gomerčić, Ana	1	0.2
Grgas, Ana	1	0.1
Groff, Claudio	3	4.4
Grubešić, Marijan	2	1.5
Gudan, Andrea	1	0.2
Guiatti, Denis	1	0.2
Gutleb, Bernhard	1	1.1
Gužvica, Goran	1	0.4
Hak, Igor	1	0.4
Heine, Michael	1	0.4
Horvath, Šandor	1	0.3
Huber, Đuro	14	10.2
Ingeborg, Bata	1	1.3
Ivanov, Gjorgi	1	0.2
Jakšić, Zrinko	3	1.6
Jedrzejewska, Bogumila	1	4.0
Jedrzejewski, Włodzimierz	1	4.0
Jelenčić, Maja	1	0.2
Jelenić, Ivana	2	0.1
Jeremić, Jasna	8	2.8
Kaphegyi, Tom	1	2.8
Karamanlidis, Alexandros	1	0.2
Katić, Anđelo	1	0.0
Katušić, Luka	3	0.8
Kauzlarić, Željko	1	0.3
Kos, Ivan	1	0.3
Krofel, Miha	1	2.5
Krušić, Irena	9	14.5
Kusak, Josip	47	134.9

Kusak, Pavao	3	4.0
Kusak, Tanja	7	16.0
Lortkipanidze, Bejan	3	15.9
Lupret-Obradović, Svjetlana	1	0.5
Ljuština, Maša	1	0.4
Majić-Skrbinšek, Aleksandra	3	0.8
Majnarić, Dario	2	3.7
Malnar, Josip	1	2.6
Mazija, Mirna	1	0.5
Melovski, Dime	1	0.2
Milosz, Malgosia	1	4.0
Myslajek, Robert	1	6.8
Novosel, Dinko	2	0.2
Nowak, Sabina	1	6.8
Oković, Patricija	7	3.8
Poklar, Miloš	1	0.1
Poljak, Anica	1	0.1
Poljak, Davor	2	0.2
Prokopović, Damir	2	0.5
Promberger, Cristoph	3	3.7
Radović, Jasminka	1	0.1
Ratković, Igor	1	1.7
Reljić, Slaven	3	6.6
Sačar, Gorana	1	0.1
Schwaderer, Gabriel	1	2.8
Sindičić, Magda	2	0.2
Skorup, Vlatko	1	0.3
Skrbinšek, Tomaž	1	0.2
Skroza, Nikica	1	0.1
Slijepčević, Vedran	4	2.3
Spajić, Tomislav	6	4.3
Spangenberg, Annette	1	2.8
Stojanov, Aleksandar	1	0.2
Šercer, Slaven	1	0.1
Šikić, Zoran	2	0.2
Šilić, Tea	1	0.5
Šoštarić, Branko	1	1.1
Štahan, Željko	2	1.5
Štrbenac, Ana	7	2.8
Šupe, Ivica	1	0.4
Toholj, Dušan	1	1.7
Tomaić, Josip	9	7.3
Tomašković, Ivna	1	0.2
Topić, Ramona	1	0.1
Trošić, Marko	4	2.0
Urli, Lucija	6	3.5
Užarević, Tomica	1	0.2
Volner, Matija	1	0.3
Vugrinec, Denise	1	0.1
Vugrinec, Ines	5	3.7
Vukšić, Ivna	2	6.5
Zec, Davor	7	2.2
Zlatanova, Diana	1	2.8
Total		371.1



Figure 1: Irena Krušić (National park Sjeverni Velebit) and Josip Tomaić (Nature park Velebit) contributed and helped in trapping activities on the project during summer 2009.



Figure 2: Two wolf enthusiasts from Bosnia and Herzegovina (Dušan Toholj and Igor Ratković) participated in trapping activities on the project in the period from 29.05.2009 to 31.05.2009.



Figure 3: Nathalie Altukhova (student from Russia) and Bejan Lortkipanidze (researcher from Georgia) participated in trapping activities on the project in the period from 18.08.2009 to 03.09.2009.



Figure 4: Miha Krofel, PhD student from Slovenia, participated in trapping activities and learned capturing techniques on the project in the period from 14.09.2009 to 18.09.2009.



Figure 5: Mohammed Docrat, a veterinary student from England, participated in trapping and tracking activities on the project in the period from 29.05.2009 to 31.05.2009.



Figure 6: Claudio Groff and Giuseppe Donati (large carnivores researchers and managers from Trentino, Italy; on the picture at road killed badger), participated in trapping activities on the project in the period from 24.09.2009 to 27.09.2009.

RADIO-MARKING OF WOLVES AND LYNX

Marking of wolves

During 2009 wolf trapping was continued in Gorski kotar, on the area of three known packs, and Velebit mountain (Lika region, south of Gorski kotar). With the end of 2008 trapping season, we had four wolves with collars, three with GPS, and one with VHF collar. One wolf was of Snježnik pack (still Hilda alive and collar working since 2002!), one from Risnjak pack (Rina), while third wolf from Gorski kotar (Max) was not a permanent member of any pack. The newly collared wolf in 2008 was a young female Tviggi, belonging to Suho pack. On Velebit mountain, we had one collared wolf (Tara) from Krasno pack. This relatively good coverage of wolf packs with radio-collars changed already during the winter 2008/2009, when one wolf (Max) died, and in spring 2009, when one wolf disappeared during the dispersal in Slovenia (Tviggi), and collars on other two (Tara and Rina) stopped functioning.

During the winter 2008/2009 on the territory of Risnjak pack, a footprints of minimum 5 wolves were found. Snježnik pack had minimum of 5 wolves, including tracked wolf Hilda. In the same time Suho pack was documented to also have minimum of 5 wolves.

The study of wolves on Velebit mountain was initiated already in 2006, but the real start was made in 2007. Velebit mountain and the adjacent Lika region are third main region of Croatia permanently inhabited by wolves. The region differs in biogeographic features, habitat conditions for wolves, from the other two areas; Dalmatia and Gorski kotar, where we studied wolves during the past 10 years. The conservation of wolves in Croatia needs reliable information on wolf home ranges, movements, numbers and densities in this part of wolf range in Croatia as well. During 2008, no new wolves were collared on this area, but during 2009, collaboration with NP Sjeverni Velebit started. Their contribution was the purchase of one GPS collar and help in field work (Irena Krušić and Josip Tomaić) and logistic.

Radiotracking of collared wolves (Hilda, Max, Rina and Tviggi) was done together with searches for wolf signs on known wolf territories. The size of the searched area in Gorski kotar was 562.2 km² (Figure 8). The search for the presence of wolves started during the spring and was continued during the summer. During the whole trapping season Josip was driving about 1000km/week, searching for wolf signs, checking traps and doing radio telemetry.



Figure 7: Beech and fir forest is typical wolf habitat in Gorski kotar (Photo J. Kusak).

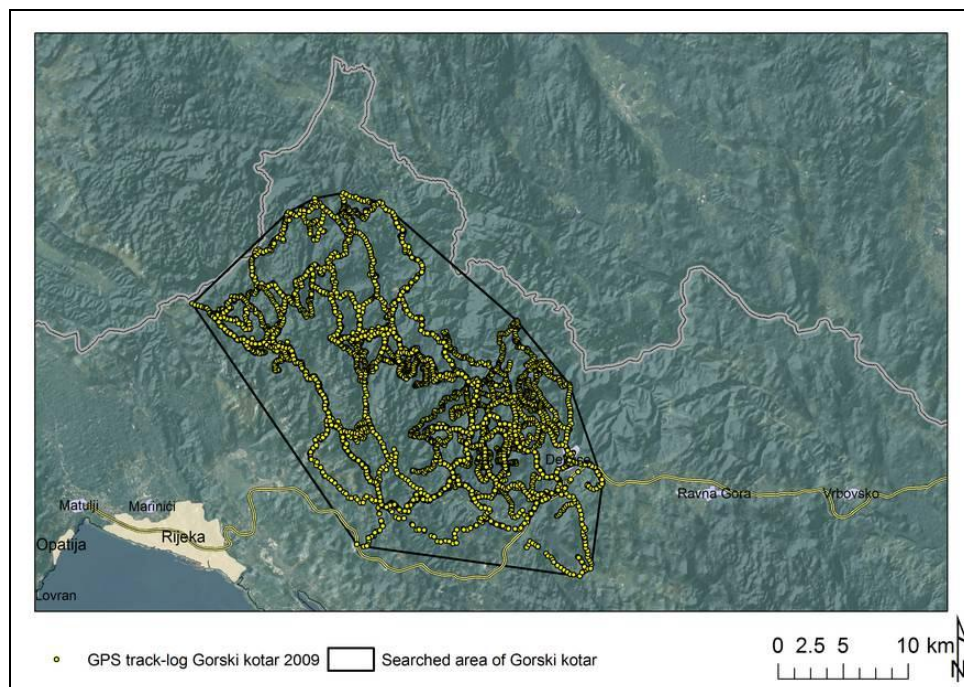


Figure 8: The area of Gorski kotar (562.2 km^2) checked for wolf and lynx signs during trapping season in 2009.

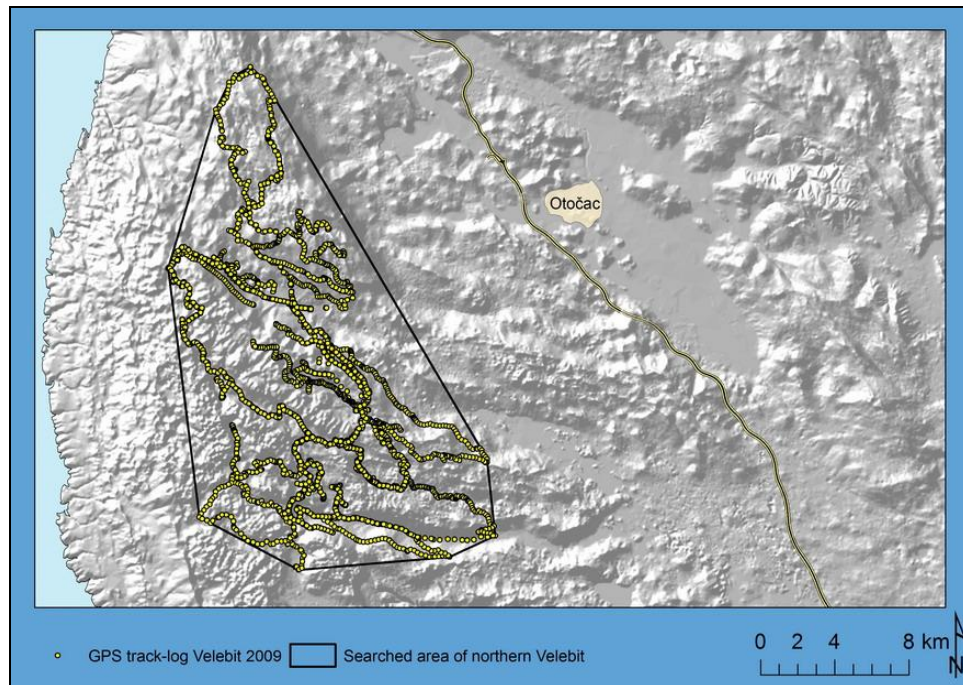


Figure 9: The area of northern Velebit (286.5 km²) checked for wolf and lynx signs during trapping season in 2009.

Signs of wolf and lynx presence (footprints, scats, scratch marks, vocalization) were found on 275 different places (Table 4). Those places were mapped with GPS device and analyzed with GIS software. Most of signs were scats and footprints, and majority of signs were found in the two most intensively searched areas (Table 5). Particularly interesting is the occurrence of wolf in the eastern part of Croatia (lowlands, Figure 10), where wolves did not occur for at least 50 years! This indicates that wolf population continues to increase, at least by expanding its range.

Table 4: Signs of wolf and lynx presence recorded in the whole Croatia during 2009.

Sign	Wolf	Lynx	Total
Scat	216	0	216
Dead animal	13	4	17
Footprint	28	1	29
Prey	4	0	4
Sighting	2	1	3
Vocalization	6	0	6
Total	269	6	275

Table 5: Signs of wolf and lynx presence, by regions in the whole Croatia during 2009.

Region	Wolf	Lynx	Total
Gorski kotar and northern Lika	205	4	209
Nature park Velebit	53	2	55
Other areas	11	0	11
Total	269	6	275

It is indicative that in spite of increased efforts of finding lynx signs, the number of those signs did not increase compared to previous years. This is yet another confirmation of recent decline of lynx population in Gorski kotar.

Irena Krušić and Josip Tomaić, expressed a significant interest to participate in our work. We engaged them to collect all signs and samples of wolf and lynx presence in the area of northern Velebit and gave them the receiver and antenna. In that way they could check for the status of collared wolf almost daily and in general increased the amount of data collected about wolves in Velebit area. They made several howling surveys to check the number and possible reproduction of the Krasno pack.

Of course, the most intensively searched area was Gorski kotar. We noted the human activity (timber cutting and extraction, one sheep flock) during summer 2009 at 21 different locations on an area of a total 41.2 km². That influenced some of the wolf activities as well. All different areas of human activity were evaluated before the final decision about where to set traps.

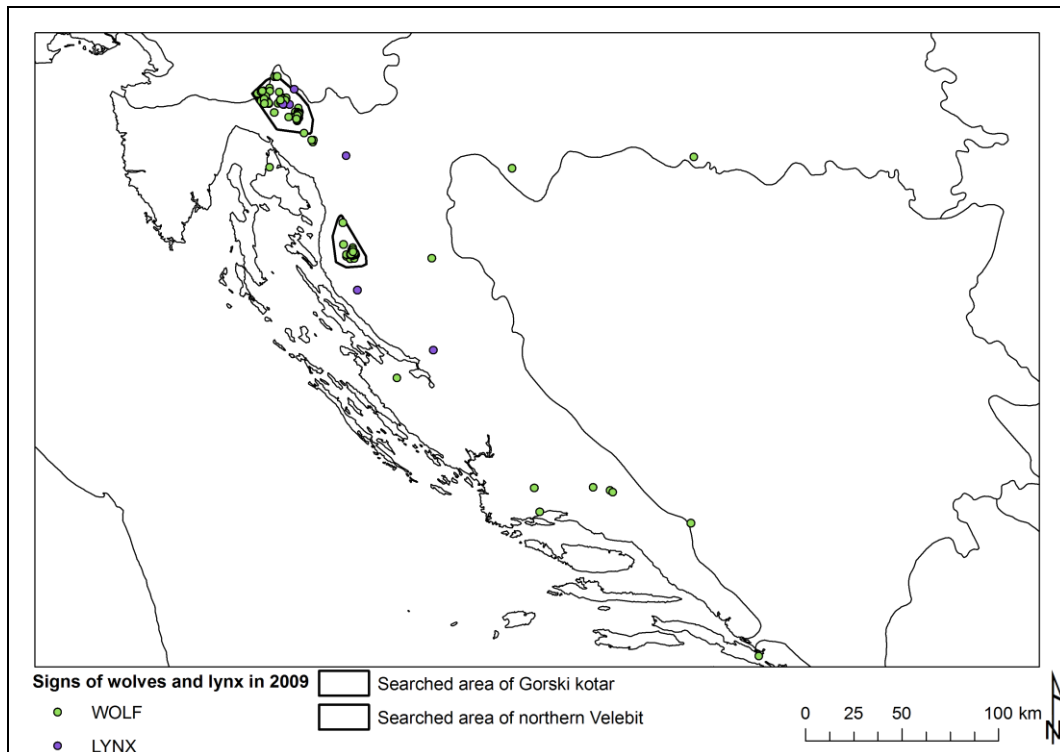


Figure 10: Locations of signs of wolf and lynx presence across the whole Croatia. The absence of detected tracks does not mean the absence of wolves or lynx.

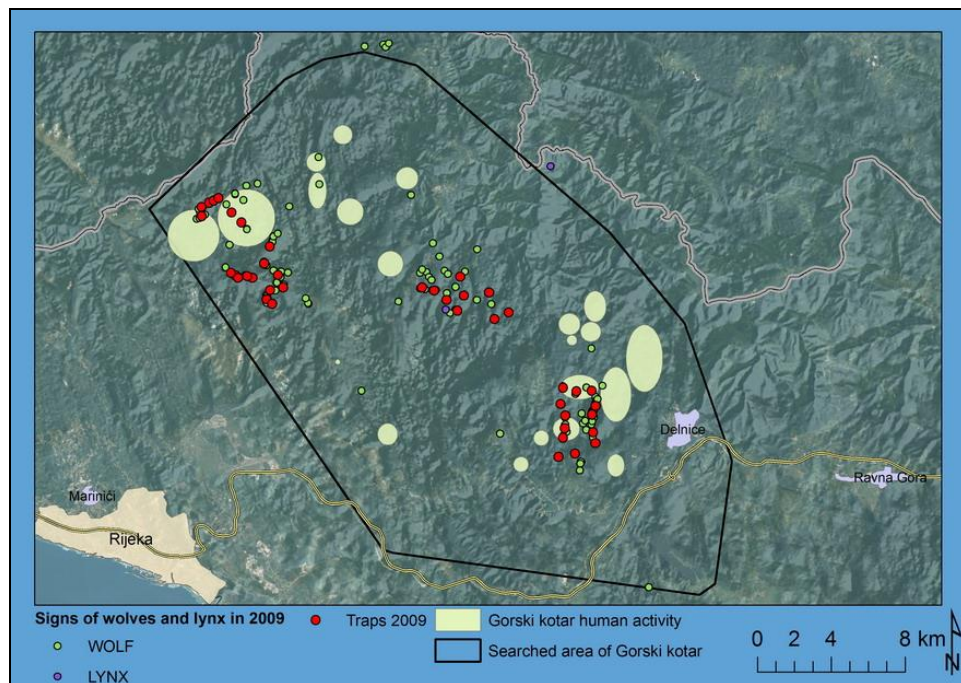


Figure 11: The area of Gorski kotar checked for wolf and lynx signs, signs of wolves and lynx, patches of forest (41.2 km² in totals) where human activity was documented and trap sets during 2009.

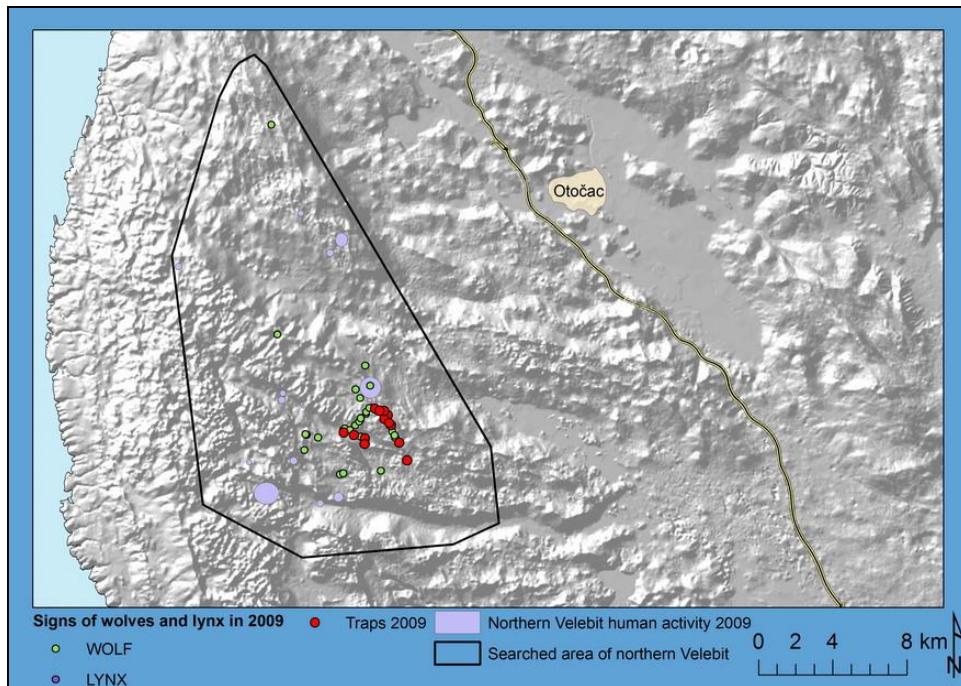


Figure 12: The area of northern Velebit (286.5 km²) checked for wolf and lynx signs, wolf signs, human activity areas (3.7 km²) and wolf traps during 2009.

Activities to radio-collar at least three new wolves in Gorski kotar and on Velebit, started rather early this year, 12.05.2009, with setting of the first traps for Snježnik pack. Traps were left

inactive until 20.05.2009. A total of 65 different trap sets (Gorsko kotar 50, velebit 15) were used for trapping, (Figure 11 and Figure 12). Because of much earlier start, we were able to concentrate trapping effort around found rendezvous sites and increase chances of capturing wolves, before capturing anything else.

In the period from 20.05.2009 to 19.10.2009 (152 days) traps were active during 8 periods, lasting from 3 to 28 days. Traps were checked 1391 times. Various events happened while the traps were active. They are listed in Table 6. There were 9 bear visits to traps this year, with one “almost captures” and one bear capture, which required tranquilization and release of the animal. Foxes visited traps nine times, but none of them was captured this year. This year we also had a badger visiting traps; a badger was captured and released once. Traps were visited by wolves nine times, and **six wolves were captured**. In one occasions a wolf escaped by pulling out the foot from the trap. Relatively frequent wolf visits to trap sites were consequence of choosing of good areas where wolves were frequently found (by radio tracking and by other signs). A rather successful trapping season could be the result of earlier start (in May), and consequent concentration of trapping efforts around the den/rendezvous sites.

Table 6: List of events on traps during 2009 trapping season in Gorski kotar, Croatia, in the period from 20.05.2009 to 19.10.2009 (152 days).

EVENT	N
man on site	1
badger capture	1
bear capture	1
bear pull out	1
marten capture	1
trap stolen	1
uncovered by rain	1
wild boar capture	1
wolf pull out	1
badger pull out	2
wolf visit	2
badger visit	3
wolf capture	6
bear visit	9
fox visit	9
rain	9
marten visit	10
unknown visit	11
nothing	1321
Total	1391

On 21.05.2009 an adult male (W21-Luka, 3.5 years, 38 kg) was captured and collared with GPS-UHF collar on the territory of Snježnik pack. The following tracking and howling checks confirmed that it belonged to Snježnik pack, as well as W06-Hilda, which is being tracked already since 2002.



Figure 13. Male wolf W21-Luka (3.5 years, 38 kg) was captured and collared with GPS-UHF collar on the territory of Snježnik pack on 21.05.2009 (Photo J. Kusak).

Only seven days later, on 28.05.2009 another male was captured and collared in the same area. It was younger male (W22-Drago, 1.5 years, 32 kg). During the first three months of tracking it stayed together with Hilda and Luka, and the conclusion was that it also belonged to Snježnik pack. Unfortunately, already one month later (03.07.2009) its collar (GPS-UHF-VHF) started to send so called “recovery” signal. It meant that the collar battery got exhausted and further data retrieval was not possible! The tracking of this wolf was continued only by VHF triangulation until the January 2010 when the VHF signal disappeared as well.



Figure 14. Male wolf W22-Drago (1.5 years, 32 kg) was captured and collared with GPS-UHF collar on the territory of Snježnik pack on 28.05.2009 (Photo J. Kusak).

Wolf trapping was then stopped for two months and continued on 18.08.2009. Third captured wolf was young female (W23-Taša, 1.5 years, 29 kg) from Suho pack, captured on 24.08.2009. It was equipped with GPS-GSM-UHF-VHF collar and during the first two weeks of tracking it stayed with Suho pack. After 17.10.2009 messages from her collar stopped coming, while the VHF signal was in the air on 19.10.2009 and then it disappeared as well. The last messages and the last signal were in Slovenia, ten days after the animal left her natal pack and started to roam in the neighbouring country.



Figure 15. Female wolf W23-Taša (1.5 years, 29 kg) was captured and collared with GPS-GSM-UHF-VHF collar on the territory of Suho pack on 18.08.2009 (Photo B. Lortkipanidze).

Another young female W24-Ira (a pup of 5 months, 13.5 kg) was captured in the area of Krasno pack (northern Velebit) on 31.08.2009. It was equipped with a small VHF collar and since then tracked by traditional triangulation.

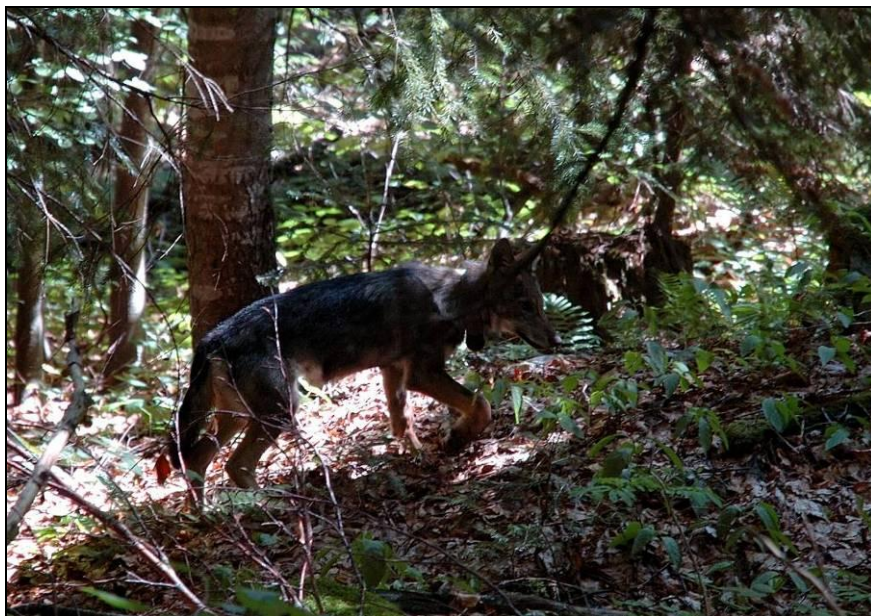


Figure 16. Female wolf W24-Ira (0.5 years, 13.5 kg) was captured and collared with VHF collar on the territory of Krasno pack on 31.08.2009 (Photo B. Lortkipanidze).

On 11.09.2009 another wolf from Krasno pack was captured. It was an adult male, age 7-9 years and mass only 31 kg. During the processing, tranquilized wolf started to wake up and Josip Kusak gave it additional dose of narcotic, which is the usual action in such situations. After this, a wolf stopped breathing, could not be recovered and died.



Figure 17. An adult male wolf (WCRO126 7-9 years, 31 kg) was captured but died during the processing on the territory of Krasno pack on 11.09.2009 (Photo I. Krušić).

The body of this dead wolf, now called WCRO126, was transported to the Veterinary faculty on the same day and the necropsy was performed the day after. The main and the most interesting was the finding of the spruce twig in lungs! The animal has apparently somehow inhaled the 8 cm long twig. The twig had the shape of an arrow and could move only forward, i.e. deeper in the lungs. The twig traveled almost all the way to the diaphragm and was causing massive chronic inflammatory process in the right side of the lung. We estimate that the process was at least two weeks old. Because of this, the wolf had insufficient respiratory capacity and could not metabolize the narcotic with dynamic pertinent to a healthy adult wolf. There were no any signs indicating the bad health status of captured wolf.

Among other pathology found, interesting was the finding of blood in urine bladder and tapeworms in intestines.

Of patho-histological findings, interesting was calcification of blood vessels (arteriosclerosis) in the brain and small bleeding in the surrounding areas. Testicles were rather small 1.9x0.5 cm, and pathohistology proved that they were atrophic, meaning that were newer used. This indicates that, beside problems caused by the twig and parasites, this old and non reproducing wolf suffered from pathology typical for old animals.

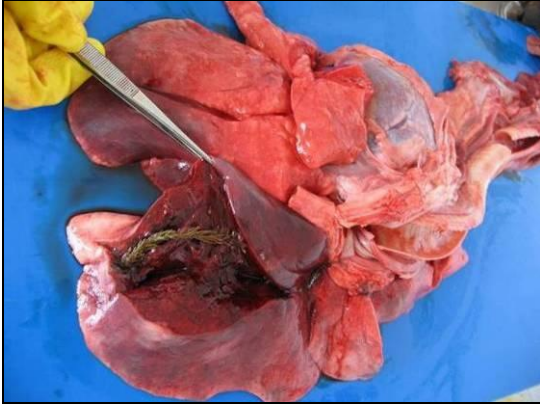


Figure 18. Twig in lungs



Figure 19. Chronic inflammatory process in lungs

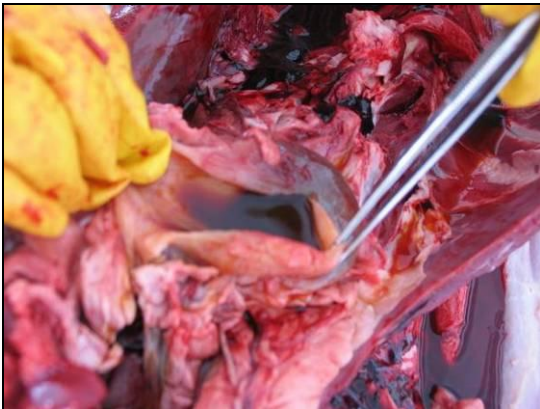


Figure 20. Urine bladder with content



Figure 21. Tapeworms in intestines

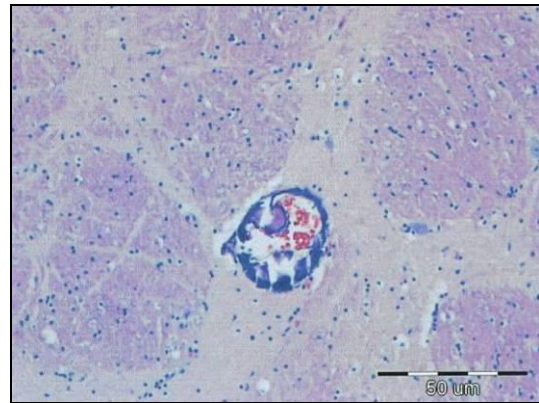
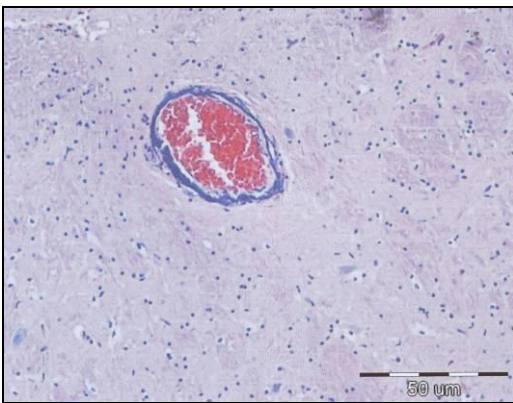


Figure 22. Mineralization of blood vessels in the brain and Figure 23: Bleeding in the brain area around the blood vessel.

Capture efforts were continued and another wolf was captured on 19.09.2009. It was recapture of a female W19-Rina from Risnjak pack! It already had a collar which stopped functioning sometime in April 2009. Her collar was replaced with a fresh GPS-UHF-VHF collar, providing the continuation of tracking of her and of Risnjak pack.



Figure 24. Female wolf W19-Rina (3.5 years, 26 kg) was recaptured and collared with GPS-UHF-VHF collar on the territory of Risnjak pack on 19.09.2009 (Photo J. Kusak).

Trapping of lynx

Radio-tracking, combined with snow-tracking of the only collared lynx in 2009, L05-Luna (captured on 05.11.2007 and recaptured on 05.04.2008) was continued. Her GPS collar was successful in only 2% of attempts. During the time when Luna was with her mother, her range was 53.5 km², but after she dispersed and started to roam alone, her range increased to 366.4 km². Luna successfully crossed the highway and entered the range of Dinko lynx. Her collar was functioning until the 13.03.2009, when it switched to recovery rhythm, which lasted until 29.05.2009. Vedran Slijepčević tried to capture it for the third time. He radio-tracked it intensively for twelve days (from 19.05.2009 to 02.06.2009), found three kills and was setting traps around them. It seems that Luna has learned that traps are something what should be avoided and did not let to be caught for the third time.



Figure 25: Belisle snares set around the roe deer prey of Luna lynx (Photo V. Slijepčević).

During the wolf trapping, J. Kusak has found signs of lynx marking (scratches and hair) around one old house called Larmina bajta in the NP Risnjak on 15.05.2009. A box trap was set on this place on 03.06.2009.



Figure 26: Lynx scratch marks and hairs, as signs of territory marking found at Larmina bajta, NP Risnjak on 15.05.2009 (Photo J. Kusak).



Figure 27: Box trap was set for a lynx at Larmina bajta, on 03.06.2009 (photo J. Kusak).

Another box trap, in the area south of highway, Bjelolasica area at Begova cisterna, was also activated the day after, on 04.06.2009. Both box traps were active until 15.07.2009, but without success.

TRACKING

Wolf tracking

Since the last reporting (after 15. November 2008), nine different wolves were radio-tracked. They belonged to 4 different packs, except one large male, Max who “floated” among four packs of Gorski kotar and Slovenia. (Table 7). A total of 14160 locations were collected for those animals.



Figure 28: J. Kusak and D. Prokopović, while downloading data from wolf GPS collar (photo T. Kusak).

Table 7: Basic data on telemetry tracked wolves in Croatia during the year 2009.

Animal	Pack	Start	End	N days	N locations
W05-Hilda	Snježnik	02.07.2002	25.10.2009	2672	400
W17-Tara	Krasno	16.08.2007	12.04.2009	605	4079
W18-Max	Changing	12.09.2007	28.11.2008	443	3461
W19-Rina	Risnjak	30.10.2007	25.10.2009	726	4420
W20-Tvigi	Suho	25.09.2008	12.04.2009	199	662
W21-Luka	Snježnik	21.05.2009	17.10.2009	149	719
W22-Drago	Snježnik	28.05.2009	25.10.2009	150	77
W23-Taša	Suho	24.08.2009	17.10.2009	54	321
W24-Ira	Krasno	31.08.2009	19.10.2009	49	21
Total					14160

Majority of animals tracked in the period from 15.11.2008 to 25.10.2009 were resident pack members, which were confirmed to stay with the rest of their packs. However, at least two wolves, both from Suho pack, showed dispersing behavior and moved north, deeper in Slovenia (Figure 29).

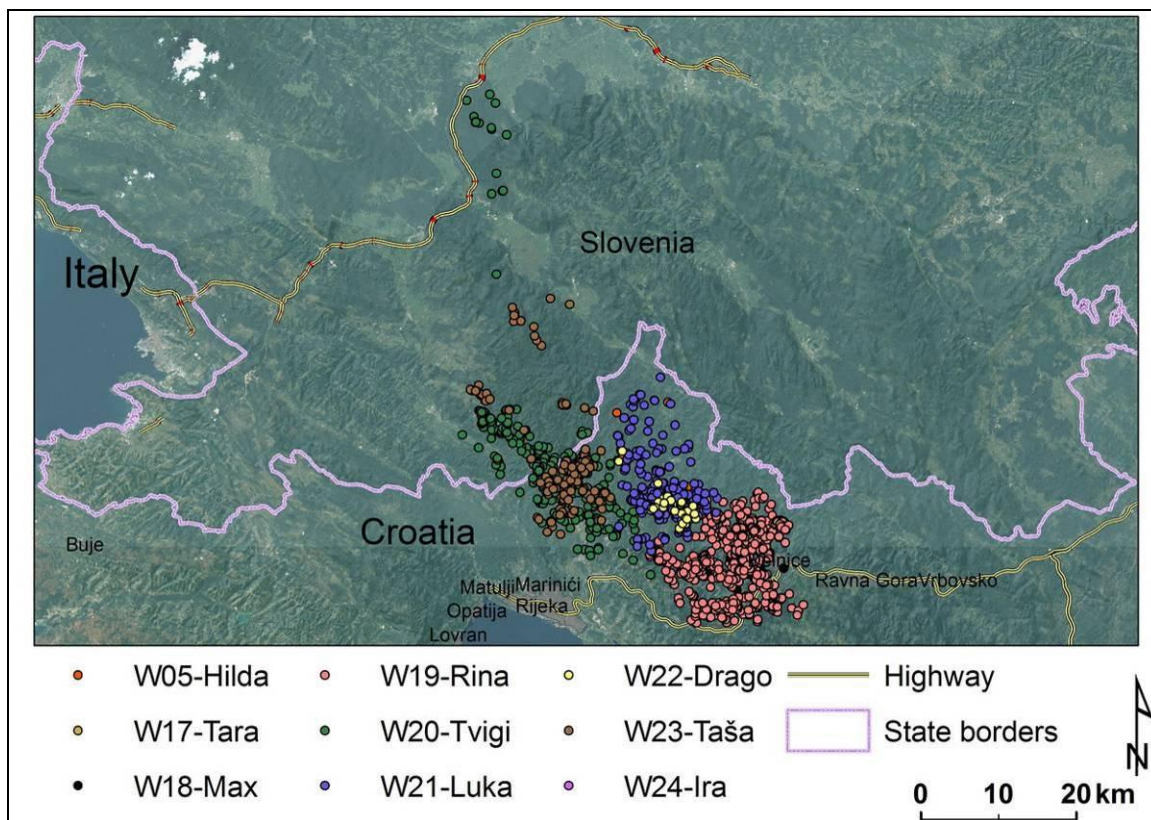


Figure 29: Locations of tracked wolves in Gorski kotar in the period from 15.11.2008 to 25.10.2009.

From obtained clusters of locations, we calculated their corresponding home ranges and will further describe them on a pack basis, with cumulative life history for each pack.

Risnjak pack was tracked since 2002 (Hilda, Blaža, Tanja and Rina wolves). During the winter 2004/2005 the pack numbered 4 to 5 wolves, but in spring and summer of 2005 no reproduction was documented in this pack. During the next winter 2005/2006 only two wolves inhabited the area of the pack, one of them was W10-Tanja. Tanja wolf continued to use the area of the temporarily non-existing Risnjak pack until the beginning of summer 2006, and then she disappeared too. The last signal from her collar Josip detected on 17.06.2006. After that time, sings of some individual wolves could be found in the area. **The fate of Tanja wolf** was revealed 08.10.2008, when a local hunter Miroslav Šafar called and informed us that a collar was found on the bottom of Lokve lake (reservoir) during the time of exceptionally low level of the water in the lake. The collar was found by another man who was walking along the shore (which normally is 15-20 m deeper). The collar seemed intact (not destroyed), but was not emitting any signal. The

collar belt was still fixed with screws. There were no any other signs (bones, hairs) on the finding site. This indicates that a Tanja wolf was most likely killed somewhere else, her head was cut-off and the collar was brought and thrown some 30m away from the shore. The VHF signal probably could not reach the surface when the collar was still emitting it and we were searching for it during 2006 and occasionally during 2007.

Tracks of four wolves were determined on Risnjak pack territory during the winter 2006/2007, probably dispersers which settled the area of former Risnjak pack and established a new Risnjak pack. The existence of a pack was further confirmed by finding numerous wolf signs during the summer 2007 and with the capture of W19-Rina. Rina wolf was resident wolf during the whole time of tracking in 2007-2008. The number of wolves in Risnjak pack during the winter 2007/2008 was five and we confirmed a successful reproduction in spring 2008 by finding the litter with seven pups.

Rina wolf and the new Risnjak pack used the same area as previous wolves living there, but they also extended their range to the south, between the old road and the highway. The territory of new Risnjak pack, as determined after 341 day of tracking by GPS collar, was 318.9 km² during 2007-2008. The territory of the old Risnjak pack, determined by tracking of Tanja wolf in 2005 and 2006, was 160.4 km². The difference could be the consequence of lower wolf number in the old Risnjak pack those years, but could also be because of the difference in technology used! Tanja wolf was tracked by the use of VHF collar and some of her movements could have been undiscovered.

During the winter 2008/2009, tracks of at least four wolves were found on Risnjak pack territory. It seems that in spite of successful reproduction in 2008, the number of wolves in the pack did not increase. Stable number indicates that losses of pack members through mortality or through dispersal, was the same as increase by reproduction.

Rina wolf was most of the winter and spring time located around the area where the litter was found a year earlier. This indicated that the pack might have had a litter in the same area this year too. The concentration of wolf signs in the same area is another confirmation for this. We did not try to actively search for the litter, to avoid disturbance of the litter.

In April 2009, the signal from Rina disappeared (the collar battery got exhausted), but almost 4000 locations were collected. It was a lucky coincidence that Rina was captured again on 19th September 2009. She was still wearing the old non-functioning collar (the drop-off mechanism did not work again). Rina was equipped with a new collar, and old collar was sent for refurbishing. After refurbishing of the old collar, we got the data for three more months of Rina's movements and activity. All data combined together (from old collar and fresh data from new collar) revealed that the shape and size of Risnjak pack territory did not change significantly during 2009. The size of their territory in 2009 was 256.8 km². With the determined minimal number of wolves during winter at 4 wolves, the general wolf density on the Risnjak pack area was 1.6 wolves/100 km² in winter/spring 2009.

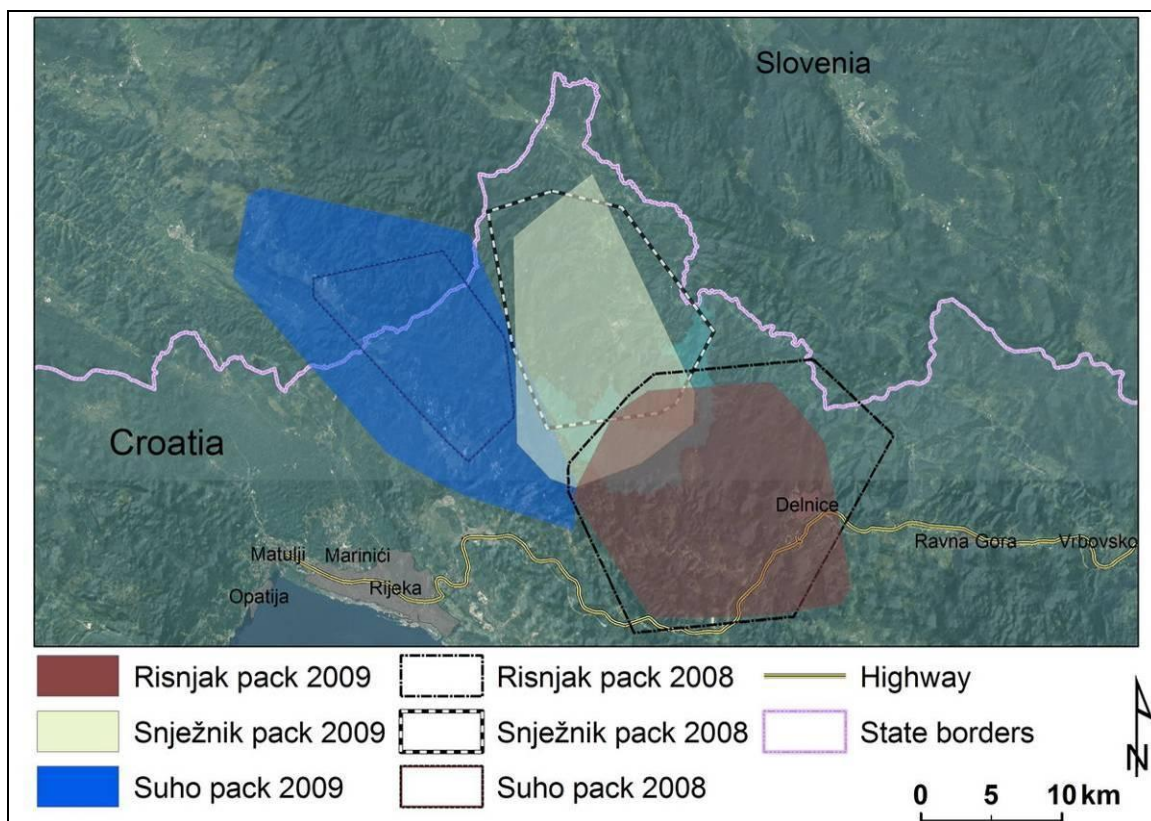


Figure 30: The territories of tracked wolves in Gorski kotar during 2009 and the comparison with same wolf pack territories in 2008.

Snježnik pack was studied since 20.07.2002 by the radio-tracking of seven different wolves (W04, W05, W08, W12, W13, W21 and W22). Alpha female Hilda is now a wolf with the longest tracked time (2672 days) in Croatia. A simple VHF collar was put on her neck at the very beginning of our work in Gorski kotar and facts that the collar is still operating and that a wolf is still alive are just amazing! With Hilda and her collar, we were lucky to witness practically the whole live of one wolf. We got to know her when she was a young, just maturing, wolf preparing for dispersal. Then she dispersed from the natal Risnjak pack, and was extremely lucky to find a mate and wolf-free area just north of her natal pack. Then, year after year, we documented some bits of her life, got to know some of her relatives, offspring from her litter, which she had every year from 2004 to 2009 (six litters). With the use of VHF collar we did not collect as many locations compared to GPS collars, but we got a very different prospective on a wolf life history.

A minimum of 6 wolves were present in Snježnik pack at the beginning of winter 2005/2006. The pack increased its territory to 358 km² during 2006. They used part of Risnjak pack territory on the south and reached Suho pack borders on the west (Figure 30). Hilda reproduced successfully in 2007 and 2008 and in the winter 2007/2008 the pack numbered at least 7 wolves. The size of pack territory, as determined only by tracking of Hilda (VHF collar) during 2008, was 184.5 km² only (Figure 30). Compared with the year 2006, when the territory size was derived from locations of Sara wolf (358 km², GPS collar). The number of wolves in the pack was almost the same in both cases, but the difference in determined territory size was almost 50%. This

indicates that the use of GPS collars gives more reliable data, compared to VHF collars. The fate of W12-Sara wolf became known to us in spring 2008. We tracked her by the use of two GPS collars (she was recaptured and collar replaced in 2006) from summer 2005 until spring 2007. Her second collar failed prematurely in spring 2007. In spring 2008 we were informed by hunters from Slovenia that a wolf with a collar was shot in Slovenia on 24.10.2007, at the edge of eastern border of Snježnik pack. Sara was shot as part of the legal intervention quota for Slovenia. We got some pictures of dead wolf and a collar which was not functioning. This event once again proves that the management of wolves and other large carnivores needs to be done on population level and not on the country level. Same animals are counted twice in two countries and are exposed to double reduction of numbers in the bordering area of countries which share the same populations of large carnivores.

During the winter 2008/2009, at least five different wolves were documented by snow-tracking on the Snježnik pack territory (Figure 31).



Figure 31: Tracks of five wolves from Snježnik (Hilda) pack found on 20.02.2009 (Photo J. Kusak).

During the spring, Hilda and her pack narrowed their movement to the southern end of their territory, indicating that the pack (Hilda) has a litter this year too (sixth litter since 2004). This was the second year that the pack decided to have a litter on the opposite side of their territory, relative to den sites in the first four years. The area was at the border of Risnjak NP and managed

forest, with four large meadows at the very border of NP Risnjak and with the water source on one of those meadows. The existence of this-year-pups was confirmed by several observations of pups by NP rangers, by us and most likely by many others. A minimum of five pups were counted during those observations. They stayed in the same area for the whole spring-summer-autumn period. By the end of summer, one pup was missing, and there were rumors that it was shot, but this (as usual) could not be confirmed.



Figure 32: Two (from a minimum of five) wolf pups from Snježnik pack at Šegina meadow on 16.09.2009 (Photo D. Turk).

With the successful capture of two male wolves (W21-Luka and W22-Drago), already during May, Snježnik pack had three wolves with collars, and documenting of pack's life was much improved. With two wolves with GPS collars, the amount of data started to increase rapidly. After five months of tracking, we collected reliable data set about Snježnik pack home range during spring-summer period. Most of the time they stayed around the den/rendezvous site, but they also made several excursions to other parts of their territory. The range of Snježnik pack was 195.2 km². By considering only adult wolves, the general density of wolves was 2.5 wolves/100km² during spring-summer.

Suho pack was tracked since 2006, when two wolves (Noah and Grga) were collared. The territory of the pack was 372 km², during the autumn and winter of 2006/2007. The Suho pack numbered 6 wolves at that time. A wolf W18-Max, collared in the summer 2007, most likely originated from Suho pack. It was obvious that wolf Max did not stay all the time with the pack already after first two months of tracking. Most of the time he did spend inside borders of Suho pack, and was together with other pack members (confirmed by howling). His GPS collar collected 3140 locations until 05.10.2008 and 1919 (61.1%) of them were inside pack territory, as delineated from locations of Noah and Grga wolves. Max was doing long excursions in all directions. It was captured and collared on the Snježnik pack territory where 271 (8.6%) of his other locations were fixed. Max wolf visited one wolf pack in Slovenia several times and 164 (5.2%) locations were inside that pack territory. The territory of that pack was revealed during 207 days of tracking of one accidentally captured wolf pup by colleagues from Biotechnological faculty from Ljubljana. A total of 956 (30.5%) Max wolf locations were recorded on the Risnjak pack territory. Risnjak pack was the last pack which Max visited and since the beginning of September 2008 stayed there, not only inside pack territory but being together with Risnjak pack. This was confirmed by the spatio-temporal comparison of GPS locations of both Max and Rina wolves. The analysis showed that they were staying and moving together. Further evidence that Max is together with the whole Risnjak pack came from repeated howling responses of the whole pack, including Max and Rina wolves. It is known from other studies (Yellowstone) that a foreign wolf can be accepted by the pack and be permanently or temporarily integrated to the pack. However, there is no many (if any) evidences that a single wolf successfully joins and leaves several neighboring packs and does not get killed by some of them. It would be interesting to monitor the development of the situation with Max wolf, only if collars on him and other wolves in the area will last long enough. The size of the area which Max wolf covered during 389 days of tracking was 1153.8 km², and this is so far the largest (home) range documented for a single wolf in Croatia. The movements of Max wolf covered territories of four known wolf packs in Croatia and Slovenia, but 112 of his locations were even outside of those four packs, maybe covering areas of some other packs which are not tracked by us.

The story of Max wolf suddenly ended on 11.12.2008, when Josip found him dead by following the mortality signal from his collar. Max lied in natural position, without visible injuries. His last resting place was under the large fir tree, on a hill top in the middle of Risnjak pack territory (Figure 34). The analysis of the data from his collar revealed that he stopped walking around on 23.11.2008, and was alive until 28.11.2008 00:45, when he stopped moving at all. Rina wolf and probably the rest of Risnjak pack visited him once on the spot where he lied while he was still alive, but then they left him for good.

Pathological examination showed that Max died due to extensive infection of left hind leg. The necrosis was caused by anaerobic bacteria from the genus *Clostridium*, which could enter the body of a wolf through a small puncture wound. Such wound was found on the leg overwhelmed by the infection.

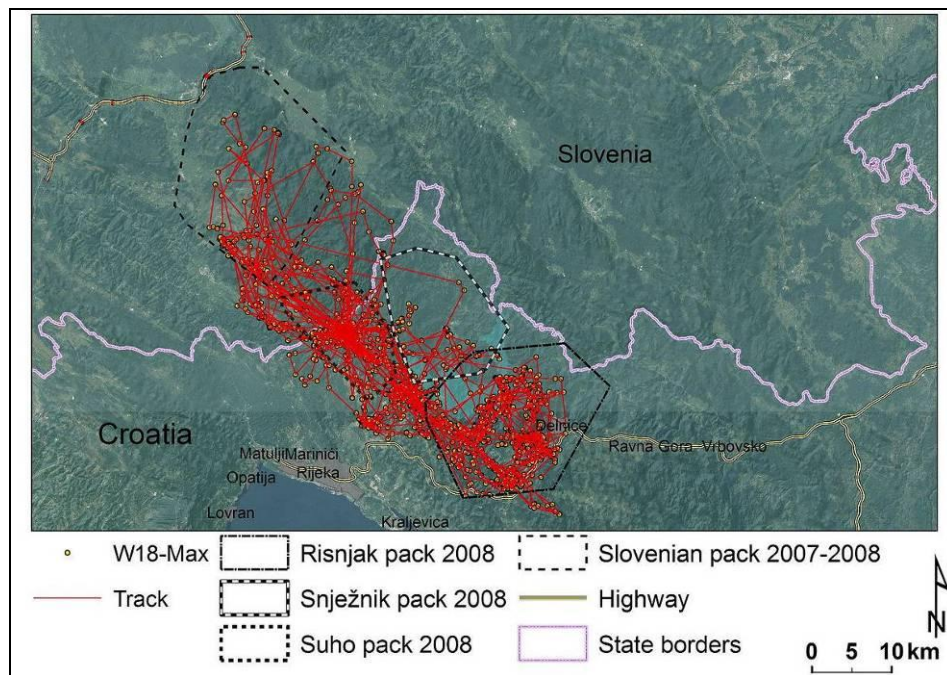


Figure 33: Movements of the wolf W18-Max. During the entire period of tracking, it was spending time in the territories of four known packs, and maybe on one unknown pack territory.



Figure 34: The wolf W18-Max died from natural causes on 28.11.2008. His last resting place was under the large fir tree, on a hill top in the middle of Risnjak pack territory.

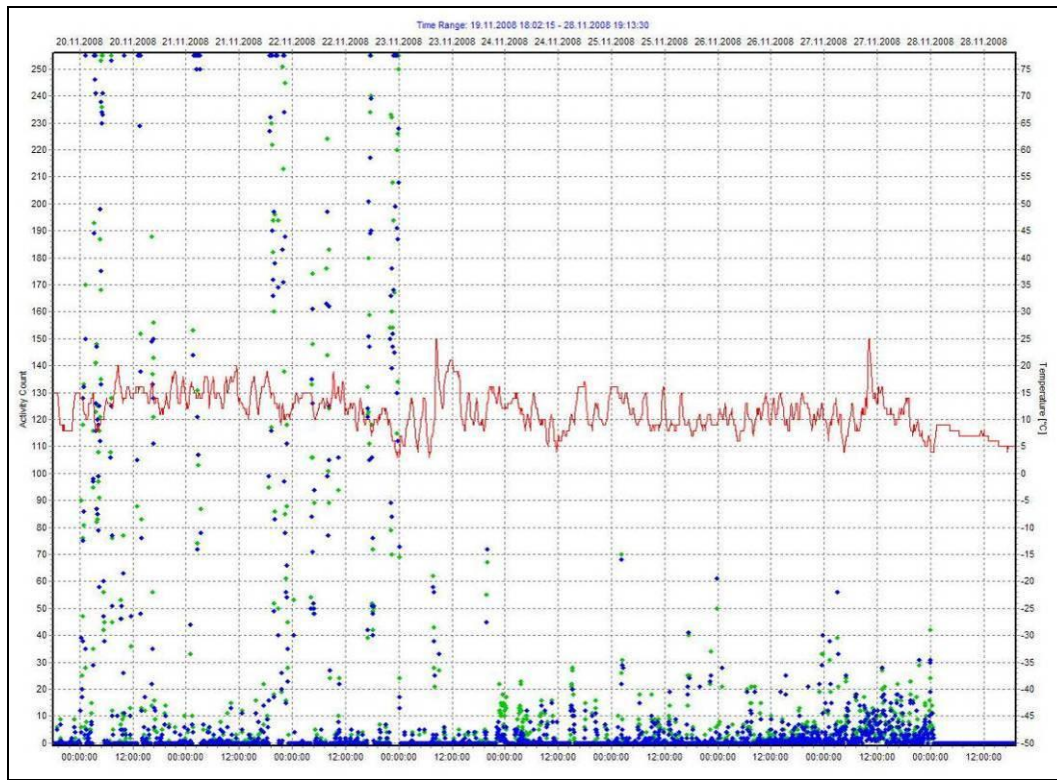


Figure 35: Activity graph of wolf W18-Max for the last ten days of his life. The wolf stopped walking on 23.11.2008 (confirmed by location data as well), but continued to show low level of activity until 28.11.2008 00:45, when all activity stopped, and the animal died.

During the winter 2007/2008 Suho pack numbered 8 wolves. During the first 45 days (autumn 2008) of tracking of wolf W20-Tvigi and Suho pack, 110 locations were collected. Tvigi and Suho pack covered 116.1 km². This was 1/3 of the Suho pack territory determined in 2006, but this time the reason for smaller range is to short tracking time. The tracking of W20-Tvigi was continued until the 12.04.2009 when the signal from her collar disappeared, after a total of 662 collected locations. Tvigi had dispersed north, to Slovenia on 02.04.2009, and it took only 10 days until it disappeared. She has moved as far as she could, close to Ljubljana town and to the very edge (fence) of Ljubljana-Trieste highway. Her sudden disappearance was most likely caused by illegal shooting, because there was no any info about the dead wolf. If a wolf was shot legally or if it has died due to traffic accident, we would get the info and the collar, like in the case with Sara wolf.

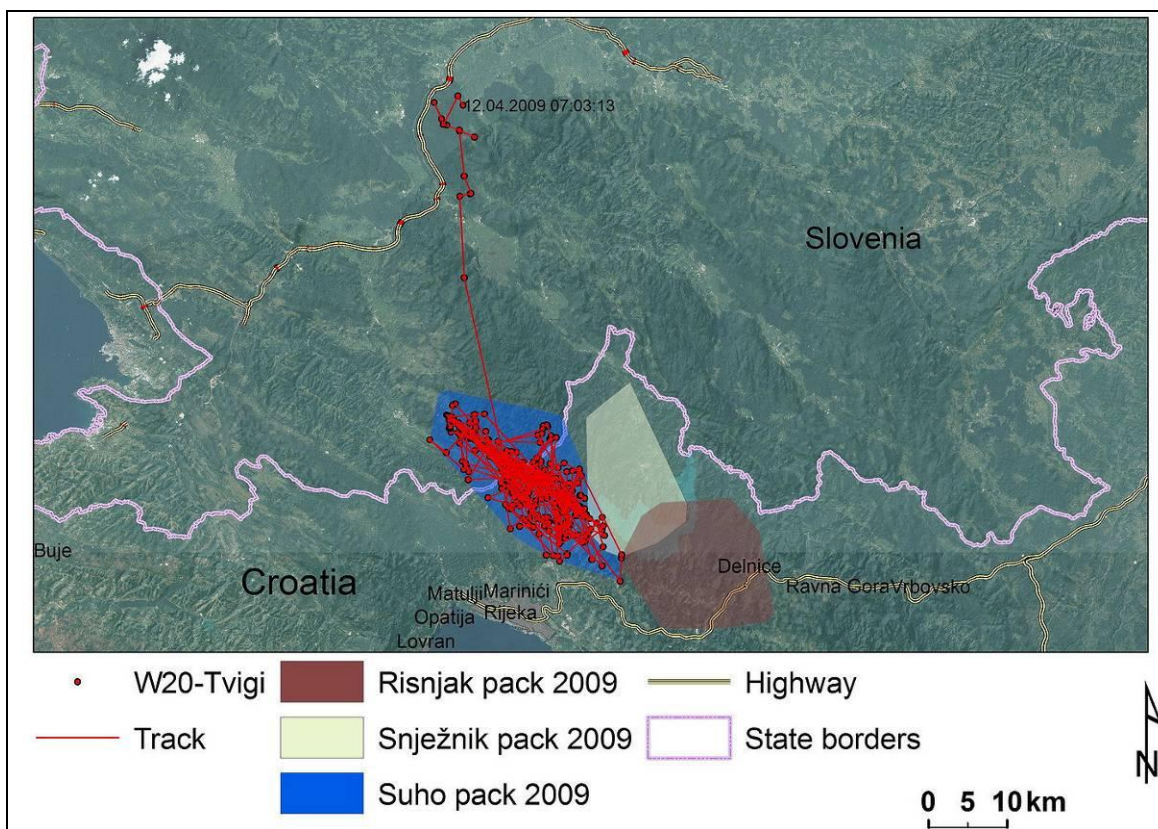


Figure 36: The movements and dispersal of wolf W20-Tvigi to Slovenia, with the date of her last known location near Ljubljana and the highway Ljubljana-Trieste.

The same story repeated with the next wolf collared in the Suho pack. Wolf W23-Taša, young female in the second year of life, was tracked as Suho pack member from 24.08.2009 and until 17.10.2009. During the period of 54 days, a total of 321 locations were collected. Taša was most of this time together with other members of Suho pack, as confirmed by howling checks and visual observations by game warden Damir Prokopović. During this time Suho pack was using area from the both sides of the CRO-SLO border. The size of the area used by Suho pack during the first 10 months of 2009 (with included locations of W20-Tvigi), was 316.8 km². By considering only adult wolves observed during winter 2008/2009, the general density of wolves on Suho area was 1.6 wolves/100km².

On 13.10.2009, Taša moved some 13 km to the north in Slovenia. She was documented to stay in this area during next seven days. Last data sent by the collar was from 17.10.2009 and on 19.10.2009, a VHF signal was detected by Miha Krofel (Slovenian researcher) near Mašun (Vrh Vil; 5449494, 5054205). No GPS data and no VHF signal were found after this time. The movement of W23-Taša is shown on Figure 37.

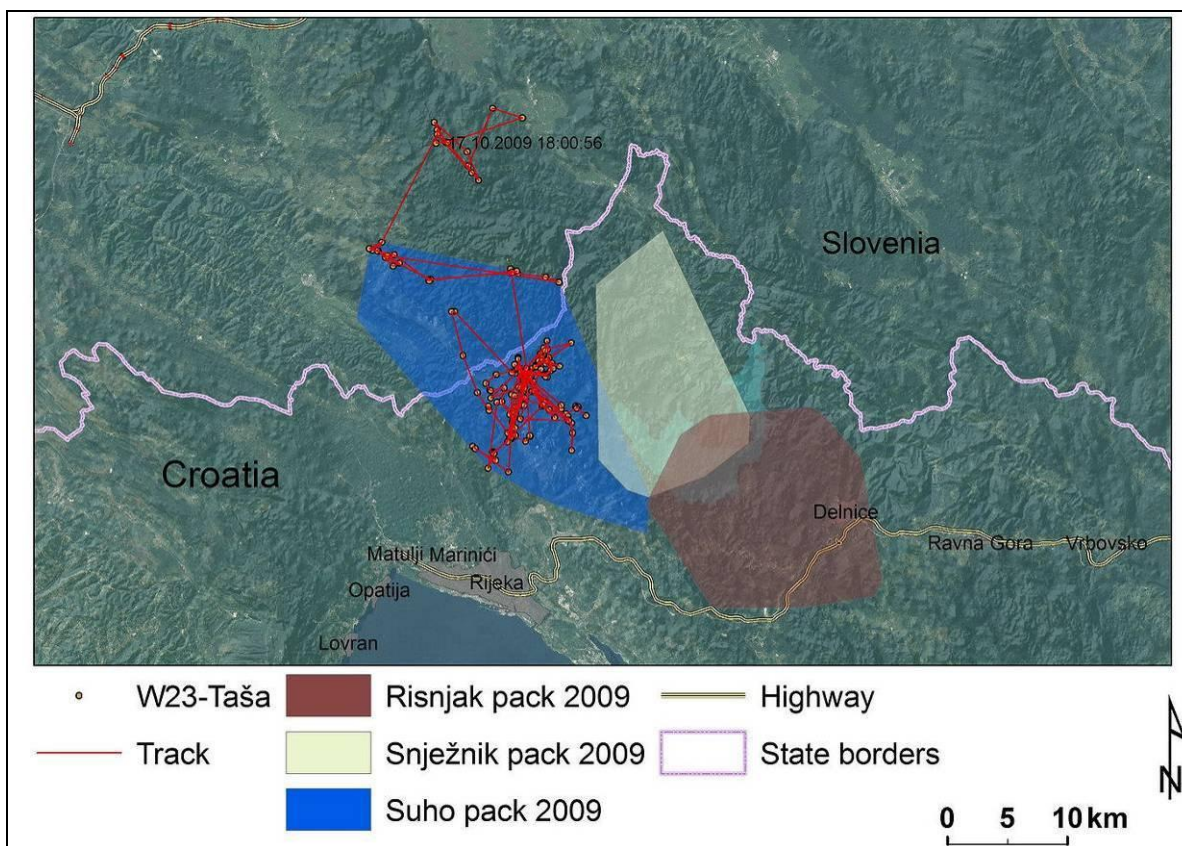


Figure 37: The movements, dispersal to Slovenia and disappearance of wolf W23-Taša.

Krasno pack on northern part of Velebit Mountain was tracked since summer 2007, when W17-Tara was collared with GPS-UHF collar. Before that, the presence of wolves in that area was determined by other signs (scats, howling and footprints). During the winter 2006/2007 Krasno pack numbered at least 6 wolves and during the next winter the number was at least 7 wolves. The pack had pups in 2008, as confirmed by howling survey and by visual observation of five pups.

During the 605 days of GPS tracking of Tara wolf and Krasno pack, a total of 4079 locations were collected. These are the first good information about wolf home ranges in Velebit area. Home range of Krasno pack was 736.4 km² during 2007-2008, but core areas with 95%, 75% and 50% of locations were only 93.1 km², 19.9 km² and 9.3 km² in the same time respectively. The size of Krasno pack territory was two times larger than the wolf territories in Gorski kotar, while the number of wolves is about the same as in Gorski kotar. This indicates that the density of wolves on Velebit Mountain was half of the density found in wolves from Gorski kotar. There could be several explanations for this phenomenon. Increased wolf ranges could be found in expanding wolf populations, but this does not seem to be the case in Croatia. Relatively low wolf density could be the consequence of low prey density, which could be more likely for the situation in Lika region, to which Velebit Mountain belongs. The only available data about wolf prey densities comes from hunting statistics, but our impression is that this data is not good enough. More research is needed in this direction.

Found low wolf density and larger daily movements of wolves in this part of their range in Croatia had immediate practical consequence for wolf conservation and management, particularly when interpreting results of winter snow-tracks counting of wolves.

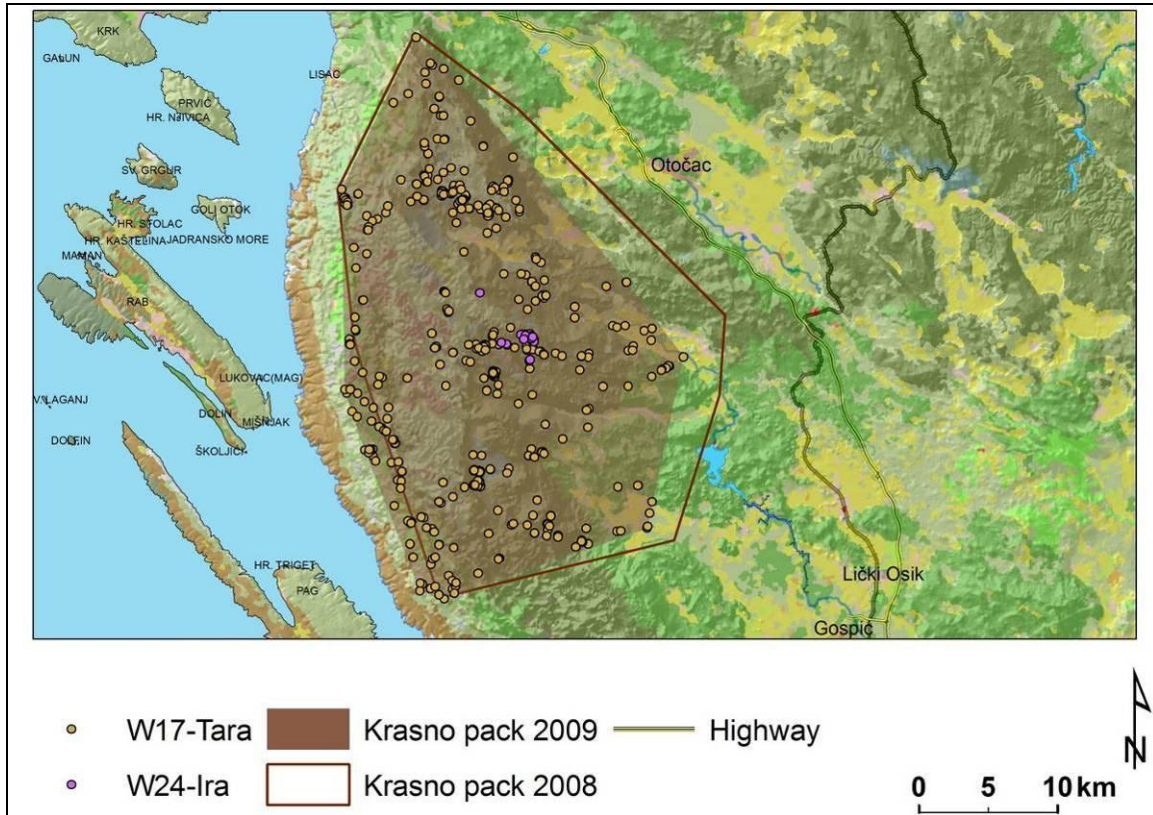


Figure 38: Home range of W17-Tara and Krasno pack during 2007-2008 was 736.4 km², but core area with 95% of locations was only 93.1 km². Home range during first 4 months of 2009 was 641.5 km².

Krasno pack numbered eight wolves during the winter 2008/2009, resulting with general density of 1.2 wolves/100km². The pack had a litter in 2009, what was confirmed by the capture of a pup W24-Ira. The den/rendezvous site was in the center of their territory and they stayed on this place until the beginning of November. Then the whole pack moved on the lower elevations and closer to Krasno village, as confirmed by radiotracking and howling in the same time.

Tracking of red deer and roe deer

Since the end of 2007 and until the end of 2009 a total of 11 cervids were radio tracked in Gorski kotar. All radio-collared cervids had VHF collars and 559 locations were collected (Table 8). The first radio-collared red deer was found dead after 38 days of tracking. The cause of its death was the rupture of urinary bladder and consequent uremia (intoxication with its own urine). It seems to have been a natural accident. All other animals survived from the winter 2007/2008 until the following winter. They were spared from being shot by hunters during hunting season, but interestingly only one of them was killed by large carnivores.

Table 8: Basic data about red deer and roe deer radio-tracked in Gorski kotar during 2008.

ANIMAL	STAR	END	N DAYS	N LOCATIONS	FATE
RD01-Fana	25.12.2007	03.03.2009	434	60	Active
RD02-Daki	12.02.2008	26.09.2009	592	32	Shot
RD03-Tina	19.04.2008	10.03.2009	325	32	Starvation/disease
RD04-Mina	25.04.2008	10.03.2009	319	24	Active
RO01-Šiljo	02.12.2007	09.01.2008	38	12	Disease
RO02-Gabi	18.12.2007	19.02.2009	429	83	Starvation
RO03-Nova	06.01.2008	20.03.2009	439	72	Starvation
RO04-Maki	07.01.2008	23.10.2009	655	101	Active
RO05-Magda	12.01.2008	03.03.2009	416	66	Active
RO06-Ars	12.02.2008	22.03.2009	404	43	Active
RO07-Lena	09.04.2008	03.03.2009	328	35	Lynx predation
ALL				560	

All tracked animals, with the exception of roe deer RO04-Maki, stayed in the vicinity of the area where they were captured and radio-collared. The size of that cumulative area was 69.1 km². By the beginning of summer 2008, roe deer Maki migrated from the area where it was collared and moved 16 km to the north-east and stayed there for the rest of the summer and autumn. It repeated this behavior in the next years too.

During and at the end of the winter 2008/2009, four tracked cervids died. Three of them died due to starvation or the combination of starvation and disease. One roe deer ended up as a prey of a lynx. During the deer hunting season the only male red deer (Daki) was legally shot in Slovenia.

It is interesting that of 11 tracked animals, only one died due to predation and one was shot, while other four died of other natural causes, mostly harsh winter. The sample size is still too small for drawing any conclusions, but is indeed intriguing and calling for more of such studies.



Figure 39: In-the-field examination (measuring the body mass) of red deer doe RD03-Fana, which died from disease/starvation by the end of the winter 2008/2009 (Photo J. Kusak).

WOLF MORTALITY

A mortality of 24 wolves was documented between 15.11.2008 and 23.10.2009. Prevailing cause of death was legal shooting, with some cases of illegal shooting. Of particular importance was the case of one rabid wolf which attacked and mauled an old man. The injured man survived the attack and consequent infection with the rabies virus (of course with full medical treatment), but the case again was used by anti-wolf groups which again raised the issue of “too many wolves”. The debate about it was going on for few months and then disappeared from the media.

Table 9: Basic data about dead wolves in Croatia between 15.11.2008 and 11.09.2009.

AnimalID	AnimalName	Gender	Time	Cause
WCRO105	Kvota GK 2008-01	M	25.11.2008 22:15:00	Legal hunting
WCRO106	Miranje Donje cesta	F	27.11.2008 22:22:22	Road kill
W18	Max	M	28.11.2008 00:45:00	Disease
WCRO107	Kvota DA 2008-1	M	30.11.2008 10:30:00	Legal hunting
WCRO109	WCRO109 kvota GK02	M	09.12.2008 20:00:00	Legal hunting
WCRO110	WCRO110 Kvota LI 2008-1	M	21.12.2008 10:30:00	Legal hunting
WCRO111	WCRO111 kvota DA 2008-02		24.12.2008 10:00:00	Legal hunting
WCRO114	Prolaz Čista Mala	M	26.12.2008 19:30:00	Road kill
WCRO112	WCRO112 kvota LI 2008-02	F	27.12.2008 10:45:00	Legal hunting
WCRO113	WCRO113 kvota DA2008-03	M	28.12.2008 09:15:00	Legal hunting
WCRO115	WCRO115 kvota GK 2008-3	F	12.01.2009 22:45:00	Legal hunting
WCRO116	WCRO116 Kvota LI 2008-03	M	24.01.2009 23:00:00	Legal hunting
WCRO117	Poličnik cesta	M	17.03.2009 05:30:00	Road kill
WCRO118	WCRO118-bjesnoća	F	21.03.2009 14:00:00	Rabies
WCRO119	Kaštel Štafilić cesta	M	07.04.2009 04:00:00	Road kill
WCRO120	Jurići zavoji	F	01.05.2009 16:00:00	Road kill
WCRO121	Gaz cesta Trilj		02.05.2009 22:22:22	Road kill
WCRO122	Vinjani lubanja		05.05.2009 19:22:22	Illegal hunting
WCRO123	Nova Gradiška		17.05.2009 06:00:00	Illegal hunting
WCRO124	Velić cesta	F	04.06.2009 22:22:22	Road kill
WCRO125	Mojanka		21.06.2009 22:22:22	Poisoning
WCRO127	Kokošinjac	F	30.07.2009 06:00:00	Legal hunting
WCRO126	Twigg in lungs	M	11.09.2009 12:25:00	Disease
WCRO128	Kvota GK2009-01	M	23.10.2009 17:35:00	Legal hunting

Another rather interesting case was the shooting of WCRO123 by the town Nova Gradiška. This wolf was shot in lowland part of Croatia, where wolves were no present in the last 50 years. See map at Figure 10. This place is close to one, relatively large (enough for 3 wolf packs) but isolated area in lowland part of Croatia, which is recognized as suitable for wolves, but currently without wolves present.

THE IMPLEMENTATION OF WOLF MANAGEMENT PLAN

The wolf management plan for Croatia is in the implementation phase since 2005.

In 2009 we actively worked on its implementation through organizing or actively participating in various workshops, meetings and field activities.

The revision of the Croatian wolf management plan is almost completed. The second workshop for its revision has been held in Zagreb on 13.02.2009. Different interest groups were represented through 31 participants. The current state of wolf population has been presented and extensively discussed. Much of the results of our work shown above were used here.

However, the main issue of discussion was the size of legal quota for wolves in Croatia. Agreement has been reached that the current population size is around 210 and that the social capacity does not allow further increase. Illegal killing is still present and the difficulty is the calculation of number of wolves to be allowed to be shot with this unknown mortality factor. Wolf population may sustain up to 30% annual loss due to human activities, but only 15% total known mortality will be planned, as the rest is probably lost in poaching. The subsequent monitoring of population trend will help design quotas for the following years.



Figure 40. The workshop for the revision of wolf management plan held in Zagreb on 13.02.2009.

The management plan allows the limited lethal control of wolf population. We set the limit of 15% human caused known (documented) wolf mortalities.

On 11.12.2009. was held a course for “damage inspectors” at the Veterinary Institute in Zagreb. All damage inspectors were present. Josip Kusak presented about distinguishing the signs of predator on prey. In the necropsy room several wolf killed sheep and goat has been dissected, as well one wolf and jackal body.



Figure 41. The course for “damage inspectors” held at the Veterinary Institute in Zagreb on 11.12.2009.



Figure 42. Practical part of the course for “damage inspectors” held at the Veterinary Institute in Zagreb on 11.12.2009.

The next day, on 12.12.2008, a course for Large carnivores emergency team was held in Zagreb, at Zagreb ZOO. After the theoretical part we trained them on immobilizing the wolf, and taking the measurements and samples.



Figure 43 and 44. Theoretical part of the course for “Large carnivores emergency team held on 12.12.2008, in the Zagreb ZOO.



Figure 45. Practical part of the course for “Large carnivores emergency team held on 12.12.2008, in the Zagreb ZOO. Training on immobilized wolf on taking the measurements and samples.

As a special problem the appearance of a new wolf pack in the part of costal area (Posedarje, Zadar town county) required the team visit and a discussion with local farmers and other inhabitants. The instructions of how to protect sheep of wolf attacks and how to obtain damage compensations were given.



Figure 46: Meeting with farmers from Posedarje area (Dalmatia) on 01.02.2009. Wolves appeared in the area after a long absence, farmers were not ready for this (Photo J. Kusak).

We are involved in counting the number of wolves by snow tracking, what is one another activity from “Wolf Management Plan”. Josip Kusak has developed a protocol and approach to this activity. Together with representatives from State Institute for Nature Conservation he held two meetings (Lika and Gorski kotar) with people who will perform snow tracking. This activity is not only to get the number of wolves, but also to actively include representatives of interest groups in the process of managing wolves, because the wolf management is not only to shoot them, but much wider and complex process.

Especially important workshop was held in Zagreb on 21.09.2009 when 39 participants agreed, after a fierce discussion, that the quota for 2010 will be 21 wolves. The details on the quota distribution and handling of killed wolves have been elaborated in subsequent meetings.

THE IMPLEMENTATION OF LYNX MANAGEMENT PLAN

The lynx management plan for Croatia is in the implementation phase since 2005.

Lynx continues to be much endangered and the close monitoring and care of the population is crucial.

The “Proposal for common lynx management strategy for Croatia and Slovenia” has been produced through DinRis INTERREG project. It is in the line of “Guidelines for Population Level Management Plans for Large Carnivores” prepared by Large Carnivore Initiative for Europe (LCIE) for EU. Following this concept for January 2010 planned is the international lynx meeting in Slovenia with participants from Slovenia, Croatia and Bosnia and Herzegovina, hence representing the entire Dinaric lynx population range. The main strategic decision should be on eventual augmentation, i.e. releasing additional lynx to the population. The fear is in spreading the Dinaric lynx population further south-east and reaching the critically endangered Balkan lynx population. That may lead to the gene mixing with unclear consequences (positive and negative).

Over the past year in Croatia we found 4 dead lynx (one killed in traffic and 3 by unknown causes). Also we had the records with evidence of reproduction: two litters with 3 and one with two kittens.

HIGHWAY MITIGATION MEASURES

In 2009 we intensively worked on all new highways in Croatia.

1) Highway Rijeka – Zagreb

In February 2009 we made the first inspection and evaluation of the entire highway length through the large carnivore range in Gorski kotar. In a 90-page document (in Croatian) each potential crossing structure was described, graded and the measures for improvement were recommended (Table 10). In 2010 we will repeat the study and will be able to compare the eventual changes.

Table 10: Summary of overall grading of Rijeka –Zagreb highway through Gorski kotar in 2009

#	Section	Length (km)	N of objects	Width of objects (m-sum)	Share of objects (%)	Cumulative grade	Grade per km
1	Bosiljevo - Grobnik	56	68	17290	25.24	201	2.93

In 2009 the monitoring of Dedin green bridge has been resumed. The new sand track (for footprints) has been prepared and infra-red sensors are activated again. Also the new signs about the limitation of human use were placed.



Figures 47 and 48. New sand track and warning sign on the Dedin green bridge in Gorski kotar

2) Highway Zagreb – Dubrovnik (section Bosiljevo – Ravča)

In April 2009 we made the fourth inspection and evaluation of the entire highway length through the large carnivore range from Bosiljevo to Ravča. The section south of Split has been evaluated for the first time, including 5 new green bridges at this section. In a 176-page document (in Croatian) each potential crossing structure was described, graded and the measures for improvement were recommended. The changes from previous years and “Hot spots” were emphasized. Table 11 indicates that the overall permeability (12.9%) is lower than in Gorski kotar (25.2%), as well as the general grade (1.67). However, we consider that the minimum standards have been reached and the proper maintenance is now essential.

Table 11: Summary of overall grading of Zagreb – Dubrovnik highway through large carnivore range in 2009

#	Section	Length (km)	N of objects	Width of objects (m-sum)	Share of objects (%)	Cumulative grade	Grade per km
1	Bosiljevo - Šestanovac	340	192	39788	12.9	567	1.67



Figure 49. Part of the new highway Zagreb – Dubrovnik south of Split (photo J. Kusak)



Figure 50. Green bridge Konšćica; one of 5 new green bridges on the highway south of Split (Photo J. Kusak)

PAPERS PUBLISHED IN 2009

Here we enclosed titles and abstracts of scientific publications were published during 2009.

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CRANIOMETRICAL ANALYSIS AND DETERMINATION OF SEXUAL DIMORPHISM IN BROWN BEAR (*Ursus arctos* L.) FROM CROATIA

Vladimir FARKAŠ, Tomislav GOMERČIĆ, Magda SINDIČIĆ, Vedran SLIJEPEČEVIĆ, Đuro HUBER, Alojzije FRKOVIĆ, Sanja MODRIĆ

SUMMARY: Family of bears (Ursidae) have a potential to exhibit various characteristics under the influence of environment and nutrition. The goal of this paper was to analyze craniometrical measurements of brown bear (Ursus arctos L.) population from Croatia with objectives to define them, as well as to determinate differences between sexes. A total of 34 skulls have been studied, out of which 13 (38,24 %) belonged to female animals, 20 (58,83 %) to males, while sex was not identified for one (2,93 %) skull. All skulls belonged to adult animals, with the average age of 8,4 years (range 3 to 20 years). A total of 49 measurements were taken on each skull with the 0,1 mm precision, so totally 829 craniometrical measurements have been statistically analyzed. Statistically significant difference between the sexes has been observed in 42 (85,72 %) craniometrical measurements, while for totally 16 (32,65 %) measurements it has been observed that males are absolutely bigger than the female bears (meaning that the smallest males were bigger than the biggest females). For those 16 measures we have defined border values that could help in sex determination. Correlation and equation of regression were calculated for total length of skull and zygomatic breadth. Corelation was $r = 0,7961$ for male bears and $r = 0,6812$ for females, while equaton of regression for calculation of zygomatic width using total skull length was: for males - zygomatic width = $0,8365$ total skull length - 79,105; for females – zygomatic width = $0,6867$ total skull length - 31,247. In comparison of skull features of bears from Croatia with the ones from Slovakia we have found that male bears were almost the same while Croatian females were smaller. Bears in Croatia were smaller than the ones in Romania but the differences among males were smaller, while the females were significantly larger in Romania.

Key word s : brown bear, Ursus arctos, craniometry, sex dimorphism, skull, Croatia

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Rehabilitation and reintroduction of captive-reared bears: feasibility and methodology for European brown bears *Ursus arctos*

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Bears need to learn appropriate survival and behavioural skills in the first 1 or 2 years of life. They can acquire those skills fully only if raised by their mothers in the natural habitat. Releasing captive-born and/or handreared cubs threatens their life expectancy because individuals will have problems finding food and shelter, and experience intra- and inter-specific predation. Additionally, bears reared in captivity may cause behavioural and genetic pollution of the indigenous free-living population. The release of bears cannot be called 'reintroduction'. The surplus of bears currently in captivity should be resolved by control of reproduction and investment in efforts to prevent situations whereby wild-born bears become orphaned and captive. The existing captive population should be given the best possible care and be used as ambassadors to raise public awareness about situation of free-living conspecifics. The above statements are corroborated by experiences with European brown bears *Ursus arctos*.

Key-words: brown bear; habituation; problem bear; rehabilitation; reintroduction; release.

The following 3 abstracts belong to this source:

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TELEMETRY STUDY OF EURASIAN LYNX (*LYNX LYNX*) IN CROATIA

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Eurasian lynx in Croatia permanently inhabits areas of Gorski kotar and Lika, and the population size is estimated at 30 to 60 individuals. There is not much data available about biology of Eurasian lynx in the Dinaric mountains, especially about their movements and activity. The goal of this research was to gather information about movements of Eurasian lynx in Croatia. Telemetry research was conducted on 4 animals; two adult males, one adult female and one subadult female in Gorski kotar, Croatia, between November 30, 2006 and April 7, 2008. Animals included in this research were captured with GSM-alarm equipped traps, chemically immobilized with mixture of medetomidine and ketamine, measured, collared with GPS and VHF collars, micro-chipped and released at the capture site. Results of research showed that adult Eurasian lynx males have larger territories than adult females with kittens. Adult male L03 - Ivek, in 83 days that he was monitored, has covered the area of 116.1 km² and adult male L07 - Dinko in 24 days has covered the area of 44.3 km². Adult female L06 - Tisa, in 54 days has covered the area of 62.5 km². Adult females with kittens on average move faster than adult males, which is probably caused by increased need for nutrients. Subadult females remain on their mother's territory until April. Eurasian lynx in Gorski kotar have similar daily movements like lynx in Poland, and identical like lynx in Slovenia.

Keywords: telemetry, Eurasian lynx, *Lynx lynx*, Croatia

COMPARISON OF MITOCHONDRIAL DNA OF GREY WOLF (*Canis lupus*) AND DOG (*Canis lupus familiaris*) FROM CROATIA

M. Sindičić, T. Gomerčić, A. Galov, H. Arbanasić, J. Kusak, Đ. Huber, A. Slavica, department for game biology, pathology and breeding Veterinary Faculty University of Zagreb Heinzelova 55, HR-10000 Zagreb (magda.sindicic@vef.hr, slavica@vef.hr); Biology Department Veterinary Faculty University of Zagreb, Heinzelova 55, HR-10000 Zagreb (tomislav.gomercic@vef.hr, kusak@vef.hr, huber@vef.hr); department for animal physiology Faculty of science University of Zagreb, Rooseveltov trg 6, HR-10000 Zagreb (agomercic@yahoo.com, haidi.arbanasic@zg.t-com.hr) Genetic findings, along with morphological and ethological characteristics, indicate that wolves are the only ancestors of domestic dogs. They have identical karyotypes, can hybridise and produce fertile offspring. While dog and wolf lineages are difficult to separate for nuclear genes, mitochondrial lineages are clearly distinguishable for the two species. This offers a good opportunity to evaluate the differences between. The aim of this research was to compare mitochondrial DNA control region of grey wolf and dog from Croatia. We have analyzed 60 wolf muscle samples and 20 blood samples of mixed dog breeds from Croatia. A 281 base pair part of the mitochondrial DNA control region has been extracted and analyzed using standard population genetic tools. We have identified 6 wolf and 20 dog haplotypes. Wolf haplotypes had 11 and dog 17 polymorphic sites. Dogs showed higher genetic diversity for all analyzed characteristics. Dog haplotype diversity was 0.9316, while for 60 wolf samples it was 0.7441. Our research confirmed previous findings that mitochondrial DNA control region haplotypes of European wolf populations are not shared with any of the dog breeds studied so far.

Keywords: grey wolf, dog, mitochondrial DNA, control region

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SEX DETERMINATION BY POLYMERASE CHAIN REACTION IN A MUSEUM MEDITERRANEAN MONK SEAL (*Monachus monachus*) SKULL FROM THE ADRIATIC SEA

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The Mediterranean monk seal (*Monachus monachus*) is the only seal species that inhabits Mediterranean Sea and one of the most endangered animal species of the world. Once found throughout Croatian part of the Adriatic Sea, the Mediterranean monk seal is considered extinct in this area in the last 20 years, although some individuals from the neighboring populations enter the Adriatic Sea and stay there temporarily. Because of its highest level of endangerment any data about this species are crucial. The Department of Anatomy, Histology and Embryology of the Faculty of Veterinary Medicine, University of Zagreb keeps a Mediterranean monk seal skull that was found in 1964 in Komiza. Soft tissues were removed from the skull and it was dried. Since knowing the sex of the specimen is important for further investigations, we aimed to determine its sex. DNA was isolated from dry tissue of dental alveoli. Polymerase chain reaction was performed using four primers (Y53-3C, Y53-3D, P1-5EZ, P2-3EZ). A 445 bp-long fragment of ZFX/ZFY gene was successfully amplified, while there was no amplification of a 224 bp-long fragment of sry gene, indicating that the investigated skull was female.

Keywords: monk seal, *Monachus monachus*, PCR, sex

DETERMINATION OF DEER CONDITION BASED ON BONE MARROW FAT CONTENT

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In Gorski kotar, Croatia wolves [*Canis lupus*] and Eurasian lynx [*Lynx lynx*] share habitat with their main prey species - red deer [*Cervus elaphus*] and roe deer [*Capreolus capreolus*]. The goal of this study was to obtain data about condition status of red deer and roe deer from Gorski kotar and to see if there are any differences between animals shot by hunters and killed by predators. A total of 53 (62%) samples of red deer and 33 (36%) of roe deer have been analyzed. Sixty two (72%) samples came from shot animals and 24 (28%) from animals killed by wolf or lynx. The age was determined for 50 (58%) animals and it ranged from 0.5 to 11 years (average 4.3 years). Bone marrow of 74 (86%) samples was from the metatarsal bones, while 12 (14%) of samples were from the femur. The condition of animals, expressed as the percentage of fat in bone marrow. The average bone marrow content of red deer from Gorski kotar was 80.2%, indicating excellent condition, while roe deer had 61.8% of fat, resulting in good condition. Bone marrow fat content was the lowest during the spring (45.3%) and the highest during the autumn (83.4%). Young animals had significantly lower fat content (56.5%), compared to adults (78.9%, $p < 0.025$). Significant difference ($p < 0.01$) was also found between human shot animals (81.3%) and those preyed by predators (52.6%). This indicates that wolves and lynxes mainly hunt animals which can barely be considered as being in a good condition.

Keywords: bone marrow, fat, red deer, roe deer, Gorski kotar, Croatia

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**CRANIAL MORPHOMETRY OF ADULT MEDITERRANEAN
MONK SEAL (*Monachus monachus*) FROM THE ADRIATIC**

SEA**Tomislav Gomercic., Vladimir Farkas., Martina Duras Gomercic.,****Duro Huber., Hrvoje Gomercic.***'Department of Biology, Faculty of Veterinary Medicine, University of Zagreb, Croatia**.Faculty of Veterinary Medicine, University of Zagreb, Croatia**department of Anatomy, Histology and Embryology, Faculty of Veterinary Medicine,**University of Zagreb, Croatia**torn is lav. gomercic@vef.hr***Abstract**

The Mediterranean monk seal (*Monachus monachus*) is one of the most endangered animal species in the world. Historically, it was spread along the Adriatic Sea, but it is declared extinct in this region since the second half of the 20th century. Cranial morphometry of an adult Mediterranean monk seal skull from the Adriatic Sea was recorded. The skull originates from the year 1964 and it is presumed that the specimen was killed by a fisherman on the small island Bisevo, close to the island Vis. Today, the skull is housed in the marine mammal collection of the Department of Anatomy, Histology and Embryology of the Faculty of Veterinary Medicine, University of Zagreb, Croatia. Twentyfour cranial measurements were taken using digital calipers. The aim of our study was to preserve craniometrical data of one of the last adult autochthonous specimen of the Mediterranean monk seal from the Adriatic Sea.

Keywords: cranial morphometry, skull, Mediterranean monk seal, *Monachus monachus*, Adriatic Sea

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Variation in teeth number, teeth and skull disorders in Eurasian lynx, *Lynx lynx* from Croatia

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A b s t r a c t. The last specimens of indigenous Eurasian lynx (*Lynx lynx*) in Croatia were exterminated around year 1903. Lynx dispersed back to Croatia after six animals were reintroduced to Slovenia from Slovakia in 1973. Considering the consequences of founder effect, genetic drift and expected high level of homozygosity, the goal of this paper was to determine variation in teeth number, teeth and skull disorders in Croatian lynx. It should also determine whether there has been a change in frequency of occurrence of developmental anomalies in relation to the population it originates from and in relation to other lynx populations. We studied 58 lynx skulls originating from the reintroduced lynx population. Changes on teeth and skull were found on 23 skulls (39.7%): supernumerary maxillary second premolar P₂ (9 skulls, 15.5%), supernumerary mandibular second molar M₂ (3 skulls, 5.2%), congenitally absent maxillary incisor (3 skulls, 6.9%), extra tooth between maxillary third incisor I₃ and canine (1 skull, 1.7%) and acquired disorders of teeth and skull (9, 15.5%).

Key words: skull, congenitally absent teeth, supernumerary teeth, reintroduced lynx

EWDA Best Student Presentation Award applicant

IMPORTANCE OF LYNX (LYNX LYNX) AT TAC K S T O LIVESTOCK AS PERCEIVED BY INHABITANTS OF LYNX AREAS IN SLOVENIA AND CROATIA

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Eurasian lynx (*Lynx lynx*), similarly to other large carnivores can cause damage to human property by preying on sheep or goats. This controversial aspect of lynx ecology is one of the reasons why people sometimes oppose its conservation. Lynx population, shared by Slovenia and Croatia, was established following a reintroduction of 6 individuals to southern Slovenia in 1974. In both countries, lynx is listed as an endangered species which is strictly protected by law. Damages caused by lynx are compensated by the governments. The purpose of this paper is to evaluate perceptions of local inhabitants of lynx areas in Slovenia and Croatia about the issue of lynx damages to livestock. We have carried out a public attitude survey in the beginning of 2008. Questionnaire with paid return postage was sent to a randomly selected 1000 households in each country. Questionnaire was followed with a reminder/thank-you card 10 days later. Obtained response rates were 35.3% for Slovenia (SI) and 20.1% for Croatia (HR). We did not find any significant difference on respondents' demographic characteristics among the two countries. Average age of respondents was 52 years for Slovenia and 51 for Croatia. In both countries most of the respondents were male (68.6% in SI and 66.8% in HR). Sheep owners were 4.5% and 4.3% of respondents in Slovenia and Croatia, respectively. There were fewer goat owners (3.1% and 2.9% for SI and HR, respectively). Damage caused by lynx on their livestock experienced 1.1% and 1.0% of respondents in Slovenia and Croatia, respectively. Although majority of respondents in both groups agreed or strongly agreed to the item "It is necessary to conserve lynx population in SI/HR for the future generations", respondents from Croatia scored significantly higher on the item (Mann-Whitney U test, $p = 0.001$), thus demonstrating more positive attitudes toward lynx. Few respondents (9.0% in SI and 11.0% in HR; $p = 0.863$) expressed fear that lynx could cause them financial damage, however almost 20% of respondents from Slovenia and 15.9% from Croatia believed that sheep and goats are the main food for lynx ($p = 0.035$). Approximately one third of respondents (SI: 35.2%; HR: 33.7%; $p = 0.500$) from both countries agreed that damage-causing lynx should be shot. Large majority of all respondents (SI: 90.6%; HR: 97.2%; $p = 0.011$) agreed that the damage caused by lynx should be compensated. In conclusion, both Slovenian and even more so Croatian respondents were in favour of lynx conservation in their respective countries. Majority of respondents do not fear that lynx could cause them financial damage but relatively high percentage, especially in Slovenia falsely believes that sheep and goats are the main lynx food. The next step is to investigate whether and how do the beliefs about the species impacts to livestock relate to support for conservation of the species.

70 Focusing on Diseases of European Wildlife and Recent Changes in Disease Distribution

The permeability of highway in Gorski kotar (Croatia) for large mammals

Josip Kusak & Djuro Huber & Tomislav Gomerčić & Gabriel Schwaderer & Goran Gužvica

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Abstract The highway from Zagreb to Rijeka stretches 68.5 km through a wildlife core area in Gorski kotar (Croatia). It has 43 viaducts and tunnels, and one specifically constructed (100 m wide) green bridge (Dedin). One quarter of the total highway length consists of possible crossing structures. At Dedin green bridge, a total of 12,519 crossings have been recorded during 793 different days of active infrared monitors being in operation, or 15.8 crossings per day. Two monitored tunnel overpasses had 11.2 and 37.0 crossings per day, respectively, whilst 4.3 crossings occurred per day under one monitored viaduct. Of those crossings, 83.2% were by ungulates and 14.6% by large carnivores. Radio-tracked large carnivores, brown bear (*Ursus arctos*), grey wolf (*Canis lupus*) and Eurasian lynx (*Lynx lynx*), expressed strong positive selection for tunnels and viaducts, whilst avoiding small underpasses or bridges. Selection for the use of Dedin green bridge was

equal to its availability. We conclude that this green bridge, constructed as a measure to mitigate the negative effects of the studied highway, served its purpose acceptably. Territorial and dispersing radio-tracked large carnivores crossed the highway 41 times, using both sides of the highway as parts of their home ranges. Overall, the highway in Gorski kotar does not seem to be a barrier. This demonstrates that it is possible to maintain habitat connectivity during the process of planning the highway route.

Keywords Brown bear . Grey wolf . Eurasian lynx .
Green bridge . Habitat continuity

Trichinellosis in wolves from Croatia

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Croatia

ABSTRACT

The aim of the present study was to investigate the prevalence of *Trichinella* infection in wolves (*Canis lupus*) in a 17,468 km² area in Croatia. Muscle samples were collected from 67 wolves between 1996 and 2007 and analyzed by artificial digestion. Muscle larvae were detected in 21 wolves (31%) and genotyped by multiplex PCR. *Trichinella britovi* was the predominant species confirmed in 90% (19 wolves) while *Trichinella spiralis* was detected in 9% (2 wolves). The presence of the so called “domestic” *Trichinella* species was a surprise since, to date, only *T. britovi* had been reported in wild animals in this region. The larval burdens in infected animals ranged from 0.3 to 45.9 larvae per gram. The prevalence of infected animals varied by geographic region; infected animals were found in the region of Gorski Kotar (20%) which has very similar environment to the region of Lika, where almost all wolves were found infected. Interestingly, this is the first report of infected wolves in Dalmatia.

Predation has a greater impact in less productive environments: variation in roe deer, *Capreolus capreolus*, population density across Europe

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ABSTRACT

Aim We aimed to describe the large-scale patterns in population density of roe deer *Capreolus capreolus* in Europe and to determine the factors shaping variation in their abundance.

Location Europe.

Methods We collated data on roe deer population density from 72 localities spanning 25° latitude and 48° longitude and analysed them in relation to a range of environmental factors: vegetation productivity (approximated by the fraction of photosynthetically active radiation) and forest cover as proxies for food supply, winter severity, summer drought and presence or absence of large predators (wolf, *Canis lupus*, and Eurasian lynx, *Lynx lynx*), hunter harvest and a competitor (red deer, *Cervus elaphus*).

Results Roe deer abundance increased with the overall productivity of vegetation cover and with lower forest cover (sparser forest cover means that a higher proportion of overall plant productivity is allocated to ground vegetation and thus is available to roe deer). The effect of large predators was relatively weak in highly productive environments and in regions with mild climate, but increased markedly in regions with low vegetation productivity and harsh winters. Other potentially limiting factors (hunting, summer drought and competition with red deer) had no significant impact on roe deer abundance.

Main conclusions The analyses revealed the combined effect of bottom-up and top-down control on roe deer: on a biogeographical scale, population abundance of roe deer has been shaped by food-related factors and large predators, with additive effects of the two species of predators. The results have implications for management of roe deer populations in Europe. First, an increase in roe deer abundance can be expected as environmental productivity increases due to climate change. Secondly, recovery plans for large carnivores should take environmental productivity and winter severity into account when predicting their impact on prey.

Keywords

***Capreolus capreolus*, forest cover, lynx, population density, red deer, roe deer, top-down control, vegetation productivity, winter harshness, wolf.**

B)**FINANCIAL ACCOUNTING**

Specification of use of UK Wolf Conservation Trust funds in the period November 2008 to November 2009:

For our work in 2009, UK WCT generously donated a total of 3000 GBP. Most of fund in 2009 was spent for field work (fuel for cars and food for field workers with some minor expenses for the consumable equipment like receiver batteries).

Other expenses include refurbishment of radio collars that we were lucky to get in hands after the batteries were already dead. In 2009 that was a case for two wolf collars. We also spent some funds for laboratory consumables. These expenses were covered from other sources.

Table 12: A detailed list of expenses made on project with the use of UK WCT fund during 2009

N	Activity	MoneyTime	To	Purpose	Amount	Reciep#
412	Trapping	19.05.2009 12:04	BAUHAUS	Technic-equipment	1127.90	32440
412	Trapping	22.05.2009 11:40	Ina Brinje	Car-fuel	394.21	156557
412	Trapping	22.05.2009 12:30	AC RI-ZG	Car-highway	44.00	2005052210108123036559
412	Trapping	23.05.2009 19:58	BILA KC 01	Personal-food	520.78	0221-20090523-059294
412	Trapping	25.05.2009 10:17	Chipoteka	Technic-equipment	87.96	55541
412	Trapping	25.05.2009 11:58	TIFON d. o. o.	Car-fuel	337.04	173348
412	Trapping	25.05.2009 12:33	AC RI-ZG	Car-highway	39.00	20090525603021219821
412	Trapping	28.05.2009 22:04	Europetrol d.o.o	Car-fuel	474.36	80648
412	Trapping	29.05.2009 12:25	AC RI-ZG	Car-highway	30.00	7500322840
412	Trapping	29.05.2009 19:49	INA d. d.	Car-fuel	247.55	084861
412	Trapping	30.05.2009 16:48	KONZUM d. d.	Personal-food	107.95	128/9049502248
412	Trapping	31.05.2009 16:06	INA d. d.	Car-fuel	360.09	173444
412	Trapping	31.05.2009 16:55	AC RI-ZG	Car-highway	44.00	20090531110107165540075
412	Trapping	01.06.2009 07:28	TIFON d. o. o.	Car-fuel	370.11	187876
412	Trapping	01.06.2009 07:44	AC RI-ZG	Car-highway	44.00	2009060160402074406542
412	Trapping	02.06.2009 16:21	KONZUM d. d.	Personal-food	114.60	56/9049502252
412	Trapping	02.06.2009 16:52	Schorpion	Personal-food	46.00	05913/0206
412	Trapping	02.06.2009 17:10	INA d. d.	Car-fuel	315.07	087512
412	Trapping	03.06.2009 16:34	Schorpion	Personal-food	36.00	05951/0306
412	Trapping	04.06.2009 17:54	KONZUM d. d.	Personal-food	40.88	196/904501258
412	Trapping	04.06.2009 18:17	INA d. d.	Car-fuel	330.07	088761
412	Trapping	05.06.2009 20:39	Europetrol d.o.o	Car-fuel	258.03	84378
412	Trapping	06.06.2009 11:48	AC RI-ZG	Car-highway	30.00	7500234642
412	Trapping	06.06.2009 19:40	Trgovina Krk d.d.	Personal-food	568.74	391029828
412	Trapping	07.06.2009 11:56	Europetrol d.o.o	Car-fuel	414.00	85105
412	Trapping	07.06.2009 13:02	Schorpion	Personal-food	46.00	06090/0706
412	Trapping	07.06.2009 14:02	AC RI-ZG	Car-highway	30.00	7500235887
412	Trapping	08.06.2009 14:17	PROTEKTOR-BANDAG	Car-maintenance-tire	40.00	99/09
412	Trapping	09.06.2009 08:46	KONZUM d. d.	Personal-food	155.00	11/9049503182
412	Trapping	09.06.2009 09:01	INA d. d.	Car-fuel	329.00	091725
412	Trapping	10.06.2009 12:09	AC RI-ZG	Car-highway	30.00	7500340770
412	Trapping	10.06.2009 17:18	KONZUM d. d.	Personal-food	129.54	213/902980181
412	Trapping	12.06.2009 13:06	INA d. d.	Personal-food	9.00	194264
412	Trapping	12.06.2009 13:49	AC RI-ZG	Car-highway	52.00	2009061210110134981977
412	Trapping	12.06.2009 18:36	OMV Hrvatska d.o.o.	Car-fuel	445.99	0-1000750340
412	Trapping	12.06.2009 19:38	AC RI-ZG	Car-highway	44.00	2009061260402193816224
412	Trapping	13.06.2009 10:20	Poklar, Miloš	Car-use	1700.00	

N	Activity	MoneyTime	To	Purpose	Amount	Reciep#
412	Trapping	14.06.2009 11:07	PROTEKTOR-BANDAG	Car-maintenance-tire	40.00	104/09
412	Trapping	14.06.2009 14:55	Schorpion	Personal-food	46.00	06462/1406
412	Trapping	14.06.2009 15:03	INA d. d.	Car-fuel	418.07	095854
412	Trapping	14.06.2009 20:21	AC RI-ZG	Car-highway	30.00	7500245609
412	Trapping	15.06.2009 06:30	INA d. d.	Personal-food	23.99	200005
412	Trapping	15.06.2009 07:19	AC RI-ZG	Car-highway	52.00	2009061500000071901896
412	Trapping	15.06.2009 13:19	TIFON d. o. o.	Car-fuel	368.76	117114
413	Telemetry	21.06.2009 08:48	INA KC 01	Car-fuel	349.05	206431
413	Telemetry	21.06.2009 15:34	AC RI-ZG	Car-highway	44.00	2009062160402153425122
413	Telemetry	21.06.2009 17:52	Restoran Bitoraj	Personal-food	35.00	95
413	Telemetry	21.06.2009 18:31	AC RI-ZG	Car-highway	30.00	7500364127
413	Telemetry	22.06.2009 14:47	Schorpion	Personal-food	82.00	00104/2206
413	Telemetry	22.06.2009 16:15	INA d. d.	Car-fuel	442.07	213525
413	Telemetry	23.06.2009 17:35	BILA KC 01	Personal-food	108.92	0221-20090623-02-6007
413	Telemetry	24.06.2009 17:41	INA d. d.	Car-fuel	290.10	201678
413	Telemetry	26.06.2009 10:51	BILA KC 01	Personal-food	178.56	0221-20090626-03-3329
413	Telemetry	27.06.2009 20:42	BILA KC 01	Personal-food	81.69	0221-20090627-03-4299
413	Telemetry	29.06.2009 11:40	BILA KC 01	Personal-food	136.07	0221-20090629-01-8113
413	Telemetry	29.06.2009 19:39	BILA KC 01	Personal-food	69.24	0221-20090629-05-2153
413	Telemetry	30.06.2009 15:07	BILA KC 01	Personal-food	86.94	0221-20090629-01-8657
413	Telemetry	01.07.2009 19:53	BILA KC 01	Personal-food	204.86	0221-20090629-05-9631
413	Telemetry	02.07.2009 09:19	TIFON d. o. o.	Car-fuel	395.18	115531
413	Telemetry	02.07.2009 09:52	HR autoceste d. o. o.	Car-highway	60.00	1090468713
413	Telemetry	03.07.2009 16:04	HR autoceste d. o. o.	Car-highway	4.00	1070265333
413	Telemetry	04.07.2009 07:57	INGRO d.o.o.	Personal-food	33.90	00002
413	Telemetry	04.07.2009 16:46	AC RI-ZG	Car-highway	4.00	2009070460502164626683
413	Telemetry	04.07.2009 18:43	AC RI-ZG	Car-highway	30.00	7500275141
413	Telemetry	05.07.2009 11:44	INA d. d.	Car-fuel	520.71	102611
413	Telemetry	05.07.2009 14:37	AC RI-ZG	Car-highway	44.00	2009070500000143719132
413	Telemetry	05.07.2009 15:57	INA d. d.	Car-fuel	271.10	223506
414	Trapping	13.07.2009 09:23	BILA KC 01	Personal-food	102.09	0221-20090713-01-2383
414	Trapping	14.07.2009 11:04	OMV Hrvatska d.o.o.	Personal-food	35.98	0-1000005462
414	Trapping	14.07.2009 13:34	INA d. d.	Car-fuel	440.20	255321
414	Trapping	14.07.2009 14:17	AC RI-ZG	Car-highway	44.00	2009071460402141748867
414	Trapping	14.07.2009 16:05	AC RI-ZG	Car-highway	30.00	7500466435
414	Trapping	15.07.2009 11:18	Trgovina Krk d.d.	Personal-food	102.81	391048829
414	Trapping	16.07.2009 07:37	TIFON d. o. o.	Personal-food	64.60	115302
414	Trapping	16.07.2009 16:54	AC RI-ZG	Car-highway	30.00	7500294895
414	Trapping	17.07.2009 09:17	Trgovina Krk d.d.	Personal-food	32.07	21993-001/2009
414	Trapping	17.07.2009 19:26	Trgovina Krk d.d.	Personal-food	100.78	391050778
414	Trapping	18.07.2009 15:52	Restoran Bitoraj	Personal-food	95.00	55
414	Trapping	18.07.2009 16:36	TIFON d. o. o.	Car-fuel	436.11	290994
414	Trapping	18.07.2009 17:55	AC RI-ZG	Car-highway	47.00	2009071800000175518031
415	Trapping	21.07.2009 16:55	BILA KC 01	Personal-food	790.09	0221-20090721-04-1325
415	Trapping	22.07.2009 11:14	TIFON d. o. o.	Car-fuel	392.07	300780
415	Trapping	22.07.2009 11:27	AC RI-ZG	Car-highway	44.00	2007072260402112758005
415	Trapping	22.07.2009 13:05	Schorpion	Personal-food	77.00	08852/2207
415	Trapping	22.07.2009 15:06	INA d. d.	Personal-food	29.78	130052
415	Trapping	22.07.2009 15:16	HR autoceste d. o. o.	Car-highway	11.00	1090478978
415	Trapping	23.07.2009 09:42	MOST d.o.o.	Personal-food	80.30	19443
415	Trapping	24.07.2009 12:00	MOST d.o.o.	Personal-food	124.95	19765
415	Trapping	25.07.2009 19:59	TIFON d. o. o.	Personal-food	38.90	137557
415	Trapping	25.07.2009 20:32	INA d. d.	Car-fuel	404.07	115579
415	Trapping	25.07.2009 20:50	AC RI-ZG	Car-highway	60.00	2009072500000205042809
415	Trapping	27.07.2009 20:35	TIFON d. o. o.	Car-fuel	338.18	146768
418	Trapping	07.09.2009 13:54	MC Donald's Hrvatska d. o. o.	Personal-food	49.00	200909071703178839
418	Trapping	07.09.2009 14:17	BILA ZG 02	Personal-food	257.94	0101-20090907-7820
418	Trapping	07.09.2009 15:34	TIFON d. o. o.	Car-fuel	293.00	424287

N	Activity	MoneyTime	To	Purpose	Amount	Reciep#
418	Trapping	07.09.2009 15:52	AC RI-ZG	Car-highway	44.00	2009090760402155215186
418	Trapping	10.09.2009 07:39	TIFON d. o. o.	Car-fuel	43.40	210647
418	Trapping	10.09.2009 08:20	HR autoceste d. o. o.	Car-highway	46.00	1090406265
418	Trapping	10.09.2009 15:57	HŽ ZG	Personal-transp-train	57.70	33765183
418	Trapping	10.09.2009 18:20	AC RI-ZG	Car-highway	46.00	2009091060402193817976
418	Trapping	10.09.2009 18:59	TIFON d. o. o.	Car-fuel	491.07	218420
418	Trapping	11.09.2009 09:24	HR autoceste d. o. o.	Car-highway	46.00	1090406689
418	Trapping	11.09.2009 14:57	TIFON d. o. o.	Car-fuel	476.04	219164
418	Trapping	11.09.2009 15:45	AC RI-ZG	Car-highway	46.00	2009091160402154518683
418	Trapping	11.09.2009 16:26	Valentin 8 trgovina	Personal-food	23.04	04101
418	Trapping	11.09.2009 16:35	Schorpion	Personal-food	87.00	10928/1109
418	Trapping	12.09.2009 10:36	AC RI-ZG	Car-highway	44.00	2009091218006103606781
418	Trapping	12.09.2009 14:15	Pizzeria "Luiziana"	Personal-food	96.00	36
418	Trapping	12.09.2009 15:18	TIFON d. o. o.	Car-fuel	370.04	179337
418	Trapping	12.09.2009 20:57	BILA KC 01	Personal-food	81.73	0221-20090912-04-4540
418	Trapping	13.09.2009 17:39	INA d. d.	Car-fuel	354.99	303498
418	Trapping	14.09.2009 18:19	AC RI-ZG	Car-highway	44.00	2009091460402181921722
418	Trapping	14.09.2009 18:31	KONZUM d. d.	Personal-food	223.15	219/904501442
418	Trapping	15.09.2009 17:35	INA DE 01	Car-fuel	268.94	162774
418	Trapping	17.09.2009 14:23	KONZUM d. d.	Personal-food	187.26	35/9049501448
418	Trapping	17.09.2009 15:06	Schorpion	Personal-food	41.00	11071/1709
418	Trapping	18.09.2009 14:47	HŽ KC	Personal-transp-train	112.80	34853077
418	Trapping	18.09.2009 18:42	INA d. d.	Car-fuel	378.75	164605
418	Trapping	18.09.2009 18:50	Risnjak, NP	Personal-food	7.00	037843/09
418	Trapping	18.09.2009 21:30	Bistro AM	Personal-food	53.00	0031
418	Trapping	19.09.2009 13:21	AC RI-ZG	Car-highway	30.00	7500474883
418	Trapping	19.09.2009 14:48	Pizzeria Matteo	Personal-food	130.00	0008
418	Trapping	19.09.2009 19:09	RUO Vrnjak	Personal-food	28.00	109025635
418	Trapping	19.09.2009 19:11	RUO Vrnjak	Personal-food	24.00	109025636
418	Trapping	20.09.2009 11:53	Restaurant Galeb	Personal-food	152.00	1015071
418	Trapping	20.09.2009 13:58	INA d. d.	Personal-food	18.00	408053
418	Trapping	20.09.2009 14:34	AC RI-ZG	Car-highway	44.00	20090920180061434415322
418	Trapping	20.09.2009 16:36	TIFON d. o. o.	Car-fuel	380.91	185286
418	Trapping	23.09.2009 22:12	T-Mobile	Personal-comm-mob	584.99	08/2009
418	Trapping	24.09.2009 15:25	AC RI-ZG	Car-highway	44.00	2009092460402164330461
418	Trapping	24.09.2009 15:56	INA d. d.	Personal-food	28.99	413910
418	Trapping	24.09.2009 16:56	KONZUM d. d.	Personal-food	261.61	113/9049501461
418	Trapping	24.09.2009 17:20	INA d. d.	Car-fuel	208.01	168509
418	Trapping	25.09.2009 21:51	INA d. d.	Car-fuel	286.06	200615
418	Trapping	25.09.2009 22:04	HR autoceste d. o. o.	Car-highway	46.00	1554964
418	Trapping	26.09.2009 10:32	Bistro MANJAN	Personal-food	64.00	89904
418	Trapping	27.09.2009 07:04	AC RI-ZG	Car-highway	44.00	2009092718003170467080
418	Trapping	27.09.2009 16:48	Petrol Trgovina d.o.o.	Car-fuel	410.00	277330
418	Trapping	28.09.2009 19:49	BILA KC 01	Personal-food	77.41	0221-20090928-03-7065
419	Telemetry	06.10.2009 08:00	INA d. d.	Car-fuel	368.05	317325
419	Telemetry	06.10.2009 08:28	AC RI-ZG	Car-highway	44.00	2009100660402093440284
419	Telemetry	06.10.2009 13:38	Konoba TRON	Personal-food	122.00	40
419	Telemetry	06.10.2009 14:18	INA d. d.	Personal-food	9.00	430205
419	Telemetry	06.10.2009 14:59	AC RI-ZG	Car-highway	44.00	200910061800514592187
	TOTAL				25541.94	

The final amount is different from the last year because of change of exchange rate and drop of GBP value related to HRK.

Table 13: Summary list of expenses made on wolf project with the use of UK WCT fund during 2009.

Purpose	N Expenses	Sum (HRK)
Car-fuel	38	13670.45
Car-highway	40	1563.00
Car-maintenance-tire	2	80.00
Car-use	1	1700.00
Personal-comm-mob	1	584.99
Personal-food	58	6557.14
Personal-transp-train	2	170.50
Technic-equipment	2	1215.86
TOTAL		25541.94

The final amount is different from the last year because of change of exchange rate and drop of GBP value related to HRK.

I close this report with all the thanks to UKWCT for all the support since 2006, and for considering our proposal for the continuation of work on research, conservation and management of wolf and lynx in Croatia.

Josip Kusak