2006 Report on the Wolf Population Status in Croatia

State Institute for Nature Protection

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1. INTRODUCTION

The wolf *(Canis lupus)* is a strictly protected species in Croatia that has been managed pursuant to the **Wolf Management Plan for Croatia**. The plan was developed in cooperation with all stakeholders and was adopted as an official document by the Ministry of Culture on 7 December 2004. The implementation of the activities laid down by the Plan aims to ensure a long-term conservation of the wolf in Croatia in as harmonious coexistence with humans as possible. In order to reduce the illegal kill as one of the major threats to the species, the Plan allows certain interventions in the wolf population, provided that such measures do not pose a threat to the stability of the population and that they are carried out on a selective basis. The interventions are allowed on a regional basis (Gorski kotar, Lika, Dalmatia) – with larger-scale interventions being allowed in areas where the damages caused to domestic animals occur, and smaller-scale interventions in areas where the wolf feeds on its natural prey. Apart from regional quotas, the total annual quota also includes emergency interventions, killings on roads, and other mortality cases. The annual quota as a percentage of estimated population is proposed by the Commission for Monitoring Large Carnivores Populations established at the Ministry of Culture, based on the annual report on the wolf population status prepared by the State Institute for Nature Protection and the School of Veterinary Medicine of the University in Zagreb. At the proposal of the Commission, the Ministry of Culture passes the decision on intervention. This conservation regime is to be carried out over a two-year trial period, starting from 2005. Last year the State Institute for Nature Protection, assisted by the experts in the field (experts authorised to assess damage caused by protected predators; scientists; supervisors in protected areas and local masters of the hunt) as well as by the colleagues from neighbouring countries (Slovenia and Bosnia and Herzegovina), made the 2005 Report on the Wolf Population in Croatia. On the basis of received data, at its extended meeting held on 13th September 2005, the Commission proposed an intervention in the population by using the method of killing 4 individuals – 2 in Dalmatia, 1 in Lika and 1 in Gorski kotar. The right to kill was granted to the hunters club "Prepelica" from Unešić (the area of joint hunting ground no. XV/18 "Unešić"), hunters club "Grivna" from Karlobag (the area of state hunting ground no. IX/19 "Velinac") and to Hrvatske šume (Croatian Forests) Ltd., Forest Administrations – Forest Office Delnice (the area of state hunting ground no. VIII/2 "Bjelolasica"). According to official data, the allowed intervention in population was not realised in any of the above mentioned hunting grounds within the stipulated deadline (31 December 2005), even though there are indications that one individual was killed in November 2005 on Kremeno brdo in the "Trtar" hunting ground located in the County Šibensko-kninska and other two in December of the same year in the area of "Bjelolasica" hunting ground (the Gomirje region). However, due to partial departing from the rights granted by the Decision, the

kill has not been reported. Regardless of unrealised intervention in the population, by the beginning of 2006 five more individuals were killed in other ways, mainly in road collisions, thus fulfilling the quota. One individual above the planned quota will be taken into account while determining the intervention in the population in 2006.

Just like last year's report, the 2006 Report on the Wolf Population Status presents the data on the wolf's impact on human activities, gives estimates of the wolf population size based on local experts' statements, provides data on mortality and briefly describes the population status in neighbouring countries. Regrettably, the Report does not address the wolf's impact on game, since the central hunting register is currently in the process of being established and the data on the number of game have not been available.

2. DAMAGES CAUSED TO LIVESTOCK

All the available data concerning the damages caused to livestock are received by the Ministry of Culture in the form of the investigation report made by experts authorised to assess the damage caused on livestock. All the data contained in the report are entered into the database maintained by the State Institute for Nature Protection where they are processed and displayed by the GIS. Since the procedure of resolving compensation claims at the Ministry of Culture is a time consuming process, a large number of cases have not yet been concluded and stored in the archives, which makes the related reports inaccessible and their further analysis impossible. For that reason the last year that is fully recorded and analysed is 2004 and the data presented in the present report mostly refer to the 2004 status. The most recent data provided by the Ministry of Culture in the form of a scanty database containing only basic information on a person who submitted damage claim and damage event, and relating to claims for damages received in 2005 and 2006, although very rough, since fresh, are also processed and included in the report.

In 2004 1,420 claims for compensation of damage caused by predators were submitted. In 1, 287 cases or 90.7 per cent it was concluded that the damage had been surely or possibly caused by a wolf and the owners received compensation. By far the largest number of damages occurred in the counties Šibensko-kninska (522) and Splitsko-dalmatinska (511) where 80 per cent of all damages caused by wolves were recorded. With 116 damages reported (9%) the County Zadarska is in the third place. The municipalities with the largest number of damages reported were Prgomet in the County Splitsko-dalmatinska, and Unešić and Kistanje in the County Šibensko-kninska (Tables 1 and 2, Figure 6), where 1.85 head of livestock were killed per attack on average.

Table 1: Distribution of reported damages caused to livestock shown by presumed type of predator and by counties in 2004

County/Predator	Wolf	Lynx	Bear	Golden jackal	Dog	Unknown	TOTAL
Dubrovačko-neretvanska	82	0	0	0	0	0	**82**
Splitsko-dalmatinska	511	0	0	0	2	22	**535**
Šibensko-kninska	522	0	0	0	13	86	**621**
Zadarska	116	0	0	0	0	3	**119**
Ličko-senjska	45	3	0	0	0	3	**51**
Primorsko-goranska	4	0	0	0	0	0	**4**
Karlovačka	7	1	0	0	0	0	**8**
TOTAL	**1,287**	**4**	**0**	**0**	**15**	**114**	**1,420**

Table 2: Municipalities with the largest number of damages recorded in 2004

Municipality	No. of damage events	No. of livestock affected
Prgomet	**130**	**244**
Unešić	**127**	**241**
Kistanje	**124**	**220**
Klis	67	107
Ervenik	55	120
Sinj	52	106
Obrovac	49	156
Muć	48	70
Dubrovnik	42	78
Drniš	36	128
Promina	35	49
Šibenik	33	48
Knin	32	79
Orlić	31	46
Benkovac	29	95
Šestanovac	29	78

In 1,287 damages caused by the wolf and recorded in 2004, a total of 2,638 head of livestock fell victim to the wolf (injured or killed) – most of all sheep (66 per cent of all animals affected) and goats (25 per cent of all animals), and far less dogs, cattle, donkeys, horses and pigs. In terms of space, the extent of damage with regard to the livestock fallen victim to the wolf turned out to be of the largest proportions in the area of the County Šibensko-kninska where 1,017 animals (39 per cent) were affected. This is followed by the counties Splitsko-dalmatinska with 934 affected animals (35 per cent) and Zadarska with 350 animals (13.3 per cent) (Table 3).

Table 3: Number of each individual breed of livestock attacked by the wolf broke down by counties

2004								
County/Predator	**Beef cattle**	**Horse**	**Goat**	**Donkey**	**Sheep**	**Dog**	**Pig**	**TOTAL**
Dubrovačko-neretvanska	34	3	52	3	61	4	4	**161**
Splitsko-dalmatinska	38	1	271	14	533	77	0	**934**
Šibensko-kninska	15	0	129	2	845	26	0	**1,017**
Zadarska	18	0	154	1	173	4	0	**350**
Ličko-senjska	0	0	48	0	91	2	0	**141**
Primorsko-goranska	0	0	0	0	15	0	0	**15**
Karlovačka	0	0	0	0	18	0	2	**20**
TOTAL	**105**	**4**	**654**	**20**	**1,736**	**113**	**6**	**2,638**

The actual impact of the wolf on the economy of a region is best reflected in the share of livestock fallen victims to the wolf, primarily sheep and goats as the most frequent victims of wolf attacks, in the total number of local livestock. The data on the total number of livestock in 2004, obtained from the analysis of applications for state incentives, were provided by the Croatian Livestock Centre (CLC). In carrying out our analysis this data has undergone a slight modification – only the total number of livestock in the mainland portion of counties or rather in the wolf's area of distribution has been taken into account (the livestock kept on islands was excluded from the analysis).

The analysis showed that in the County Šibensko-kninska, where in 2004 the largest number of livestock fell victim to the wolf, the share of the sheep attacked in the total number of sheep amounted to 1.14 per cent and that of goats 2.11 per cent. In the County Splitsko-dalmatinska, where the largest number of attacks on goats was recorded, the share of goats affected in the total number of goats amounted to 3.07 per cent. The share of sheep affected was lower and amounted to 1.05 per cent. Even though the County Zadarska had the largest number of livestock registered in Dalmatia in 2004, wolf attacks recorded in this county were few, and the share of animals affected in the total number of livestock registered was only 0.18 per cent for sheep and 1.13 per cent for goats (Table 4).

Table 4: Share of sheep and goats fallen victims to the wolf in the total number of sheep and goats by counties

2004				
Type	Sheep		Goats	
No. of livestock / County	Total no. registered by CLC	Share of sheep fallen victim to the wolf (%)	Total no. registered by CLC	Share of goats fallen victim to the wolf (%)
Dub-neretvanska	3,789	1.61	1,507	3.45
Spl-dalmatinska	50,691	1.05	8,816	3.07
Šib-kninska	73,904	1.14	6,118	2.11
Zadarska	97,159	0.18	13,679	1.13
Ličko-senjska	57,913	0.16	2,322	2.07
Prim-goranska	44,324	0.03	743	0.00
Karlovačka	14,410	0.12	905	0.00
Total	342,190	**0.51**	34,090	**1.92**

In the period from 1 January 2005 to 1 September 2006 the Ministry of Culture received 2,393 claims for damages found to have been caused by the wolf. Since 163 claims refer to cases that occurred in 2004 which were therefore included in the previous analysis, the number of damages caused by the wolf in 2005 and partially in 2006 amounts to 2,230. Out of that number 1,454 claims were received in 2005 and 776 in 2006. These numbers, however, do not reflect the actual number of damage

events that occurred in 2005 and 2006, because numerous applications received after 1 January 2006 still refer to damages that occurred in 2005. It should also be noted that a number of data on the very damage events were not available, which makes it impossible to analyse and present data on the livestock affected for that period. Nevertheless, the data received provide a general insight into the status of damage caused over the last two years.

Just like in 2004, in 2005 the largest number of damages was recorded in the County Šibensko-kninska (47 per cent), followed by the counties Splitsko-dalmatinska with 37 per cent and Zadarska with 8.5 per cent. The largest number of damages was reported in the municipality of Unešić in the County Šibensko-kninska, where 293 attacks on livestock occurred, making 20 per cent of all damages! Other municipalities that recorded a considerable number of damage events are Kistanje, Drniš and Šibenik also located in the County Šibensko-kninska; Prgomet, Trilj and Sinj in the County Splitsko-dalmatinska; and Obrovac in the County Zadarska (Tables 5 and 6, Fig. 1).

In 2006 the majority of damages were also recorded in three Dalmatian counties – Šibensko-kninska (55 per cent), Splitsko-dalmatinska (26 per cent) and Zadarska (12.8 per cent). The municipality with the far largest number of damages reported remains to be the municipality of Unešić, where no less than 29 per cent of all damage events were recorded by 1 September 2006. This is followed by the municipalities of Kistanje and Drniš in the County Šibensko-kninska, Prgomet in the County Splitsko-dalmatinska, and Obrovac and Benkovac in the County Zadarska (Tables 5 and 7, Figure 2).

Table 5: Number of claims for damages received from 1 January 2005 to 1 September 2006 (not including damage events occurred in 2004), found to have been caused by the wolf, showed by years and counties

County	No. of damages in 2005	No. of damages in 2006
Dubrovačko - neretvanska	66	13
Splitsko - dalmatinska	535	203
Šibensko - kninska	690	426
Zadarska	124	99
Ličko-senjska	23	14
Primorsko-goranska	11	3
Karlovačka	5	16
Istarska	0	2

Table 6: Municipalities with the largest number of damages caused by the wolf in 2005 (based on damage claims received in the period from 1 January to 31 December 2005, not including damage events occurred in 2004)

Municipality	No. of damages in 2005
Unešić	293
Kistanje	127
Prgomet	120
Trilj	84
Drniš	67
Šibenik	63
Obrovac	61
Sinj	57
Klis	48
Benkovac	35
Knin	34

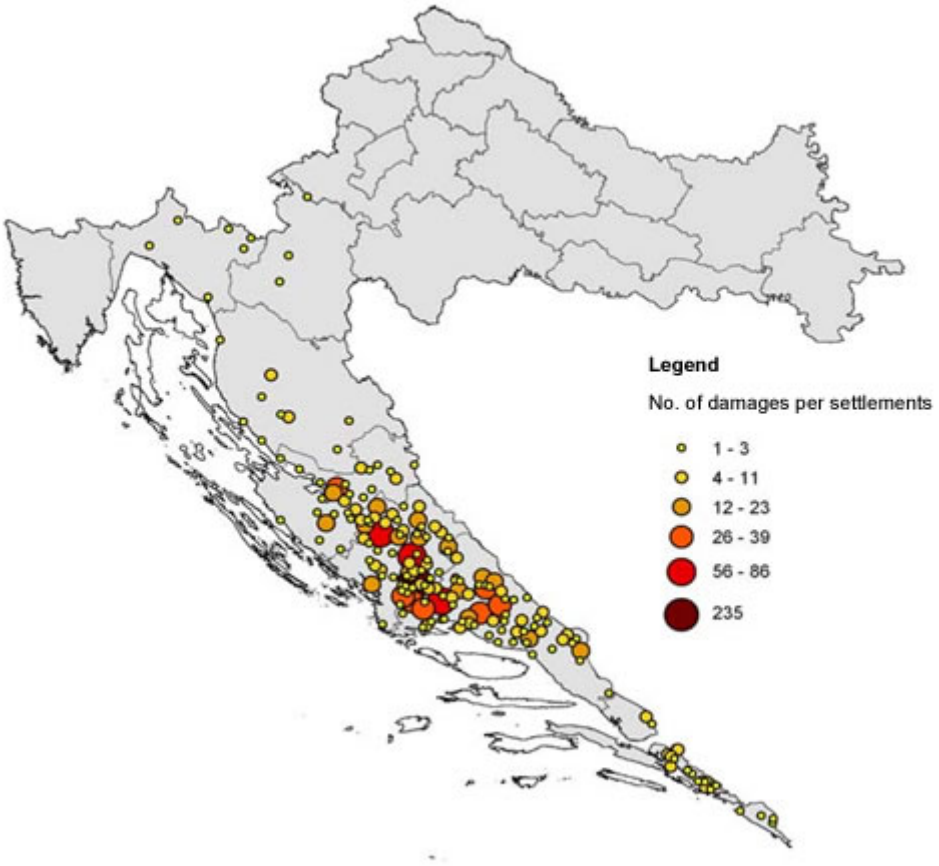

Figure 1: Locations of damages caused by the wolf in 2005 (based on damage claims received in the period from 1 January to 31 December 2005, not including damage events occurred in 2004)

Table 7: Municipalities with the largest number of damages caused by the wolf recorded in 2006 (based on damage claims received in the period from 1 January to 1 September 2006)

Municipality	No. of damages in 2006
Unešić	223
Kistanje	72
Drniš	45
Prgomet	42
Obrovac	37
Benkovac	33
Gračac	25

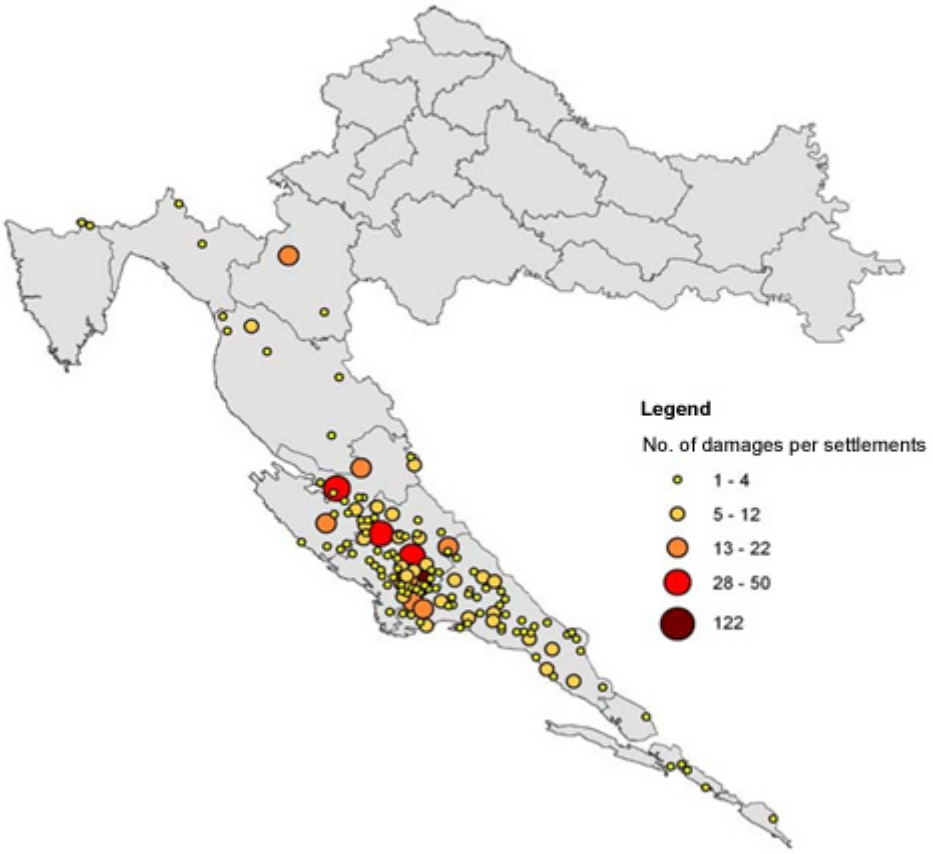

Figure 2: Locations of damages caused by the wolf in 2006 (based on damage claims received in the period from 1 January to 1 September 2006)

The comparison of data collected in 2004, 2005 and 2006 shows the continued increase in the number of damages caused by the wolf in the County Šibensko-kninska. Parallel to that, the number of damages reported in the municipality of Unešić is on the increase, with the number of damages recorded in 2005 being

doubled as compared to 2004, while the number of 223 damage events reported in 2006, which has not finished yet, makes one forth of all the damages caused by the wolf in 2006. Although the year 2006 has not finished yet, the data received by 1 September 2006 points to a significant decline in the number of damages reported in the area of the counties Splitsko-dalmatinska and Dubrovačko-neretvanska. The municipality of Prgomet in the County Splitsko-dalmatinska, which in 2004 was ahead in terms of the number of damages reported; in 2006 is lagging far behind the municipalities of Unešić and Kistanje in the County Šibensko-kninska. In 2006 the novelty is the occurrence of damage events in the area of the County Istarska, and a slight increase in the number of damages reported in the area of the County Karlovačka, more precisely in the municipality of Generalski Stol (14 cases) where the damage events were scarce in previous years. Over the last two years, the decrease in the number of damages reported in the area of the County Ličko-senjska can also be noted.

3. WOLF POPULATION SIZE

The size of the wolf population in Croatia has been estimated on the basis of statements given by local experts. Sixteen experts authorized by the Ministry of Culture to assess damage caused by protected animal species, the supervisor of the Velebit Nature Park and Goran Gužvica, a research associate of the LIFE project, were asked to mark their findings on possible wolf packs locations on the maps of wider areas where they conduct their activities, indicating the presumed number of individuals in each pack as well as the general wolf population trend in the respective area (downward, no change or upward). The credibility of all the received data has been verified by the comparison with the results of telemetric research on the wolf population in Croatia, more precisely with data on the size of wolf packs territory and a possible number of individuals in a specific area, which subsequently resulted in slight modification of some statements. In order to verify the credibility of data, the GIS probability model of wolf occurrence in specific areas of Croatia has been used, which was developed within the LIFE Project on Conservation and Management of Wolves in Croatia. The radio telemetry data for the area of the western part of Gorski kotar were provided by Dr. Josip Kusak of the School of Veterinary Medicine of the University of Zagreb.

Although this method involves a larger number of people conducting their activities in the field and the received data has been critically reviewed and modified on the basis of scientific findings, it is still subjective in its nature and should be taken with reservation. The accurate status of the wolf population can be determined only on the basis of scientific research which includes genetic analyses of scat samples, radio telemetric monitoring and coordinated snow tracking actions.

From the data collected and processed, it follows that the wolf population in Croatia ranges from a minimum of 180 to a maximum of 240 individuals or rather about 210 individuals on average, belonging to a little more than forty packs. The largest number of individuals, i.e. 60 on average, was estimated to inhabit the area of the County Splitsko-dalmatinska, and the smallest number – less than 10 individuals – those of the counties Istarska and Dubrovačko-neretvanska. As to population trends in different counties or even in parts of the same county, the opinions vary. The experts from the counties Primorsko-goranska, Ličko-senjska and Dubrovačko-neretvanska argue that the wolf population size in these areas, when compared to previous years, has not changed. Still, Goran Gužvica, a research associate of the LIFE Project, pointed to a noted decline in the number of wolves over the last three years in the area of Brinje-Vratnik-Krasno in the County Ličko-senjska. Due to an increased number of damages caused to livestock as compared to previous years, the experts responsible for conducting investigations in the southern part of the County Šibensko-kninska and in the north of the County Zadarska, are inclined to think that the wolf population size has also increased in these areas. At the same time, due to the reduced rate of damages in the central and northern part of the County Splitsko-dalmatinska, the competent experts take the view that the wolf population size in that area is in decline. Due to small volume of damages caused to livestock, the experts covering the south-eastern part of the County Splitsko-dalmatinska, more precisely the wider area of the Biokovo Mountain, as well as experts from the County Karlovačka have based their assessment mainly on statements given by foresters and hunters operating in the mentioned areas. As the hunting ground representatives claim that the wolf's impact on game has increased, the experts have concluded that the wolf population is on the increase. The positive trend has also been observed in the area of the County Sisačko-moslavačka situated along the very border of the wolf's area of distribution. Until recently the wolf presence in that area was only sporadic (Table 8, Figure 3).

Table 8: Number of wolves and wolf packs and a general population trend in various counties assessed on the basis of local experts' statements (population trend: «-» downward, «+» upward, «=» unchanged, «?» unknown)

County	Min. no. of packs	Max. no. of packs	Min. no. of individuals	Max. no. of individuals	Average no. of individuals	Trend
Sisačko-moslavačka	2	2	10	14	12	+
Karlovačka	3	6	13	18	15.5	+
Istarska	1	1	4	5	4.5	?
Primorsko-goranska	4	5	16	22	19	=
Ličko-senjska	6	7	28	40	34	=
Zadarska	5	7	21	27	24	+
Šibensko-kninska	7	8	31	42	36.5	+
Splitsko-dalmatinska	13	15	50	67	58.5	–

Dubrovačko-neretvanska	3	3	4	7	5.5	=
TOTAL	**44**	**54**	**177**	**242**	**209.5**	

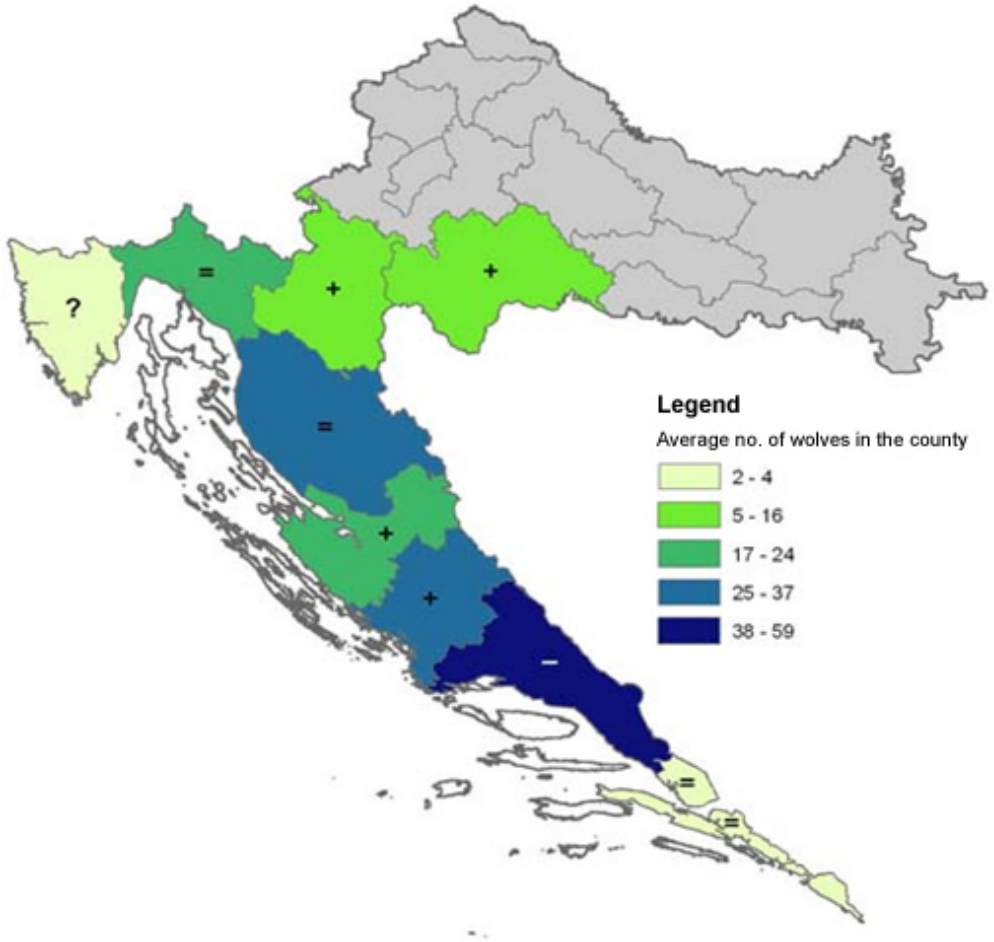

Figure 3: The wolf population trend by various counties in the wolf's area of distribution («-» downward, «+» upward, «=» unchanged, «?» unknown)

After having analysed all received data and presumed the most likely solutions under uncertain estimates, the locations of wolf packs in Croatia have been reconstructed. The number of packs present was estimated at 44, with the majority, i.e. 13 of them,

located in the County Splitsko-dalmatinska. This county is followed by the County Šibensko-kninska with the wolf packs estimated at 7, the counties Ličko-senjska with 6 packs, Zadarska with 5 packs, Primorsko-goranska with 4 packs, Karlovačka and Dubrovačko-neretvanska with 3 packs each, Sisačko-moslavačka with 2 packs and finally by the County Istarska with only one pack (Table 9, Figure 4).

These results have been then compared with last year's results of the population size estimates and have been found to deviate only slightly. The most striking change refers to the wolf occurrence in the area of the counties Sisačko-moslavačka and Istarska. By excluding the individuals inhabiting those areas from the total number of individuals estimated in 2006, the population size is identical to the last year's assessment i.e. about 190 individuals on average. However, even though the total number is the same, certain changes seem to have occurred in terms of the packs' spatial pattern. Thus, a substantial reduction in number of wolves in the County Primorsko-goranska can be noticed, with a simultaneous increase in the number of individuals in the counties Karlovačka and Ličko-senjska. In the same way, the decrease in the number of wolves in the counties Splitsko-dalmatinska and Dubrovačko-neretvanska is accompanied with the increase in the number of individuals in the counties Šibensko-kninska and Zadarska. The construction of the highway, which has cut the wolf's habitat longitudinally, has probably also contributed to changes in the packs' spatial pattern. This is also supported by data on the dynamics of the wolf population in Bosnia and Herzegovina, showing an increase in the wolf population in certain municipalities neighbouring with Croatia. It is likely that, due to the construction of the highway, individual packs have moved toward the north, and in that process some of them have crossed the border, settling down in Bosnia and Herzegovina. The expert responsible for conducting investigations in the south-western part of the County Splitsko-dalmatinska points out that the passage of the highway has reduced the number of attacks in the municipality of Primorski Dolac situated south of the highway, with the majority of damage events now occurring north of the highway in settlements of Radošić, Lećevica, Bogdanovići and Trolokve. The expert responsible for the north-western part of the County Splitsko-dalmatinska claims that the number of wolves in that area has dropped for 20-30 per cent. According to him, there is a possibility that wolves, which came down to Croatia during the war, are now going back to their old habitats in Bosnia and Herzegovina. The increase in the wolf population in the Livno Canton of the BiH Federation supports his assumptions. The highway has most likely also made an impact on the packs' spatial pattern in the mountainous part of Croatia. The decline in the wolf population in the County Primorsko-goranska, along with a simultaneous occurrence of packs in adjacent areas of the County Karlovačka, where previously there were none, could indicate that packs have most likely crossed the highway and changed their location. Since the wolf was not present in this new location, i.e. in the

municipality of Generalski Stol in previous years, the occurrence of damages caused on domestic dogs provoked a strong resentment among the inhabitants. The occurrence of the wolf, and thereby the damages, in the County Istarska is a result of spreading of the wolf into new habitats on the territory of the Republic of Slovenia, more precisely in the Primorska region, from where (the Slavnik Mountain) they occasionally come into the territory of the Republic of Croatia.

On the basis of data presented, it can be concluded that the wolf population size in Croatia depends to a large degree on changes occurring in neighbouring countries Croatia shares the population with, and therefore it cannot be observed separately, taken out of context. Due to Croatia's specific shape and its long border with neighbouring countries, on the territory of Croatia there is a large number of border packs, which spend a part of the year in, and a part of the year outside Croatia. Since some of these packs are located on the border with Bosnian and Herzegovian municipalities where the increase in the wolf population size has been recorded in 2006, it can be assumed that it is precisely in the area of these municipalities where these packs spend most of their time – for example, the pack found in the north of the County Zadarska bordering with the Grahovo municipality, and the pack located in the south-eastern part of the County Karlovačka adjacent to the municipality of Bihać. By dividing the number of border packs' individual members in half (due to constant crossing of the border and their stay in other countries), and by adding it as such to the number of wolves estimated for the rest of Croatia, the average number of individuals would then amount to 190.

Table 9: Estimated wolf packs in Croatia including the respective number individuals and experts that made the estimates; for easier reference and orientation in the space the pack names are fictitious (except the Snježnik pack telemetrically monitored by Dr. Josip Kusak); the packs written in italics represent border packs

ID	Pack name	Min. no. of ind.	Max. no. of ind.	Average no. of ind.	Local experts	County
1	Snježnik	3	4	3.5	Frković, Kusak	Primorsko-goranska
2	Platak	2	3	2.5	Frković	Primorsko-goranska
3	Lukovdol	4	6	5	Frković	Primorsko-goranska
4	Velika Kapela	7	9	8	Frković, Dasović, Matičić, Pavličić	Primorsko-goranska
5	*Ćićarija-Slavnik*	*4*	*5*	*4.5*	*Frković*	Istarska
6	Glina	4	6	5	Abramović, Gužvica	Sisačko-moslavačka
7	Zrinska gora	6	8	7	Abramović	Sisačko-moslavačka
8	Mala Kapela-Brinje	4	7	5.5	Dasović, Pavličić, Matičić	Karlovačka
9	*Mašvina*	*4*	*5*	*4.5*	*Matičić, Pavličić*	Karlovačka
10	Dobra-Generalski Stol	5	6	5.5	Matičić	Karlovačka
11	Vratnik-Krasno	3	5	4	Gužvica, Šimunić, Tomaić	Ličko-senjska

12	Štirovača-Pazarište	6	7	6.5	Gužvica, Šimunić, Milković, Tomaić	Ličko-senjska
13	Vrhovine-Saborsko	6	8	7	Dasović, Pavličić, Matičić	Ličko-senjska
14	Lukovo Šugarje	3	5	4	Milković	Ličko-senjska
15	Mogorić	4	7	5.5	Milković	Ličko-senjska
16	Donji Lapac	6	8	7	Gužvica	Ličko-senjska
17	Deringaj	3	4	3.5	Hak	Zadarska
18	*Srb*	*5*	*6*	*5.5*	*Hak*	Zadarska
19	Velika Popina-Bogatnik	5	7	6	Grgas, Hak	Zadarska
20	Jasenice-Obrovac	4	5	4.5	Grgas	Zadarska
21	Radašinovci	4	5	4.5	Grgas	Zadarska
22	Medviđa-Ervenik	5	7	6	Grgas, Ljubičić	Šibensko-kninska
23	Dinara	5	7	6	Ljubičić	Šibensko-kninska
24	Brištane-Oklaj	5	7	6	Ljubičić, Šupe	Šibensko-kninska
25	Ružic	4	6	5	Šupe	Šibensko-kninska
26	Sedramić-Planjane	4	5	4.5	Šupe	Šibensko-kninska
27	Danilo-Ljubostinje	4	5	4.5	Šupe	Šibensko-kninska
28	Ostrogašica	4	5	4.5	Šupe	Šibensko-kninska
29	Lećevica	3	4	3.5	Bračulj	Splitsko-dalmatinska
30	Primorski Dolac	2	3	2.5	Bračulj	Splitsko-dalmatinska
31	Svilaja	2	4	3	Bosiljevac, Kokić	Splitsko-dalmatinska
32	*Debelo brdo*	*4*	*5*	*4.5*	*Kokić*	Splitsko-dalmatinska
33	Čemernica-Mojanke	3	5	4	Kokić	Splitsko-dalmatinska
34	*Bili brig-Kamešnica*	*4*	*5*	*4.5*	*Kokić*	Splitsko-dalmatinska
35	Dugobabe-Ogorje	4	6	5	Bosiljevac	Splitsko-dalmatinska
36	Mosor	4	6	5	Bosiljevac	Splitsko-dalmatinska
37	Opanci	3	4	3.5	Bosiljevac, Šabić	Splitsko-dalmatinska
38	Cista	5	5	5	Bosiljevac	Splitsko-dalmatinska
39	*Imotski*	*5*	*6*	*5.5*	*Bosiljevac*	Splitsko-dalmatinska
40	Eastern Biokovo	7	8	7.5	Šabić	Splitsko-dalmatinska
41	Western Biokovo	4	6	5	Šabić	Splitsko-dalmatinska
42	*Mlinište*	*1*	*2*	*1.5*	*Petković*	Dubrovačko-neretvanska
43	*Cepikuce*	*2*	*3*	*2.5*	*Petković*	Dubrovačko-neretvanska
44	*Duba Konavoska*	*1*	*2*	*1.5*	*Petković*	Dubrovačko-neretvanska

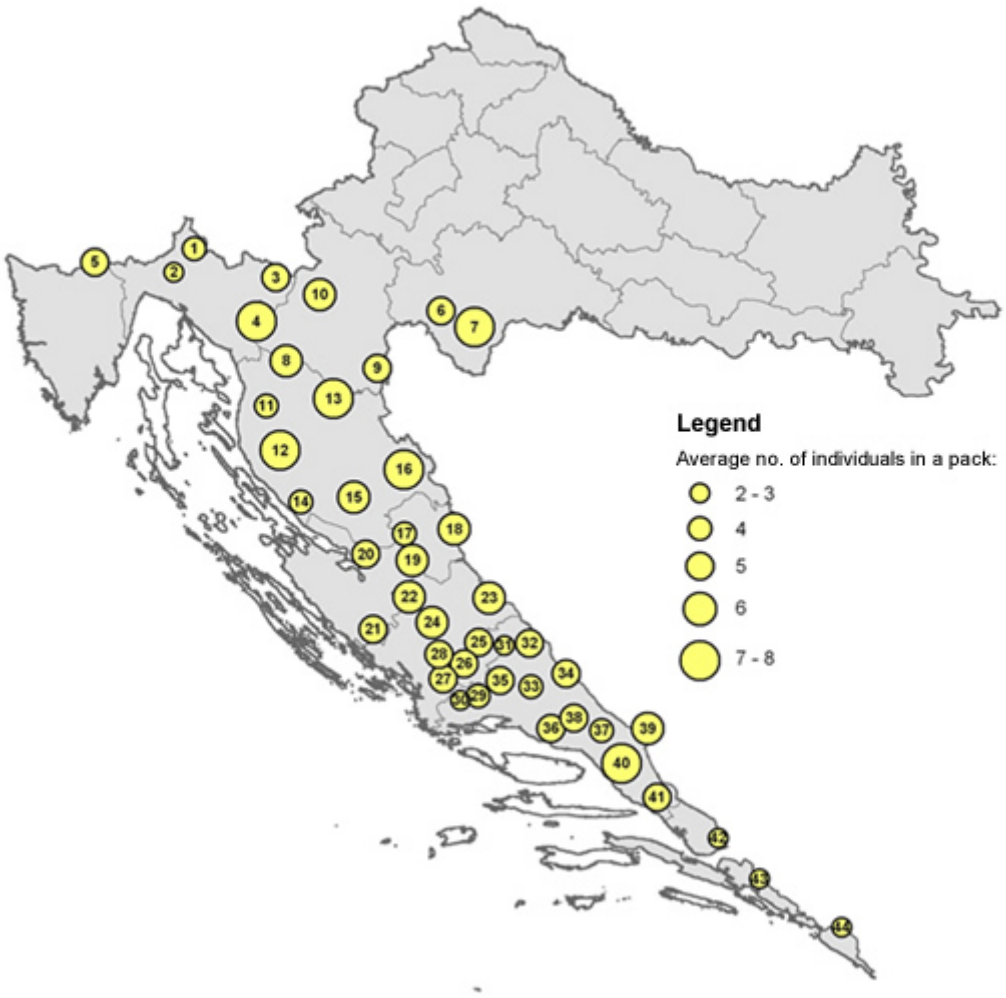

Figure 4: Wolf packs locations in Croatia identified according to local experts' statements. The packs are numbered (from 1 to 44) and more detailed data are contained in Table 9 (the size of the symbol does not indicate the actual size of the pack's range, but only the different number of individuals in a pack; a larger circle → a larger number of individuals).

4. WOLF MORTALITY

At present the major threat to the wolf are construction of roads that fragment its habitat and intersect migratory routes, illegal kill and shortage of natural prey. According to the data available, in the period from 13 September 2005 to 13 September 2006 a total number of 15 wolves were reported killed. 9 individuals died, surely or probably, due to road collision, one was shot, and the cause of death for 5 of them is uncertain or cannot be determined. The carcasses of 9 individuals were found, collected and transported to the School of Veterinary Medicine where they were dissected. Other killed individuals have not been found due to a delayed report, illegal nature of the action or, in case of telemetrically monitored individuals, due to the

absence of the signal. Their deaths have been attested by photo documentation, traces found on the scene of the accident or by the statements of reliable eyewitnesses.

The exact cause of death of individuals no. WCRO73 and WCRO78 could not be determined even though the carcasses were found. When the carcass of the wolf no. WCRO78 was found, it was at least two weeks old, with hair having fallen off and in the state of decomposition; while during the autopsy on the wolf no. WCRO73, the bites on the body from an unknown perpetrator were found. The wolf no. GG200501051200 was reported dead by an eyewitness who wanted to remain anonymous. A reliable eyewitness claims that an unknown perpetrator has shot the wolf in the area of the Glina municipality in the County Sisačko-moslavačka and has transported it illegally to Slovenia. The wolf no. DŠ020220061300 was seen killed by Mr Rogić while he was driving to work in the morning on 2 February 2006 on the road Gospić-Gračac. Due to business obligations, it was not until noon that he reported what he had seen to regional coordinator Dragan Šarić. When Mr Šarić arrived to the scene of the accident, he established that the carcass had been removed; however, the traces of blood on the road indicated that the accident had occurred. The information about the wolf that was killed near Medviđa, north of the main road Obrovac-Knin, was sent to the Ministry of Culture in writing by the expert Ana Grgas with photo documentation enclosed to substantiate the killing. Regrettably, the case was reported with a three-month delay, so that the scientists from the School of Veterinary Medicine were not able to collect the carcass and determine the cause of death. In the same letter the expert Ana Grgas mentions the case of the wolf that fell victim in the area of Zelengrad in November 2005, as well as allegations concerning the existence of a wolf scull in Medviđa, on the stretch in the direction of Bogatnik. Due to the lack of photo documentation or other evidence, these cases have not been taken into account when the records on the wolf mortality in Croatia were compiled. Regional coordinator in charge for Dalmatia Nikica Skroza found out about the wolf fallen victim near Badanj in the Drniš municipality, in the vicinity of the "Dalmacijavino" vineyard, from a cattle breeder while visiting a donated electric fence. The expert authorised for the area of the County Šibensko-kninska Mr Ivica Šupe has received the same information from another source. However, since both reports arrived with delay, it was not possible to find the carcass.

Markings W10 and W13 refer to wolves that were telemetrically monitored in the area of Gorski kotar and whose signals were lost during the first half of 2006. In February 2006, during airplane tracking of marked individuals, Dr Josip Kusak received a rapid "mortality" pace from a young female wolf named Kyra, which indicated that the animal, i.e. the collar, had not moved for several hours. The last signal of female wolf Tanja (W10) was received during the field visit in June. Due to his injury, Dr Josip Kusak was unable to carry out his research during July and a part of August, and

when he came back to the field in late summer, he established that the she-wolf's signal got lost. After thorough search of the terrain where her pack "Risnjak" used to be based, it was also established that there were hardly any signs of the wolf presence and it is assumed that the pack "Risnjak" has disappeared. Although the carcasses of the mentioned female wolves have never been found, the absence of the signal is the indication of negative changes, most likely of their death, which is why they have been included in the mortality records.

Even though, after the adoption of the Wolf Management Plan for Croatia and development of the Protocol for collecting killed protected animals (wolf, lynx), the cases of wolf mortalities started being reported to a larger extent, and in most cases in time, still it does not mean that all of mortality is recorded. Judging by the experts' statements, the actual number of killed wolves could also be considerably higher. The expert from the County Primorsko-goranska points out that illegal kill hinders the wolf population growth in the area of Gorski kotar. At the "Roundtable discussion on the status of the wolf population portion in the Čabar area", held in March 2006, the president of the Primorsko-goranska County Hunters Club Josip Malnar said that two individuals are killed on average annually in the territory of the municipality of Čabar (250 km^2), and that in the period from 1995 (since when the wolf has been declared protected) to 2005 a total of 19 wolves were shot. The expert Ana Grgas mentions traps placed by local population of the County Zadarska on locations where wolves pass by; when wolves get trapped they are either killed or left to die. In some other areas of the counties Šibensko-kninska and Splitsko-dalmatinska poisonous baits are reported to have been placed for "mischief-doers". The expert Ivica Šupe believes that poison is present in the borderline area between the municipalities of Unešić and Drniš. His assumption is based on the dissection of a dog carcass, which, due to the lack of any other visible injuries, led him to conclude that the dog had been poisoned. The same applies to the expert Stipe Kokić who performed dissection of a seemingly uninjured dog near place called Otišić at the foot of the Svilaja Mountain, while two eagles, which subsequently fed on the carcass, died. The above-mentioned expert also refers to the presence of weapons among inhabitants of this area. In early May of 2006 the expert Marko Ljubičić also reported to have found poisonous baits in the Bukovica area in the County Šibensko-kninska, after which the local police collected the baits and the case is under investigation.

The case of the pup that is kept in captivity in Siverić near Drniš should also be mentioned. The pup was found by Mr Damir Ilić in mid July on the Promina Mountain. Even though it is a living individual, due to its alienation from nature and becoming accustomed to people, it is not likely that it is ever going to be able to return to nature, and as such presents an exemption from the overall wolf population in Croatia.

Table 10: List and basic features of wolves found killed in the period from 13 September 2005 to 13 September 2006

No.	Date	Location	Area	Marking	Sex	Age (years)	Weight (kg)	Cause of death
1.	19/09/2005	Mojanka, Sinj	Dalmatia	WCRO69	F	2.0		Vehicle
2.	21/09/2005	Grab, Trilj	Dalmatia	WCRO70	F			Vehicle
3.	04/11/2005	Kričke, Drniš	Dalmatia	WCRO71	F	3.5		Vehicle
4.	16/11/2005	Zalesina,	Gorski kotar	WCRO72	M	1.8	30	Vehicle
5.	24/12/2005	Brdo Gradina, Trilj	Dalmatia	WCRO73	M	2-3		Unknown (bites on body)
6.	05/01/2006	Municipality of Glina	County Sisačko-moslavačka	GG200501051200	M	adult		Kill/Shot
7.	17/01/2006	Turjaci, Trilj-Imotski road	Dalmatia	WCRO74	F	2-3	30	Vehicle
8.	02/02/2006	Rosulja-Bilaj	Lika	DŠ020220061300				Vehicle?
9.	06/02/2006	Medviđa	Dalmatia					Unknown
10.	27/02/2006	Krivodol near Imotski	Dalmatia	WCRO75	F	2-3		Vehicle
11.	03/03/2006	Badanj, Drniš	Dalmatia					Vehicle?
12.	end April 2006	NP Paklenica	Southern Velebit	WCRO78				Unknown
13.	27/05/2006	Pađene near Knin	Dalmatia	WCRO77				Vehicle
14.	February 2006	Snježnik	Gorski kotar	W13 (Kyra)	F	0.8		Unknown
15.	spring/summer 2006	Risnjak	Gorski kotar	W10 (Tanja)	F	7-8	28	Unknown

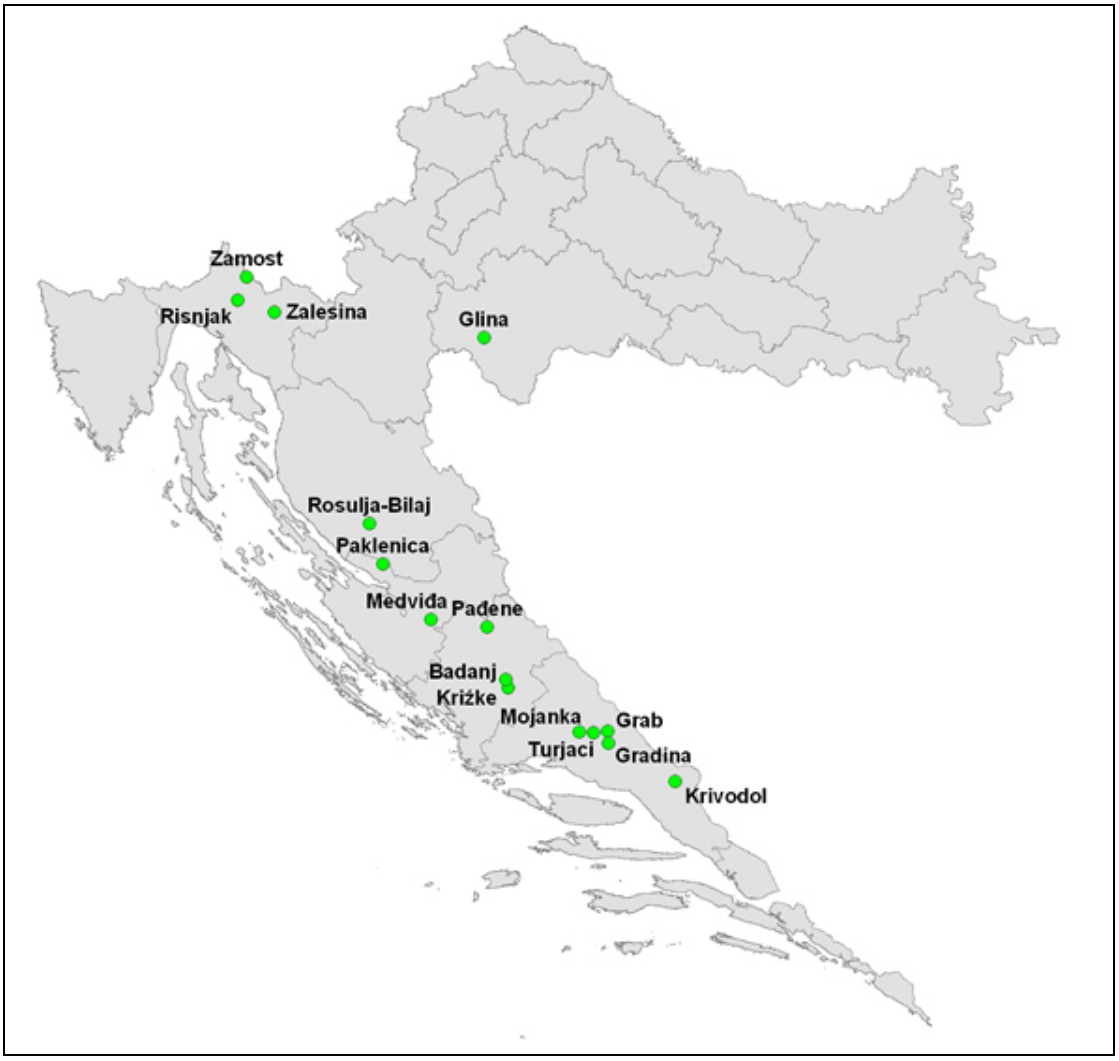

Figure 5: Locations where killed wolves were found in the period from 13 September 2005 to 13 September 2006

5. WOLF POPULATION STATUS IN NEIGBOURING COUNTRIES

The wolf population in Croatia is a portion of a larger Dinaric population inhabiting Slovenia, Croatia and Bosnia and Herzegovina and spreading further to the south of the Dinarides. Since large carnivores can travel large distances and do not know for state borders, it is of the utmost importance that the countries sharing the population cooperate, exchange information and try to harmonise their legislations. Currently, there has been an initiative launched in Europe, requiring large carnivores to be managed at the level of population level instead of the state level in order to render their management more natural and protection more efficient, based on actual spatial units.

5.1. Bosnia and Herzegovina

Data relating to the wolf population status in Bosnia and Herzegovina have been provided by Saša Kunovac, MA from the division of hunting and nature protection of the Faculty of Forestry of the University of Sarajevo. According to his knowledge, the wolf population size throughout the entire Bosnia and Herzegovina is estimated, just like last year, at some 500 individuals. The reported kill for the 2005/2006 hunting year amounts to 292 individuals, with the majority of individuals having been killed in the area of the municipalities of Olovo (21 individuals) and Kalinovik (17 individuals). In addition to reported kill by organised hunt, some more 30 individuals are likely to have been killed, as this information has been corroborated by a fair number of eyewitnesses. Regardless of such a high kill rate, the data from previous years indicate the stability of population, perhaps even a slight rise in population size in certain areas (Kupres, Bihać, Glamoč, Grahovo, Šipovo, Bugojno) where, as a result, the number of lynx went down. However, the accuracy of these claims will be proven only after this year's data have been collected and processed.

As to the legal status, in Republika Srpska the wolf is beyond the regime of protection, i.e. it falls into the category of unprotected species, whereas in the Federation of Bosnia and Herzegovina, pursuant to the new Hunting Act from February 2006, the wolf has been protected species via close season regime. Regrettably, due to the slow pace of the system, the time of the close season has not been determined yet.

In hunting year 2005/2006 the reported damages caused to livestock by the wolf include damages to 32 heads of cattle (mostly cows-heifers, 5 horses and 2 donkeys), 113 heads of small stock (18 goats and 95 sheep), and 69 dogs (56 hunting dogs and 13 shepherd dogs). Since the data refer only to reported damages, there is a possibility that the actual number is slightly higher (especially with regard to damages caused to hunting dogs).

5.2. Slovenia

Data relating to the wolf status in Slovenia have been provided by Anton Marinčič, head of the «Jelen» breeding-hunting ground within the Forestry Institute of Slovenia. According to his opinion, the wolf population size has not changed significantly over the last several years and is estimated at 60-100 individuals. Although there are some indications that the population size has increased, in Mr Marinčič's opinion it is only about the wolf having spread into the areas outside its traditional habitats (the regions of Kočevje and Notranjska). As an indicator of the wolf presence, there is an increasing number of damages caused to livestock, which are being reported in the southwest of Slovenia (the Primorska region) and in the area of Krim (between Cerknica, Ljubljana and Kočevje). Compared to previous years, there is a slight increase in the number of damages caused to livestock reported in 2006.

The wolf management regime has not changed as compared to previous years, which means that all the three large carnivores (wolf, lynx and bear) remain to be under the jurisdiction of the Ministry of Environment and Spatial Planning, which issues annual decisions on interventions in populations of all the three species. Since the Wolf Management Strategy is only in the process of being developed, it cannot be said with certainty what decision will be made this year. In Mr Marinčič opinion, the kill quota should be at last year's level, i.e. 5 individuals.

References

1. Desnica Sonja (2005): 2005 Report on the Wolf Population Status. State Institute for Nature Protection, Zagreb.
2. State Institute for Nature Protection, LIFE Project on Conservation and Management of Wolves in Croatia: Database of Damage Caused to Livestock.
3. Croatian Livestock Centre: 2004 Data on the Number of Sheep and Goats in Croatia.
4. Kusak, J. (2002): Living Conditions of the Wolf (*Canis lupus* L.) in Croatia. Doctoral dissertation. Faculty of Science of the University of Zagreb.
5. Ministry of Culture, Nature Protection Directorate: Database of Claims for Damages Caused to Livestock.
6. Štrbenac, A. et al. (2005): Bulletin of the Project on Conservation and Management of Wolves in Croatia, State Institute for Nature Protection, Zagreb.
7. Štrbenac, A. (ed.) (2005): Wolf Management Plan for Croatia, State Institute for Nature Protection, Zagreb.