

# Monitoring of Conservation Status of Wolves in Slovenia during the 2017/2020 period – FINAL REPORT

## SUMMARY

### BACKGROUND

This summary reports the results from the »Spremljanje varstvenega stanja volkov v Sloveniji v letih 2017/2020« Project (Monitoring of Conservation Status of Wolves in Slovenia during the 2017/2020 period). This is the third such project financed by the Slovenian Ministry of the Environment and Spatial Planning. The methods used in the project were developed under the LIFE SloWolf project (LIFE08 NAT/SLO/000244) and are described in detail in the Action plan for sustainable management of the wolf (*Canis lupus*) population in Slovenia for the period 2013 – 2017. This report includes the results of wolf monitoring for the season 2019/2020. The fieldwork (sample collection, tracking of occurrence and predation data) for the 2019/2020 season started in May 2019 and lasted one year (until the end of April 2020), to reflect the reproductive biology of wolves.

### METHODS

We used multiple methods including established field-based protocols, laboratory tests, and quantitative methods to provide a holistic approach to wolf population monitoring in Slovenia.

We used the **howling method for detection of wolf litters** to systematically survey the entire wolf range in Slovenia. We sampled 3 x 3 km quadrants that contain 65% or more of forest cover. In the season 2019/2020, the survey quadrant net was expanded by 72 quadrants due to the expansion of the wolf population to the Alpine and pre-Alpine regions. The howling survey was carried out in August 2019, covering the area of 529 quadrants, or 4761 km<sup>2</sup>. We detected wolves in 27 quadrants. **Twelve quadrants included the responses of pups.** The pup responses in the area of Škofja Loka hills, Pokljuka and Jelovica plateau, represent the first confirmed wolf litters in the Slovenian part of the Alps.

Field collection of noninvasive genetic samples was carried out between 1st of May 2018 and 30th April 2019. During this period, we collected 508 noninvasive genetic samples (438 scat samples, 49 urine samples, 12 saliva samples collected on natural wolf prey, 4 hair samples and 5 blood samples) of which 387 samples were genetically analyzed. This reduction was made due to the limited funds for noninvasive genetic sample analysis. Besides noninvasive genetic samples we also analyzed 28 tissue samples of dead wolves (table I) and 8 samples collected during the wolf capturing for telemetry. In the final estimate of the wolf population size and social structure we also included all working genetic samples (N = 67) of wolf saliva from livestock damages (genotipisation of these was financed by Slovenia Forest Service). Altogether we gathered 283 working wolf and hybrid samples. Based on the results of genetic analyzes, we estimated the size of the Slovenian part of the wolf population (mark-recapture method) and analyzed kinship relationships between animals.

Table I: Dead wolves, inspected in the period from 1. 7. 2019 to 30. 6. 2020

Št.	LUO	Hunting ground	Date	Sex	Body weight (kg)	Age estimate	Type of mortality	Remarks
1	Notranjsko	Iga vas	21.07.2019	F	26,0	3+	legal cull	
2	Triglavsko	Porezen	01.09.2019	F	15,3	0+	legal cull	
3	Zahodno visoko kraško	Logatec	03.09.2019	F	30	4+	legal cull	
4	Primorsko	Gradišče - Košana	15.09.2019	M	24	0+	legal cull	
5	Notranjsko	Tomišelj	18.09.2019	M	26,5	1+	loss	illegal killing
6	Notranjsko	Trnovo	25.09.2019	F	32,0	4+	legal cull	
7	Notranjsko	Prestranek	07.10.2019	M	27	1+	loss	roadkill
8	Kamniško - Savinjsko	Gornji Grad	13.10.2019	M	17,5	0+	legal cull	
9	Kamniško - Savinjsko	Gornji Grad	13.10.2019	F	19,5	0+	legal cull	
10	Gorenjsko	LPN Kozorog Kamnik	20.10.2019	M	22	0+	legal cull	
11	Notranjsko	LPN Jelen	23.10.2019	M	NA	0+	loss	illegal killing
12	Zahodno visokokraško	Hotedršica	07.11.2019	F	21	1+	loss	roadkill
13	Kočevsko - Belokranjsko	LPN Snežnik Kočevska Reka	09.11.2019	M	32	1+	loss	roadkill
14	Notranjsko	Borovnica	19.11.2019	F	NA	1+	loss	intraspecific aggression
15	Primorsko	Slavnik - Materija	23.11.2019	F	25	1+	legal cull	
16	Notranjsko	Cerknica	30.11.2019	F	33	1+	loss	roadkill
17	Kamniško - Savinjsko	Luče	15.12.2019	M	29	0+	legal cull	
18	Gorenjsko	Železniki	27.12.2019	M	35,5	0+	legal cull	
19	Notranjsko	LPN Jelen	28.12.2019	F	29	1+	legal cull	
20	Notranjsko	Rakek	03.01.2020	M	42	3+	loss	roadkill
21	Gorenjsko	Selca	12.01.2020	M	35	0+	legal cull	
22	Gorenjsko	Nomenj-Gorjuše	13.01.2020	F	25.8	0+	legal cull	
23	Triglavsko	Volče	30.01.2020	M	36	4+	loss	roadkill
24	Notranjsko	LPN Jelen	07.02.2020	M	36	2+	legal cull	
25	Zahodno visoko kraško	Krekovše	09.02.2020	M	39	5+	loss	drowning
26	Kočevsko-Belokranjsko	Draga	14.02.2020	M	39.5	1+	loss	roadkill
27	Kočevsko-Belokranjsko	Predgrad	01.03.2020	F	25	6+	loss	natural-old gunshot wound
28	Notranjsko	LPN Jelen	12.05.2020	F	28	1+	legal cull	

The entire superpopulation, including all wolves detected in transboundary packs, was estimated at around 131 individuals (121–150, 95% confidence interval) but through the genotypes we detected 103 unique individual wolves 56 males and 47 females. Through the reconstruction of the pedigrees, we have identified 16 wolf packs, 4 of which are transboundary. There are also 14 wolves in the population that are outside the territories of the confirmed packs. Since the estimated average size of

the wolf pack in Slovenia is around 6 wolves, and since 6 of the immigrants/disparagers are detected close to the border with Croatia, these wolves will be considered as two additional packs, of which one is transboundary. According to the methodology from the previous years 5/18 (27,8 %) of the population are considered as cross-border animals.

Also in accordance with the previous years' practice, half of the estimated cross-border animals are subtracted from the estimated population for management purposes. Thus, **in the season 2019/2020, we have 113 (104-129) wolves for management purposes (after correction for cross-border animals) in Slovenia.**

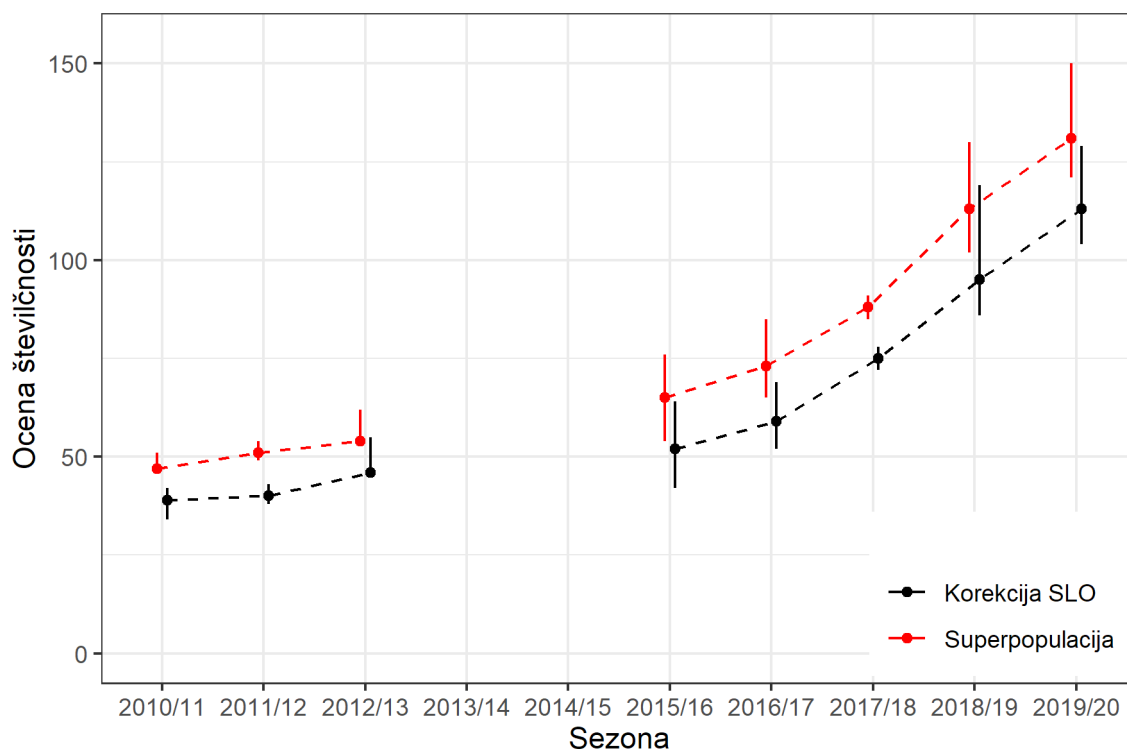


Figure II: Multi-year dynamics of the wolf population in Slovenia. The points are mean population size estimates, the vertical lines indicate a 95% confidence interval.

In the last decade, the wolf population in Slovenia has increased significantly. It seems that wolf abundance in Slovenia is now at the point where chance and mortality of each individual are becoming less important for defining the species conservation status. The wolf population shows a constant positive dynamic in both abundance and spatial characteristics, as it has been increasing and expanding spatially since 2010, ever since we have quality monitoring data. Although this year we record six packs with unknown status and seven with one of the active statuses (vital or in development), the numeric trend remains positive. **As a result, we can still define the conservation status of the wolf in Slovenia as favorable.** During the last two monitoring seasons the situation significantly changed in the Alpine part of the wolf presence area, as this season all three newly established packs in that area had litters. Although one of the three packs lost its reproductive male and so it is very likely that it will disintegrate, we can expect the dynamics of wolf spread to the Slovenian alps to accelerate. So the key challenge in this part of Slovenia will be to find solutions for coexistence - to dispel myths about the dangers of the wolves and to directly help people who are directly materially affected by the presence of the wolves.

This season we noticed the disappearance of the Javorniki 2018 and Menišija 2016 packs without the recorded mortality of reproductive animal. We also detected fewer animals than expected in the Trnovski gozd 2016 and Gotenica 2016 packs. Given the recorded cases of illegal killing of both wolves that we telemetrically monitored during the 2019/2020 season as well as the general public climate over the past few years regarding large carnivores and their management, we are concerned that there may be an increase in illegal killing in the population.

Due to recurrent sampling, we can continue to monitor population dynamics. Because of differences in sampling intensity some estimators in the table II can be over or underestimated, nevertheless we get the overall picture of the population dynamics. The population shows remarkable dynamics that have been recorded since 2010.

*Table II: Population dynamics table. Estimates are based on the actual detected animals, not model abundance. Based on the reconstructed pedigree, we divided the total population growth into reproduction and immigration.*

Above diagonal: no. of animals in season Y caught again in season X.											
Season X Season Y	15/16	16/17	17/18	18/19	19/20	Total animals	Loss	Growth	Imigration	Reproduction	Nett
15/16	49	15	13	8	5	49					
16/17	3	51	31	18	13	66	31 (63.3%)	51 (104.1%)	4 (7.8%)	47 (92.2%)	20 (40.8%)
17/18	1	3	53	38	26	87	32 (48.5%)	53 (80.3%)	3 (5.7%)	50 (94.3%)	21 (31.8%)
18/19	0	1	4	44	38	85	45 (51.7%)	44 (50.6%)	8 (18.2%)	36 (81.8%)	-1 (-1.1%)
19/20	0	0	0	0	64	106	41 (48.2%)	64 (75.3%)	5 (7.8%)	59 (92.2%)	23 (27.1%)
Missed in season X	0	3	3	4	0	Diagonal: no. of first catch					
Under diagonal: no. of animals from the season X, not caught in season Y, but were caught later.											

The problem of cross breeding between wolf and domestic dog is becoming more and more worrying. The hybrid pack from the area of Velika planina (where the female wolf mated with a dog) is mostly removed. We believe that in order to ensure long-term protection of the wolf population in Slovenia, confirmed wolf-dog crosses should be removed from the population, which is extremely difficult. An additional problem at the moment is the uncertainty in identifying animals that are not first generation (F1) hybrids. Although we now have no problem distinguishing animals coming from Italy, a new problem with Dinaric wolves has emerged. In cooperation with colleagues from Croatia, Bosnia and Herzegovina and Serbia, we are expanding the range of samples from these countries and trying to define the genetic picture in their (sub) populations of wolves. Genetically different subpopulations have been formed in Dalmatia and Bosnia and Herzegovina, whose animals are defined as backcross hybrids (hybrid - pure wolf) in comparison with specimens from Slovenia and other parts of Croatia. There are many indications that this is a "hybrid swarm", a long-term hybridization that has "moved" into the population, but we cannot say for sure. As a result, specimens that can be classified in the BIH-Dalmatia (sub) population by genotype should not be classified as crossbreeds as a precaution until the condition is investigated. Such an example is also the reproductive male of the Kozarišče pack,

which in previous seasons was defined as a hybrid and therefore decisions for cull were issued for the pack.

As part of the public opinion survey, we analyzed 733 returned and fully completed questionnaires. Participant response was 26%, which is slightly lower than the expected 30%. Respondents generally show a positive attitude towards the wolf and want it to be preserved for future generations. The results show that most respondents are well informed about the number of wolves in Slovenia and recognize the important role that the wolf plays in the ecosystem for regulating the number of ungulates. The public does not want a further increase in the wolf population and does not oppose the culling, and even supports it in the event of damages on livestock. The majority of the respondents also think that appropriate protection measures should be used to prevent wolf attacks on livestock. Compensation, as a system for conflict mitigation, seems to them to be an appropriate way, and the public has the opinion that the current compensation is too low.

Wolf has not been recognized as a potential for the development of ecotourism, despite the fact that bear related tourism has developed considerably in Slovenia in recent years.

The public thinks that damage to livestock, the belief that the wolf does not belong in the local environment, disagreement with the abolition of regular cull of wolves and concern for the safety of children and other members of the local community are the most likely factors in increasing the risk of illegal wolf shooting (poaching).

The public wants to be involved in the process of managing the wolf population, and it also recognizes the value of projects in the field of coexistence of humans and large carnivores. Confidence in the media and relevant ministries is low, while foresters, biologists, veterinarians and hunters are the most trusted. Trust in decision-makers is crucial for wolf management in Slovenia and maintaining tolerance for large carnivores.

## **CONCLUDING REMARKS**

In the season 2019/2020, sampling success is comparable to that in the 2018/2019 season, although due to the increase in the population, the funds provided are no longer sufficient for the analysis of all the samples, leaving some samples unanalyzed. In addition, we received a significantly higher number of samples of non-target species this season than in previous seasons. Regardless of this, we can stress out that we know the Slovenian wolves on a “personal” level for many generations and that we understand their social structure, abundance and long-term population dynamics in detail. Because of that we have all the data for cutting edge, science-based management of this charismatic large carnivore species in our country.

Despite the high recorded mortality of animals this season, we are still recording an increase in the number of wolves in Slovenia. The shape of the population growth curve is in line with the logistical growth of the population, but in the last season a turn can be sensed and it seems that the population is no longer growing exponentially.