

# Monitoring of Conservation Status of Wolves in Slovenia in 2016/2017

## REPORT SUMMARY IN ENGLISH

### Background

This summary reports results from the »Spremljanje varstvenega stanja volkov v Sloveniji v sezoni 2016/2017« Project (Monitoring of Conservation Status of Wolves in Slovenia in 2016/2017). This is the second annual report 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 2013 – 2017 period. The fieldwork (sample collection, tracking of occurrence and predation data) started in July 2016 and lasted one year (until the end of June 2017), 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 contained 65% or more forest cover. Altogether we surveyed 418 quadrants, or 3762 km<sup>2</sup>. The survey was done during August 2016. We detected wolves in 18 quadrants. Seven quadrants included responses of pups that confirmed the presence of wolf litters.

We monitored **wolf mortality** and recorded four dead wolves (Table I). All dead wolves were examined by a veterinarian. The results indicate a healthy wolf population. We did not detect any contagious diseases such as canine distemper, parvovirus, or adenoviruses. Additionally, we did not detect any serious zoonoses (e.g. rabies or Echinococcus).

Table I: Examined dead wolves

No.	Area	Hunting Area	Date	Sex	Body Weight (gross)	Age Estimate	Type of Mortality	Note
1	Notranjsko	Prestranek	4.1.2017	m	30,5 kg	1+	Natural	Killed by cause of other wolves death
2	Zahodno visokokraško	Logatec	25.1.2017	f	25 kg	0+	Legal cull	
3	Primorsko	Gradišče Košana	25.1.2017	f	35 kg	1+	Legal cull	
4	Primorsko	Brkini	28.1.2017	f	32 kg	1+	Legal cull	Culled on damage case

We used **genetic analysis** on 430 noninvasive samples to estimate the wolf population size and social structure. This analysis was based on 237 scat samples, 63 urine samples from snow, 15 saliva samples from natural prey and 111 samples from livestock damages. We also analyzed the tissue samples from the four registered wolf mortalities. Thanks to the LIFE WolfAlps project (LIFE12 NAT/IT/000807), an effort being implemented in the Alpine Convention area, we were able to analyze many more samples that would have been possible with existing funds. We used mark-recapture and social structure parentage/sibship assignments to generate an overall population estimate.

## Results

We detected **14 wolf packs in Slovenia during the sampling period from 2016-2017**. **Five of the packs we observed have had several generations of young**. These were the Gotenica, Menišija, Rog, Nanos, and Javorniki Jug/Vremščica 2 packs (Figure I). We found that there were **3 packs that are being formed** (likely without a “mature” social structure – Trnovski gozd, Snežnik, Javorniki Sever 2) and **6 packs for which we couldn't determine the status** (we didn't have enough samples - Slavnik 2, Gorjanci, Gomance 3, Poljanska gora, Fara, Suha krajina). It appears that these six packs have most of their territory in neighboring Croatia, where we did not collect samples.

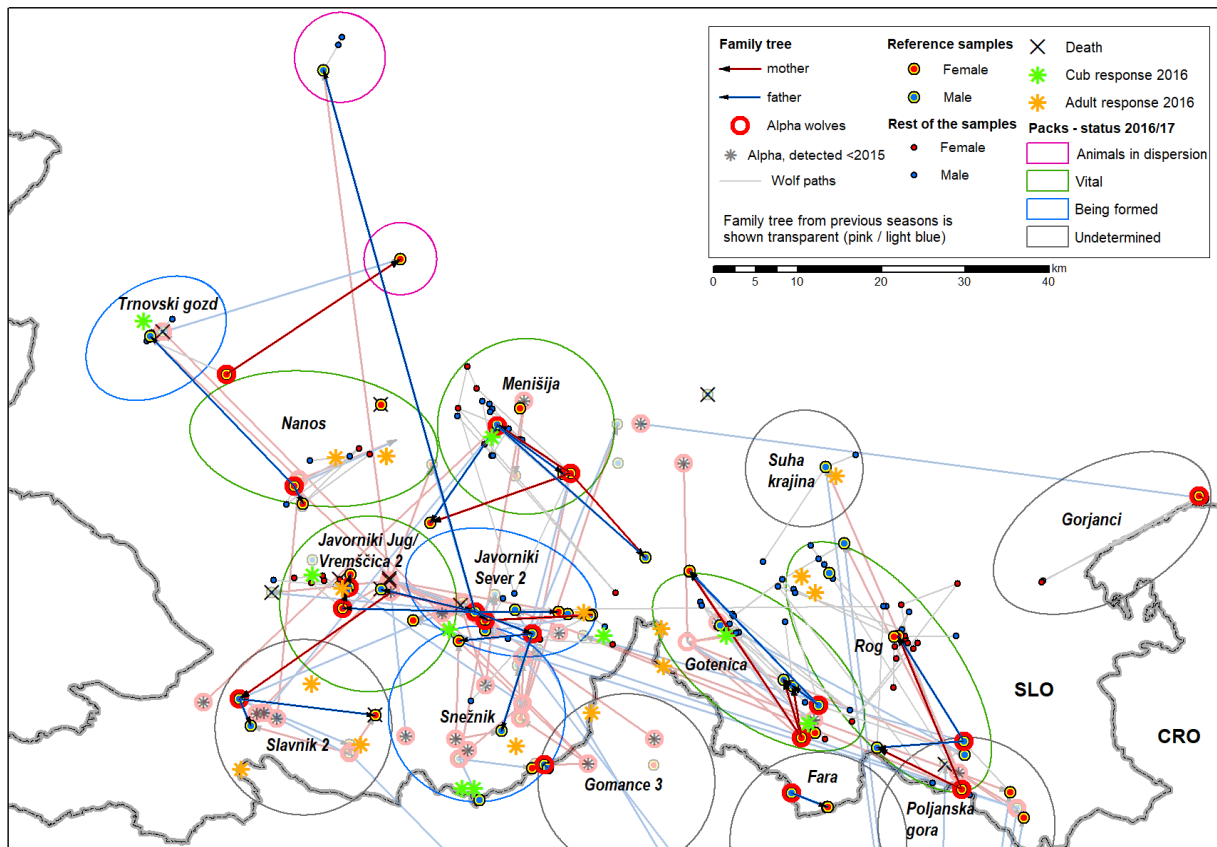


Figure I: Distribution and status of wolf packs in Slovenia in the 2016/2017 monitoring season (violet rings mark the locations of the two individuals that dispersed to the pre-Alpine area)

**The wolf population in Slovenia has been slowly increasing over the long-term** (Figure II). The entire superpopulation, including all wolves detected in transboundary packs, was estimated at around 73 individuals (65–85, 95% confidence interval). Through mark-recapture analysis, we detected 60 unique individual wolves through genotypes. When correcting the population size estimate for the Slovenian population, we excluded two border packs (Fara and Gomance 3), which marginally contribute to

Slovenian wolf population and Suha krajina pack, in which we actually detected only a single wolf but where later data indicate that this may be a newly forming pack. Correcting for the rest four transboundary packs that we share with Croatia (“assigning” a half of their estimated members to Slovenia), we can estimate **the management population size of wolves in Slovenia for the 2016-2017 monitoring season at 59 (52—69) individuals.**

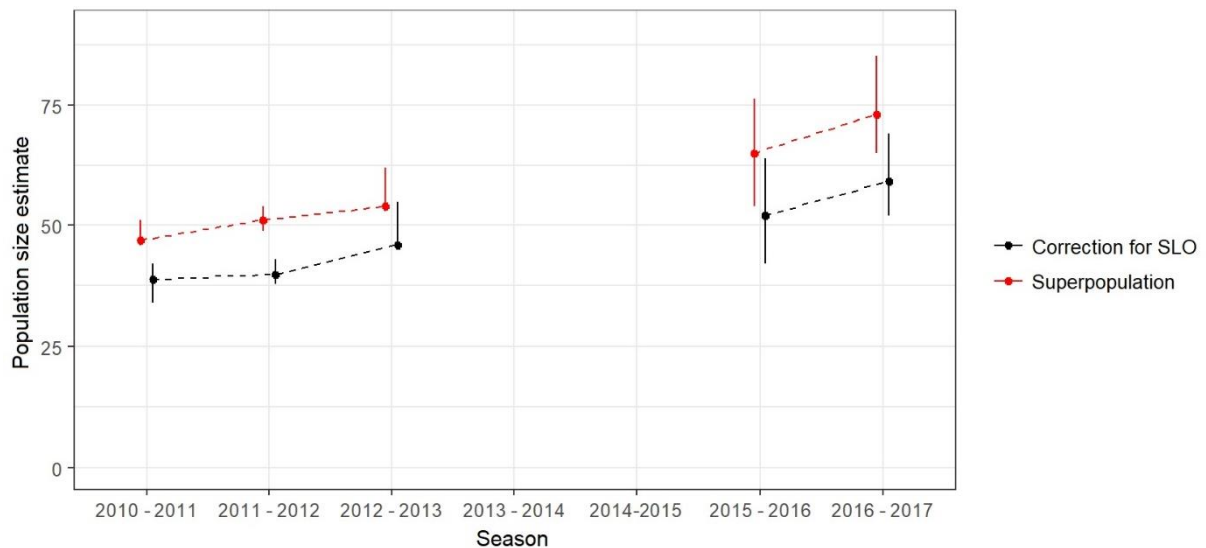


Figure II: Estimates of wolf population size in Slovenia. Dots are point estimates. Vertical lines indicate the 95% confidence intervals. The estimates for the superpopulation include all animals from packs that are shared with Croatia with the corrected estimates including half of these animals.

In the 2016-2017 season we did not detect any mortality of reproductive animals, therefore all packs have status “vital”, “being formed” or “undetermined” as their status.

In the 2016-2017 season we lost the Racna gora pack (maybe it just entirely moved its territory to Croatia), Gomance 2 (Gomance 3 are their relatives) and Javorniki Sever (none of alfa former animals were detected, but we detected the other reproductive pair in the area of their territory). It looks that new pack is being formed in Suha Krajina and also in the area of Gorjanci, which is bringing new challenges for the management of this protected species.

We have six packs that we share with Croatia. It appears that the Gomance 3, Fara, and Poljanska gora packs have most of their territory in Croatia. For the remaining three packs (Snežnik, Slavnik 2, Gorjanci), the status is unclear since we could not collect enough genetic samples from their territories. This may have been a result to poor local sampling or that these packs spent most of the season in Croatia.

Besides territorial or dispersing wolves from the Slovenian packs, we also detected **4 dispersing individuals from elsewhere.** These included one wolf in the vicinity of the Logatec- mortality, two in the territory of the “Rog” pack and one wolf in the territory of the pack “Javorniki Sever 2”. We are still detecting a male, which relocated from “Javorniki Jug” pack into pre-Alpine areas of Jelovica in the beginning of 2016. In this season, we also detected the presence of a female originating from the “Trnovski gozd” pack in the pre-Alpine area (Polhograjski dolomiti).

Since hybridization with domestic dogs is a serious problem for wolf conservation, we also checked if there were any **wolf-dog hybrids** among the sampled animals. We detected the presence of one male wolf-dog hybrid (vicinity of Babno Polje). Most probably it is a back-cross between »pure« wolve and

wolf-dog hybrid. Parentage analyses indicate that its origin is not from the Slovenian part of the population. It is likely that this hybrid dispersed from the Dalmatia region of Croatia, where we found an extremely high hybridization rate (35 % - previous studies). It would be reasonable to consider removing these types of hybrids from the population in order to maintain a healthy genetic status for the Slovenian wolf population.

### **Concluding Remarks**

Although the two-year »pause« from systematic monitoring (period 2013-2015) prohibits us from continuing with the direct tracking of the year-to-year population dynamics in the 2016-2017 season, we are still confident that we have one of the most thorough wolf population monitoring systems in Europe. We know Slovenian wolf packs at a »personal« level for several generations. This has given us insights into their social structure and has allowed us to effectively monitor their population status.

Since the wolf population in Slovenia is stable and shows slow population growth since we began intensive scientific monitoring in 2010, **we consider the wolf conservation status in Slovenia as favourable**. This is especially true for the Dinaric part of the wolf range where empty territories quickly fill in, mostly by offspring of neighbouring packs and or individual animals of the »old« packs that dissolved, likely from mortalities of the alpha wolves.

In the Alpine part of the monitored area, we observe permanent presence of wolf pack in the area of Trnovski gozd. Frequent observation of dispersed wolves in Alpine part shows us that there is a very real possibility for the appearance of the reproductive pair there in the future. With such a low number of animals it is difficult to talk about a conservation status (or a »population« for that matter) since the number of packs and wolves still mainly depends on chance. However, because of the expansion and constant occurrence of dispersing wolves in Alpine and pre-Alpine areas, we can consider the conservation status favourable.

That said, we must not forget that the total number of wolves in Slovenia is much too low for long-term population viability, which makes maintenance of connectivity with the other Dinaric wolves in Croatia and Bosnia and Herzegovina paramount. An eye should be kept on the emerging border fences on the Slovenian side with Croatia, which are being constructed to direct the human migration flows. Care should be taken that these fences do not result in isolation of the »edge« populations of large mammals in Slovenia.