Monitoring wolves (*Canis lupus lupus*) – citizen science provides important results

Authors: Peter Schütte (wolf commissioner) & Matthias Hammer (Biosphere Expeditions)

Introduction

After an absence of more than 150 years, the Eurasian wolf (*Canis lupus lupus*) started to colonise Germany and reached the federal state of Lower Saxony in 2006. This 'Central European Lowland Population' of *Canis lupus lupus* is:

- classified by IUCN as Endangered since 2012 (Kaczensky et al. 2013)
- protected by European law through the Fauna Flora Habitat (FFH) Directive and German law (Federal Nature Conservation Act)
- defined as isolated, as there is no unrestricted reproductive exchange with other populations

The objective, as per the FFH Directive, is to achieve and maintain a 'Favourable Conservation Status' (FCS) for this wolf population. We argue that for this active wolf monitoring is required.

Monitoring area in Lower Saxony (Google Maps)

However, in Lower Saxony the official wolf monitoring methodology is conducted in a passive way only (sign is not actively searched for, but only reported as it is found by hunters, wolf commissioners and others as and when they have time to report findings) following SCALP criteria.

Citizen science NGO Biosphere Expeditions, the state wolf bureau and a number of wolf commissioners started an active monitoring programme (where by sign is actively searched for over a concentrated time period). This programme involved international citizen scientists and data gathered were added to the existing wolf monitoring database.

Field work conducted (one group up to 12 citizen scientists for one week):

2017: 4 groups of 1 week each in June/July, total of 49 citizen scientists

2018: 2 groups of 1 week each in June/July, total of 23 citizen scientists

Methods

Field work

Citizen scientists conducted 'presence sign surveys', searching for signs of wolves such as tracks, scats, scratch marks, kills or direct sightings following Reinhardt et al.'s (2015a) monitoring methods, ways of documenting and evaluating findings in the field. The main focus was to find DNA material (scat) for further analyses of the wolf population and to determine individuals from this.

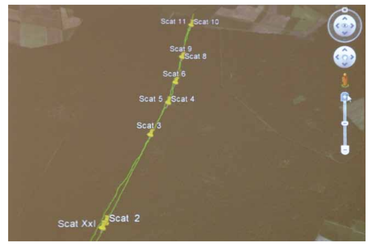
Field training

The first two days of each week were dedicated to training the citizen scientists through a mixture of classroom sessions and practical lessons in the field. Training included recognizing wolf signs (tracks, scat, kills/carcasses or hair), sample collection and handling in accordance with Kaczensky et al. (2011) and Senckenberg Institut für Wildtiergenetik (2011).

Documentation of findings was also covered, using data sheets and photos following Reinhardt et al. (2015b). Equipment training on GPS receivers, cameras, radios and sample collection kits was also conducted. Standardised datasheets, translated from and closely based on those of the official wolf monitoring programme, were designed for surveys and citizen scientists were trained on how to complete them correctly.

Typical expedition day

Survey routes were decided in advance with input from wolf commissioners, landowners/landusers and foresters. Each morning the expedition team divided into sub-teams of two or more people, who were assigned to survey a certain area that day. Each group was equipped with field and tracking equipment as above.



Results

2017 (dietary analysis pending):

Over four weeks 49 citizen scientists took part (42 from Germany or its immediate neighbour states (86%), four of them (8%) from Lower Saxony, three from North America (6%), two from Australia (4%), as well as one person each from India (2%) and Singapore (2%).

Twenty-five 10x10 km grid cells of the EEA grid system and 1,133 km were surveyed on foot or by bicycle. All grid cells were surveyed multiple times (n = 52).

76 wolf scat samples were collected. 33 yielded material for DNA analysis and 75 provided material for dietary analysis.

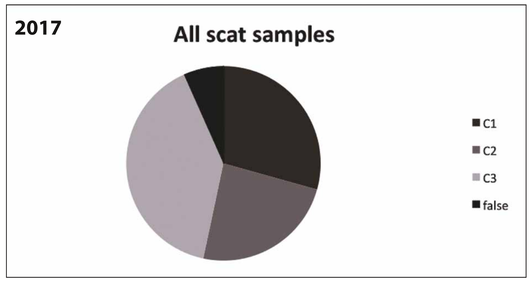
Twenty-two (29%) of the 76 scat samples collected were classified as C1 pieces of hard evidence on the SCALP classification system, 19 (24%) as C2 confirmed observation and 30 (40%) as C3 unconfirmed observations. Five (7%) did not originate from a wolf. One direct sighting was also recorded as a C1 piece of hard evidence.

Results of DNA analysis:

- six individuals confirmed: two female and four male wolves
- presence of a new wolf pack confirmed
- two areas of high wolf activity identified

Thirty-two tracks, a variety of fur remains and five wolf kill carcasses were also found, but did not pass quality assessment procedures.

2017	DNA wolf	DNA no wolf	Species not determinable	Total DNA samples
Week 1	1	0	0	1
Week 2	4	0	2	6
Week 3	14	4	4	22
Week 4	3	0	1	4
Total	**22**	**4**	**7**	**33**



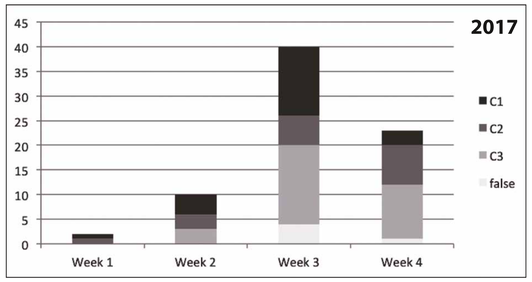
2018 (preliminary results, DNA and dietary analysis pending):

Over two weeks 23 citizen scientists took part (15 from Germany or its immediate neighbour states (65%), two of them (8%) from Lower Saxony, three from North America (13%), three from UK (13%), as well as one person each from Australia and Iceland (4%).

Fifteen 10x10 km grid cells of the EEA grid system and 638 km were surveyed on foot and 100 km by bicycle. All grid cells were surveyed multiple times (n=29).

200 wolf scat samples were collected. 25 yielded material for DNA analysis and all of them provided material for dietary analysis. Another 50 scats were very old and therefore not sampled.

Seven tracks were found, but did not pass quality assessment procedures. One direct sighting was also recorded as a C1 piece of hard evidence.



Conclusions

The quantity and quality of samples collected by the active monitoring effort of citizen scientists is remarkable, boosting annual official wolf sign records by over a third in quantity and producing a quality ratio of 53% of C1 and C2 records (the quality ratio of the passive official monitoring programme is around 40%).

This shows that with two days of training, contributions of citizen scientists towards wolf research and conservation can be high in quality as well as quantity. The project serves as a showcase of how international citizen scientists can make a significant contribution to regional wildlife conservation efforts.

Literature:
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