Bears

Objective: Stabilise abundance and reduce conflicts

Carpathian Mountains

status: improving

Problem: The population size and structure of brown bears in the region has been impacted by changes in bear population management, disturbance from logging and rapid climate change, and the absence of a prevention strategy for human-bear conflicts. This has resulted in an increase in conflicts between bears and humans, and a reduction in public acceptance of the species.

Brown bear (Ursus arctos). Photo: Foundation Conservation Carpathia.

Action: Foundation Conservation Carpathia has leased hunting concessions in which hunting has been halted, and has also purchased forest land where they have ceased logging and started to restore native mixed forest. Over time, the cease of hunting and reduction in disturbance, as well as improved connectivity through habitat restoration, should lead to an increase in bear populations. To reduce human-wildlife conflict, local farms have been equipped with electric fences and bear spray as well as Carpatin breed livestock-guarding dogs. Rapid response teams have also been set up to resolve conflicts.

Indicator: Robust, science-based monitoring of individuals and populations of brown bears is being used to support human-bear coexistence.

Methods

Monitoring aimed to estimate the brown bear population size within the hunting-free area of the project. To do this, sampling was conducted over 900 km^2 in 2017, expanded to 1200 km^2 from 2018-2022.

Biological samples (faeces and hair) were collected during continuous tracking sessions in autumn 2017, 2018 and 2022 along trails and forest roads. Additional tracking in the peak feeding season in autumn was also carried out between 2018 and 2022. Tracks were followed on foot as long as possible, and all scat and urine samples found were collected. In addition, from 2018-2022 samples were opportunistically collected whenever damage from a "problem bear" was reported to the rapid response team. The maximum age of biological sample used was 5 days, to ensure good preservation. Samples were preserved in ethanol before being sent to the University of Ljubljana in Slovenia for genetic analysis.

Between 2017 – 2022, 2985 samples were collected, of which 2002 returned a reliable bear genotype.

DNA sample collection. Photo: Călin Șerban.

Collecting a faeces sample. Photo: Călin Șerban.

Results

Baseline sampling identified 283 individuals (137 females and 146 males), with a density of 18.6 bears /100 km^2 (95% confidence interval = 18.3 – 21.9) in 2017 in the 900 km^2 area, and 13.1 bears / 100 km^2 (12.4 – 16.6) in 2018 in the expanded 1200 km^2 area (Fig. 1). Over the full sampling period 2017-2022 a total of 504 individuals (215 females and 289 males) were identified. Estimated density for 2022 was 23.9 bears / km^2 (95% confidence interval = 22.3 – 31.7) for the 900 km^2 originally sampled, and 22.6 bears / km^2 (21.6 – 29.0) for the expanded sampling area.

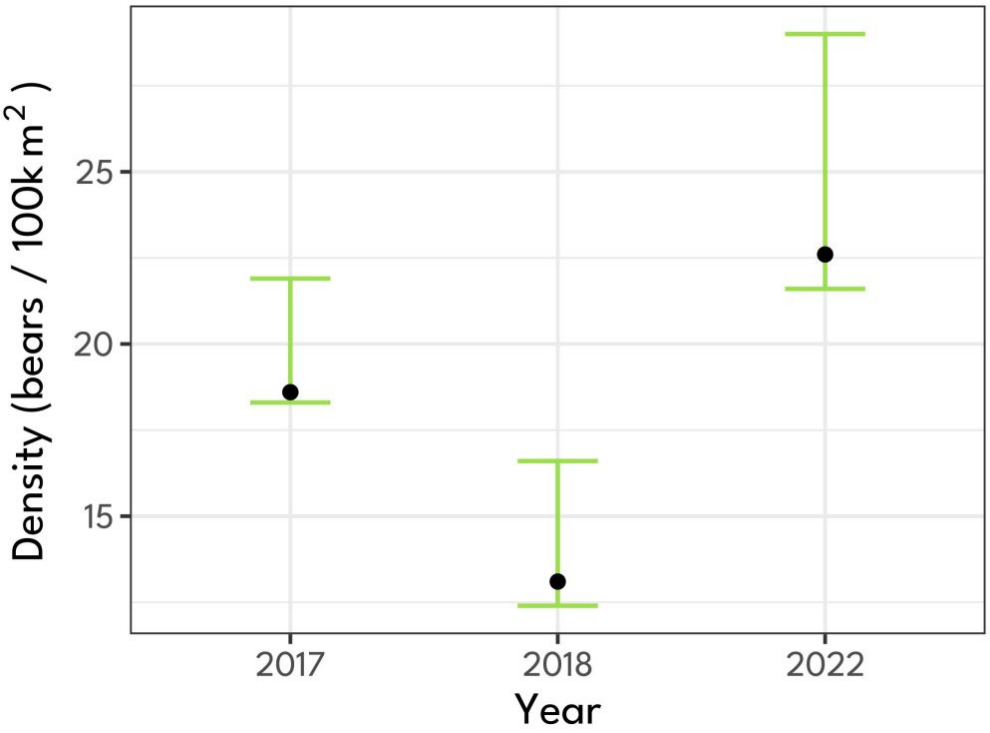

Figure 1: Density of bears estimated in 2017, 2018 and 2022. Error bars show 95% confidence intervals. Density for 2017 was estimated across the smaller 900 km^2 area, while density for 2018 and 2022 was estimated across the expanded 1200 km^2 area.

The movement of individual bears in the landscape was also tracked across time (Fig. 2).

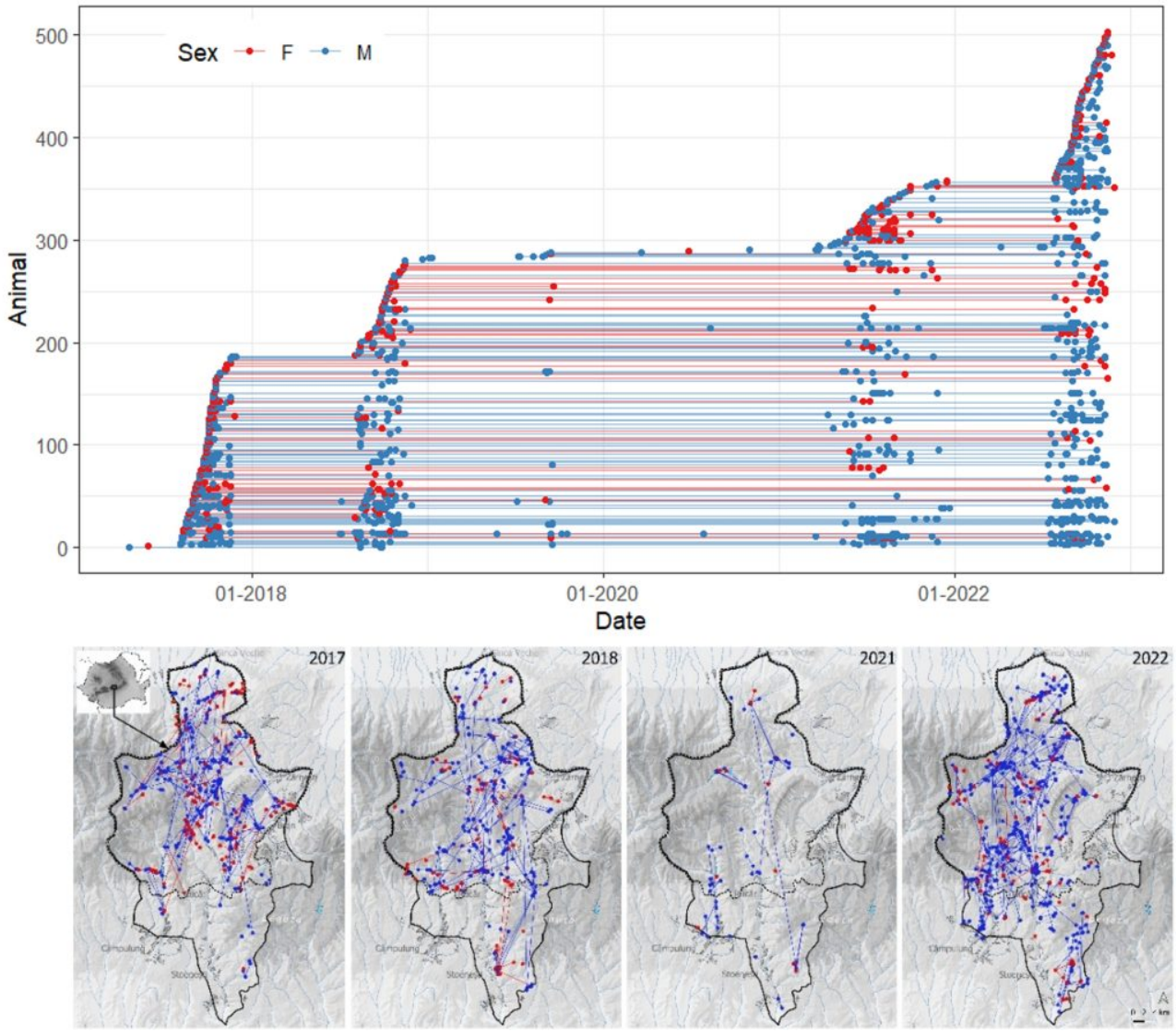

Figure 2: Genotyped brown bear samples between 2017 and 2022. Each dot represents one capture (males in blue, females in red) and lines connect the same individual through time as it was recaptured.

Interpretation

There was significant variation in the number of bears detected in each year, a bias towards repeatedly detecting males more often than females, and in general, a low overlap in the genotypes from one year to another. This suggests that the population in the area is highly dynamic. The skewed observed sex ratio may be due to the sampling methodology failing to capture females, which may evade open areas, roads, and animal paths (commonly used for collecting samples) in order to protect cubs.

Although the non-overlapping confidence intervals for population estimates from 2017-2022 suggest a significant change in bear population density at local to regional scales over the studied period, it is unlikely that these changes can be extrapolated to the entire Romanian Carpathians. For example, 2018 was a year with crop failures in the orchards of the study area, while 2022 was a very productive year for hard mast (trees producing nuts and acorns, resulting in high food availability). This may have caused a high immigration rate in this well-connected landscape from wandering bears in search of food. The

apparent rise in the bear population could also be attributed to the decrease in logging activities under Foundation Conservation Carpathia's management, lowering the energetic costs needed by bears to avoid disturbances in heavily logged areas.

Carpatin shepherd dogs, which have been donated to local farmers to guard livestock. Photo: Călin Șerban.

Rapid response teams have been created to resolve conflicts between bears and humans. Photo: Foundation Conservation Carpathia.

Next steps

The bear population dynamics revealed by this data spark further questions aimed at understanding the spatial dynamics of food availability for bears, its subsequent impact on shifting hotspots of bear densities across the Carpathian landscape, and how this affects the numbers of conflicts in adjacent rural areas.

The next population survey will be done in autumn 2027, 10 years after the baseline survey, adding to the longest dataset for the species in this part of Europe. Additionally, from 2025, Foundation Conservation Carpathia plans to evaluate bear diet and to establish a permanent network of plots to measure natural food availability. The goal will be to understand how food availability influences bear diet and whether this affects rates of human-bear conflict.

Publications

Report: Genetic monitoring of brown bears

Partners


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