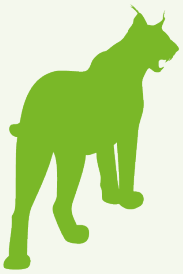
Lynx

Objective: Increase abundance

Carpathian Mountains
status: no change observed



Problem: Legal and illegal sport and trophy hunting as well as disturbance from logging have led to a decline in populations of apex predators including lynx.

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 cessation of hunting and reduction in disturbance, as well as improved connectivity through habitat restoration, should lead to an increase in lynx populations.

Indicator: An increase in lynx numbers indicates increased ecological integrity and intact food webs, with greater prey abundance.

Lynx sitting on a rock. Photo: Foundation Conservation Carpathia.

Methods

Monitoring aimed to estimate the lynx population size within the hunting-free area of the project. Since distinctive coat markings mean individual lynx can be distinguished from images, camera trapping was used. Camera traps were distributed according to a pre-set 2.7 x 2.7 km grid on an area of 100,000 ha. Cells with more than 2/3 of their area exceeding 1800m elevation, above the treeline, were excluded since lynx were expected to use these alpine and subalpine habitats only occasionally, leading to a low detection probability. Cells that only partially overlapped the study area were also removed. From the remaining cells, cameras were placed in every second cell (a total of 78). If a cell could not be accessed, an adjacent cell was used instead. At each location, two cameras were deployed opposite one another, facing

the lynx's expected path, to maximise the chance of capturing both sides of the lynx to provide the best possible images for individual identification.

Lynx caught by a camera trap. Photo: Ruben Iosif.


Lynx caught by a camera trap. Photo: Foundation Conservation Carpathia.

The baseline survey was done across two sessions in 2018-2020: a winter session (December 2018 to April 2019, which included the reproductive season) with 48 camera trap sites, and an autumn-early winter session (October 2019 to January 2020, non-reproductive season), with 59 camera trap sites. The winter session aimed to maximize lynx detections during the intense movement that comes with the reproductive season, in order to identify the best locations for camera trapping and build a reliable library picture for identification. The second session was intended to capture stable home ranges and come as close as possible to the population closure assumption of spatially explicit capture-recapture models.

In the second phase of the monitoring, in 2023-2024, another 76 sampling stations were deployed, replicating the grid used in the baseline survey. Data was collected from October 2023 – April 2024, covering both the autumn-early winter session (non-reproductive spatial territoriality) and the winter session (reproductive migrations).

Data were used to estimate the regional population using a spatial capture-recapture modelling approach, in which monitoring effort in time (e.g. camera functionality over sampling occasions) or in space (e.g. GPS transects recorded at each DNA sampling occasion) was included as a covariate for predicting population size and density.

Results

Baseline sampling in autumn-early winter 2019-2020 identified 23 unique individual lynx, from 116 detections (Fig. 1). In the 2023-2024 sampling period, 15 individuals were identified from 92 detections. An extension of the last camera trapping season with 100 additional trap nights (until mid-April 2024), increased the number of detected lynx from 15 to 23 lynx individuals, including 8 new individuals that

were not captured in previous years.

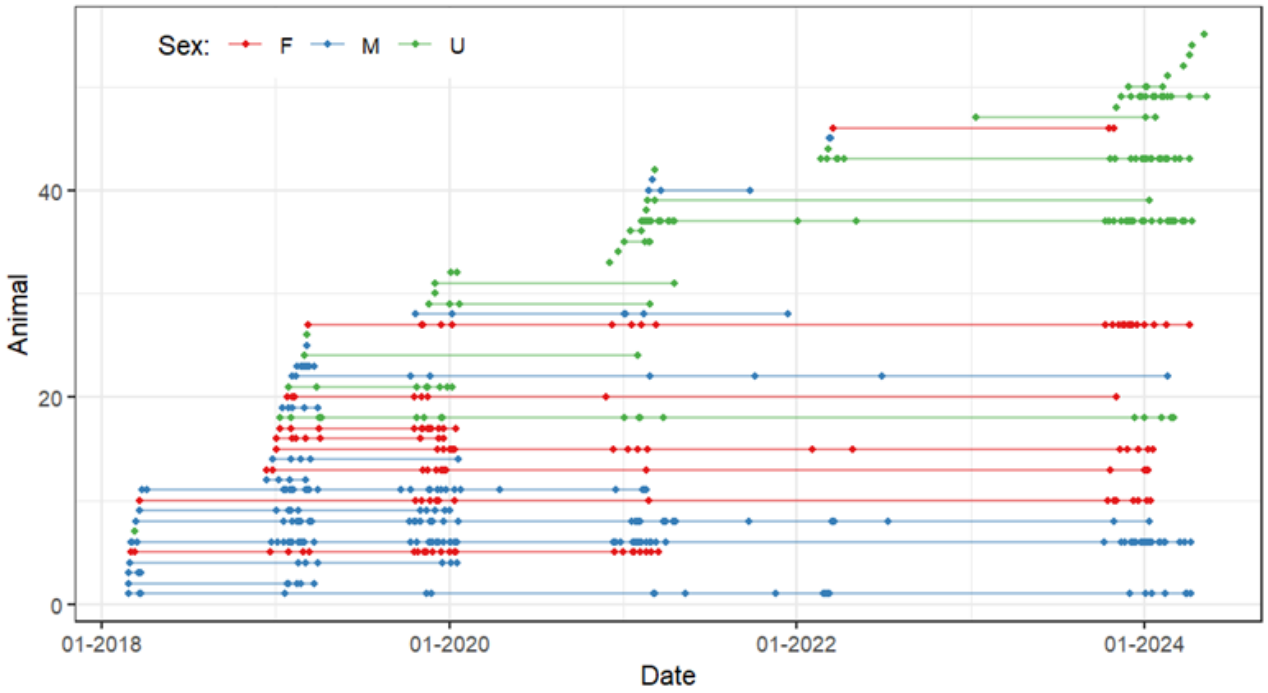


Figure 1: Detections of lynx individuals between 2018 and 2024. Each dot represents a detection, and lines connect the same individual as it was detected through time.

Mark-recapture models estimated the regional population in 2019-20 at 48 individuals (95% confidence interval 36.5 – 69.5) with a density of 1.73 individuals / 100 km^2 (95% confidence interval 1.12 – 2.66; Fig. 2). In the 2023-24 sampling period, the estimated regional population was 29 individuals (95% confidence interval 21 – 45 individuals) and estimated density of 0.86 lynx / 100 km^2 (95% confidence interval 0.57 – 1.45). Overlapping confidence intervals for the 2019-2020 and 2023-2024 data suggest that this apparent decrease in lynx population density was not statistically significant.

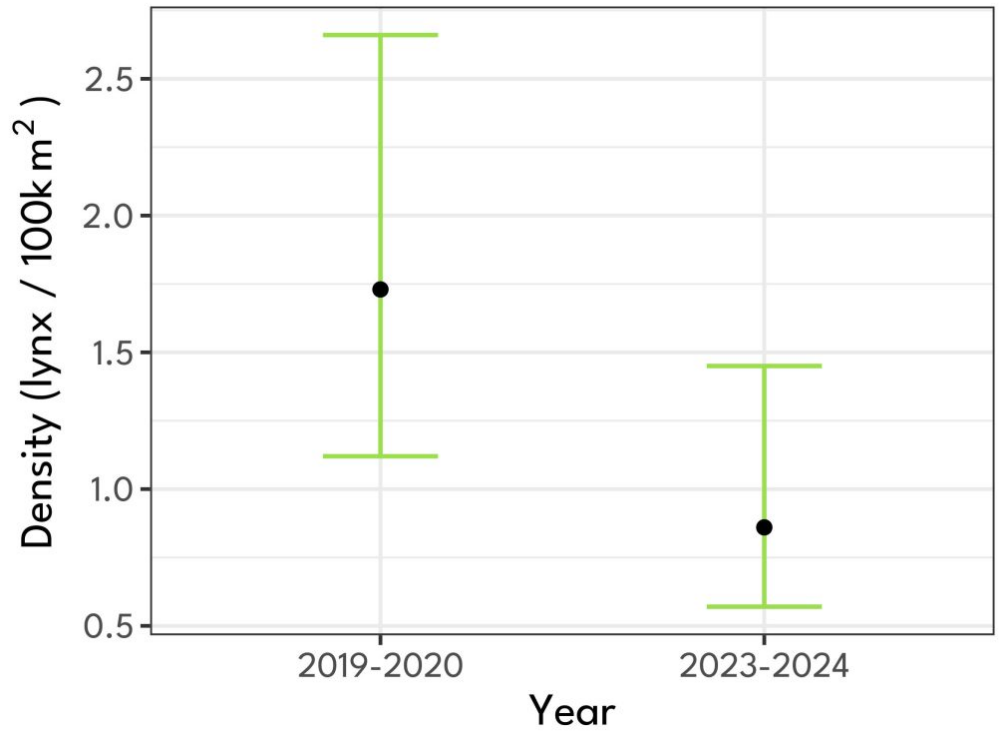


Figure 1: Density of lynx estimated across the sampling region in autumn-early winter sampling sessions in 2019-2020 and 2023-2024. Error bars show 95% confidence intervals.

Interpretation

The apparent decline in the lynx population could be seen as a natural one, and the lack of historical data makes it difficult to assess whether the baseline estimates might have captured a population peak, rather than being reflective of a stable longer-term population size. Future monitoring will be needed to confirm whether the lynx population is really in decline. It is possible that short, late winters, with low temperatures in April-May, might be responsible for low cub survival, hindering recruitment in the population.

Publications

Report: Camera trapping of lynx

Iosif, R., Popescu, V. D., Ungureanu, L., Șerban, C., Dyck, M. A., & Promberger-Fürpass, B. (2022). Eurasian lynx density and habitat use in one of Europe's strongholds, the Romanian Carpathians. *Journal of Mammalogy, 103*(2), 415-424.

Partners

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