

## FIRST CAMERA-TRAP SURVEY IN THE NATIONAL PARK MAVROVO, MACEDONIA

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### ABSTRACT

In the frame of the “Balkan Lynx Recovery Programme”, a camera-trapping survey was performed in the Mavrovo National Park, Macedonia from 26.02. until 26.04.2008. The aim of the survey was to gain data on the distribution and minimal number of the lynx population in the National Park (730 km<sup>2</sup>), which is considered as a core area of the Balkan lynx population.

The study area was divided into 2.7 x 2.7 km grid cells. A total number of 32 grid cells were selected in an area of 432 km<sup>2</sup>. In each grid cell the most appropriate and “promising” site where lynx was supposed to pass by (forest roads, hiking and game trails) was chosen. Two opposite “Stealthcam” camera-traps were installed at each site in order to record both flanks of the animal. As an attractant a pole with Valeriana (*Valeriana officinalis* dilution) was set between the two cameras. The cameras were checked for a function control, change of batteries and, if needed, change of film every 8 days. The survey ran over 60 trap nights.

The first camera-trap survey in Macedonia resulted in 29 lynx photographs from eight camera-trapping sites. Preliminary data analysis showed the presence of at least 7 to 10 different individuals. There are two photographs with two individuals at the same time. Besides lynx, bear, wolf, red fox, wildcat, badger, wild boar, chamois, roe deer and brown hare photographs were taken, which is a good evidence of the presence of lynx prey and other carnivores in the park. The first photographs of the Balkan lynx ever taken in this area are a solid proof for the existence of this critically endangered subspecies.

**Keywords:** Camera-traps, Lynx, Mavrovo, Macedonia, Lynx lynx, survey

### INTRODUCTION

The Balkan lynx is the most endangered autochthonous population of Eurasian lynx (*Lynx lynx*) with an estimated number of no more than 100 mature individuals (VON ARX *et. al.*, 2004). Its distribution is mainly in the mountain ranges along the border between Macedonia and Albania, some nuclei in Kosovo and Montenegro and unconfirmed observations in Northern Greece.

In order to halt the further decline of the Balkan lynx population, a long-term project – the “Balkan Lynx Recovery Programme” – started in 2006. The main objectives of the project are to obtain more accurate knowledge on lynx distribution and numbers as well as on its ecology, to build professional capacity and to create the preconditions for developing a recovery strategy. One of the main activities in the frame of the project so far was collecting significant data on the presence of lynx and its prey as well as information on conflicts between large carnivores and local people and socio-economic factors in the villages of the lynx

range. This was done by means of questionnaires (see TRAJÇE *et. al.*, this volume). Snow-tracking activities were carried out, as well.

As a logical continuation of the monitoring process started in this project, the camera-trapping method was for the first time introduced in Macedonia and Albania. It started in autumn-winter 2007 when four cameras were installed at the most promising sites in the Mavrovo National Park and first lynx photos were recorded. From February-April 2008, the Balkan lynx team, assisted by experts from KORA, conducted the first systematic camera-trap study in the area of the Mavrovo NP. The survey was supported by the national park authorities, border police and the local NGOs. A one-day workshop about the monitoring methods, field signs, lynx biology and status of the Balkan lynx was given to the Mavrovo NP staff before the official start of the camera-trap survey.

All these activities are very important and serve as a stepping stone towards the development of a range-wide Conservation Strategy and national Action Plans.

## INVESTIGATED AREA

The Mavrovo National Park (Fig. 1) with a total surface of 730 km<sup>2</sup>, is the largest of the three national parks in Macedonia. It was established in 1949 when forested areas around Mavrovsko Pole were proclaimed as National Park. Furthermore, in 1952, the borders of the park were enlarged significantly and gained the today's shape and size. The area of the park belongs to the Shara Mountain group of mountains and is part of the Scardo-Pindic system (SINADINOVSKI, 1993). Most of the southern part of the Shara Mt., the whole missives of Korab and Deshat Mts. and a considerable part of Bistra Mt. are constituent of the Mavrovo National Park. The relief is very interesting and diverse. It is mainly consisting of steep mountain slopes, gorges, high mountain pastures and valleys. The National Park comprises 36 villages in four local regions. Alpine mountain vegetation is represented only on Korab Mt., while on the mountains Bistra, Deshat and parts of Shara Mountain there is sub-alpine vegetation.



Fig. 1. Location of the Mavrovo National Park Macedonia

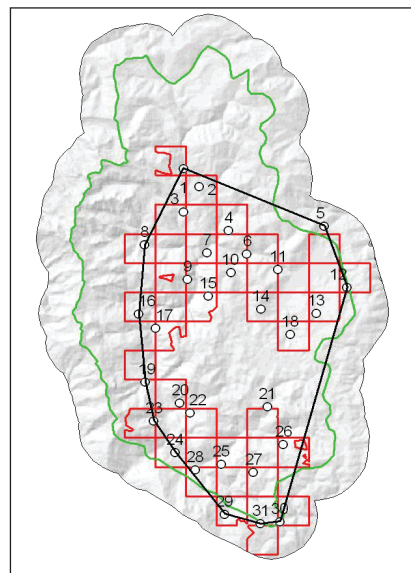


Fig. 2. Study area (black polygon). 32 sites (white dots) were chosen, one each grid cell (in red). The green line defines the border of the Mavrovo National Park.

## MATERIALS AND METHODS

According to the results of a questionnaire survey carried out in 2007 (see Trajçe *et. al.*, this volume), the Mavrovo NP was selected as study area for the systematic camera-trap survey because a high number of

chance observations were reported from this region. The sample design for this study was the same as the one used in Switzerland since 1998. The area covered with camera-traps included 432 km<sup>2</sup> (Fig. 2, black line). A total number of 32 grid-cells were chosen for setting the camera-traps. Grid cells of 2.7 x 2.7 km were selected by overlaying a map over the Mavrovo NP in the Geographical Information System (GIS). All cells with more than 2/3 of their area over 1800 meters altitude were excluded. Then, every second grid-cell was chosen for setting camera-traps, excluding cells that cover open areas as well as those located in very remote areas, particularly in the northern part of the park. Camera-traps were set on sites with a high probability to picture a lynx: along game paths, hiking trails or forest roads (Fig. 3). At each site, 2 opposing camera-traps (Stealthcam) were set in order to picture both flanks of each lynx simultaneously, enabling for a reliable individual identification later on (ZIMMERMANN *et. al.*, 2004). As lure a pole with a solution of “Valeriana” was used. Cameras were triggered by a motion detector which registers any movement. Each site was controlled every 8 days, whereupon the functionality of the cameras was checked and batteries and films were changed when necessary.

The camera-trapping method is a widely used method for the estimation of the number of individuals in the study area within a confidence interval by means of capture-recapture analysis. It is very often used on species with an individually different coat pattern, such as the spotted cats. Moreover, using the camera-trapping method, one gets an idea of the presence of other species (prey and predator species) and obtains basic information about dispersal and spatial use as well as indications for the survival of individuals and reproduction. If conducted over several years capture-recapture estimation gives an excellent indication of the population development.



**Fig. 3.** Camera-traps set at a hiking trail in the vicinity of Radika River (Mavrovo NP)

## RESULTS

The camera-trap survey was conducted over 60 nights, starting on 26 February and ending on 26 April 2008, a period likely short enough to meet the population closure assumptions. Potential sampling effort was 1920 trap-nights (32 sites multiplied by the number of trap nights, 60). Unfortunately, two camera-traps were sabotaged and six camera-traps were stolen during the survey. This reduced the effort to 1796 trap nights, representing 93% of the potential. A total of 29 lynx pictures were taken (10 right flanks, 16 left flanks and 3 unidentified) at eight camera-trap sites (Fig. 4). Both flanks of one lynx individual were simultaneously pictured in 7 cases. Preliminary data analysis showed the presence of at least 7 to 10 different individuals. A female lynx with a cub was pictured once, which proved a successful reproduction (Fig. 5) Moreover, many pictures of different species were taken: 13 brown bear pictures, 7 wolf pictures, 10 red fox pictures, 6 wild cat pictures, 12 badger pictures, 47 wild boar pictures, 28 chamois pictures, 36 roe deer pictures and 30 brown hare pictures.

These results from the first camera-trap survey in Macedonia are very promising. Pre-eminently, first pictures

of the Balkan lynx were taken which is strong evidence that this critically endangered lynx subspecies still exists. In addition, the data may allow making a quantitative estimation of the lynx population in the national park using photographic capture-recapture analysis.



Fig. 4. Lynx photo on 08.04.2008 at vicinity of village Bibaj



Fig. 5. Lynx mother with cub on 25.03.2008 at vicinity of village Janche

## CONCLUSIONS

With no more than 100 mature individuals living in the south-west Balkans, the Balkan lynx is considered to be the most endangered autochthonous lynx population in the world. Urgent conservation efforts are needed to preserve this subspecies from vanishing. The project “Balkan Lynx Recovery Programme” started in 2006 and will last until 2009 with the main aim to halt the further decline of the Balkan lynx. Series of activities have been undertaken in the frame of the project. Starting with basic monitoring techniques such as snow-tracking and conducting questionnaire surveys in the potential lynx range, the most promising region of lynx presence was outlined for the first camera-trapping study in Macedonia and Albania: The Mavrovo National Park is situated in western Macedonia, bordering with Albania. It is the largest national park in Macedonia and believed to be the core area of the Balkan lynx. The survey took place from 26 February until 26 April 2008. A total number of 32 sites were chosen in an area of 432 km<sup>2</sup>. At each site two opposing motion detector cameras were placed. Camera-traps were placed on forest roads, hiking trails and game paths, where there are good chances of photographing lynx. As an attractant a pole with “Valeriana” solution was placed between the cameras. A total number of 29 lynx pictures were taken at eight camera-trapping sites. The preliminary results showed that the minimal number of lynx in the area of the park is 7 to 10 individuals. Except for lynx, many other wild animals were pictured. The team will now try to make a quantitative estimation of the lynx population in the national park using photographic capture-recapture analysis.

The first photos of the Balkan lynx are a solid proof for its existence in the Mavrovo National Park. However, we need to expand our studies to further potential regions of lynx presence outside the park in order to get a better general picture. The development of a range-wide Conservation Strategy and national Action Plans will aim to define targeted activities for the recovery of the Balkan lynx population for the near future and will close the successful three years project. We are however ready to continue our efforts beyond 2009.

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