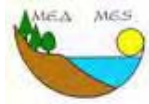# Estimating the population size of the Balkan lynx in Mavrovo National Park, Macedonia, by means of camera-trapping

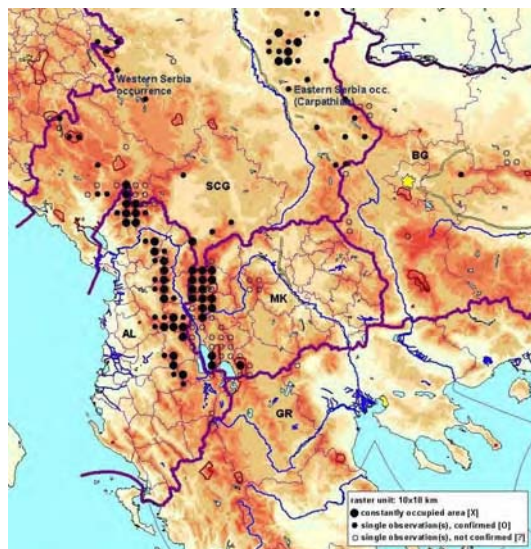**Aleksandar Stojanov, Dime Melovski, Gjorge Ivanov, Aleksandër Trajçe, John Linnell, Fridolin Zimmermann, Manuela von Arx & Urs Breitenmoser**
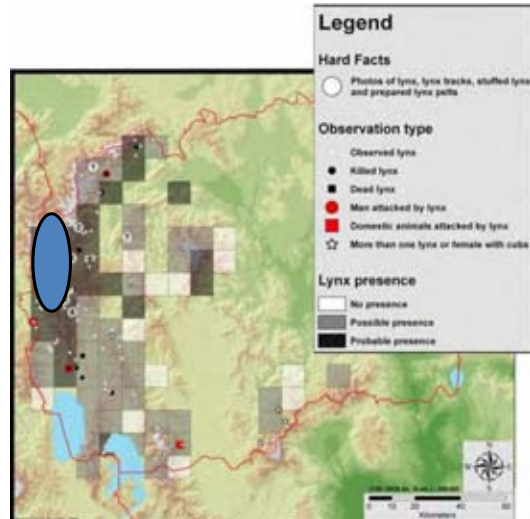

Introduction

**Distribution of the
Balkan lynx**
(1996-2001)

ELOIS
(von Arx *et al.* 2004)
based on **expert opinion**

Introduction

- According to literature data, Mavrovo NP is considered to be the stronghold of the Balkan lynx population
- Few "hard facts" (tracks, photos, killed lynx) from our field surveys
- Therefore, Mavrovo NP was selected as study area

Introduction

- Aims of the camera-trap study:
  - confirmation of the presence of the lynx (hard facts)
  - to get a minimum number of individual lynx
  - to make a quantitative estimation of the lynx population in the national park using photographic capture-recapture sampling
  - information on reproduction

Methodology

- Sampling design (Zimmermann et al. 2008)
  - 2.7 x 2.7 km grid cells
  - Cells with > 2/3 above 1800m and non-accessible ones were removed
  - Camera trap site in every 2nd cell
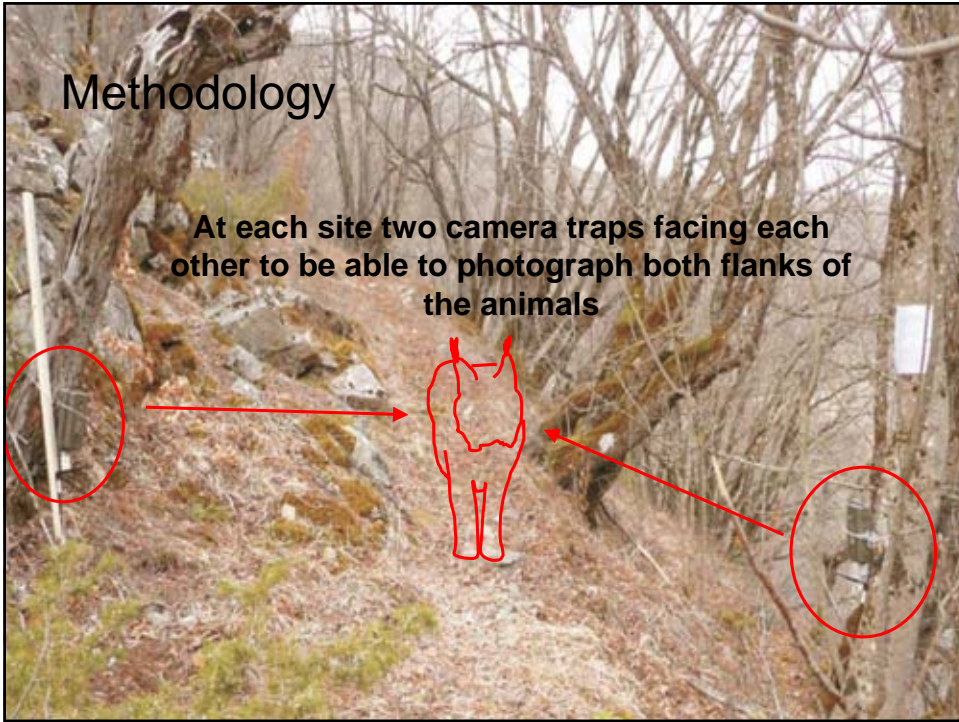 - 32 sites in an area of 436 km^2 (MCP)
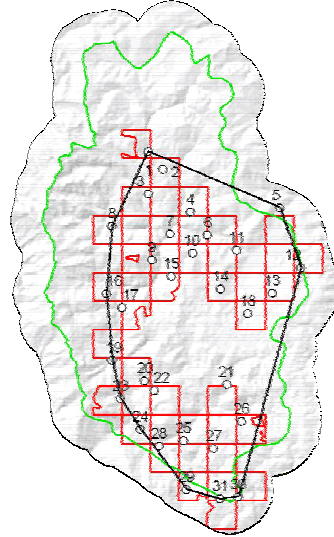
Methodology

- Good locations (game-trails, hiking paths, forest roads)

Methodology

At each site two camera traps facing each other to be able to photograph both flanks of the animals

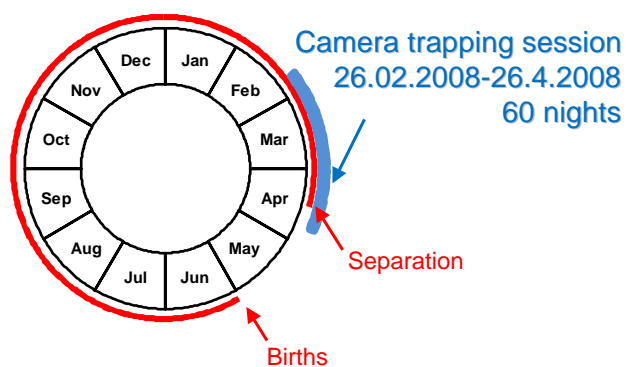# Methodology

- Individual identification

Village of Bibaj   Village of Vrbjani

Pole treated with Valeriana extract

Timing of the study in comparison with lynx life cycle

Camera trapping session
26.02.2008-26.4.2008
60 nights

Separation

Births

⇨ Increased capture probability in winter (movements!)

⇨ Sampling period 60 nights ≈ assumed closed population

Building the capture histories:

⇨ 60 nights = 6 trapping occasions @ 10 consecutive nights each
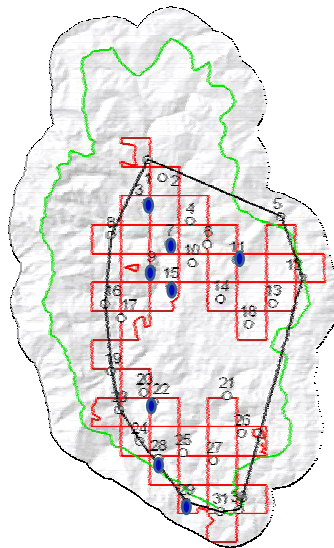
⇨ Juvenile lynx = capture of mother (resident female)

=

⇨ Estimated number of lynx = number of **independent** lynx
(resident & subadult lynx)

Results & Discussion

- The sampling effort was 1796 trap-nights or 93,5% of the potential (1920 trap-nights)
- 8 of 32 camera-trapping sites were positive (25 %)
- 29 lynx pictures were taken (10 right and 16 left flanks, 3 unclear)

Results & Discussion

- "Hard facts" for presence of critically endangered Balkan lynx in Mavrovo NP
- Evidence of reproduction

Results & Discussion

- Analyses with programs CloseTest and Mark

- Model M_h (capture probability males ≠ females)
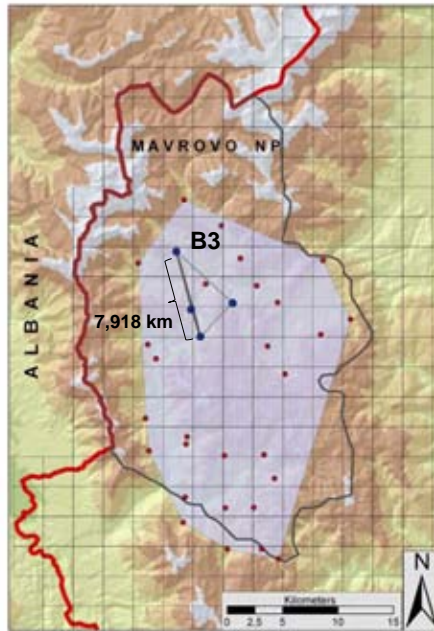
- Density calculated according to Karanth & Nichols (1998)

Area	Polygon [km²]	# sites	N_{min}	$\hat{p}$	$\hat{N}$	$\hat{W}$ [km]	$\hat{A}$ [km²]	$\hat{D}$ [ind/100 km²]
Study area	436	32	5	0.24	7±1.82	4.2	838	0.84±0.24

Results & Discussion

Inter-photo movements

Lynx	Max Distance (km)
B1	10, 237
B3	7,918
L6	7, 073
Mean distance	8, 409
D/2	4, 204

B3

7,918 km

Results & Discussion

Area 838 km^2

7 lynx

Density = 0.85 ± 0.24 lynx/100 km^2

436 km^2

D/2 = 4.2 km
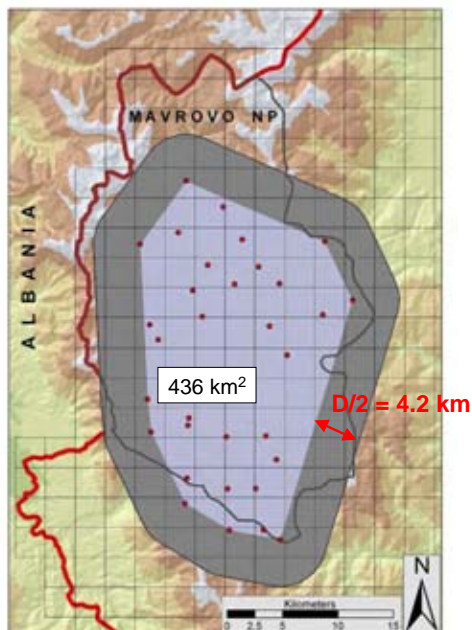
Results & Discussion

- Model M(h) of the programme MARK fitted the data

- Population estimation was 7 ± 1,82 independent lynx

- Correspondent population density was 0,84 ± 0,24 independent lynx/100km^2

Conclusions

- First pictures of the Balkan lynx - strong evidence that this critically endangered lynx subspecies still exists
- Evidence for a reproductive population of about seven lynx
- Density of 0.85 comparable to other functioning lynx populations
- $\Rightarrow$ Proof for a functioning core population in the Mavrovo NP
- Needs to be continued!!!

Thank you for your attention!