

Qualitative and quantitative monitoring of small populations of large carnivores:

What do we need to know?

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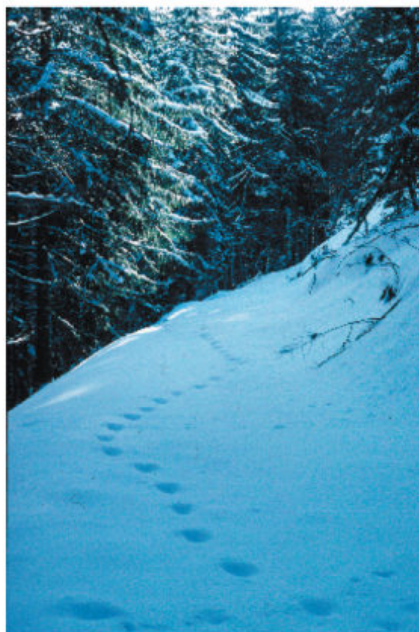
1. **WHY** do we monitor?
2. **WHAT** should we monitor?
3. **HOW** can we monitor?
4. **WHO** should monitor?



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Guidelines for the Monitoring of Lynx



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ENGLISH:

http://www.catsg.org/balkanlynx/01_recovery-programme/1_5_monitoring/KORA_Bericht_33_e_Monitoring_Guidelines_English.pdf

ALBANIAN:

http://www.catsg.org/balkanlynx/01_recovery-programme/1_5_monitoring/KORA_Bericht_33_al_Monitoring_Guidelines_Albanian.pdf

MACEDONIAN:

http://www.catsg.org/balkanlynx/01_recovery-programme/1_5_monitoring/KORA_Bericht_33_mk_Monitoring_Guidelines_Macedonian.pdf



1. Why do we need to monitor?

Three arguments for monitoring:

1. To observe the conservation status of the target species
→ *Logical argument: conservationists, scientists*
2. To control the effectiveness and efficiency of conservation and management interventions
→ *Economic argument (funding agencies, managers)*
3. To fulfil obligations of national legislation and international treaties
→ *Formalistic argument (administrations)*



Definitions:

Survey: Compilation of qualitative or quantitative information through standardized procedures to define status.

Surveillance: Series of surveys to reveal a dynamic process (e.g. surveillance of epidemics).

Monitoring: Regular and structured surveillance to assess the effect of a (conservation) measure in respect to a goal to be reached (e.g. recovery of an endangered species).



2. What can be monitored?

Distribution:

- Total occupied area, e.g. outline polygon or point distribution
- Presence/absence (e.g. raster distribution)
- Areas of reproduction/no reproduction *or* confirmed/unconfirmed presence

Abundance:

- Relative abundance (source/sink; high, medium, low)
- Absolute density (total count; capture-recapture methods)
- Frequency of selected parameter (standardised sampling method)

Population trend:

- Changes in distribution area: changes in outline polygon, # occupied raster cells
- Relative or absolute changes of population (total population, density) in time
- Changes of frequency of observations/parameters over years

Health and genetics:

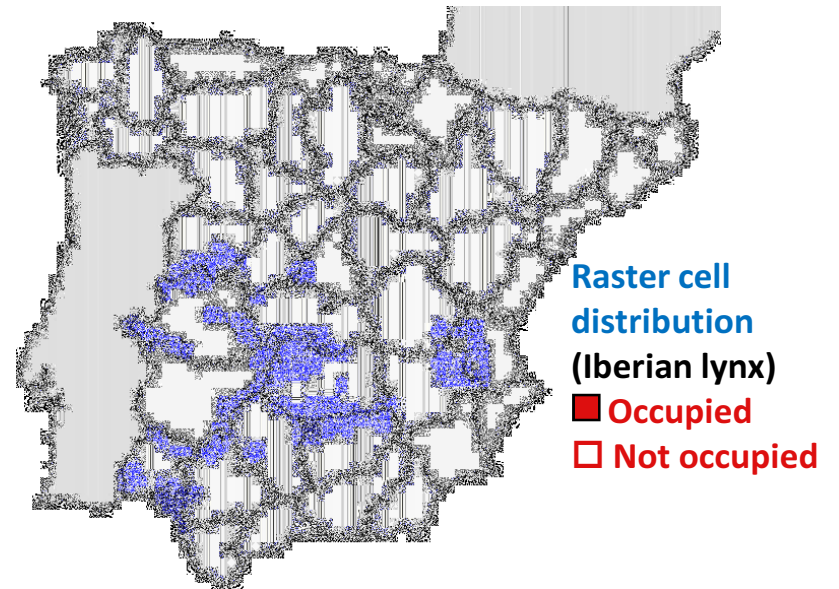
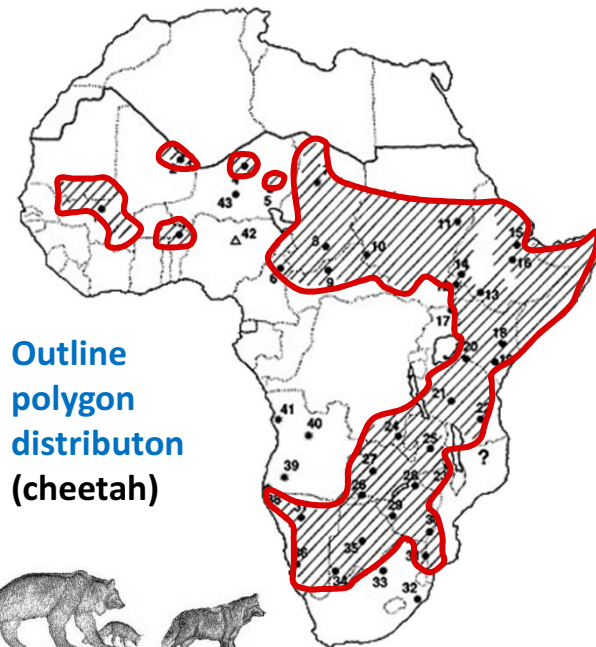
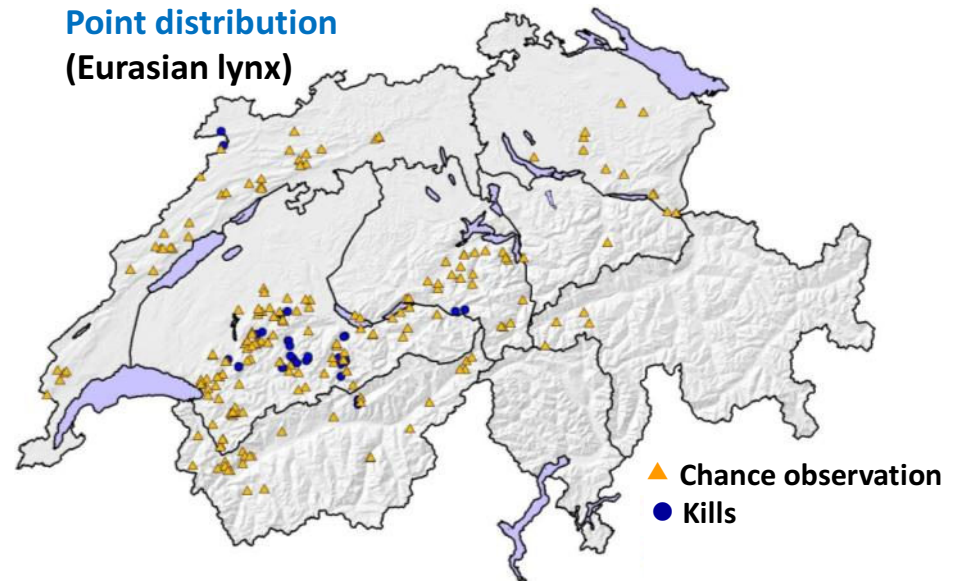
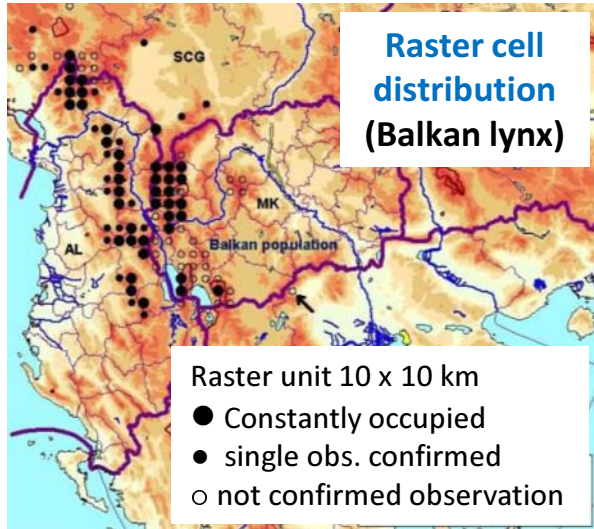
- Presence/absence or incidence of pathogens
- Genetic variability, genetic drift

Human dimensions

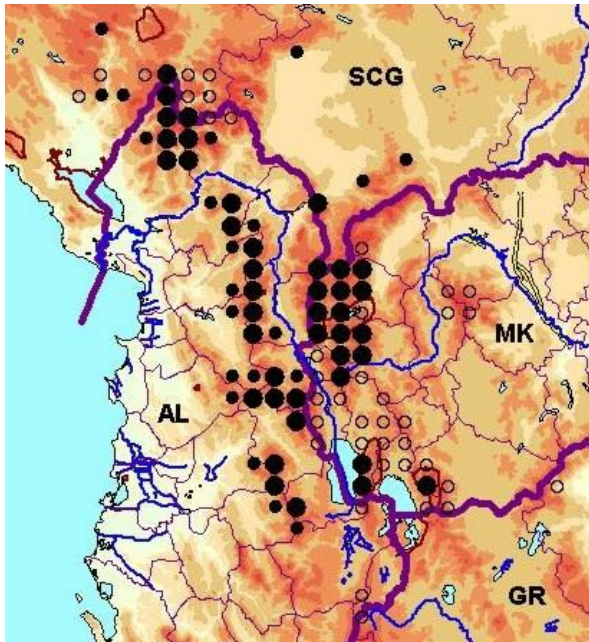
- Human attitudes and beliefs
- Conflict level and socio-economic constraints



Distribution



Abundance



Relative abundance

(Eurasian lynx)

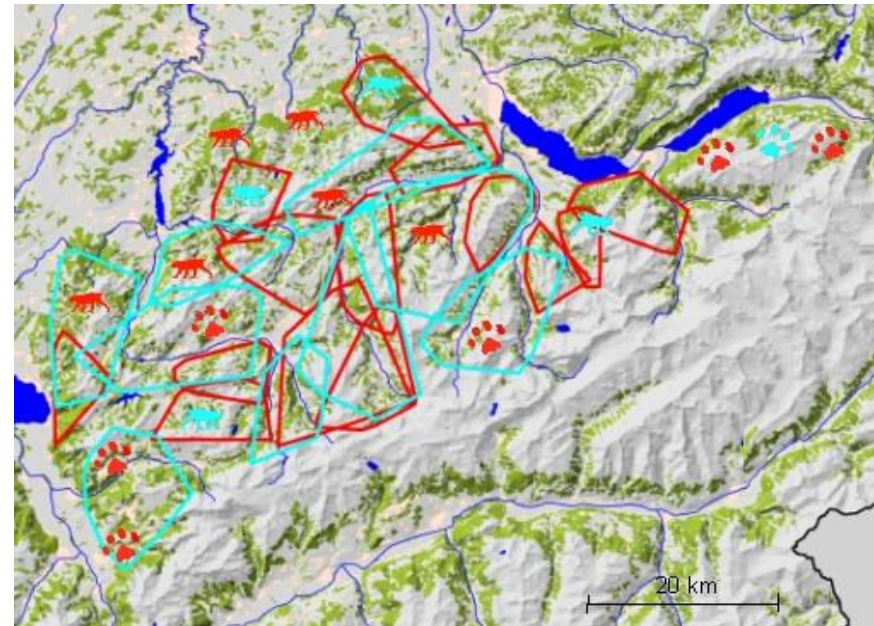
Expert opinion

- Permanent
- Sporadic
- Unconfirmed

Absolute abundance

(Eurasian lynx)

Radio-telemetry, camera trapping



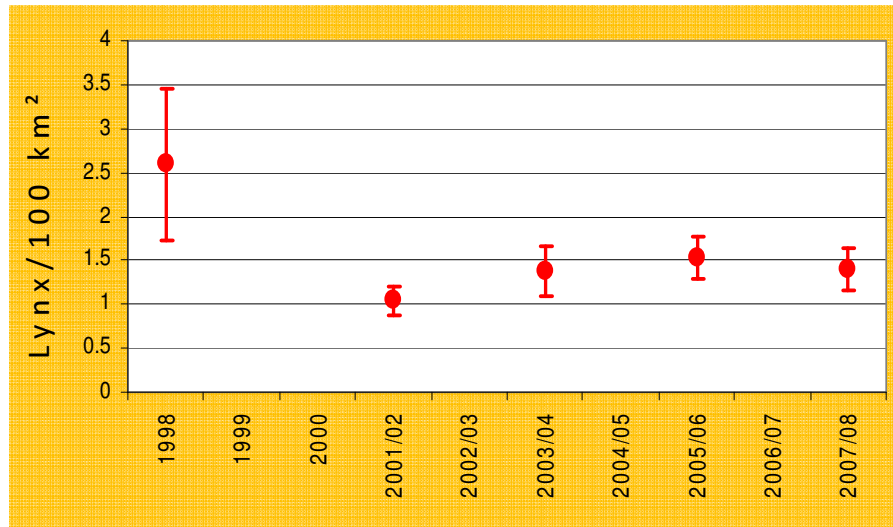
Polygons: Home ranges resident **males**, **females**

Lynx symbols: Resident **males**, **females** camera trapping

Footprints: **Males**, **females** from indirect observations

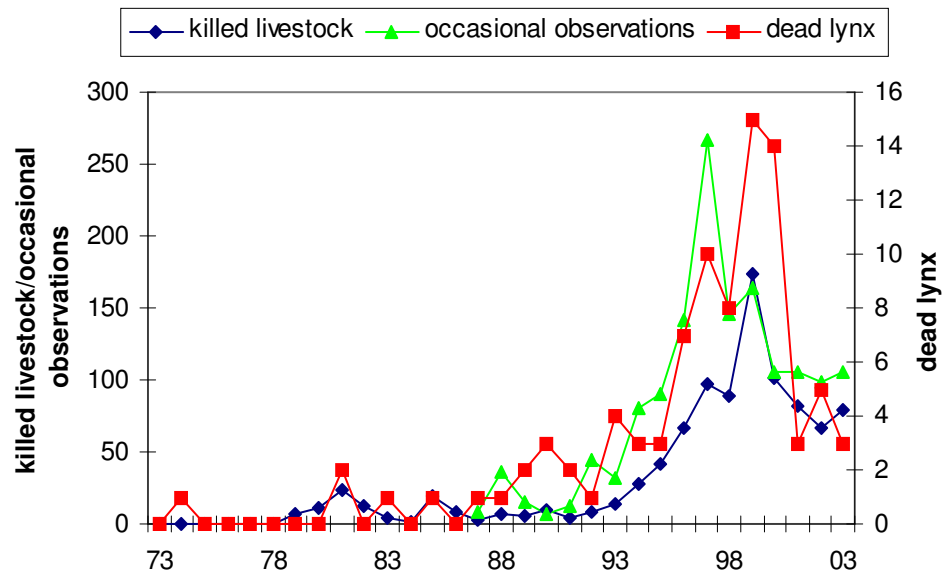


Population trend



Absolute density (Eurasian lynx)

Density of lynx (ind./100 km²) based on number of lynx in reference area, confidence interval



Trends of parameters (Eurasian lynx)

Observations consistently collected over years in entire study area



Health and genetics



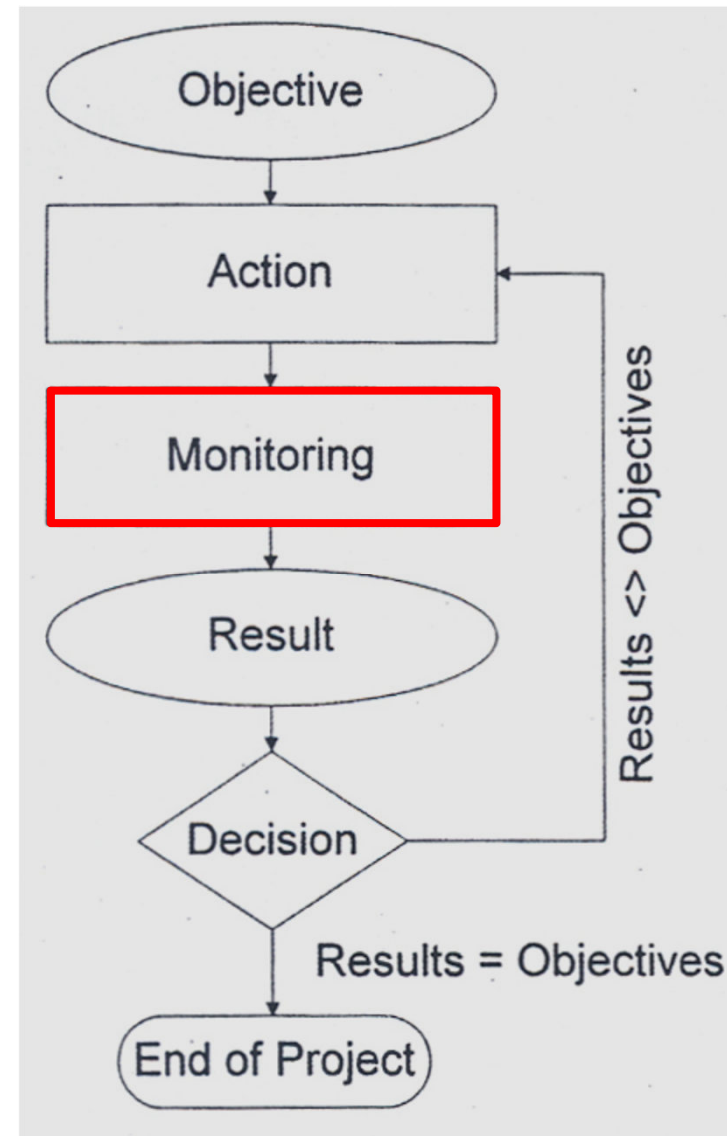
- Defined protocols for dead and captured specimens
- Consistent collection, storage and analyses of samples
- Apply the same protocols, analyses and interpretation over the entire species area



3. How can we monitor?

Principles of monitoring:

1. Define the goals and objectives to be reached.
2. Measure (repeatedly) control parameters to describe the dynamics of the process being monitored.
3. Evaluate of the outcome of the measuring against the goals and decide on
 - (a) the adjustment of the actions *and/or*
 - (b) continuation of monitoring.



Checklist questions for the planning of a monitoring programme:

Purpose: What is the aim of the monitoring project?

What questions need to be answered?

Method: How can this be achieved?

Which parameter(s) do we need to measure?

Which method(s) can be used to collect the data needed?

Analysis: What analyses and statistical tests will be used?

What sample size, quality or accuracy of data is needed, and what is the required repeat frequency?

Interpretation: What might the data mean?

Will the interpretation approve decisions and allow adjusting of actions if needed?

Fulfilment: When will the objective of the actions be achieved?



Concept of stratified monitoring:

We cannot measure **everything everywhere** at **any time**...

→ **Stratified monitoring!**

→ **See presentation “Stratified Monitoring” from the Workshop in Vevchani**

(http://www.catsg.org/balkanlynx/01_recovery-programme/1_6_meetings/range-wide-meeting-oct-2012/2.2_Stratified_monitoring_-_aims_and_principles.pdf)



Biases and pitfalls:

Data bias: The data collected are not representative or not adequate for the question asked.

Sampling sites: The sampling area is not representative for the entire population (too small, wrong habitat).

Time scale: The duration of data collection does not allow the determination of the dynamic process (short-term fluctuations *versus* longer-term trends).

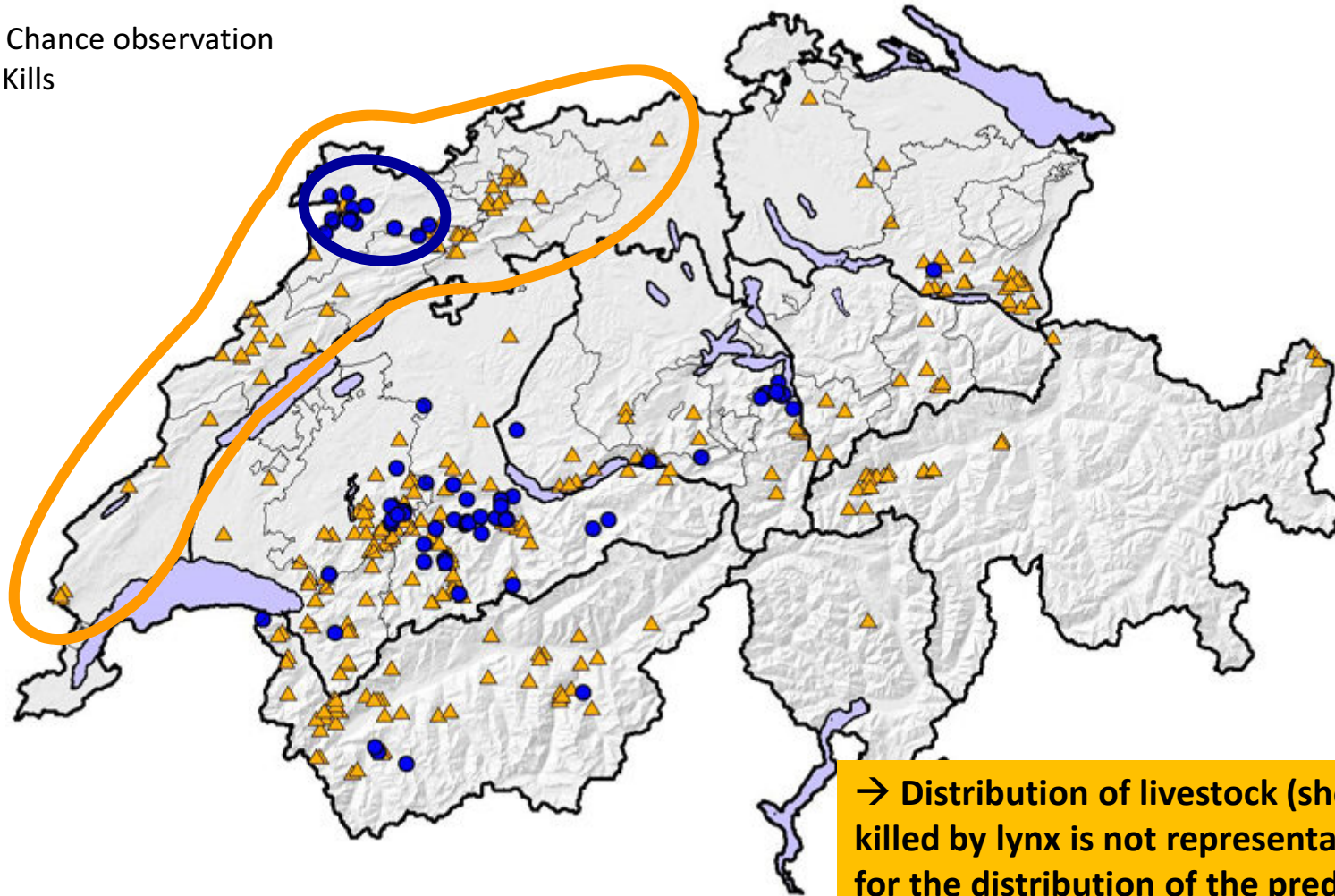
Interpretation: The interpretation of the results is wrong or not generally accepted.



Data bias

Distribution of lynx signs in Switzerland 2002

- ▲ Chance observation
- Kills



Sampling site bias



**Above timberline: Easy observation,
but untypical habitat**

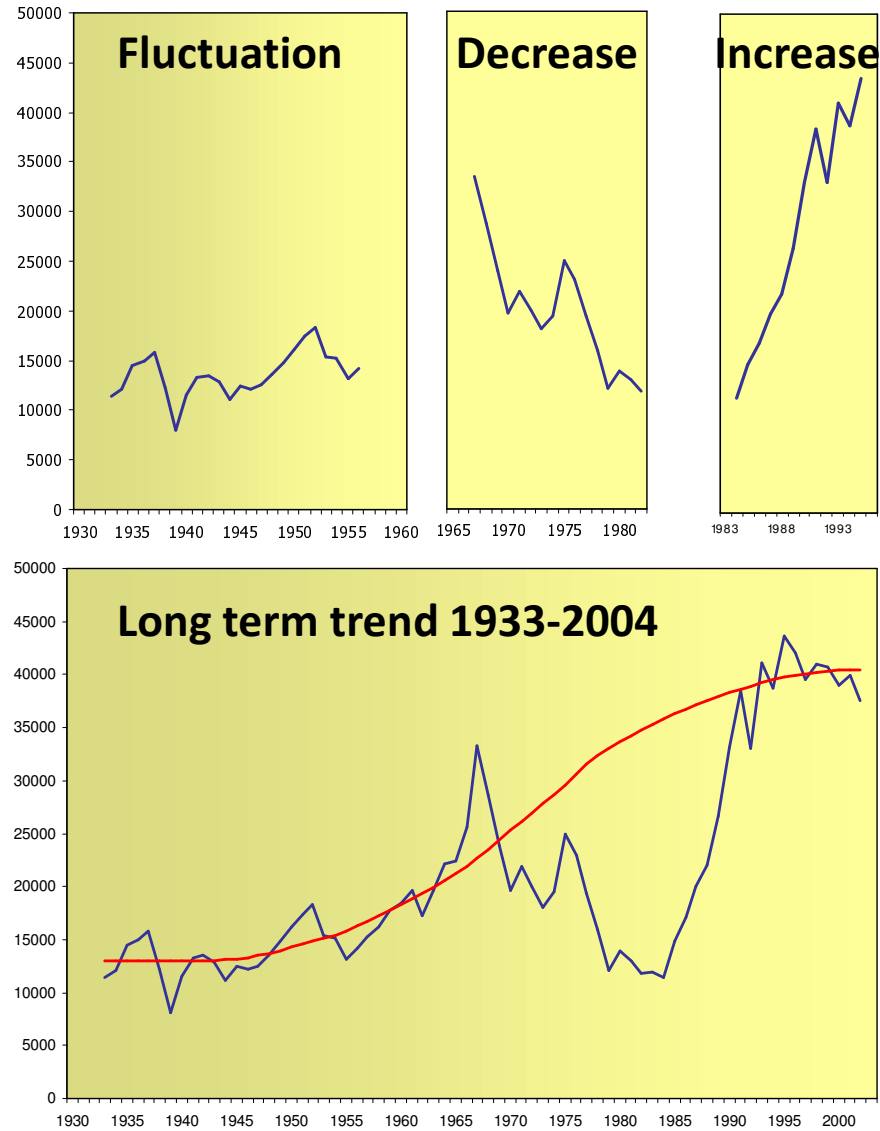


**Forest: Difficult observation
in typical habitat**



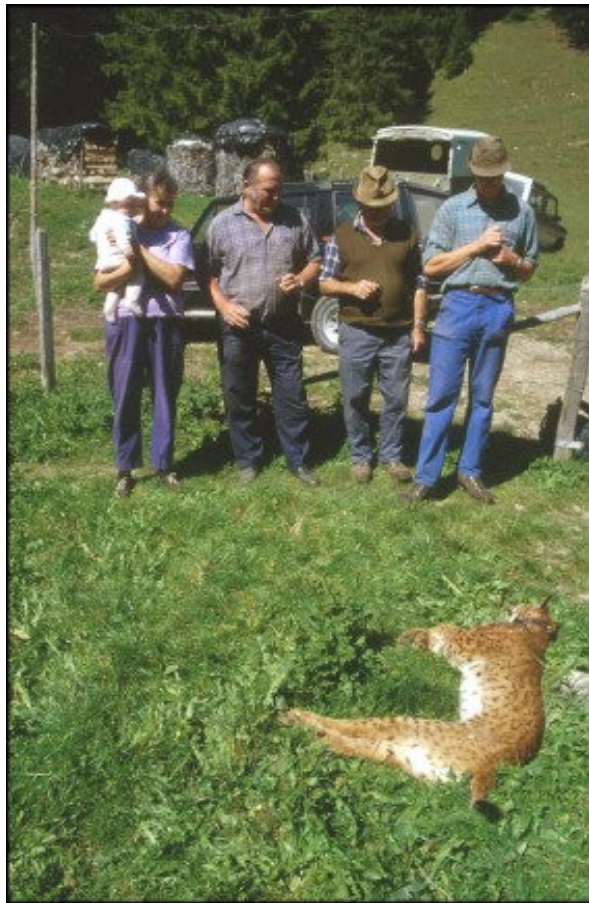
Time scale bias

Red fox
hunting bag
in Switzerland



Interpretation pitfall

- The interpretation does not match the data and observations.
- The interpretation is not accepted by stakeholders.



- Review of monitoring results and interpretation
- Discuss and agree interpretation and consequences of monitoring results in advance



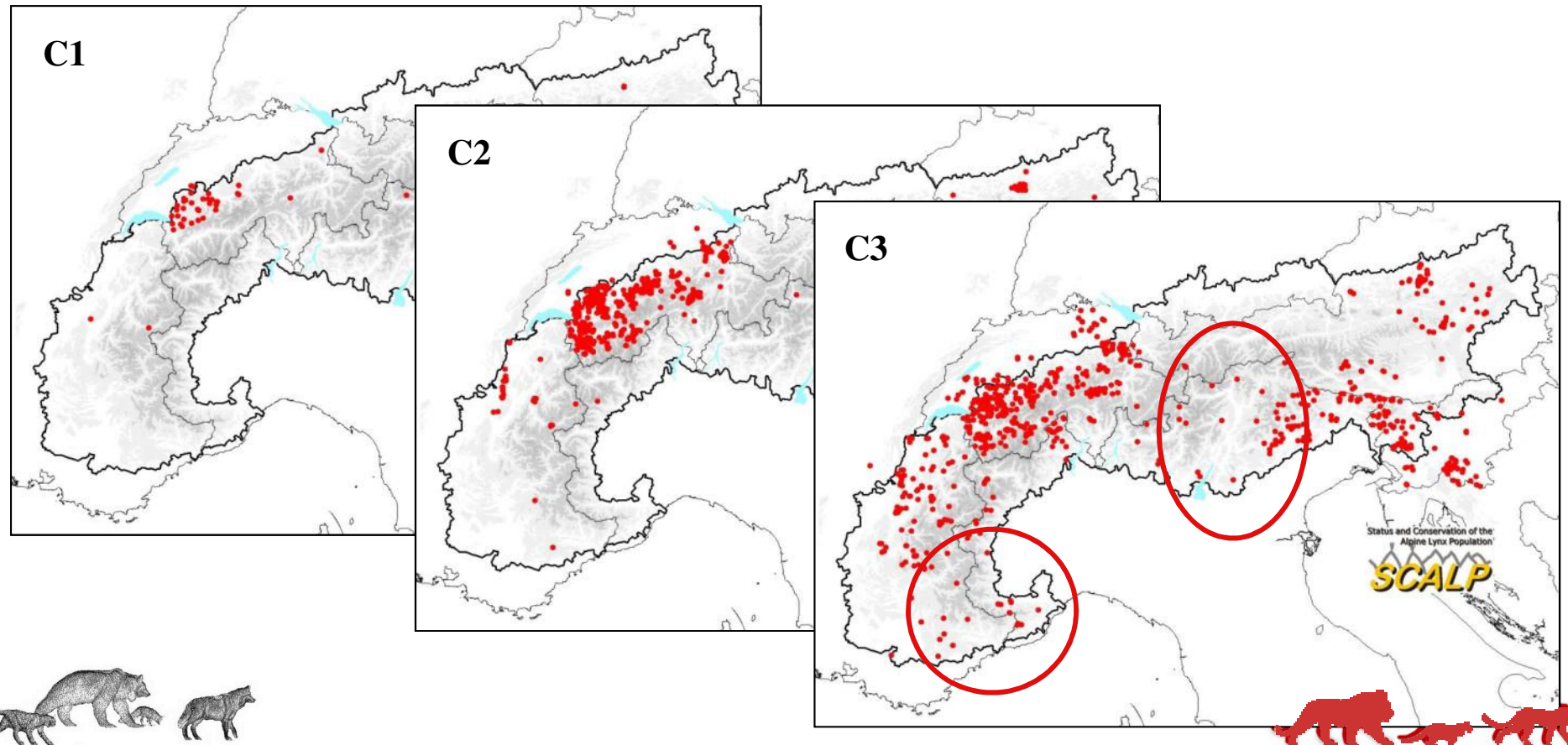
Biases and pitfalls:

Different power and reliability of data sets → SCALP criteria:

Category 1 (C1): „Hard facts“: dead lynx, pictures, genetic samples

Category 2 (C2): Confirmed data: kills, tracks, etc. confirmed by trained staff

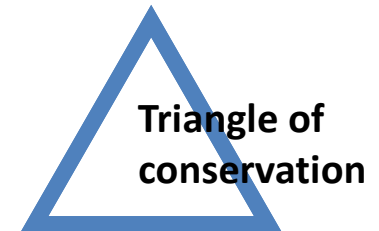
Category 3 (C3): Unconfirmed kills, tracks, not confirmable data (sightings, sounds)



4. Who should be monitoring?

The monitoring-partnership

- GOs, NGOs, and scientists must work together.
- A **network** of observers and reporters needs to be established.
- Interests groups (hunters, foresters, veterinarians, etc.) and the public must be informed.



The monitoring-network

- Professionals and volunteers must be trained in identifying field signs, methods and reporting.
- Member of the network must get a feedback!
- Co-ordinators are responsible for the group identity and need to communicate on a regular basis or to organise reunions.

