Field Research on Small Rodents

Torbjørn Ergon

University of Oslo / Finse Research Center

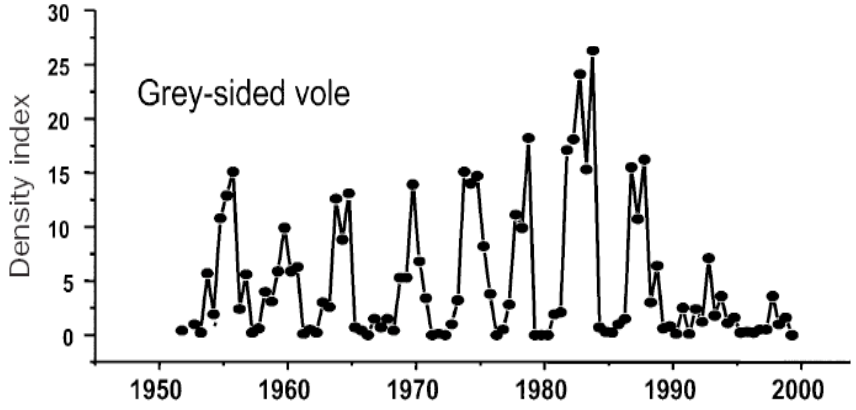
Norway lemming

Root vole / Tundra vole

Grey-sided vole

Studies of population cycles date back to the 1920's

Charles Elton, 1924



Field research on small rodents today

- Population dynamics
- Life-history theory
- Ecophysiology
- Ecosystem functioning

- Basic science questions
- Studies of animals in their natural environment
- Replacement (alternatives) not possible

Field research on small rodents today

- Po
- Lif
- Ec
- Ec

Instrumental for other fields of (applied) ecology

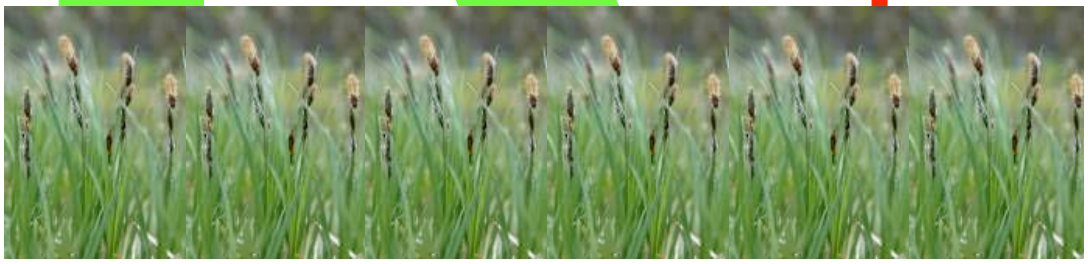
- Basic science questions
- Studies of animals in their natural environment
- Replacement (alternatives) not possible



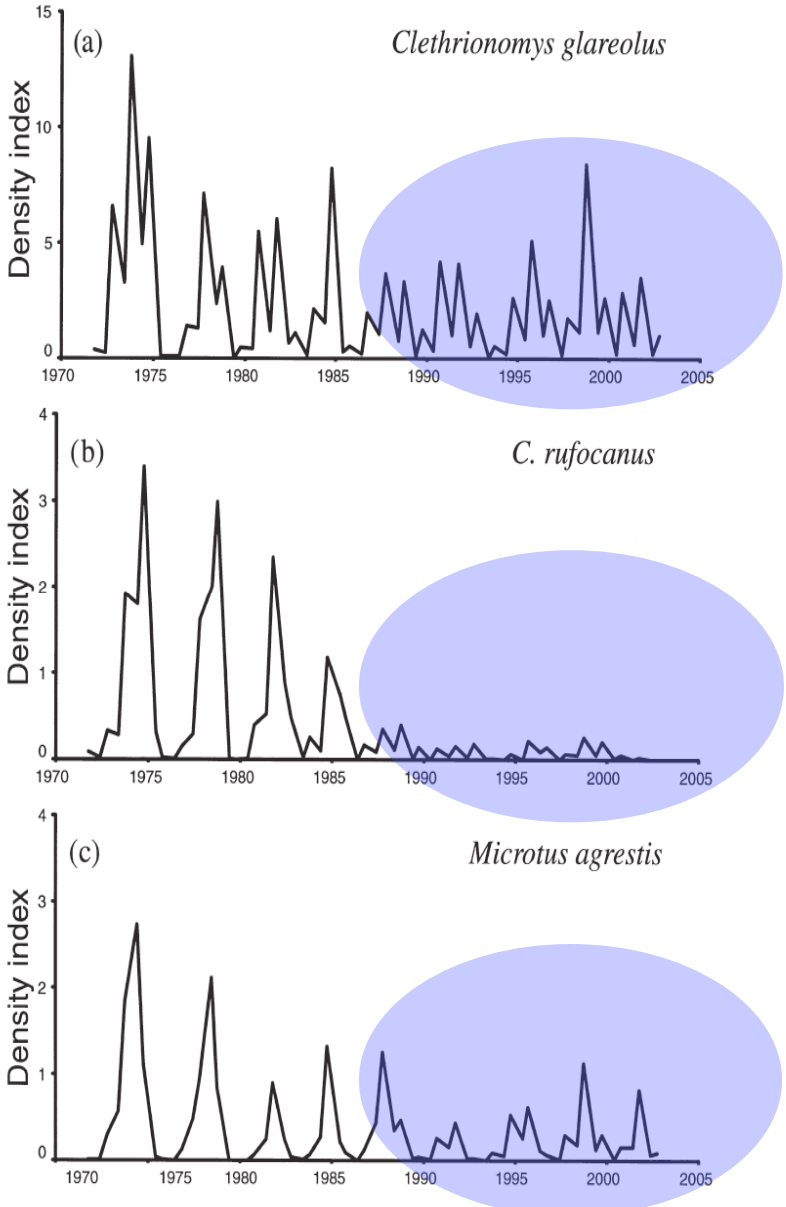




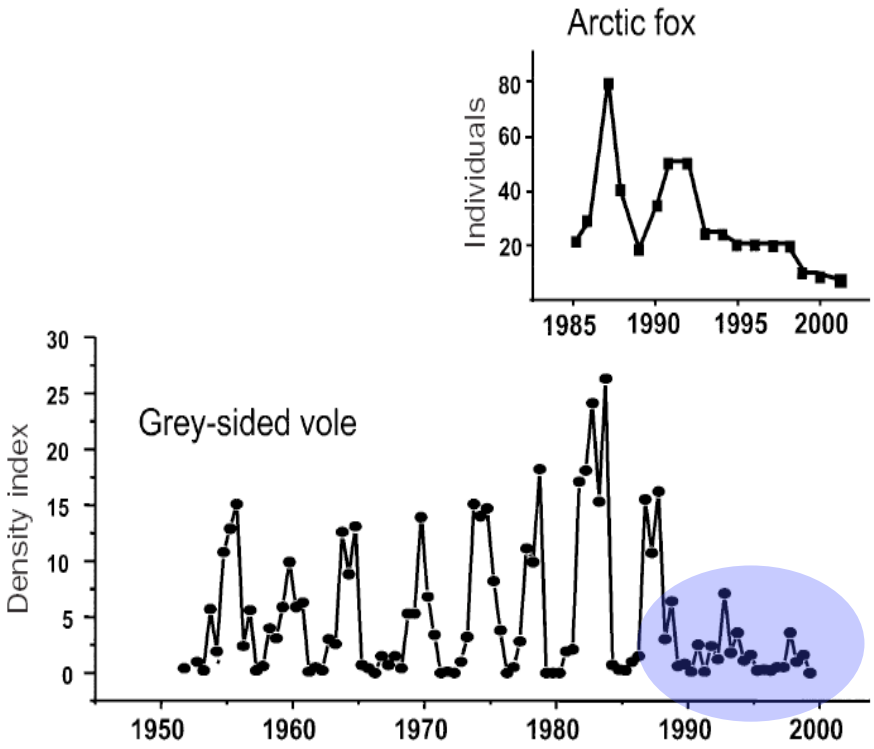




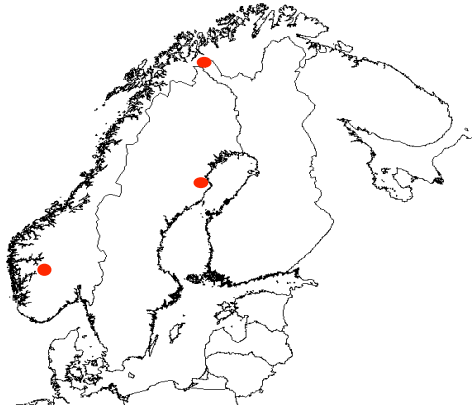
Rodent cycles and climate change



Hörnfeldt, 2004



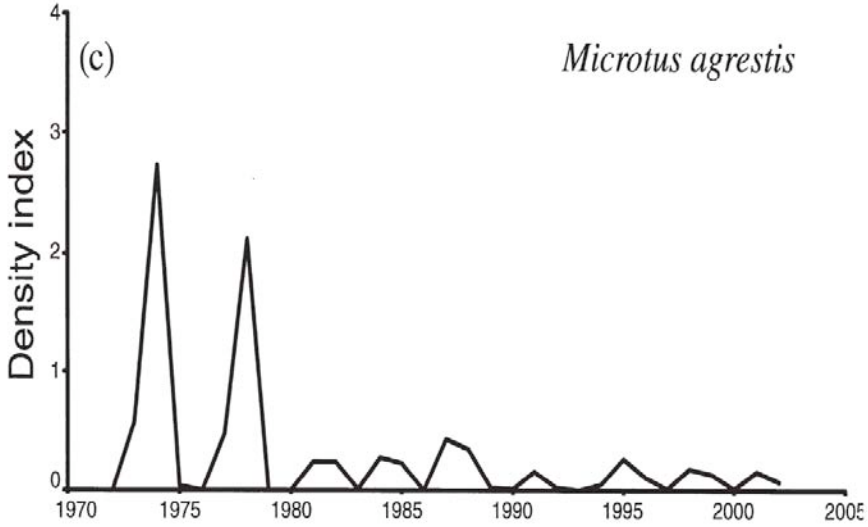
Henttonen & Wallengren, 2004



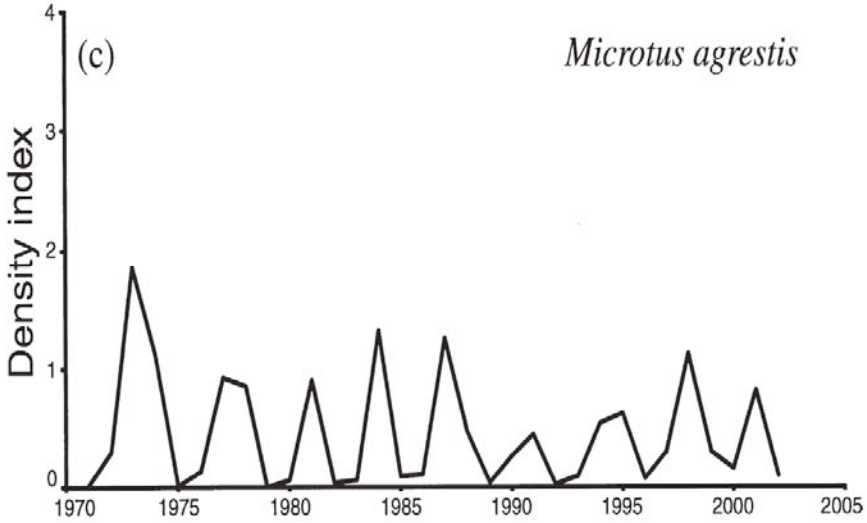
Rodent cycles and climate change

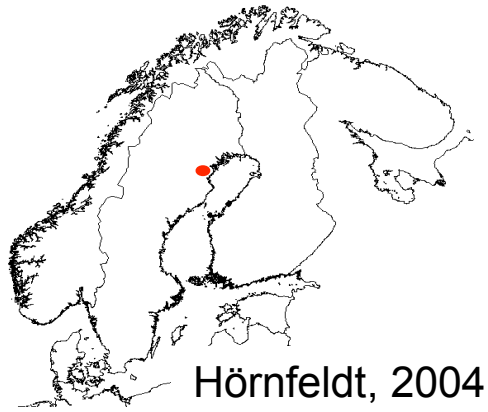
Largest change in spring densities:

SPRING



AUTUMN

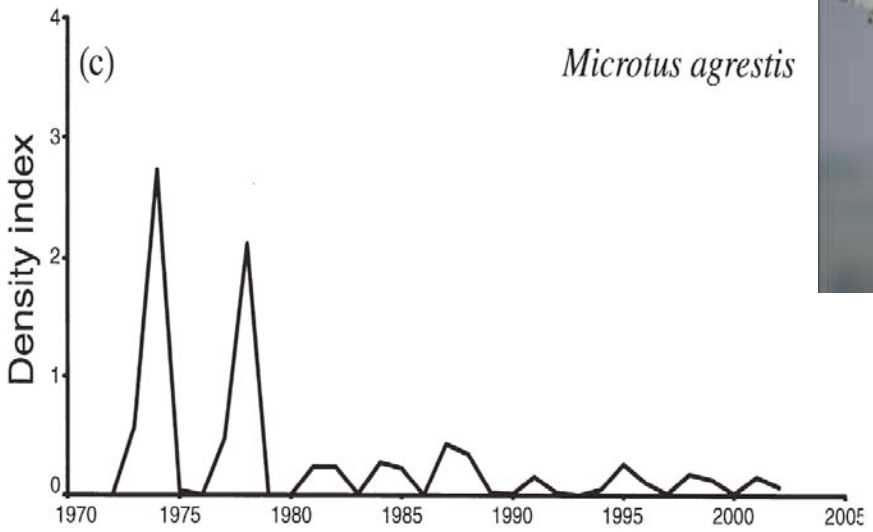




Hörnfeldt, 2004

Rodent cycles and climate change

Largest change in spring densities:



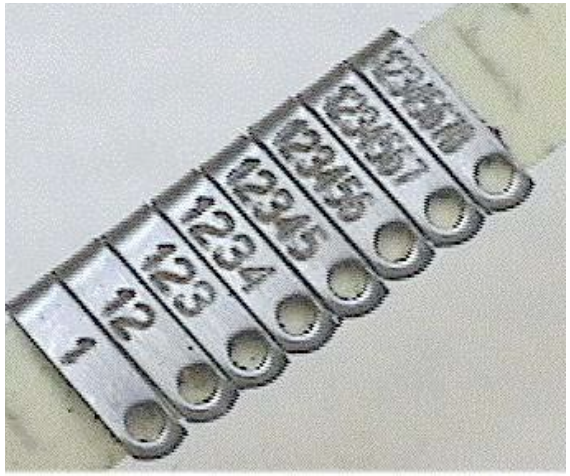
Indications that this is due to worse snow conditions during winter

Understanding population (and ecosystem) dynamics requires knowledge about:

- Population size and structure
- Survival rates
- Recruitment rates
- Fecundity
- Age at first reproduction
- Movements
- ...etc.

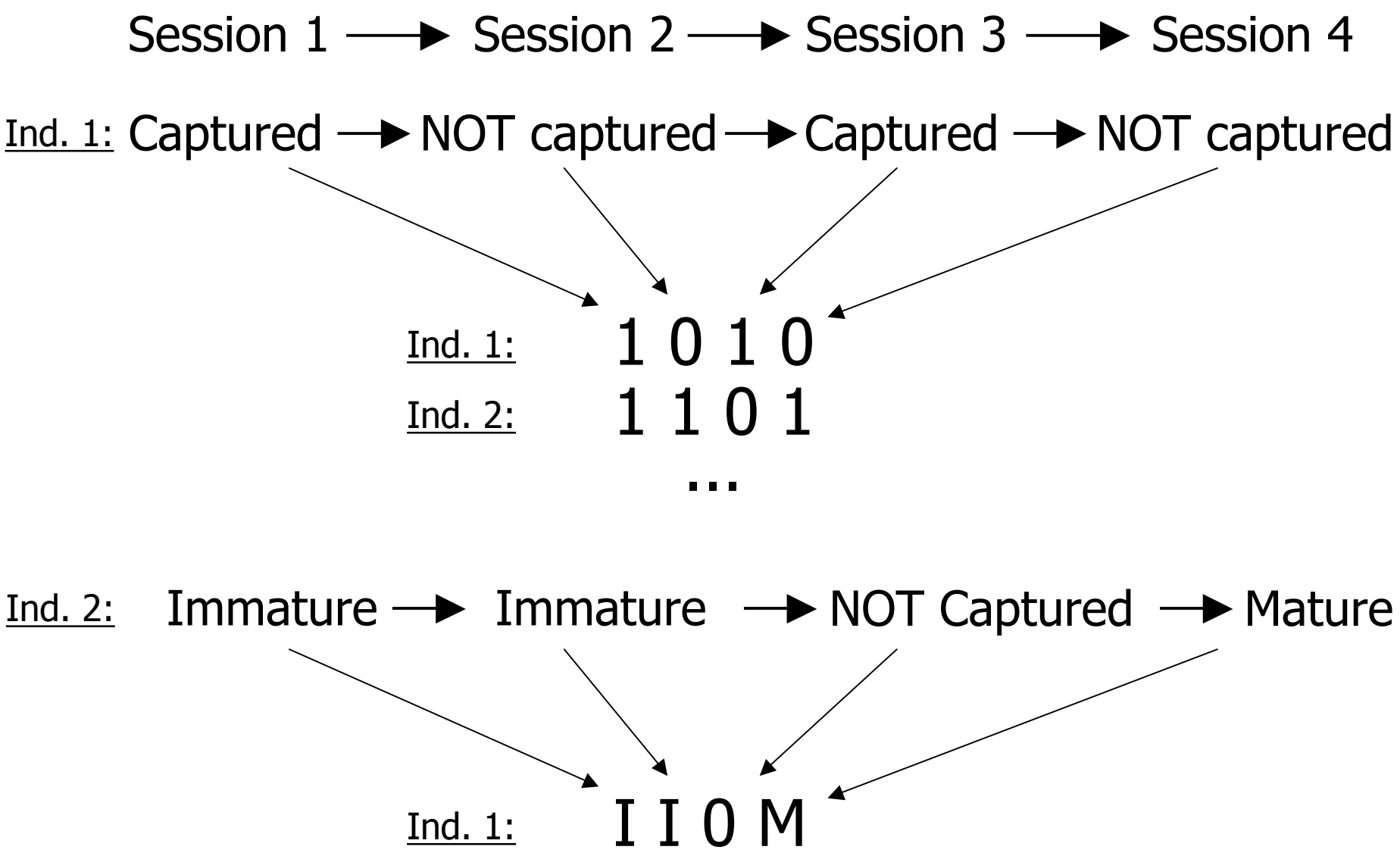
Field methods in population ecological studies

- Radio tracking – equipment with radio collars
- Capture-mark-recapture – individual identification marks



Collecting Capture-Mark-Recapture Data

Capture-Mark-Recapture Data



Capture-Mark-Recapture Data

Session 1 ⟶ Session 2 ⟶ Session 3 ⟶ Session 4

Ind. 1: Captured ⟶ NOT captured ⟶ Captured ⟶ NOT captured

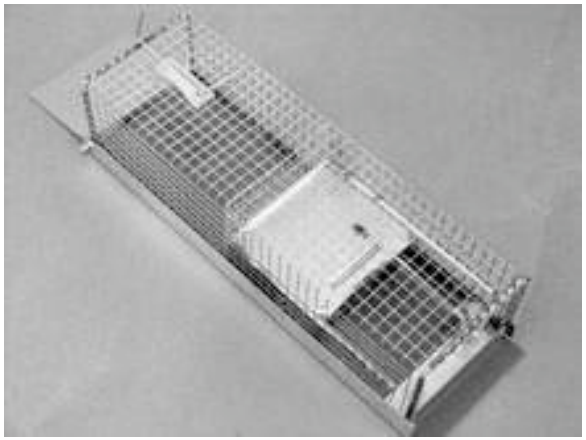
Statistical modeling allows estimation of:

- (Capture probability) – dealing with imperfect detection
- Survival probabilities
- Recruitment rates
- Maturation rates
- Age of reproduction
- Timing of life-history events
- Population size and structure
- ... (parameters needed to understand population dynamics)

Need to mark a high number of individuals

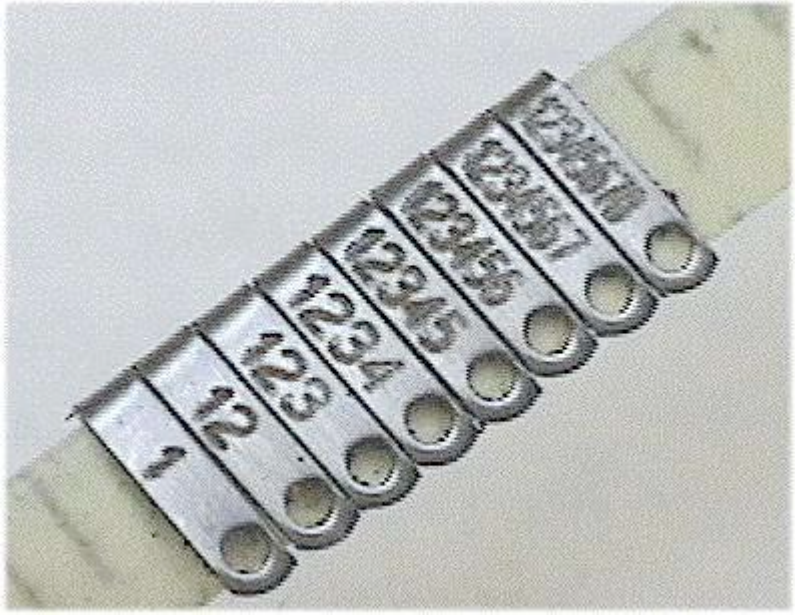
Live-trapping

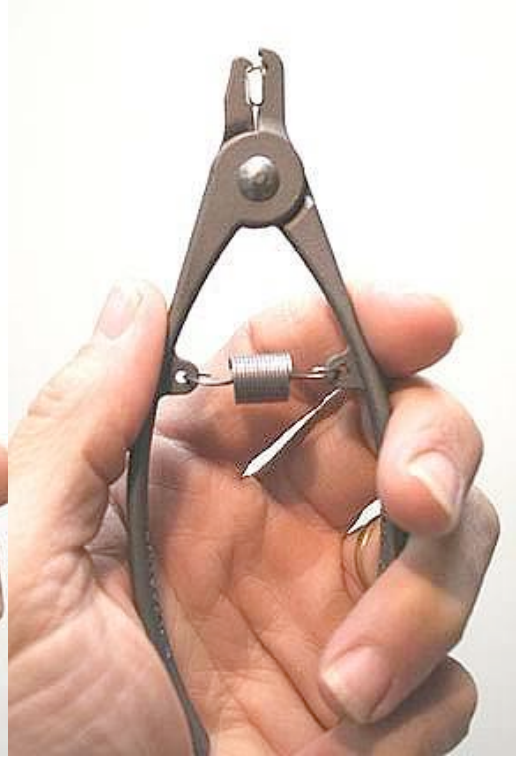
- Food in trap (e.g., grain and carrots)
- Cotton bedding when cold
- Traps checked every ~6 hours



Methods for individual marking

- Ear tags
  - May cause infection
  - May cause ear to rip





Methods for individual marking

- Ear tags

- Toe clipping

<u>Some argue better than ear tags:</u>

- Less risk of infection

- Ear tags are obstacles that can get caught in vegetation

<u>...but:</u>

- may be painful

- *may* reduce function (depends on species)

$5 \times 5 \times 6 \times 6 - 1 = 899$ combinations

Methods for individual marking

- Ear tags
- Toe clipping
- Transponders (PIT-tags)

Methods for individual marking

- Ear tags
- Toe clipping
- Transponders (PIT-tags)

Best alternative:

- low impact on animal
- reliable, can use automatic readers

...but:

- rather expensive

Experimental treatments:

- Treatments of individuals
  - Anti-parasite treatment
- Treatments of the local environment
  - Predator exclusion
  - Supplemental feeding
  - Habitat characteristics (fragmentation, hides, ...)

Physiological measurements:

- Blood samples (tail tipping)
- Energetic measurements by use of doubly-labeled water
- Measuring body composition by ‘total body electrical conductivity’ (TOBEC)

Thank you for the attention!