

# Capture and marking of wild landbirds (in terrestrial habitats) for scientific purposes – state of the art and 3R considerations

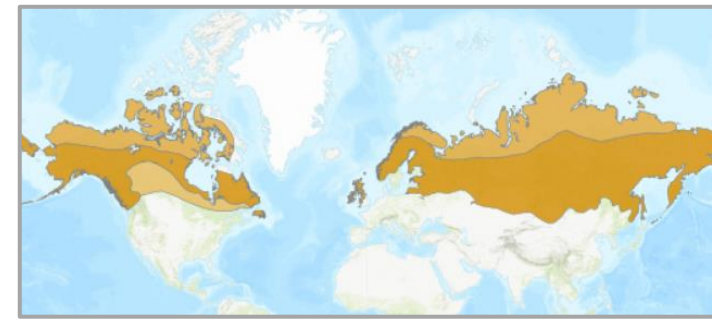
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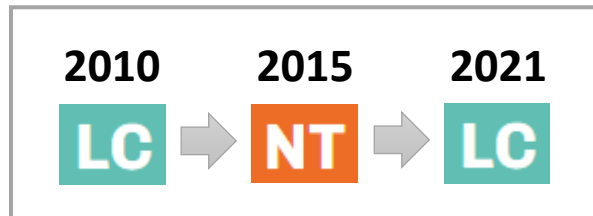
# Willow ptarmigan (*Lagopus lagopus*)



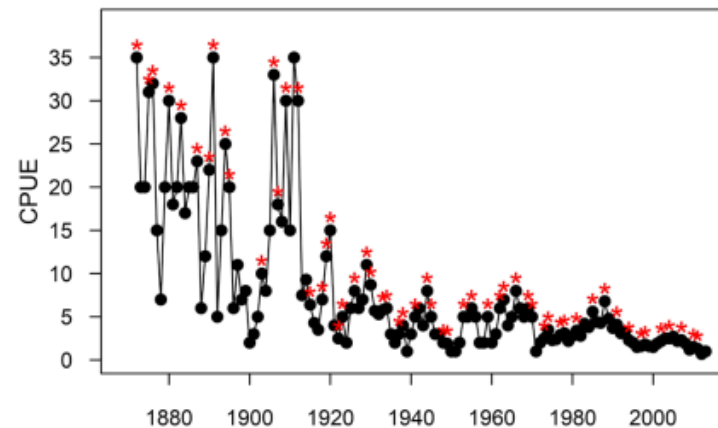
BirdLife International (2016)



Foto: Jan Eivind Østnes



Norwegian Red List for Species



Hjeljord & Loe (2022) *Wild.Biol.*

Identify environmental and demographic drivers



Targeted conservation and management

# Studies of willow ptarmigan demography

- 2015 - today
- Multiple environmental and demographic drivers affect survival and reproduction
- Objective: Assess survival, reproductive success and movement, and causes for variation in these



# The three R's - Replace

- Difficult to recreate a natural environment → observing wild birds in nature
  - Major focus on non-invasive methods
    - large-scale population dynamics (distance sampling transects)
    - climate effects on diet
    - parasite analyses
  - Other highly relevant questions remains to be answered
    - mortality causes → track individuals
    - nesting failure causes → locate and monitor nests
- marking and following individual birds



# The three R's - Reduce

- Sample size determined by *the minimum number of animals needed for statistical inference and generalisation*
  - High natural turnover, high variation in survival
  - Cyclic population dynamics (3-4 years between peaks)
  - Cover variation in environmental forcing
  - Cover variation between areas, and variation between males and females
- Minimum sample size 30-40 individuals per year, tracked frequently

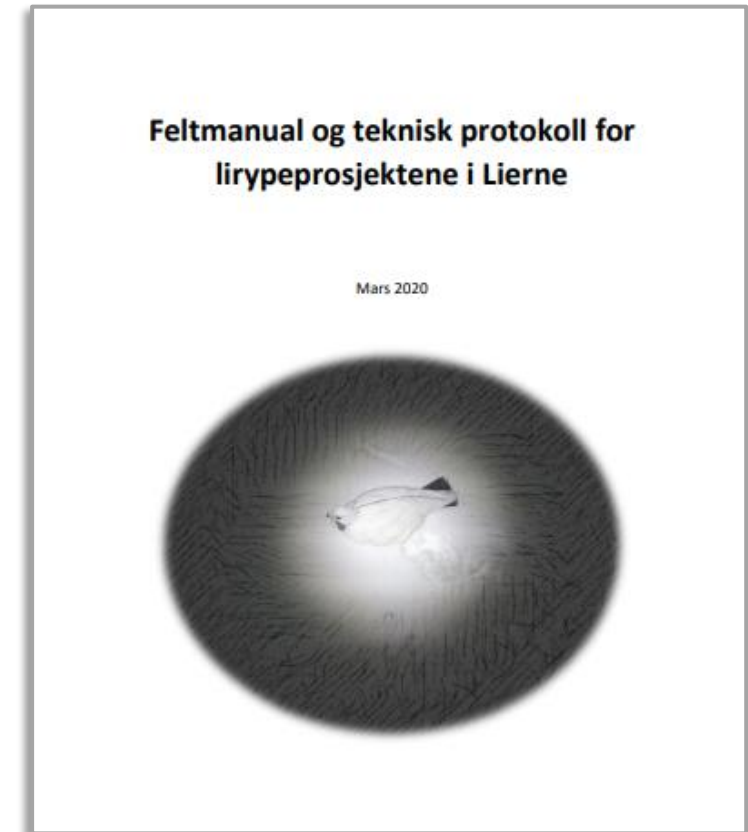
2015 – 2021: A total of 272 individuals marked with VHF transmitter

→ minimum sample size that gives acceptable precision in estimates



# The three R's - Refine

- Protocol for capture and marking
  - Based on ethics, legislation and previous experience
- Dynamic tool
  - continuous evaluation of methods
  - documentation
  - protocol in case of unwanted incidents
  - training tool for field personell



# Data collection and marking



- Calm birds dazzled by the light
- Calm and gentle captures
- Transferable to other species



Photo: E.Law



Photo: E.Law



Photo: K.Nesser / Lierne nasjonalparksenter

# Summing-up and looking forward

- Essential data on **survival** and **reproduction** have been collected by marking with VHF transmitters
- From 2023 collecting data also on **area use and adaptive capacity** under climatic variation, using GPS-based transmitters
  - No real alternatives (replacement), minimum acceptable sample size (reduction)
  - Continuous **refinement**, with evaluation of best methods and transmitters
  - This work is still ongoing, no results yet
- Understanding the impact of pressure factors gives necessary knowledge for targeted management and conservation