Sustaining wildlife populations in a human dominated world. What knowledge do we need, and how can we get it?

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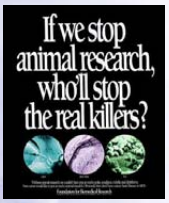
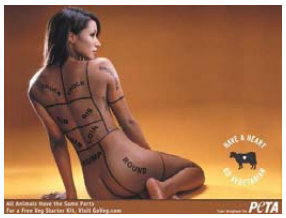
Animal welfare / animal rights / human controversy



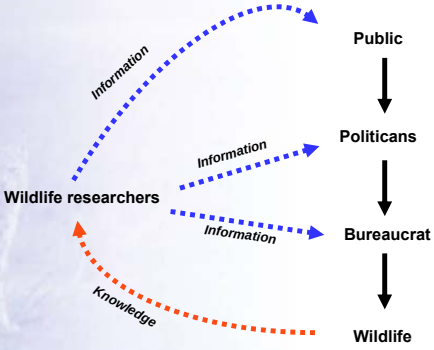


Animal welfare / animal rights / human controversy

There are many differences between wildlife research and lab animal research.

The basic one is that it concerns the very survival of the wildlife species.

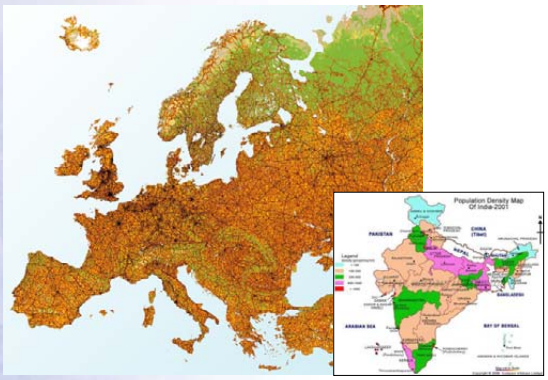
What is "wildlife research"?



Context – wild ungulates

Context – large carnivores

Context – a crowded continent



Context – conceptual

- Biodiversity conservation
- Ecosystem sustainability
- Context of Europe = crowded continent
- Goal = coexistence

- Cannot be achieved using hands-off approach
  - Human exploitation of the resources
  - Humans compete for space
  - Conflicts
  - Conservation status

Context – values & ethics

Democracy – informed debate and decision making.

Conservation – right for biodiversity to exist.

Curiosity – science as a form of knowledge.

Welfare – ethically acceptable to conduct "invasive" field research on a sample of individuals within certain limits, given certain justification.

This meeting is really about discussing those limits and justifications.

Context – values & ethics

Wildlife biologists share an appreciation of the 3 R's

Replace

Reduce

Refine

But we feel the need to add a 4th R

Reality - of knowledge need and methods

Context – knowledge needs

The knowledge needs for integrating wildlife into sustainable ecosystems are very diverse, and include;

- Behaviour & social organisation
- Diet and predation
- Habitat use and tolerance of fragmentation
- Demographics = reproduction and mortality
- Genetics
- Pollution
- Parasites and diseases

Key point: Most of the work that we do is descriptive, not experimental: assumption is that the procedural influence on the animal is minimal.

Non-invasive methods

Faecal DNA or hairs – species, sex, individual identity

Powerful tool in both research and management – especially as compliment.

Like all methods, they have limits. Sampling. Time. Space.

Non-invasive methods

Camera trapping – census / species distributions

Faecal hormones – stress, reproductive status

Stable isotopes analysis - diet






The need for marking

Some questions cannot be effectively answered without marking individuals with some form of transmitter.

The radio-transmitter revolutionised our understanding of wildlife.

Two major areas where marking is needed.

(1) Movement

(2) Life histories

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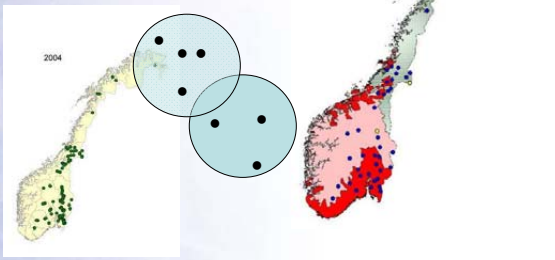
Why?

Movement – foundation for census

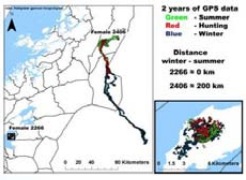
Movement – help the bears to cross the road

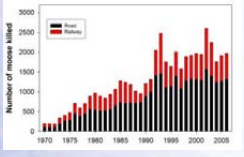




Movement – reducing collisions

- Vehicle – moose collisions kill moose and people



Movement – who kills the sheep?

- Norway's greatest animal welfare problem!
- 40.000 sheep per year are killed by carnivores.
- 8.000 killed by lynx.
- Which lynx are doing it ? Do problem individuals exist?
- How to target mitigation?



Movement – understanding ecology / saving lives

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- Indian leopards live in multi-use landscapes with 300 people / km^2.
- People are attacked and killed
- Studying leopard ecology to understand the ecology.
- Mitigation.

Movement – understanding ecology / saving lives



Context – sustainable harvests + predation

- 5 million hunters in Europe – 200.000 in Norway.
- In Norway hunting is supported by 75% of the population
- Large carnivores are returning.
- How to ensure that combined impact of predation and harvest remains sustainable?
- Need data on predation rates.

Movement – kill rates?

- Need data on kill rates – how many roe deer killed per unit time.
- Study by following radio-collared lynx

Life history – birth and mortality?

- Need data on mortality rates of prey.
- Study by following birth and mortality rates of radio-collared prey






Life history – mortality from poaching

- Wherever carnivores are studied in Europe poaching is identified as a leading cause of death.
- Telemetry is only way to quantify it.


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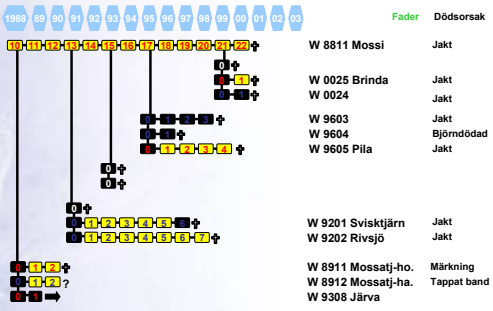
Life history – building a family tree

Mossi's family tree : An example of long-term individually based research

Born	1978
Marked	1988
Time with collar	13 years
Captures	9
Death (shot)	2000 (22 years)

Mother	22 cubs
Grandmother	62
Greatgrandmother	63
Greatgreatgrandmother	8
Decendents	153
(of which 60 have been collared)	

Life history – building a family tree



How do we get the data that is needed?

- Two main telemetry technology platforms.

VHF

= radio-transmitters

- signal must be triangulated from the ground or the air

GPS

= satellite locations

- store on board for later recovery
- download through cellphone network GSM

GPS vs VHF

GPS with GSM download and VHF beacon = 300g

VHF = 150g

GPS vs VHF

GPS	VHF
Heavy.	Light (50%).
Not always reliable.	Reliable.
Many locations in short time.	Locations must be collected manually.
Short battery life.	Cheap (10%).
	Long battery life.
Best for short term intensive study.	Best for long term study with extensive follow-up.
Best for movement data collection.	Best for life history data collection.

Ecosystem results & Scientific production

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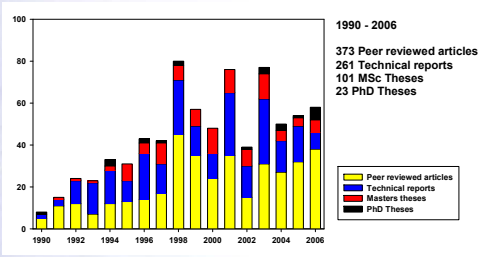
Combining relevance and excellence in Norwegian ungulate and carnivore research



Summary

Reality	Determines the important real-life questions and the need for knowledge. Technology and the fact that our species are wild places logistical limitations on approaches.
Replace	Difficult for heavily managed species because data precision requirement is so high and species ecologies are so different – can't manage reindeer like moose. Non-invasive methods have their limits.
Reduce	We already work with small sample sizes, logistics do not lead us to operate on a larger scale than needed. Intra-specific variation is crucial. **Make the most of each study.**
Refine	**Improving capture and handling methods to reduce mortality.** **Analysing our work to look for impacts.** **Availing of latest technology to choose lightest marking methods for the specific context and that which require as infrequent capture as possible and as short periods of use as possible.** **Use of drop-offs for time-limited studies** **Exploring non-invasive alternatives – faecal / hair DNA**

Controversy – lab & field

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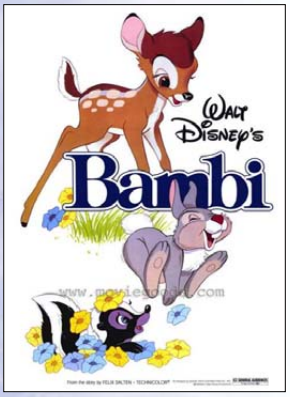
Controversy – lab & field

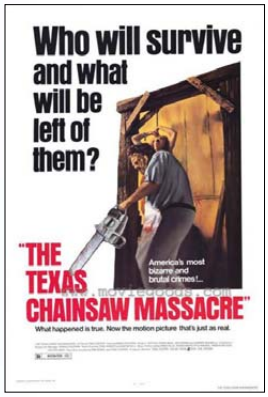
Consequence of getting it wrong?

Decline and regional extinction!







Regulation of wildlife research

Regulation is crucial! Not least because of controversy.

But, it must fit the topic, and be professional.

At present the system based on laboratory animals does not function optimally for wildlife.

It is not adapted to;
- the management context,
- the reality of available technology, or
- the reality of field conditions.

We encounter problems with both the process and the decisions, which weakens the reputation of both the regulatory system and the researchers.