Marine mammal training and behaviour: a complement to field research

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Outline

- Benefits of conditioning behaviour through training
  - Well-being
  - Research
- Challenges of marine mammal research
- How research on captive animals can assist in interpreting results from free ranging populations
  - Leopard seals
  - Australian sea lions

Training Marine Mammals

- Seals are predators and hence good learners
- Many species have limited maternal investment and must learn to hunt
- Species specific temperaments

- Training through positive reinforcement
  - rewarding a specific behaviour increases the probability that that behaviour will re-occur

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Benefits of Training for Well-being

- Regular health checks
- Allows a range of procedures and makes them less invasive
- Examples include checking external features, ultrasound, x-rays, blood samples

Benefits of Training for Research

- Accepting proximity of keepers and veterinarians
- Reduced need for anaesthetics and disturbance
- Potential to conduct experiments - non-invasive but requiring cooperation from the animal
- Ease of sample collection
  - Blood, saliva, urine, fur

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Important Considerations in Training

- The well-being of the animal and the safety of the people involved are the primary consideration
- Individual animals are provided with choice to limit potential distress
- Animals develop strong working relationships with their trainers
- The benefits for individuals or species must be weighed against changes to an individuals environment

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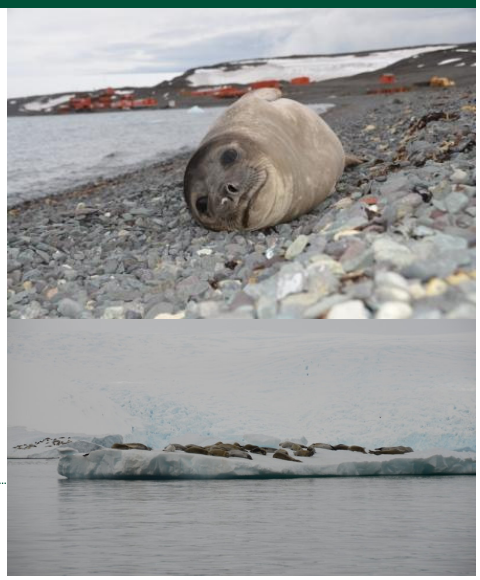
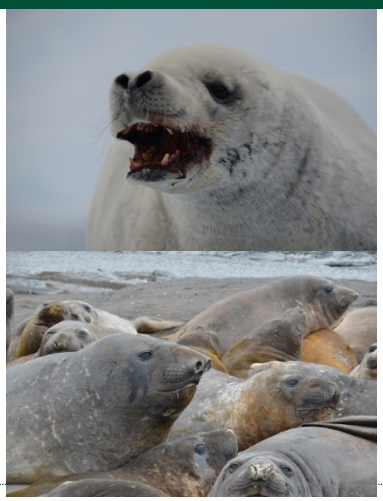
Challenges of marine mammal research

- Access to animals limited
- Many seal species haul-out for short periods – breeding and moulting
- Some locations make access difficult
- Some species are endangered



Challenges of marine mammal research

- Animals can be fierce and intractable
- Targeting individual animals may be difficult
- Marine mammals are a key component of marine ecosystems
- Difficult to answer fundamental questions such as what do they eat and how much?



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Value of Research

- Why is it important to know the answers to these fundamental questions?
- To understand what changes have occurred or are occurring in the marine environment as a result of the changing climate

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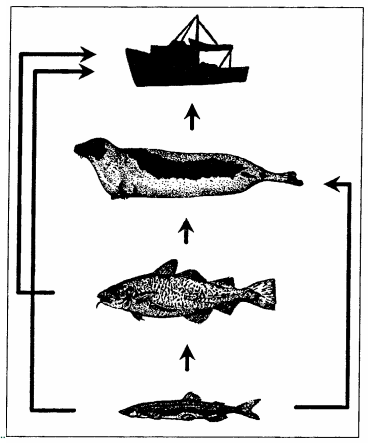
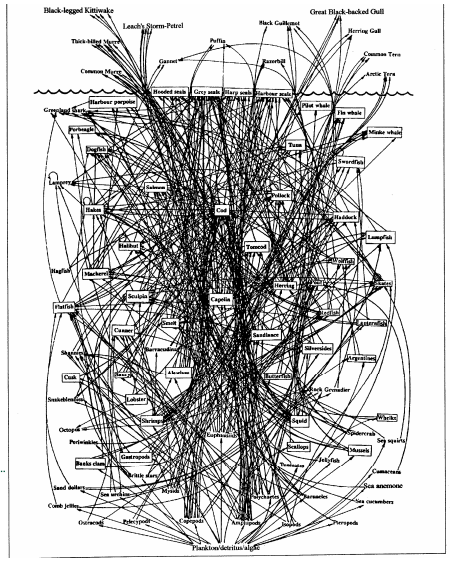
Marine ecosystems – simple or complex





Leopard Seal Research

- Leopard seals are a top predator
- Responsive to large scale environmental change
- A good barometer for understanding the health of the ecosystem

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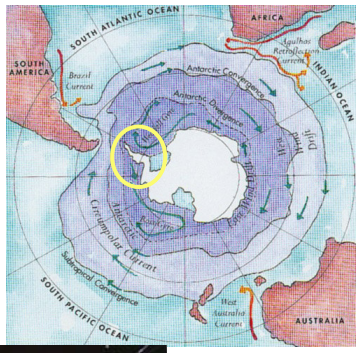
The changing marine ecosystem

- Western Antarctica has experienced a 6°C increase over 50 years
- Largest increase on the planet
- Sea ice is receding
- Krill population decreased



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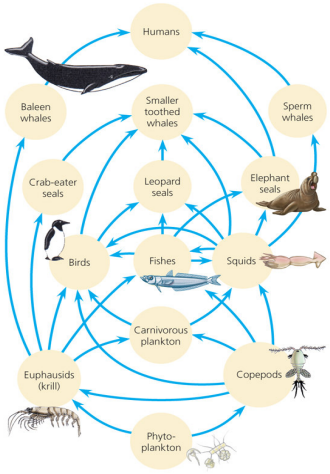
Leopard seals in the ecosystem

- Stable isotopes - whiskers
  - $\delta^{15}N$ indicates trophic level
  - $\delta^{13}C$ indicates feeding location off shore or near shore



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Leopard Seals

- Leopard seals occur from time to time on the NSW coast
- Numbers vary from year to year
- Usually young animals often in poor condition
- Taronga has two in the collection that hauled out at Clontarf and in the Royal National Park in 2007
- The Scientific Committee on Antarctic Research recommends to Treaty members that Antarctic seals taken into captivity not be released

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Leopard Seal Research

- Key to understanding stable isotope signatures
  - rate of growth of whiskers
  - impact of physiological state – moulting or breeding

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Leopard Seal research

- Validating the isotopic signatures through feeding experiments
  - Feeding trials using krill, fish and penguin surrogate
- Once validated we can look at historic samples

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Changes between East and West Antarctica

- Changes in average mass between Western Antarctica and Eastern Antarctica
- Related to diet changes
- Historic samples will enable us to track when changes in diet occurred and add to our understanding of the impacts of climate change

Australian Sea Lions

- Endemic endangered species breeding on islands in SA and WA
- Unique reproductive cycle – 18 months but high variability
- High natal site fidelity
- Isolated populations most with pup production of a few hundred
- Is stress a factor in population decline?

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Australian Sea lions

- How to measure stress non-invasively
- Stress is removal from homeostasis and measured through adrenal activity
- If we can measure adrenal activity in individuals can this translate to the field situation to measure stress in a population?
- Can we also measure reproductive hormones as an indication of population reproductive output?

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Measuring adrenal activity in Australian sea lions

- Adrenal activity (corticosteroids) can be measured in blood, urine, saliva and faeces
- Samples integrate stress over different time frames
- Faecal collection is simple and possible for wild populations
  - Sample integrity
- Captive animals can be trained for saliva collection

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Captive seal research to answer ecological questions

- Validating techniques
  - Food transit times
  - Growth rate of whiskers
  - Measuring adrenal or reproductive hormones
- New observations
  - Reproductive behaviour
  - Maternal behaviour
- Measuring physiological parameters
  - Metabolic rate when diving

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Summary

- Training of seals in the collection is important to enhance their well-being
- Training seals potentially opens up areas of research that would be difficult in wild populations
- Using our seals for research allows us to validate many assumptions in ecological research which has benefits for conservation of individual species and of the marine environment

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