

Climate Change and Arctic Marine Mammals---An Uneasy Glance into the Future



A matter of credit where credit is due...

- Presentation by:

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- With thanks to our colleagues and teachers:

Many Native leaders, hunters and friends

Scientists representing a range of disciplines

Goals of this presentation

- Describe some ecological changes that are ongoing and/or likely to occur
- Discuss why marine mammals are especially vulnerable to such changes
- Provide case studies to illustrate what is already happening
- Recommend research and monitoring
- Underscore the concerns such changes raise for subsistence communities

Ecological changes



Examples of changes in community ecology/function

- Arctic food webs and productivity are shifting from ice-associated to more open-ocean systems
- The ecological role of Arctic cod may be declining
- “New” diseases may affect population status
- Increased exposures to effects of shipping, fisheries, contaminants, noise, oil and gas exploration, and coastal development

Inherent Vulnerability



Consequences of being large and adapted to extreme conditions....

- Consummate K-strategists
 - long lifespans
 - delayed onset of sexual maturation and low fecundity
 - generally adapt poorly to changing conditions
 - out-competed by r-strategists

Case studies...



Some specific challenges...

The loss of sea ice habitat (18% reduction in area in 2002, 2003, 2004) can directly affect, for example:

- Ice seals---foraging and habitat for reproduction
- Walrus---resting and access to benthic forage
- Polar bears---foraging and reproductive success
- Bowhead whale---foraging and competition

plus

- Humans---a wide range of activities

The polar bear...the poster “child”

- The Hudson Bay case study illustrates a cascade of events that could occur elsewhere, too.



Climate change has led to:

- Changes in sea ice distribution, extent, and timing, causing...
- Changes in ice seal distribution, causing...
- Changes in polar bear foraging, leading to...
- Reductions in polar bear health, body condition, and reproductive success, and even contributing to...
- Higher mortality.

As a result..

- Stirling and his colleagues have gone so far as to suggest that polar bears may disappear from at least some parts of the Arctic in the foreseeable future.

Bowhead and gray whales



A plausible scenario that could affect bowhead whale status...

- Bowhead whales are highly derived, with highly specialized feeding
- BCB stock of bowheads is expanding at a rate $> 3\%$ per year
- Gray whale populations are also growing @ 2-3%/year and expanding their range as ice cover decreases
- Gray whales have a broader diet, breed faster, and generally seem more capable of colonizing new areas than bowhead whales
- So...

A plausible scenario that could affect bowhead whale status...

- So...some important questions include:
- Will changes in productivity and food webs affect bowhead whales positively or negatively?
 - Will gray whales outcompete and eventually replace bowhead whales?
 - What will the effects be on subsistence communities?

To summarize so far:

- Conditions are changing
- Marine mammals of all types are inherently vulnerable to environmental change
- Scientists have already documented changes or possible scenarios in which marine mammal populations or species may decline
- But considerable uncertainty exists about effects of changes on at least some species
- What constitutes, then, a way forward?

Research and monitoring



Requirements for improving future prospects

- Redefine the concept of “status”
- Expanding our community to include scientists of various disciplines and Holders of Traditional Ecological Knowledge
- Prerequisites:
 - Communication, respect and trust
 - Long-term vision and long-term funding
 - Quality science—asking the “right” questions
 - Leadership and team-building

BWHAM

- Bowhead Whale Health Assessment and Monitoring
- Proposed through the North Slope Borough
- Combines the features mentioned before to attempt to assess ecological and biological attributes
- Other examples also exist...but all too rarely do they reach fruition

**But...where does research get
you?**



And what happens to subsistence communities?



Changes underway

- Loss of whole islands and villages (e.g., Shishmaref)
- Redistribution of marine mammals essential for subsistence (e.g., walrus at St. Lawrence Island)
- Reports of ill or diseased marine mammals, and fears of contamination have affected some peoples' willingness to maintain a traditional diet
- Palatability of some species is a concern
- Access to animals and human safety are important issues

Ecosystems normally change over time but current changes raise questions:

- How dependent are communities on marine mammals?
- What are some possible impacts of turning away from a traditional diet?



Returning to the role of science...

- Provides clarification of outcomes or likely outcomes
- But solutions and mitigation demand changes in values, and scientific data itself does not necessarily affect values

So a solution is...

- Conduct the necessary science, incorporate the traditional knowledge, and develop strong partnerships
- Convey the best possible information to decision makers
- Communicate in terms that strike at and shape fundamental values
- Marine Mammal Commission follow-up to Portland consultation---helping science shape values

Thank you



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