

NAMMCO



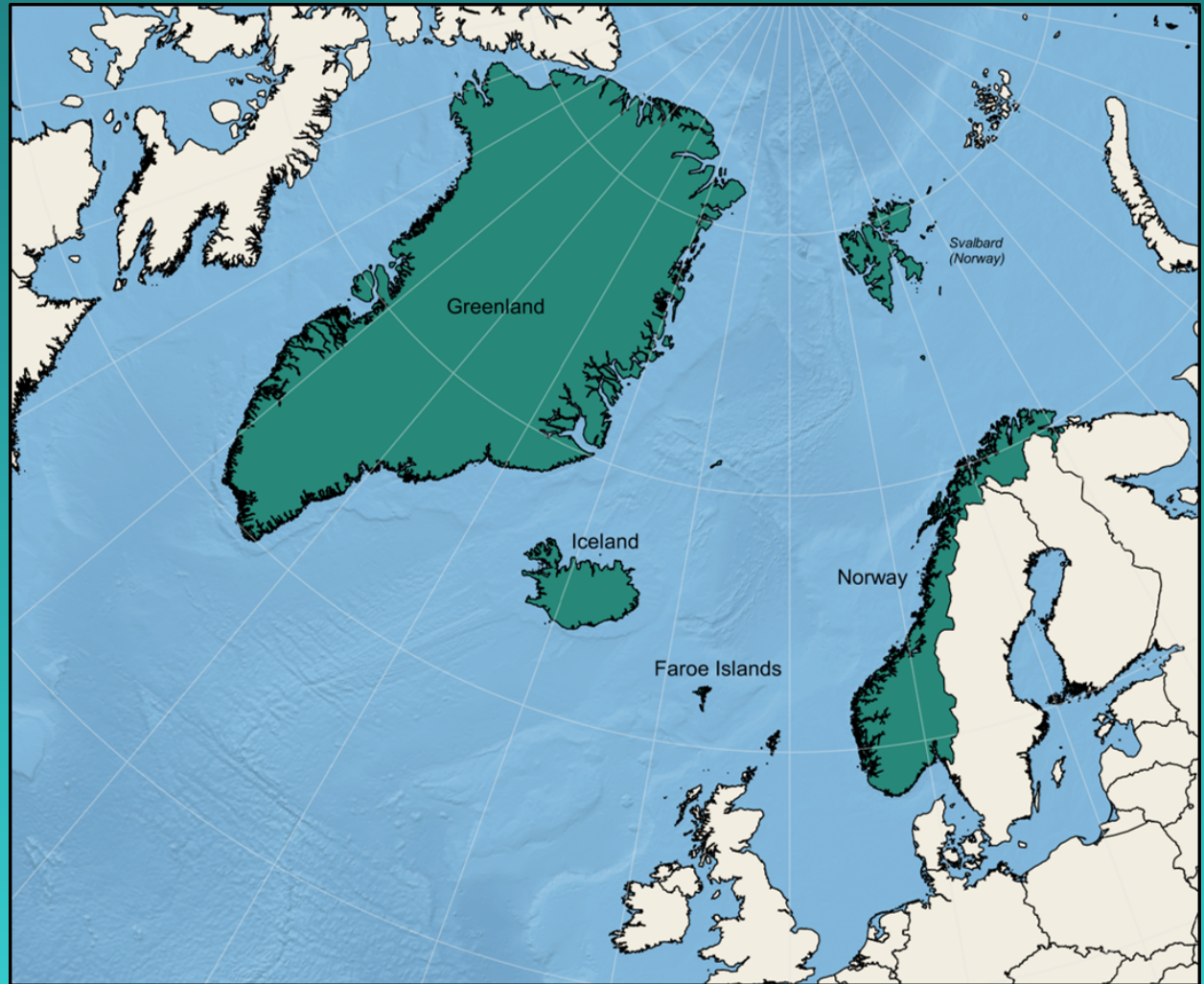
Benefits of Ecosystem Based Management for Marine Mammals

Geneviève Desportes and Jill Prewitt



What is NAMMCO?

- IGO, RFMO, observer to AC
- Advisory mandate
- Conservation, management and study of marine mammals





What is NAMMCO?

Parties:

- Recognise
 - ✓ the rights and needs of coastal communities
- Have committed to the
 - ✓ Effective Conservation of MM
 - ✓ Sustainable and responsible utilisation of MM
 - ✓ Management decisions based on best available scientific advice and local knowledge
 - ✓ Ecosystem-based approach



How to incorporate EBM in marine mammal conservation and management?

- **Currently** assessments are primarily single species
 - Based mainly on abundance/trends, and catch data
- Moving towards incorporating all impacts on marine mammals, not just direct catch
 - Human needs
 - Human activities
 - Ecosystem interactions & changes



Boundaries: Large Marine Ecosystems

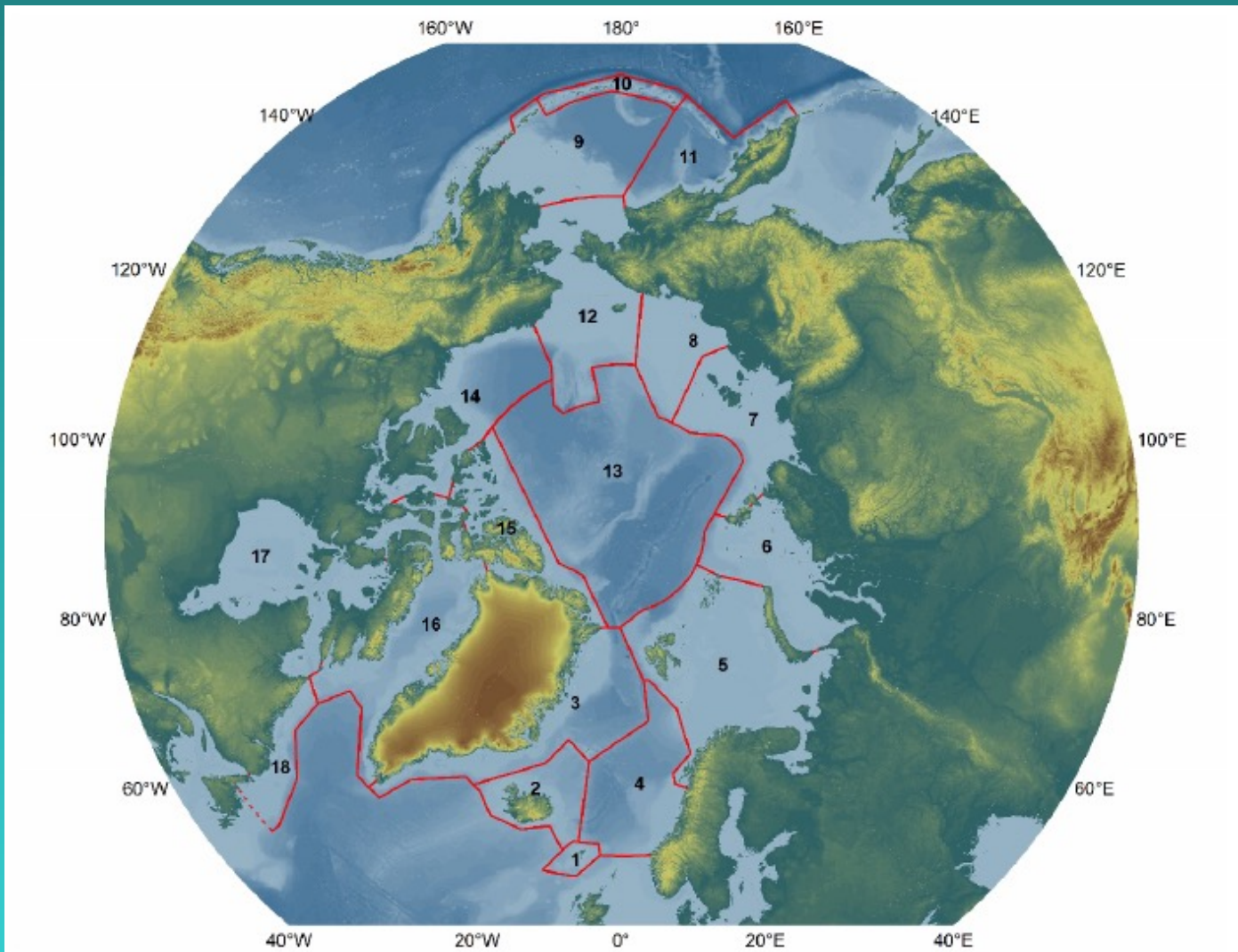


Figure. 3. Revised Map of 18 Arctic LMEs (version 17 April 2013).



Ecosystem Services

- **Ecosystem services of marine mammals**
 - Nutrient cycling (“whale pump”*, whale falls), carbon sequestration**, predator/prey relationships, etc.
- **Humans are part of the ecosystem**
 - Provisioning of food, culture, tourism (whale- and seal-watching), education, echolocation/sonar research, military, etc.



Hunting

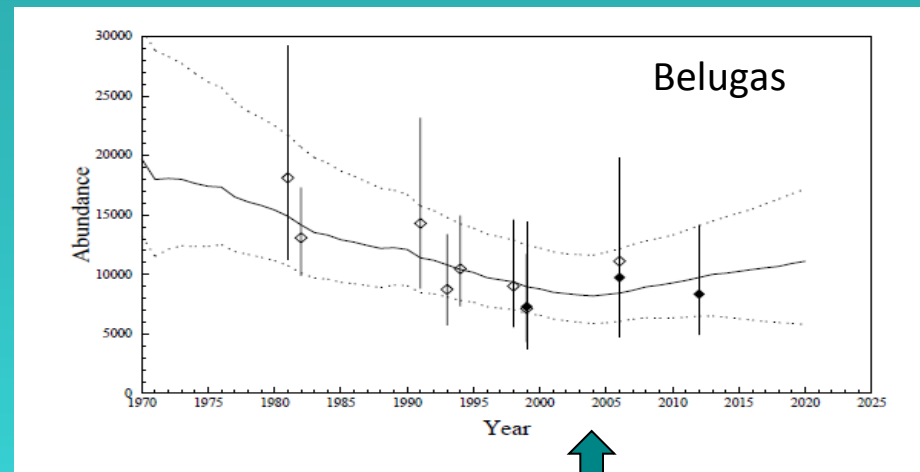
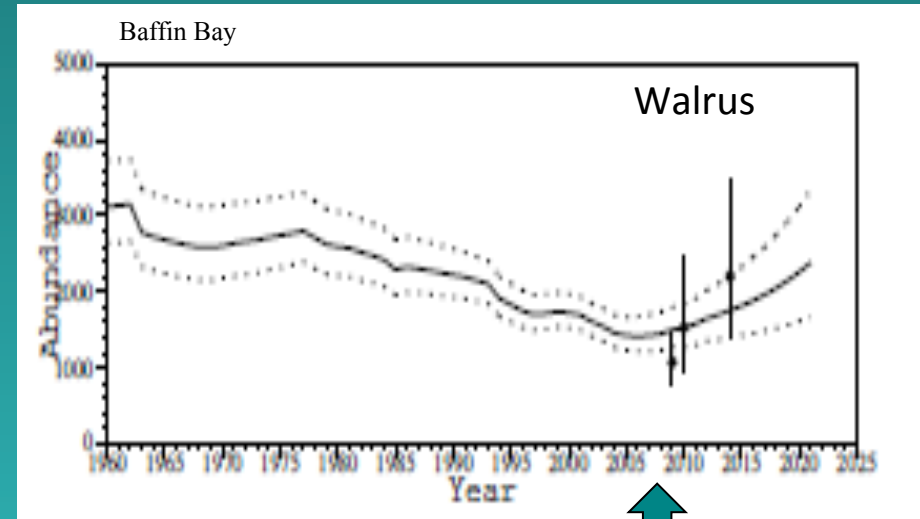


Objective:
Sustainable
populations



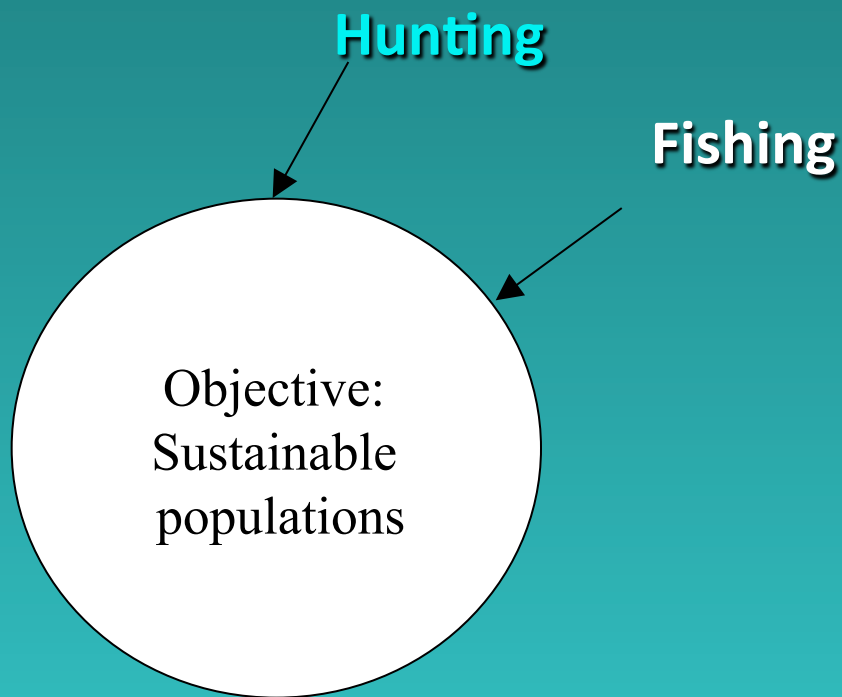
Hunting

- “Easy”?
- Quantifiable
 - Abundance (surveys)
 - Regular assessments (biological parameters, population modelling, etc.)
- Quotas/Catch reporting





What is missed without EBM?





Fishing

➤ By-catch

- Management must be flexible
 - Ex) coastal seals & Norwegian management plan

➤ Competition

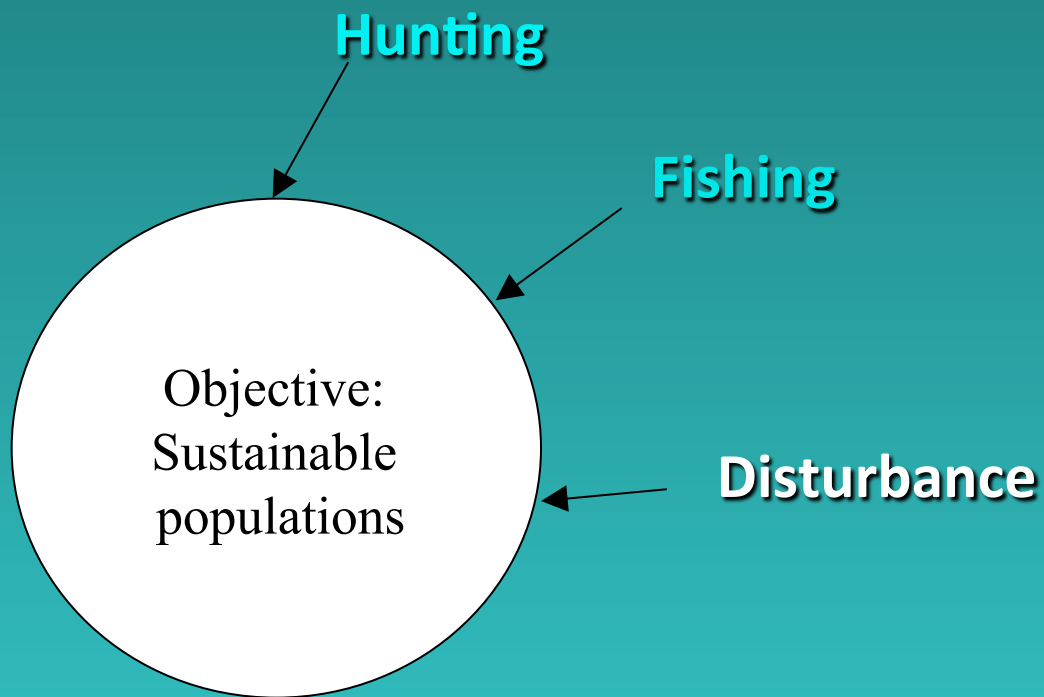
- Ex) Shifts in diet linked to decline in preferred prey-harbour porpoises (Santos et al. 2003)



Monitor possible new fisheries... Identify by-catch risks and predict possible prey competition to marine mammals?



What is missed without EBM?





Disturbance

- Tourism (whale-watching and seal-watching)
 - Changes in behaviour and distribution → impacts foraging/repro./resting, etc.

- Resource Extraction
 - Behaviour/dist changes, also noise causing physical damage, and masking of communication etc.



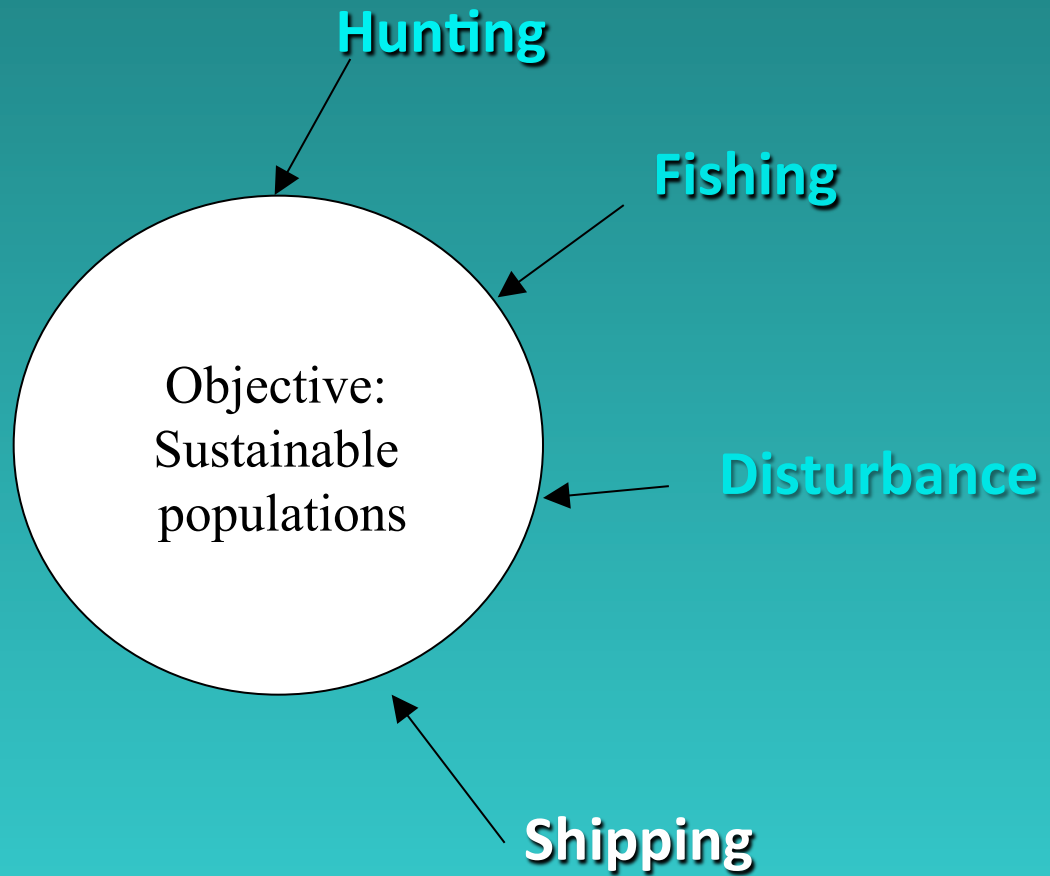
How to quantify the impacts and/or mitigate the effects on the population level?

What level of disturbance is acceptable?

- 5% of the population “disturbed”? 10? 20%?
- But must be considered...



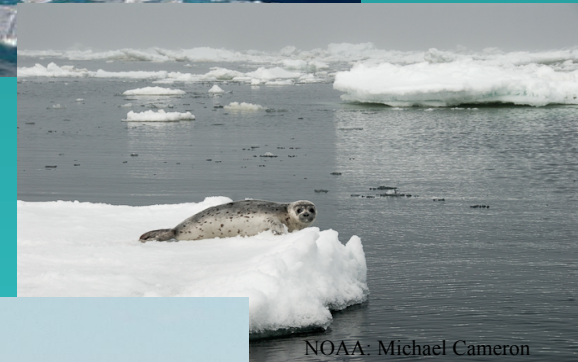
What is missed without EBM?





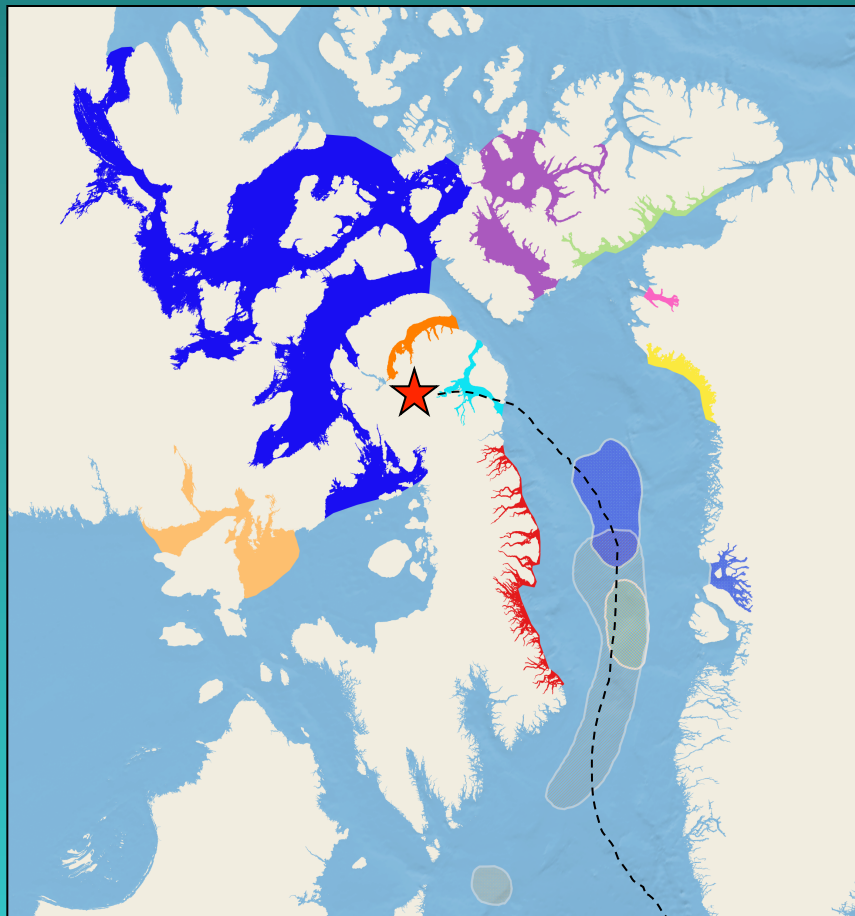
Disturbance → Shipping

- Shipping
 - Noise, habitat destruction (especially icebreaking *Wilson et al. 2008)
 - Stress, loss or avoidance of key habitat/ migration routes, masking of communication, ship strikes etc.
 - ...





Example: Ship strikes



Narwhal Summering Aggregations

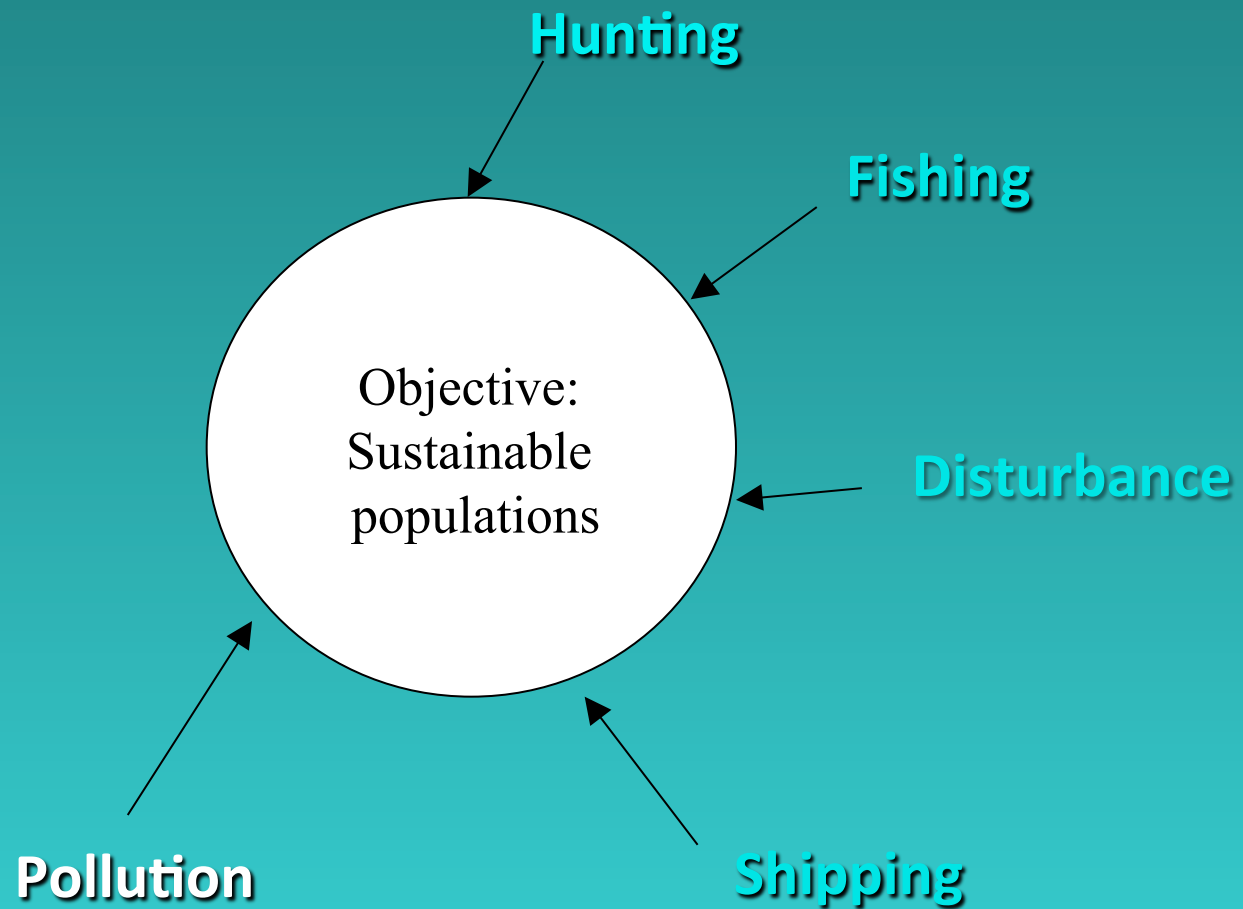
Somerset Island	Eclipse Sound	Melville Bay Winter
Somerset Island Winter	Jones Sound	East Baffin Island
Admiralty Inlet	Smith Sound	Northern Hudson Bay
Admiralty Inlet Winter	Inglefield Breeding	Northern Hudson Bay Winter
	Melville Bay	

Baffinland -- Mary River Mine Project ★

- Icebreaking & shipping up to 10 months per year -----
- DFO: 123 narwhals per year susceptible to ship strike*
- Almost = to the hunting quota of Eclipse Sound
- Where to allocate these removals?
- Unknown which stock ship strikes are from



What is missed without EBM?





Pollution

- Direct impacts (e.g., from oil spills)
 - Physical contact
 - Effects from single events **MAY** be quantifiable



- Indirect impacts
 - Habitat destruction, prey contamination, sub-lethal effects
 - Ex) Reproductive failure, e.g. harbour porpoise (Murphy et al 2015), and killer whales in Europe (Jepson et al. 2016)



What is missed without EBM?

Climate Change

- Sea Ice (habitat loss/ opening of new habitat)
- Competition w/ new species
- Predators
- Ecosystem changes
 - Physical, biological
 - Shifts in prey

Hunting

Fishing

Disturbance

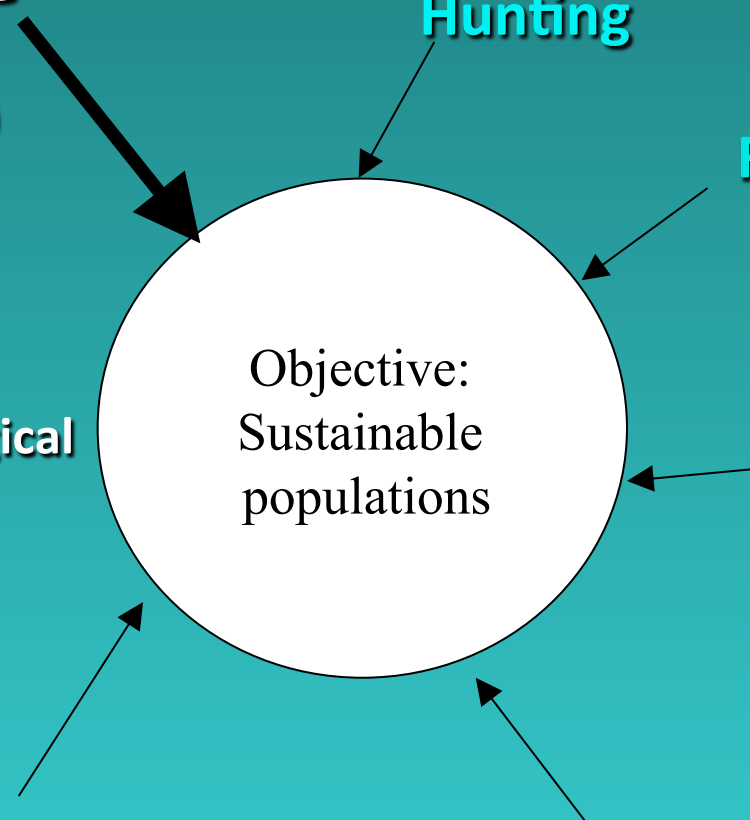
- Increased human presence

Objective:
Sustainable
populations

Pollution

Shipping

- Ship strikes
- Habitat disruption





Ecosystem changes

- Decreased minke whale body condition
 - linked to reductions in herring (Norwegian Sea; Solvang et al. 2016), competition for prey with increasing cod stocks (Barents Sea; Bogstad et al. 2015)



- North Atlantic- Changes in SST/salinity → changes in distribution of fish & euphausiids → shift in distributions of cetaceans (Vikingsson et al. 2015)



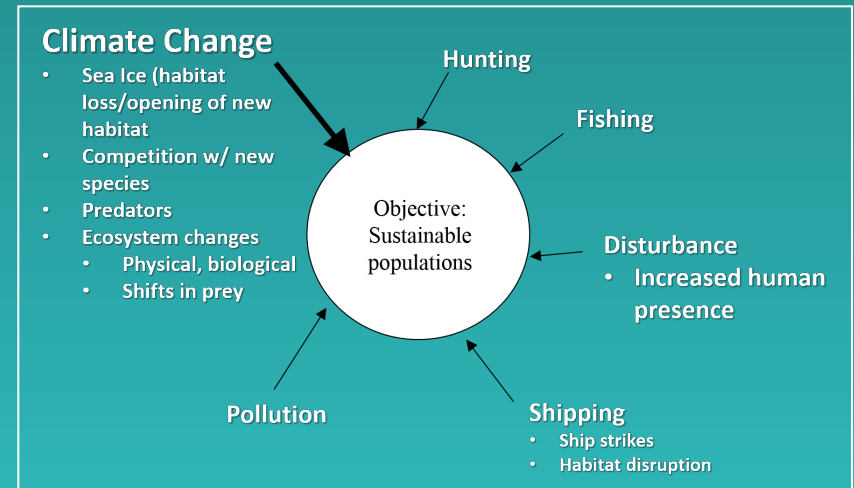
Challenges

- Predicting the future...
- Quantifying the impacts as much as possible
 - Cumulative impacts
- What will our advice look like?
 - Options for managers to make decisions



Now what?

- NAMMCO Activities
 - Disturbance Symposium
 - Impacts of human activities on Arctic MMs
 - Expert Working Groups
 - By-catch
 - Tourism
 - Pollution
 - ...





Questions?

