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.

Objective: Sustainable populations
Hunting

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

More info: www.nammco.no
What is missed without EBM?

Objective:
Sustainable populations

Hunting
Fishing
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?

Objective: Sustainable populations

- Hunting
- Fishing
- Disturbance
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?

Objective: Sustainable populations

- Hunting
- Fishing
- Disturbance
- Shipping
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.
  - ...

NOAA: Michael Cameron
Example: Ship strikes

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

*NCSAS 2013/024
What is missed without EBM?

Objective: Sustainable populations

- Hunting
- Fishing
- Disturbance
- Pollution
- Shipping
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?

**Objective:**
Sustainable populations

**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

**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
NAMMCO Activities

• Disturbance Symposium
  – Impacts of human activities on Arctic MMs

• Expert Working Groups
  – By-catch
  – Tourism
  – Pollution
  – …
Questions?