CBMP-Marine Plan incorporating the DBO

Kathleen Crane and Reidar Hindrum
Expert Monitoring Groups (EMG):

- Marine (MEMG),
- Coastal,
- Freshwater (FEMG),
- Terrestrial Flora, and Fauna
- + Arctic Protected Areas Monitoring Scheme (APAMS)
Participating institutions in the MEMG:
Marine EMG members:

Co-leads:
Dr Kathleen Crane, US
Mr Reidar Hindrum, Norway

US:
Dr Sue E. Moore
Dr Russ Hopcroft
Dr Katrin Iken

Russia:
Dr Igor A. Melnikov
Dr Boris I. Sirenko
Dr Olga S. Liubina
Dr Nina Denisenko

Greenland:
Mr Fernando Ugarte
Ms Aili Labansen

Iceland:
Dr. Gudmundur Gudmundsson

Canada:
Dr Jill Watkins
Dr Jim D. Reist

Norway:
Dr Ingrid Bysveen
Mr Dag Vongraven
Dr Per Arneberg

CBMP Secretariat:
Mr Mike Gill

Aleut International Association:
Ms Victoria Gofman

AMAP:
Mr Jason Stow

PAME:
Ms Soffia Gudmundsdottir
Developing a Marine IMP: Overall Process & Timeline

- Marine Expert Monitoring Group (MEMG) activated (Aug’08) – consisting of:
  - Norway & U.S. (Co-leads), Canada, Russia, Greenland/Denmark, Iceland, Aleut International Association (AIA), & Arctic Monitoring & Assessment Program (AMAP)
- Background paper (Dec’08)
- 1st Expert Workshop - Tromsø, Norway (Jan’09)
- 2nd Expert Workshop - Coral Gables, U.S. (Nov’09)
- Marine IMP 1st and 2nd Draft for review (Jan’/June’10)
- CBMP-Marine Plan for CAFF and SAO review (Sep-Jan,10-11)
- Arctic Council Endorsement & Implementation (2011)
Arctic Marine Biodiversity Monitoring Plan (CBMP-Marine Plan)
Final Draft – January 2011
CIRCUMPOLAR BIODIVERSITY MONITORING PROGRAM

Arctic Marine Areas

1. Atlantic Arctic
2. Davis-Baffin
3. Hudson Complex
4. Arctic Archipelago
5. Beaufort
6. Pacific-Arctic
7. Kara Lofot
8. Arctic Basin
## Parameters by Arctic Marine Area

### EXAMPLE:

<table>
<thead>
<tr>
<th>Focal Ecosystem Components</th>
<th>Key Parameters</th>
<th>Existing Monitoring Programs</th>
<th>Coverage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Phytoplankton</td>
<td>Chlorophyll</td>
<td>Marine Basic Zackenberg</td>
<td>Zackenberg, East Greenland</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Barents Sea Ecosystem (IMR+PINRO)</td>
<td>Barents Sea from 68-80°N, 5°W to Novaya Zemlya</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Assorted (NPI)</td>
<td>Svalbard and MIZ region</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Assorted (ARCTOS, e.g. CLEOPATRA, Arctic Tipping points)</td>
<td>Barents Sea, Svalbard, MIZ</td>
</tr>
<tr>
<td></td>
<td></td>
<td>White Sea Labs (Katesh - ZIN, WSBS -Moscow State)</td>
<td>White Sea</td>
</tr>
</tbody>
</table>
The most important drivers:

- **Environmental contamination** (i.e., long range transport of contaminants)
- **Invasive species** (non-native)
- **Increasing ship & air traffic**
- **Harvest**
- **Oil & gas exploration**
- **Climate change**...
  ...the most pervasive threat!
Sentinel Benthic Regions, Stations and Transects
Sentinel Plankton Stations and Transects
Sentinel Fish Regions, Transects, and Stations
Sentinel Marine Mammal Regions and Tagging Sites

- Chukchi Sea Acoustic Site
- Bering Strait Obs. NOAA
- BWASP, MMS
- COMIDA, MMS
- Whale and Seal Tagging and Recorder Sites
- Harp and Hood Seals, GINR
- Greenland Cetaceans, Summer
- Greenland Beluga, Walrus Bowhead and Narwhal
- Greenland Narwhal Surveys
- North Atlantic Minke Whales (N)
- Cetacean NASS (l, F.I.)
- l., and F.I. and Minke Survey Overlaps
- Canadian communities with desirable observations of whales, seals and/or walrus
- Russian Beluga, PINRO
- Russian Observing Locals WWF
- Russian Desirable Locals WWF
- Walrus Haulout and Tagging Sites
- CAFF Arctic Boundary

N., l., and F.I. (Norway, Iceland and Faroe Islands)
Sentinel Seabird Monitoring Sites

- Monitoring Annually
- Monitoring every 3 yrs
- Russian Zapovednik Monitoring
- Russian Desired Monitoring
- Monitoring by MMBl or AARI
- Thick-billed Murre
- Black-legged Kittiwake
- Common Eider
Data Management Approach

- Data Management (treatment, roles, national financing, links to SAON, objectives, etc.) Existing Node is for Seabirds (FWS sponsorship)
- CBMP Web-Based Portal and Data Nodes sponsored by Nations (agencies). These need to be determined.
- Data formats agreed upon by Data managers appointed by nations.
- Current data (status) to be compared to historical baselines – trends
CBMP-Marine

CIRCUMPOLAR BIODIVERSITY MONITORING PROGRAM

Marine Expert Monitoring Advisory Committee (MEMAC)

- US
- Canada
- Russia
- Greenland
- Iceland
- Norway
- AMAP
- AC PP
- + PAME?

Indicators/Parameters

- Sea Ice
- Marine Mammal
- IUCN PBSG
- CAFF CBIRD
- Fish
- Plankton
- Benthos
- Walrus
- Ringed Seal
- Bowhead Whale
- Community Based

Based on AMAP Benthos Marine Expert Networks (MEN)
Start up from 2011

• Marine Expert Networks (MEN’s) supported by the nations will be established by the Marine Expert Monitoring Advisory Committee (MEMAC) (supported by nations)

• Task: Expert Networks will establish “baselines” from historical data (funding from individual nations)

• Task: Expert networks will aggregate existing Pan Arctic data sets.
# Reporting timeline

<table>
<thead>
<tr>
<th>Time</th>
<th>Reports</th>
<th>Frequency</th>
</tr>
</thead>
</table>
| 2012 | • Status of indicators  
      • Performance reports and work-plans                                   | bi-annually     |
|      |                                                                         | annually        |
| 2013 | • Scientific publications and papers  
      • Various summaries and other communications material                 | ongoing         |
|      |                                                                         | ongoing         |
| 2015 | • State of Arctic Marine Biodiversity Report, including AMA status reports  
      • Independent review of parameters, sampling approaches, data management approach, analysis and reporting | every 5-y       |
|      |                                                                         | every 5-y       |
Circumpolar Marine Biodiversity Monitoring: A Phased Approach to Planning & Implementation

**Phase 1 (2008-2011):**
- Arctic Nations – Russia, USA, Canada, Greenland/Denmark, Iceland, & Norway (Possible addition of other Arctic Countries (such as Sweden and Finland))

**Phase 2 (2015 - TBD):**
- Integration of Observer Countries into Phase 2 IMP (f. ex. PAG Member Nations: Japan, China, & Korea)

Pacific Arctic Group (PAG) – organized under International Arctic Science Committee (IASC)
The SAON vision is that users should have access to free, open & high quality data that will realize pan-Arctic & global value-added services & provide societal benefits.

To attain that vision, SAON's goal is to enhance Arctic-wide observing activities by facilitating partnerships & synergies among existing 'building blocks', & promoting sharing & synthesis of data & information.

The CBMP MEMG directly supports the SAON vision & goal using the Circumpolar Marine Biodiversity Monitoring Plan as a tool to achieve this.
In A.O. Negative periods, the Pacific Arctic AMA is bound by the Lena River Outflow, the Atlantic Water Boundary Current, the Barrow Canyon and the Maximum Average Ice Extent in the Bering Sea.
Boundaries: A.O. Positive western extent of Pacific Water, Atlantic Water Boundary Current, 1,000 m contour Barrow Canyon and Southernmost extent of the Sea Ice Cover
Beaufort Shelf Arctic Marine Area

Boundaries: 1000 m contour, Atlantic Water core, Beaufort Gyre in storage mode, Barrow Canyon, outflux of water through Arctic Archipelago
Circumpolar Biodiversity Monitoring Program

Barrow Canyon

Pacific Arctic

Beaufort

Nishino et al., 2008
Pacific Arctic-Beaufort

(a) Silicate [μmol/kg]

(b) Chlorophyll a [μg/L]

Nishino et al., 2008
Pacific Arctic-Beaufort

Ammonium [μmol/kg]

Depth [m]

Barrow Canyon

Nishino et al., 2008
CIRCUMPOLAR BIODIVERSITY MONITORING PROGRAM

Arctic Ocean

Chukchi Sea

Beaufort Sea

Barrow

Kaktovik

Wainwright

Pt. Lay

Nuiqsut

Kaktovik

Little Diomede

Savoonga

Gambell

Savoonga

Kivalina

St. Lawrence I.

Bering Sea

DBO
(Including RUSALCA and other PAG observations)
Thank you!