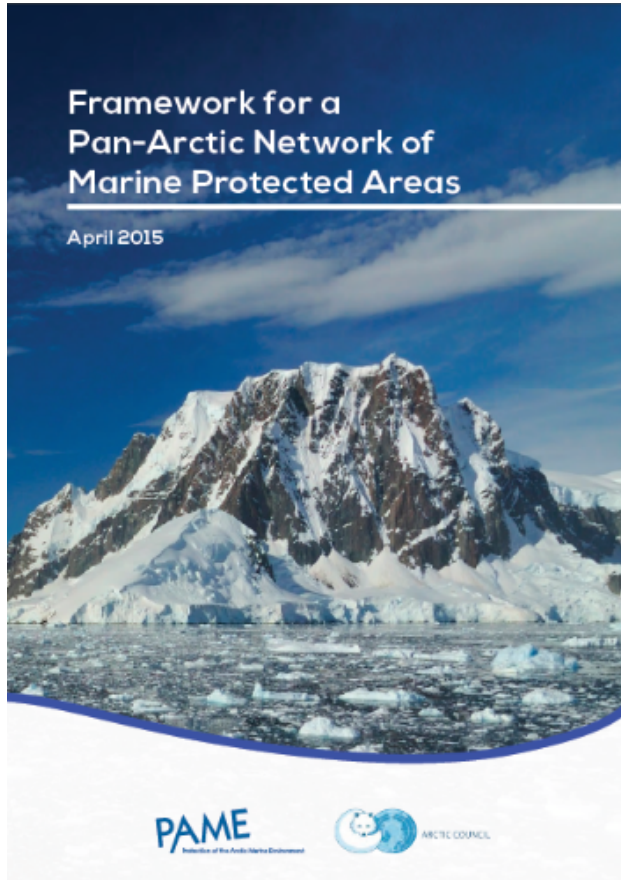


PAME I-2019: Agenda 4.2

Modelling Arctic oceanographic connectivity to further develop PAME's MPA toolbox

*To continue PAME's Framework for a
Pan-Arctic Network of Marine Protected Areas*

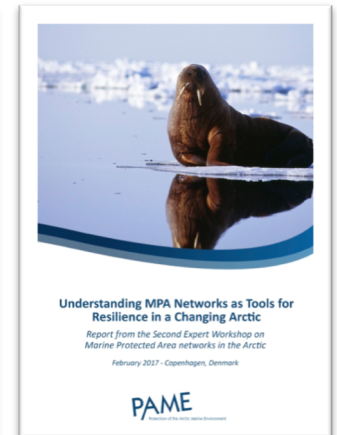
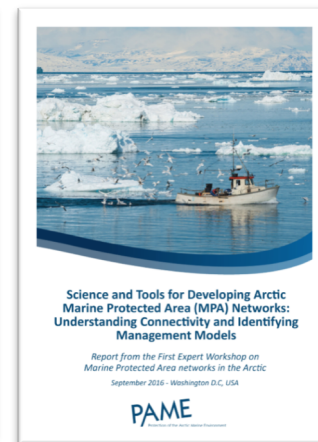
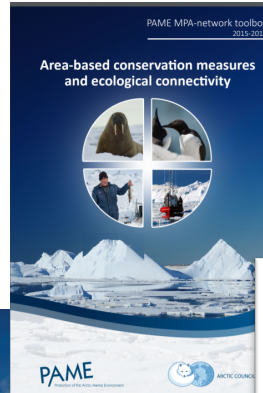
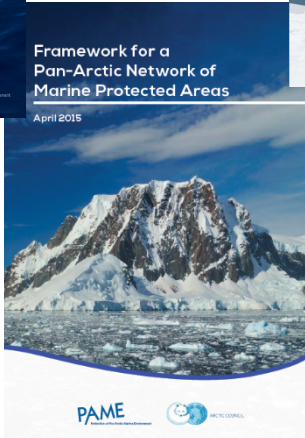


***Vision:** ‘Ecologically connected, representative and effectively-managed network of protected and specially managed areas’*

PAME recognizes that each Arctic State pursues MPA development based on its own authorities, priorities and timelines.

Modelling Arctic oceanographic connectivity

Swedish Agency
for Marine and
Water Management

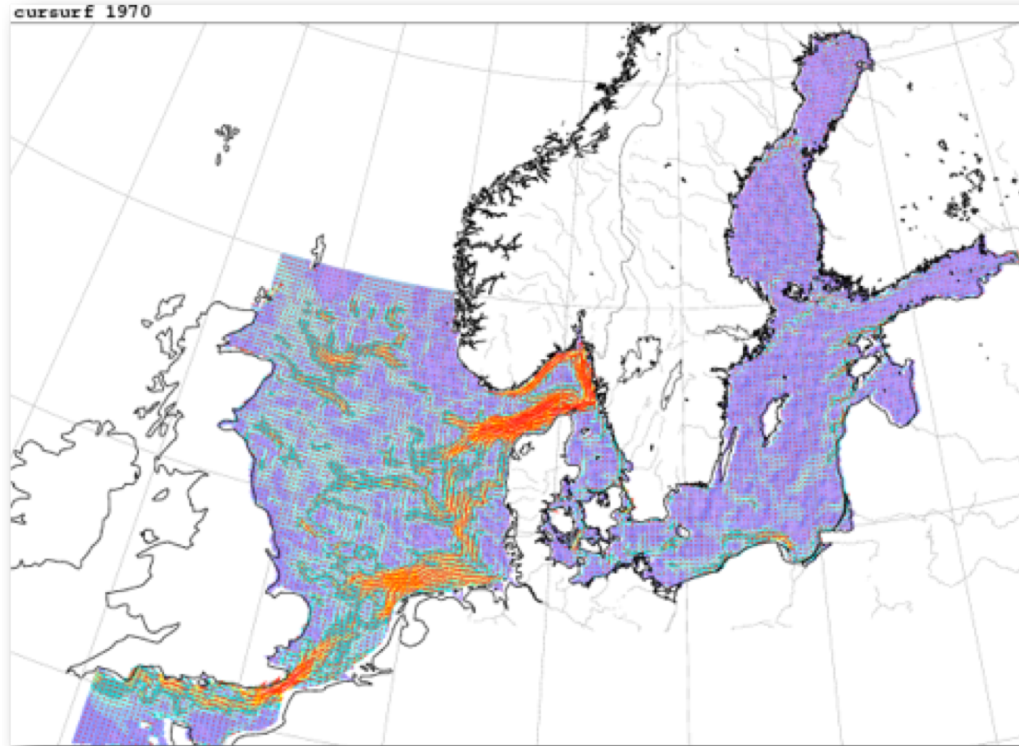


Aim & objectives

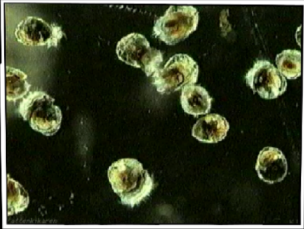
- To further develop the PAME MPA toolbox;
- To map oceanographic connectivity in the Arctic region using biophysical modelling; and
- To identify major barriers to gene flow based on modelled marine connectivity.

Circulation model

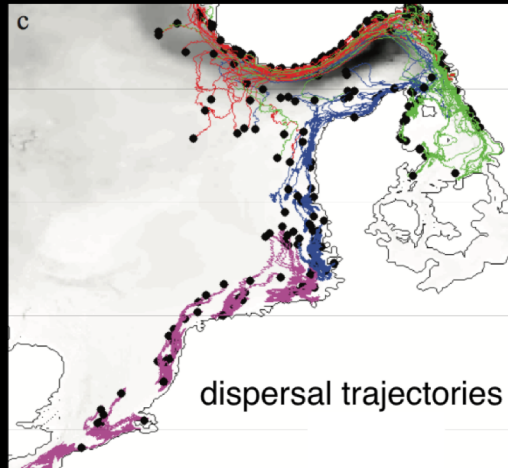
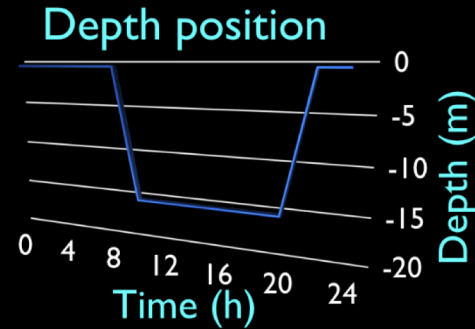
Swedish Agency
for Marine and
Water Management



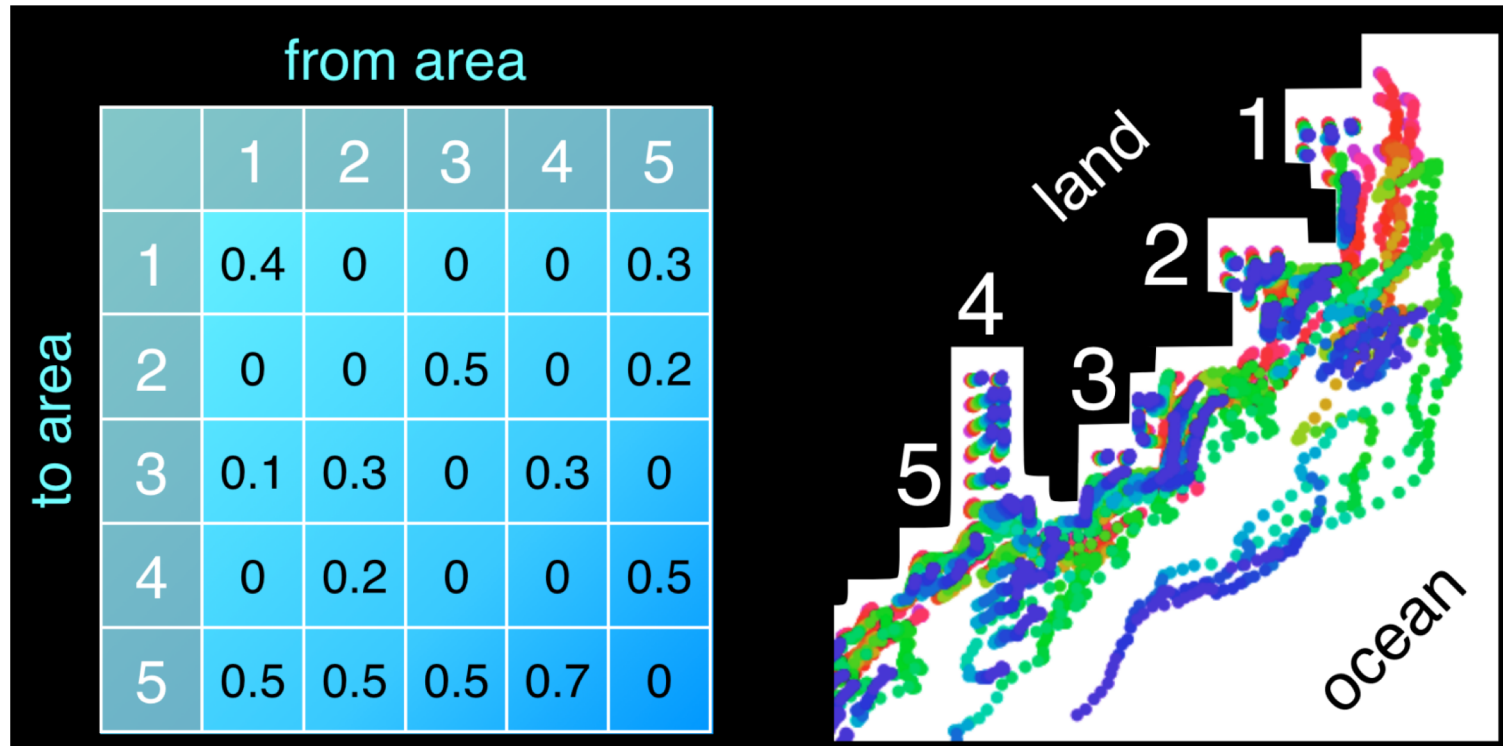
Circulation and biological model



- Spawning time
- Pelagic larval duration
- Vertical behavior
- Settling behavior

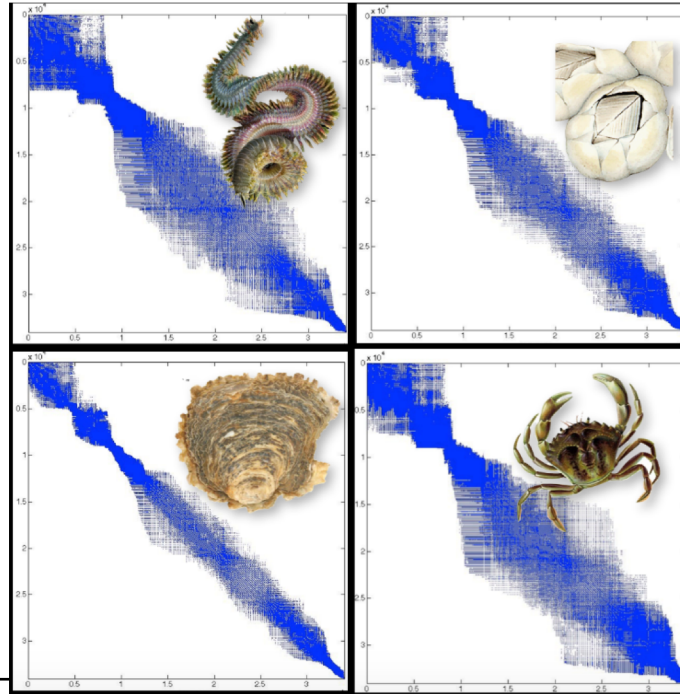
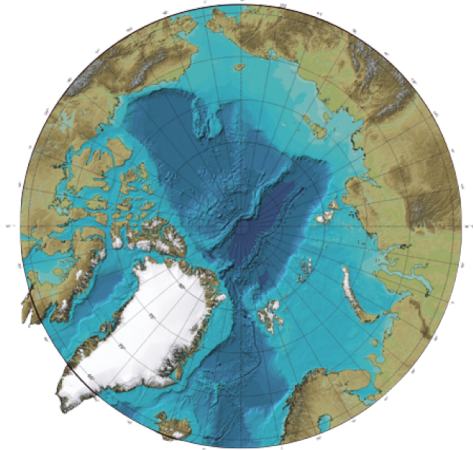


Connectivity matrix

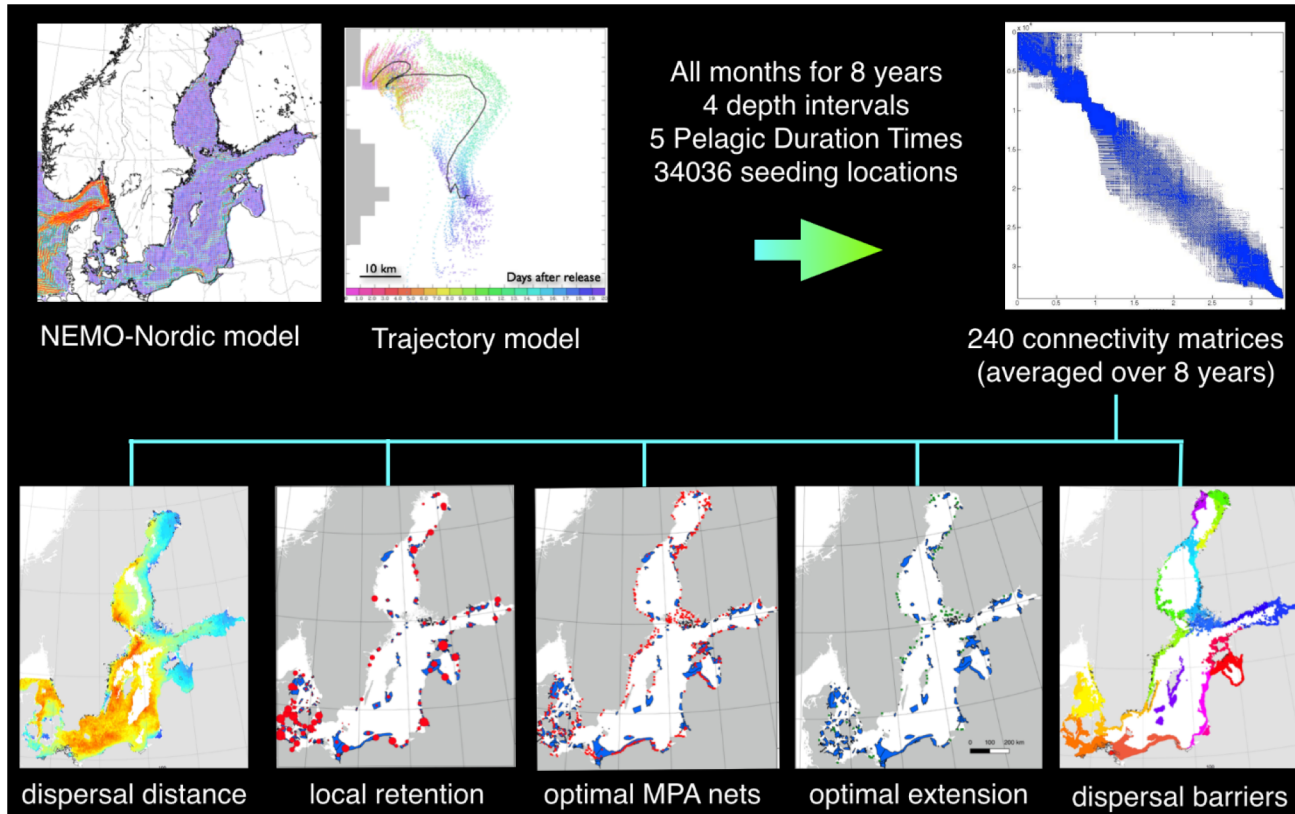


The connectivity matrix

- Calculating connectivity matrices (trait and habitat dependent)



Example of MPA assessment



Model limitations

- Dispersal assumed by passive water transport
- Knowledge of larval behaviour often poor
- Estimating only potential connectivity

Why choosing this approach?

- High coverage in space & time
- Can cover a broad range of organisms
- Inexpensive if circulation model is available
- Study can suggest areas for more detailed investigations, e.g. genetic studies

- Biophysical modelling of dispersal in the Arctic Ocean
- Analysis of dispersal distance
- Analysis of connectivity, sources and sinks
- Ranking of areas according to network importance
- Mapping of dispersal barriers

Timeline and major activities

1. Downloading of velocity fields from the oceanographic model – 2m
2. Development of existing code for the model – 1m
3. Review of available data on habitat distribution of key species – 3m
4. Simulation of dispersal trajectories and summarizing into connectivity matrices – 6m

5. Calculation of the MPA metrics: dispersal range, optimal networks, dispersal barriers – 3m
6. Coordination, meetings and report – 4m

Overall budget

Item	Budget (USD)
Data management and trajectory simulation	65.000
Planning, calculation o MPA metrics, reporting	38.500
Review of habitats and dispersal traits	38.500
Calculation of optimal network and barriers	15.200
Travels	3.335
Hardware	1.200
Software	1.200
Estimated total	162.935