Connecting Seas

NorthSEE – Baltic LINes MSP conference

Environment

Planning Issues, Criteria and Tools

Hosts: Anne Langaas Gosse, Goncalo Carneiro, Lise Schroeder

Environment – planning issues, criteria and tools

16:00 Introduction

16:05 Four presentations

16:30 Five pitches introducing the workstations

16:40 The audience choose and find their first table

16:45 1. round of workstation presentations

17:00 The audience choose and find their first table

17:05 2. round of workshop presentations

17:20 Questions and wrap up

17:00 End of session

Presentations on planning issues and criteria

- **Anne Langaas Gosse** (Norwegian Environmental Agency): The Knowledge Base for Maritime Spatial Planning – the Norwegian approach
- **Goncalo Carneiro** (Swedish Agency for Marine and Water Management): Maritime Spatial Planning and the need for Spatial Decision Support – the Swedish approach (Symphony)
- **Mats Huserbraten** (Norwegian Norwegian Institute for Marine Research): Modelling of Connectivity among Marine Protected Areas, Particularly Valuable and Vulnerable Areas
- **Lena Bergström** (HELCOM): The HELCOM Second Holistic Assessment of the Ecosystem Health of the Baltic Sea and the development of regional cumulative impact assessments

Pitches and workstations on tools for MSP

- **Henning Sten Hansen** (Aalborg University): MYTILUS – cumulative impact assessment tool and scenario-based decision support for MSP'
- **Lena Bergström** (HELCOM): Recent applications in the Baltic Sea Impact Index, for cumulative assessments at the Baltic Sea scale
- **Jonas Pålsson** (Swedish Agency for Marine and Water Management), **Duncan Hume** (The Geological Survey of Sweden): Symphony – the Swedish approach to Spatial Decision Support for MSP
- **Daniel Depellegrin** (National Research Council – Institute of Marine Sciences, CNR-ISMAR): Tools4MSP – tools for analysis of conflicts between marine uses and the analysis of cumulative impacts (CI) of human activities on marine environments.
- **Magali Gonçalves** (Breda University of Applied Sciences), **Giovanni Romagnoni** (Oslo University), Jeroen Steenbeek (Ecopath International Initiative): Ecopath with Ecosim – combining ecosystem modelling and serious gaming to aid transnational management of marine space

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Planning Issues and Criteria

North SEE

Interreg North Sea Region

Baltic LINes

Interreg Baltic Sea Region

Planning issues and criteria

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The value of a good knowledge base

Anne E. Langaas Gossé
Senior Adviser, Coordination of Marine Management

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Knowledge for planning


Photo: Øyvind Hagen – Statoil ASA


Photo: Nils Øien, Norwegian Institute for Marine Research

Photo: Hvalsafari


Photo: Frontline


Photo: MAREANO. Norwegian Institute for Marine Research

Photo: Aker Seafoods

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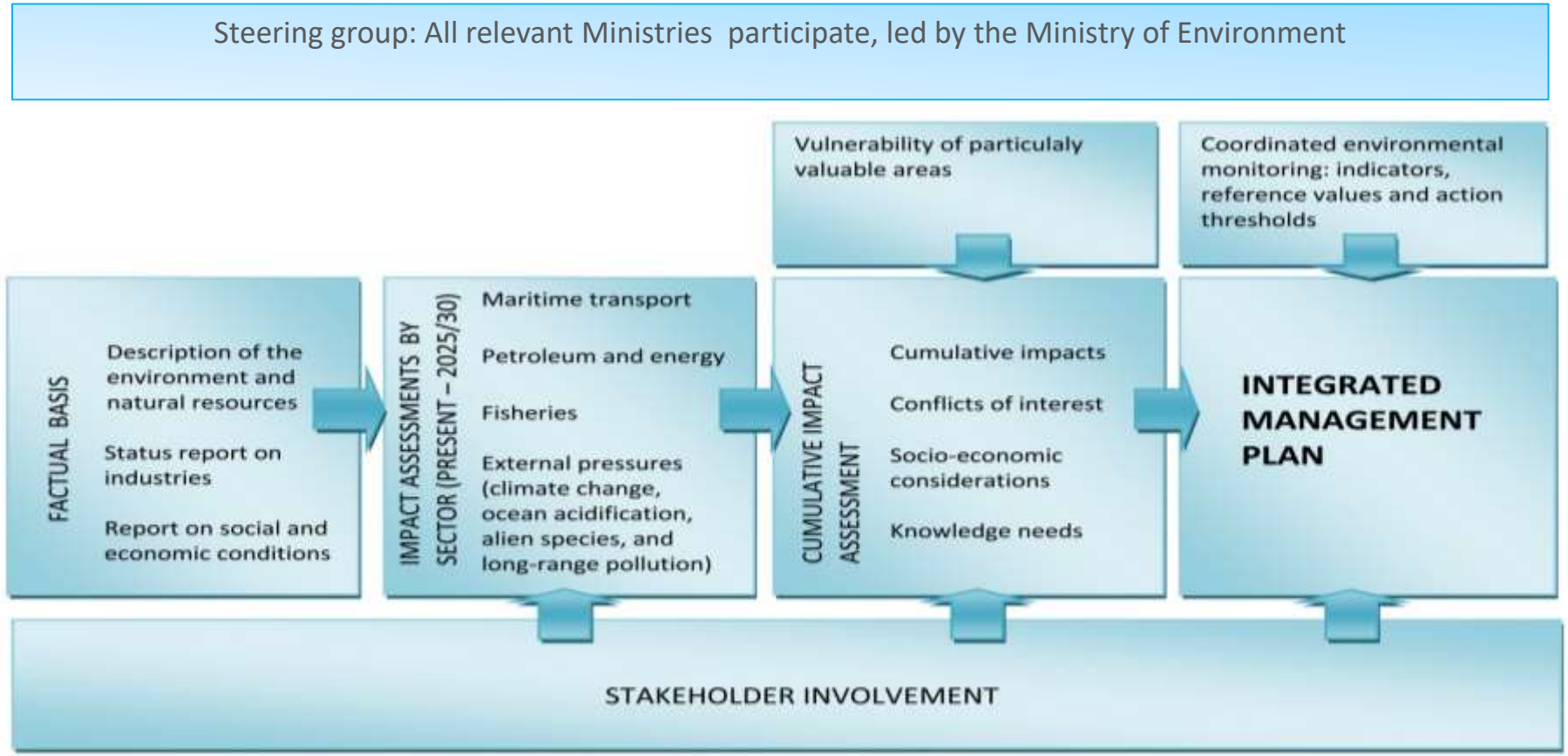
Generating knowledge… the Norwegian model



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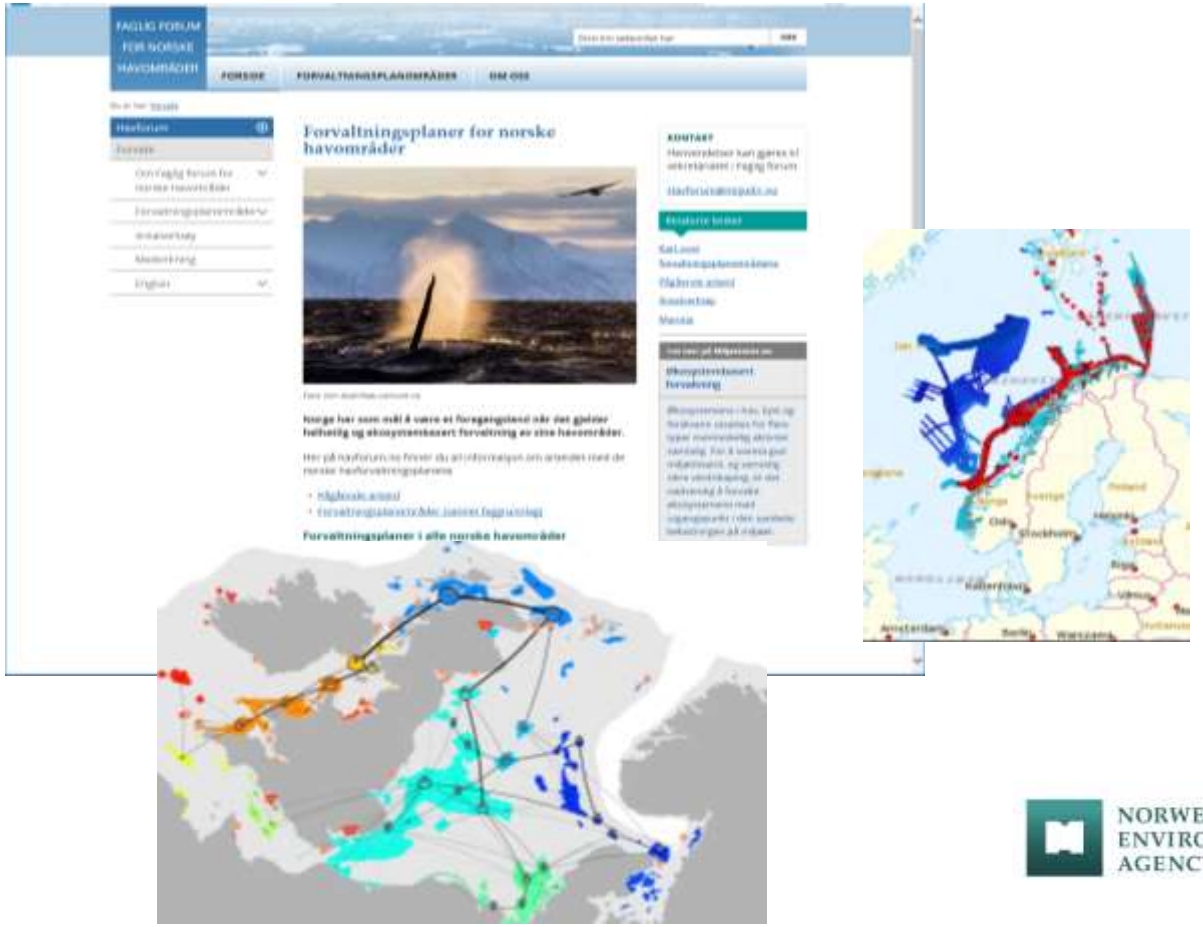
Sharing knowledge – web-page

All knowledge should be publicly available:

- From mapping, monitoring, research, assessments, reports …
- To decisions, restrictions, white papers



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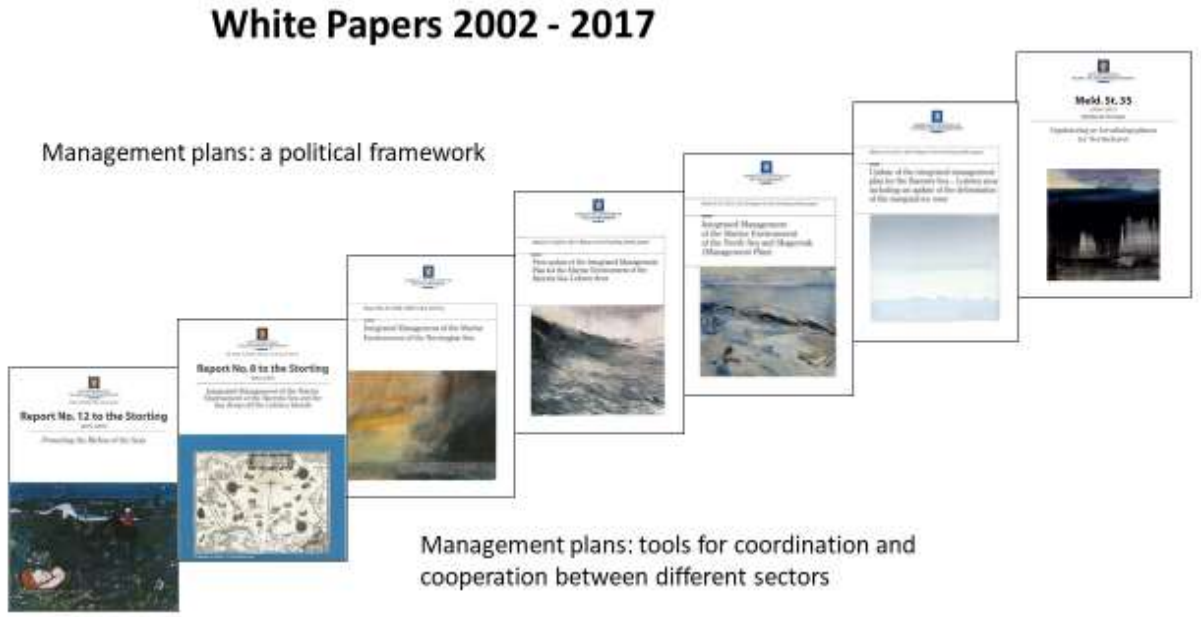

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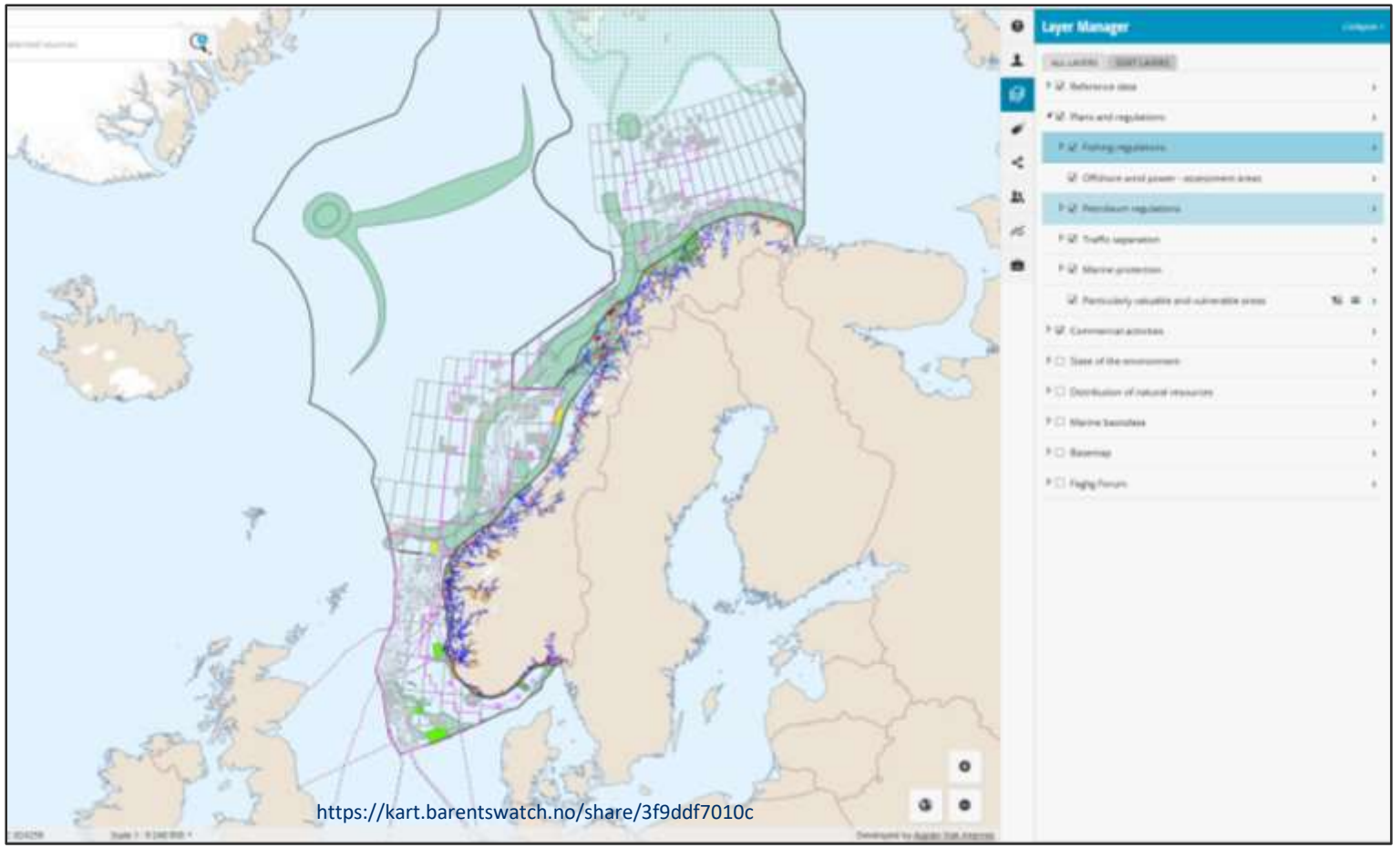
Sharing knowledge – spatial management tool



https://kart.barentswatch.no/share/3f9ddf7010c

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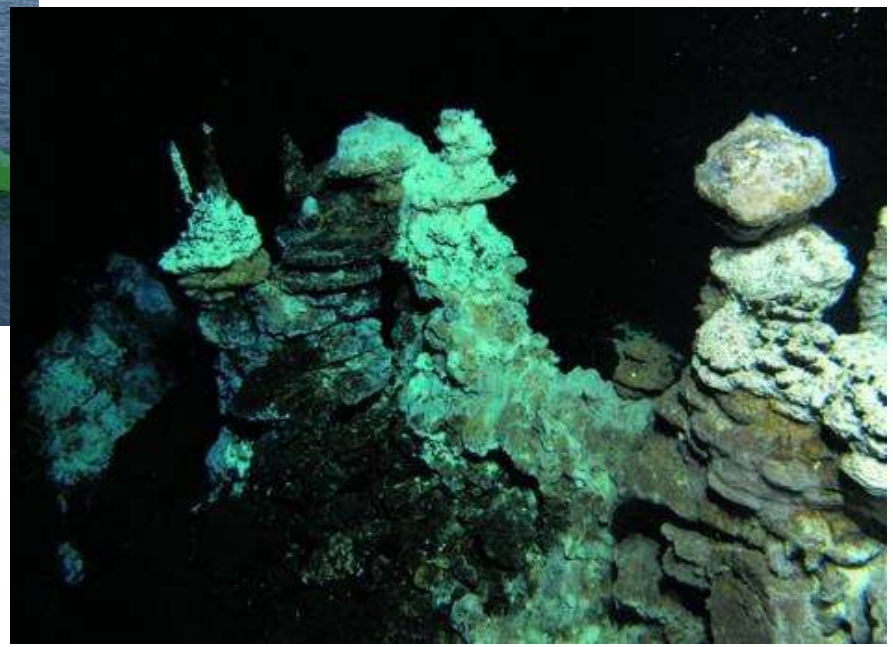
A good knowledge base benefits blue growth

Potential new activities can harvest from the knowledge

It helps in IEA and gives predictability on ecosystem vulnerability, the need for mitigation measures and so on

- Bioprospecting
- Offshore aquaculture
- Deep sea mining
- Offshore energy develpment



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All i all

Why share knowledge and information?

- Re-use, avoid double work
- Public awareness
- Stakeholder participation
- Predictability
- Benefit blue growth

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Thank you for your attention!

Common guillemot colony, Bear Island, Barents Sea

Photo: Hallvard Strøm, Norwegian polar institute

Connecting Seas

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Spatial decision support in Swedish MSP

A symphonic approach to cummulative impact assessment

Gonçalo Carneiro, Swedish Agency for Marine and Water Management

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Interreg Baltic Sea Region

What's in a Symphony?

Equation

$$P_{sum} = \sum_{i=1}^{n} \sum_{j=1}^{m} B_i \times E_j \times K_{i,j}$$

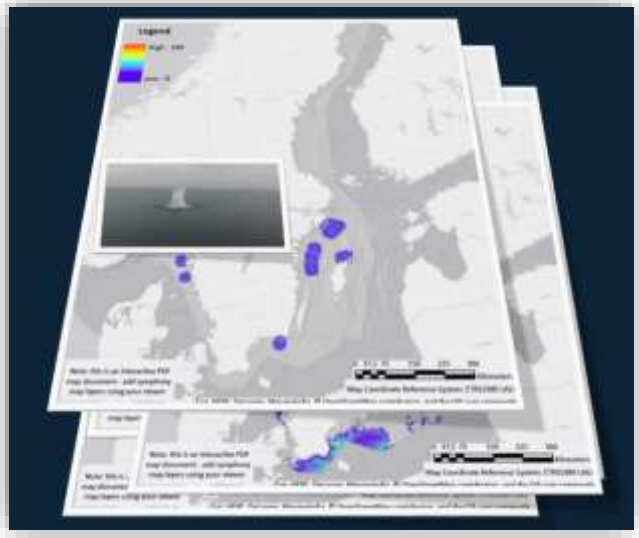
Cumulative impact (*P*) is calculated as the sum of the product of all pressures' (*B*) effects on all ecosystem components (*E*), given the particular sensitivity (*K*) of every ecosystem component to every pressure.

Pressures

Ecosystem components

Sensitivity matrix

Output



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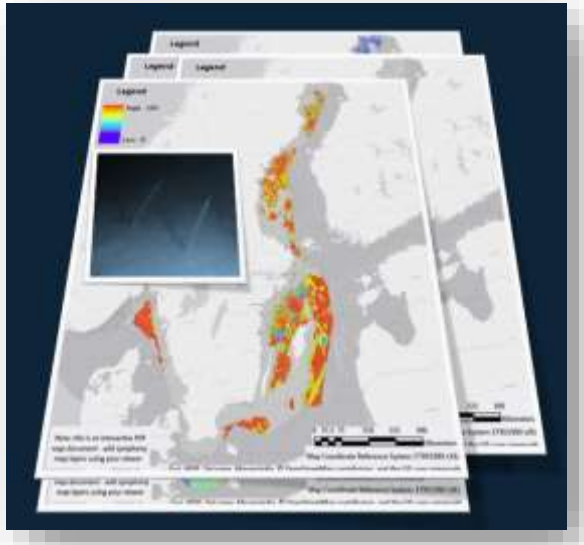

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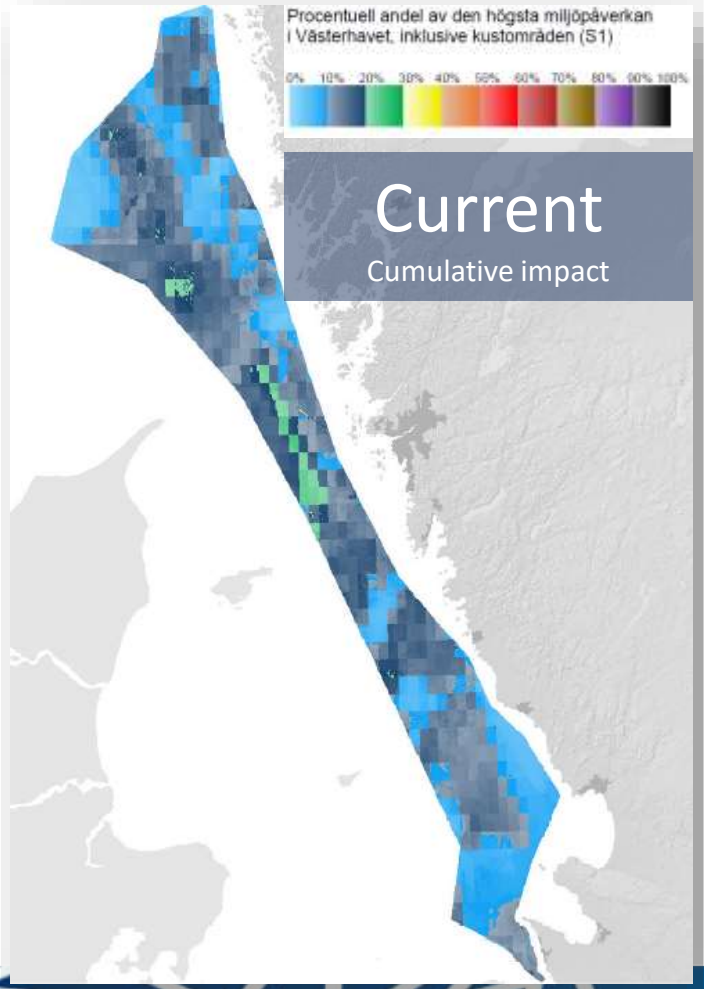
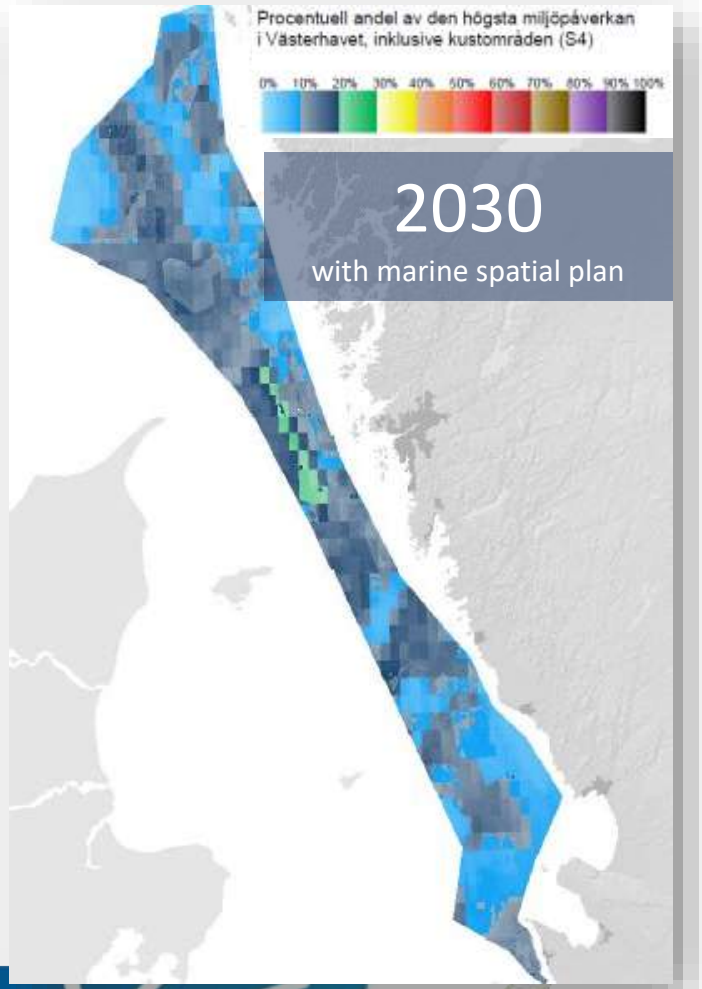
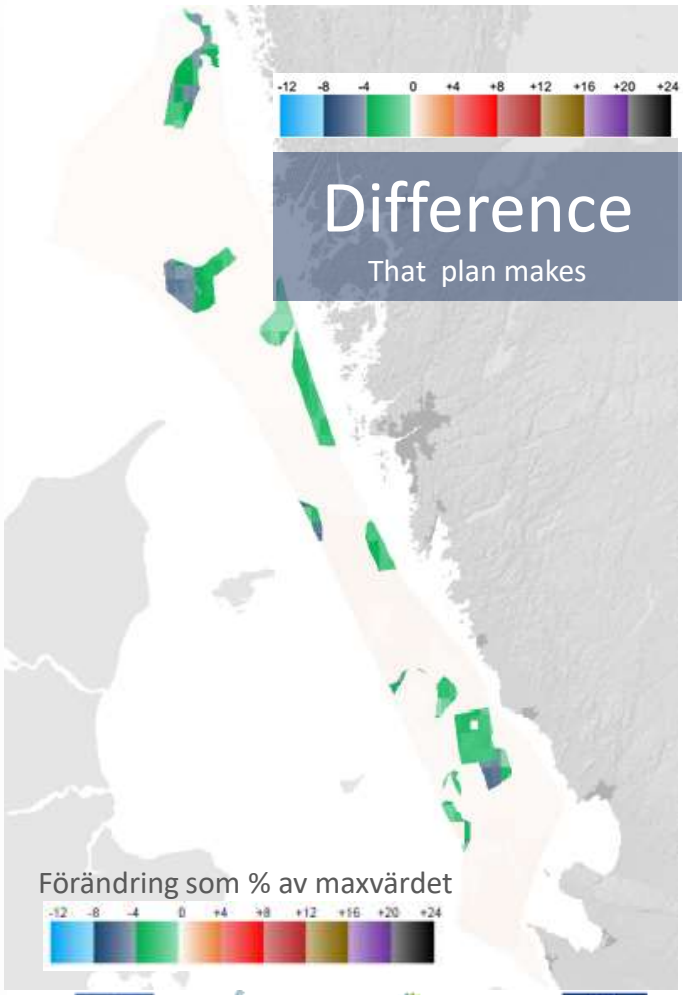
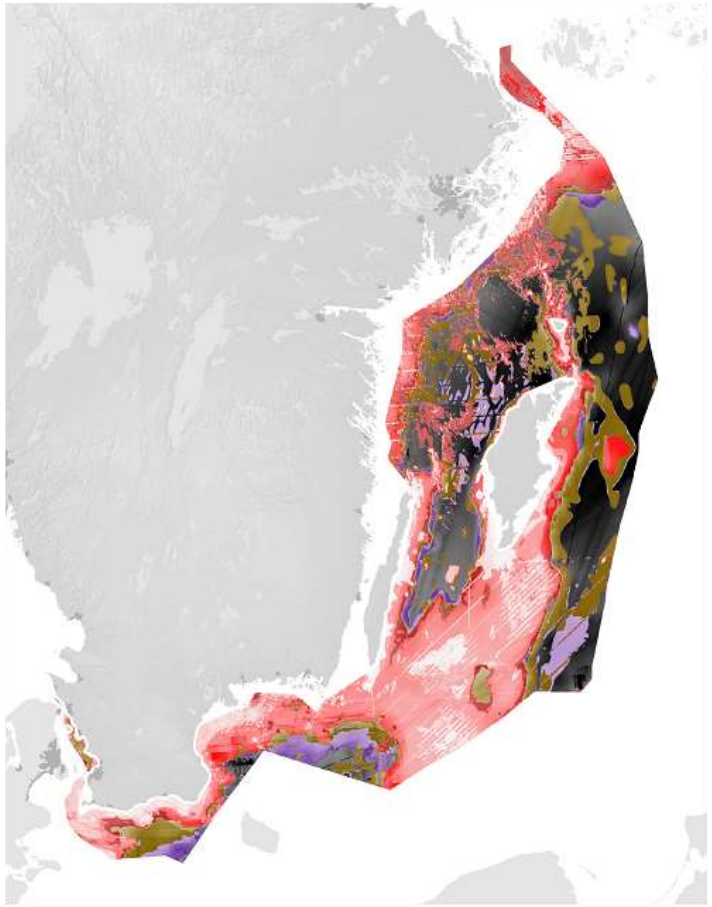
Symphony products

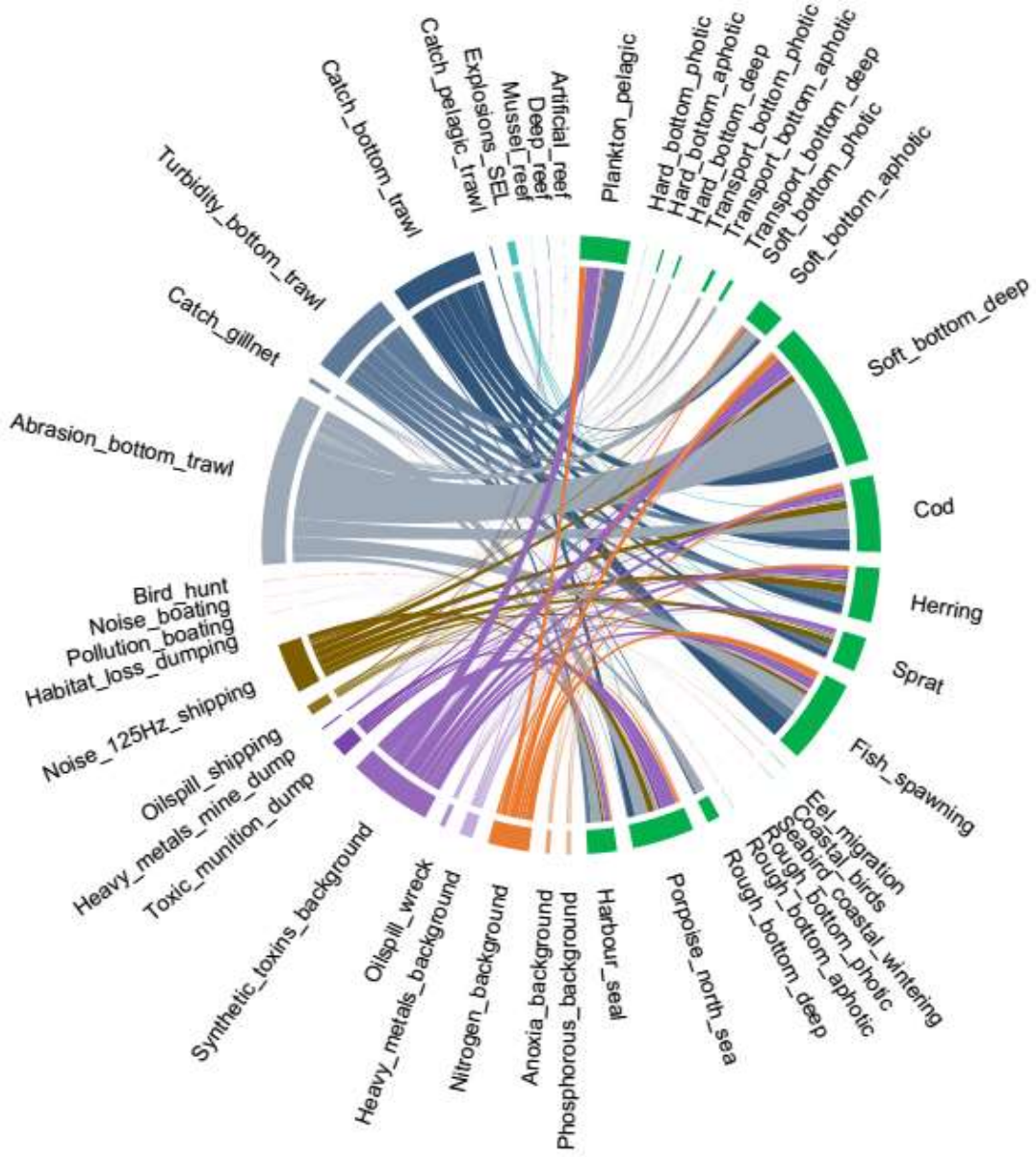






Symphony products





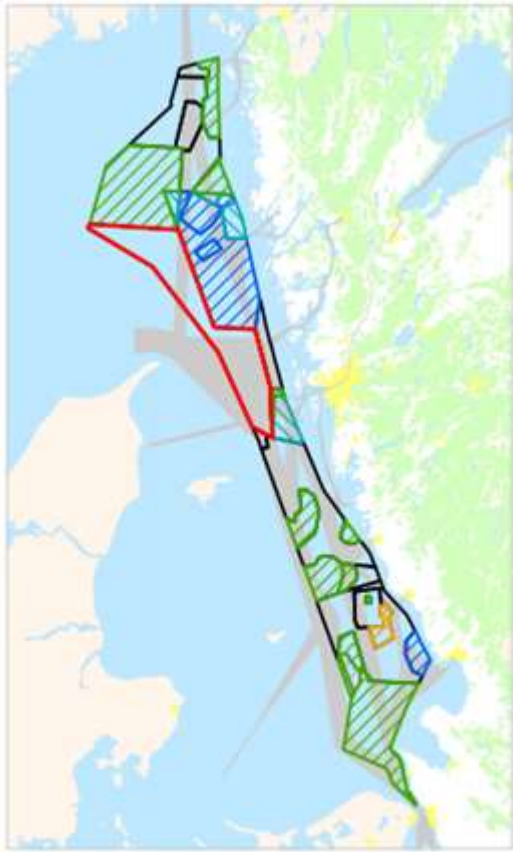
Use in planning

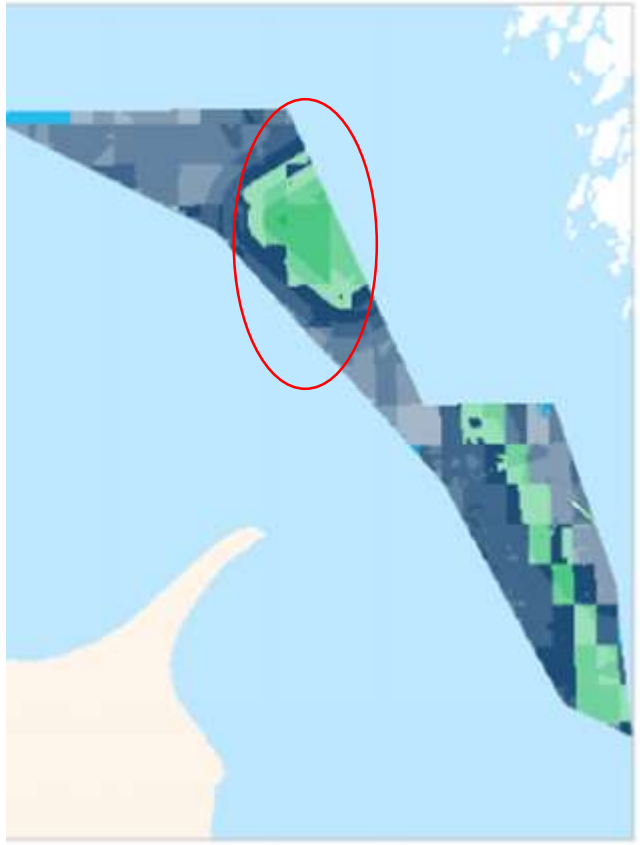
- Environmental assessment during planning
  - Identification of areas for particular consideration for high natural values
- Ex-ante assessment of plan consequences
  - Assessment of effects of plan through SEA and Sustainability Appraisal
- Integration of environmental issues in plan review
  - Integration of results of impact assessments into planning during and after SEA/SuA

Particular consideration for high natural values

Multicriteria analysis					Particular consideration areas (n)										
Documentation					*HELCOM/OSPA*	*Grönakartan*	*Grönakartan 2*	*Symphony*	*Symphony*	*County admin b*	*Climate refu*	*Seamount inventory*	*IBA*	*Planned conservati*	*Quanlity of do*
Criteria					Designated area	Values much higher than surroundings	Values much higher than surroundings	High impact (top 10%)	Pristine environment, low impact (bottom 10%)	High natural values + background doc	Number of proposed climate refuges				Uncertainty in Symphony/GK3 (0, 1, 2) 0 = high 1 = medium 2 = low
Area (old)	**Area**	**Designation**	**Old use**	**New use**											
Ö111	**Ö248**	Södra Midsjöbanken	Efn	Efn	0	1	1	0	1	1	1	1	1		1
Ö133 slås	**Ö249**	Norr om Bornholmsdjupet	An	Gn	0	1	0	1	0	0	0	0	0		0
	Ö250	Del av Hoburgs bank och sjöövningsområde hav "Martin"		FN	0	0	0	0	0		0				0
Nytt	**Ö251**	Sydväst Ölands världsarv			0	1	0	0	1	1	0	0	0		0

Plan review process
Example: Area V331



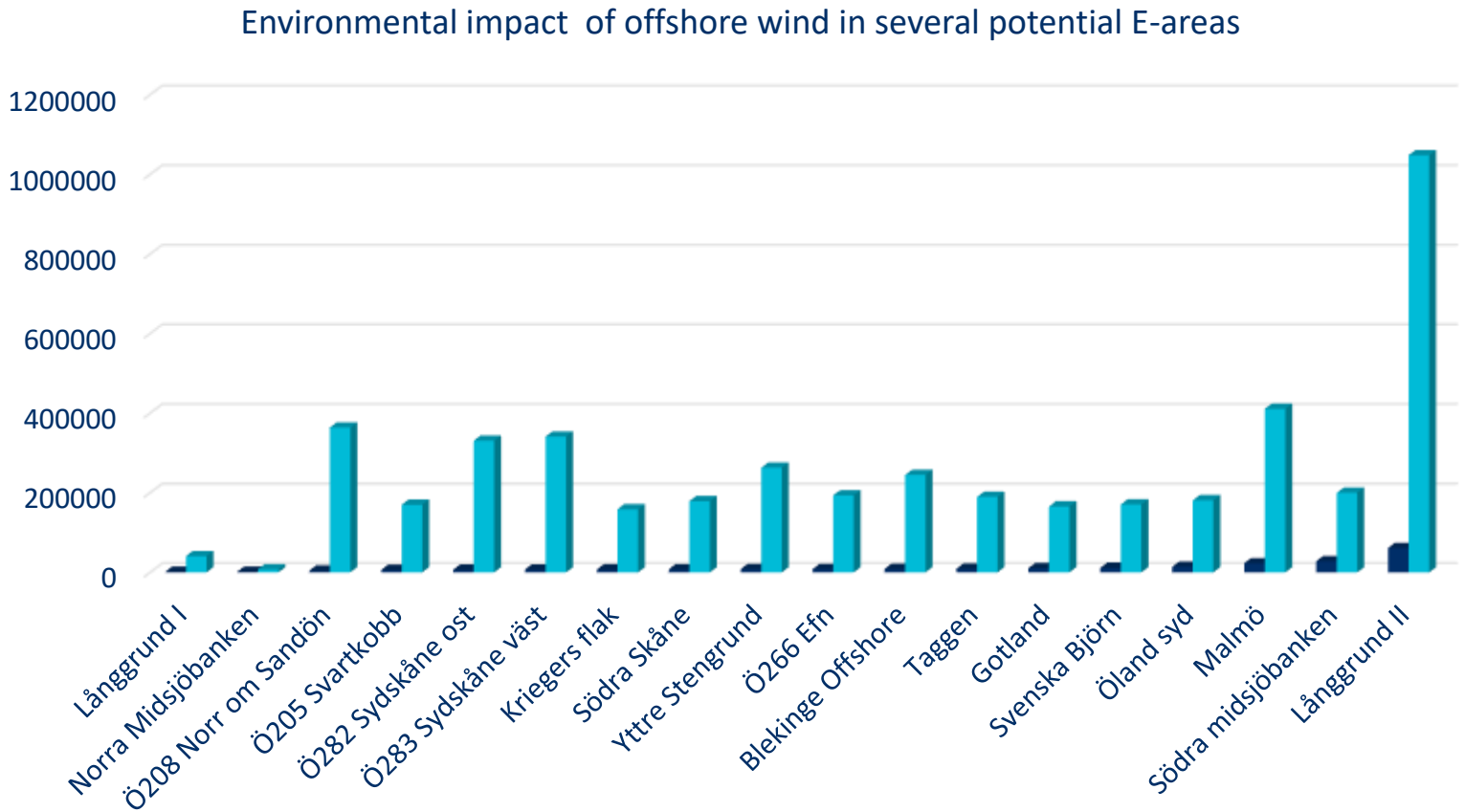


	Fisheries	
Abrasion Bottomtrawl	24.82	(24.82)
Catch Gillnet	0.83	(0.83)
Turbidity Bottom trawl	13.71	(13.71)
Catch Bottom trawl	16.67	(16.67)
Catch Pelagic trawl	0.33	(0.33)
Total	56.37	(56.37)

Feeback to planning process

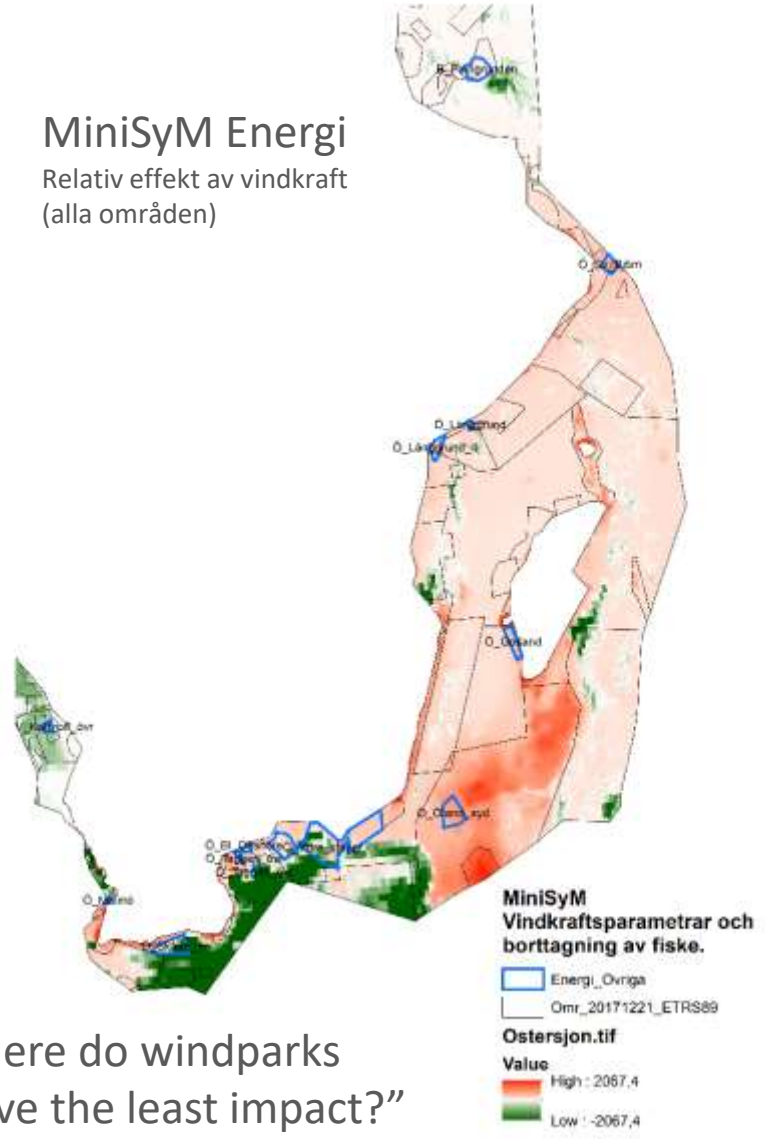
- Assess impact on different bottom types
- Assess effect of reduced bottom trawling
- Review planning decision
  - G -> Gn

Plan review process

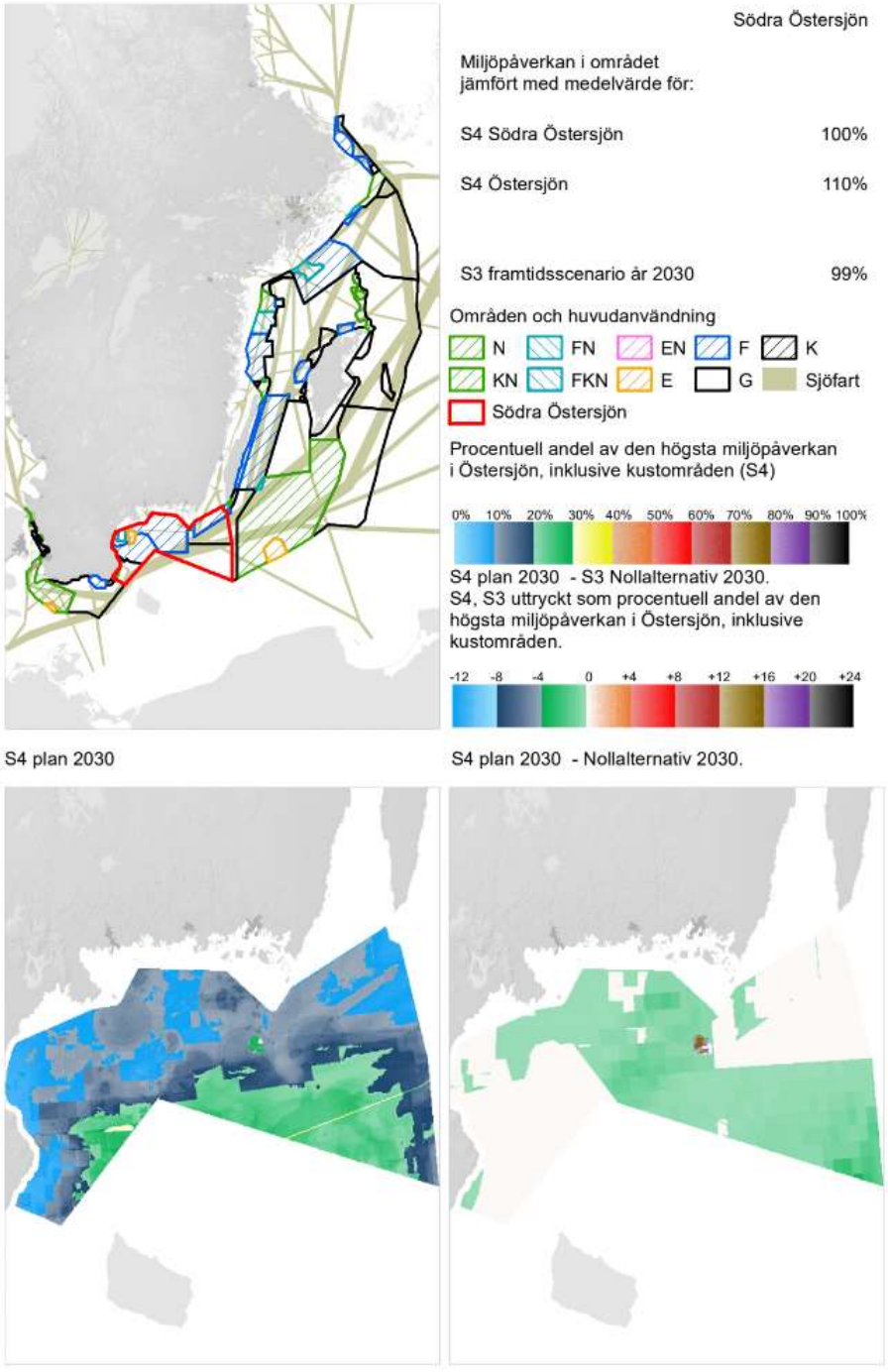


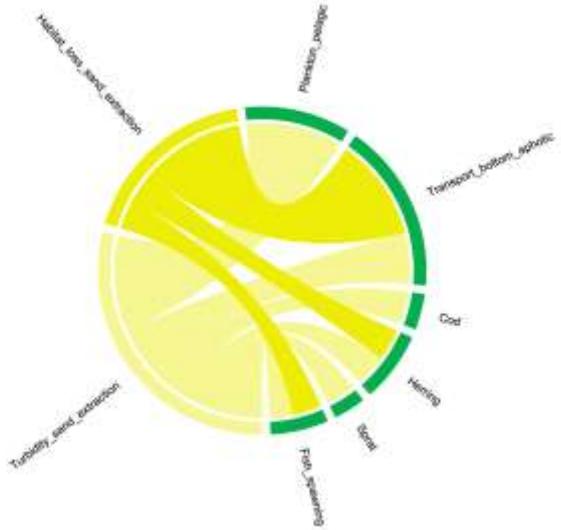
MiniSyM Energi

Relativ effekt av vindkraft
(alla områden)



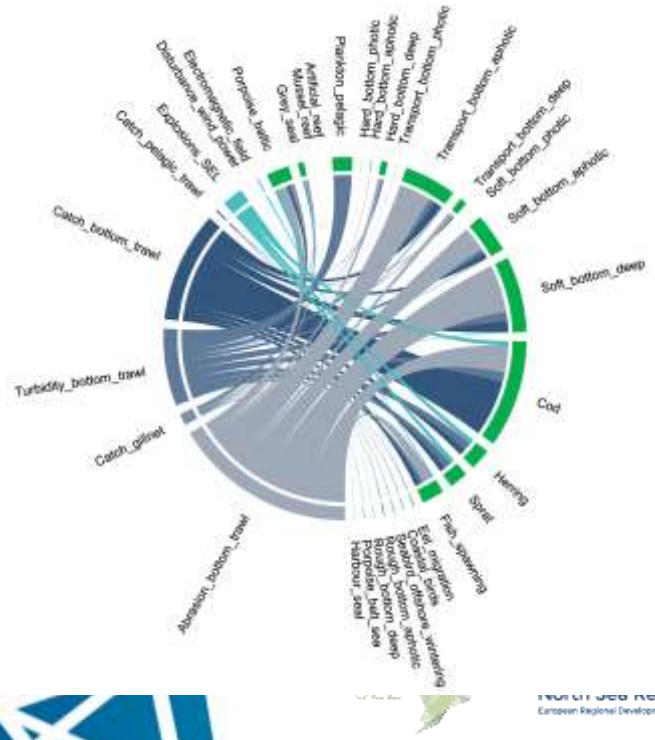
Where do windparks have the least impact?”





Use in ex-ante impact assessment

Increased impacts



Input to assessment against MSFG, WFD, Swedish environmental goals, etc
Input to SuA

Decreased impacts

What's Symphony got to do with it?

Provides

- Snapshop of spatial distribution of pressures, natural values and impacts

Supports decisions:

- Where is special attention to environmental values necessary?
- What impact do the different sectors have?
- What are the environmental consequences of planning decisions?

Connecting Seas

NorthSEE – Baltic LINes MSP conference

CONNECTIVITY AMONG MPAs IN THE GREATER NORTH SEA AND CELTIC SEAS REGIONS

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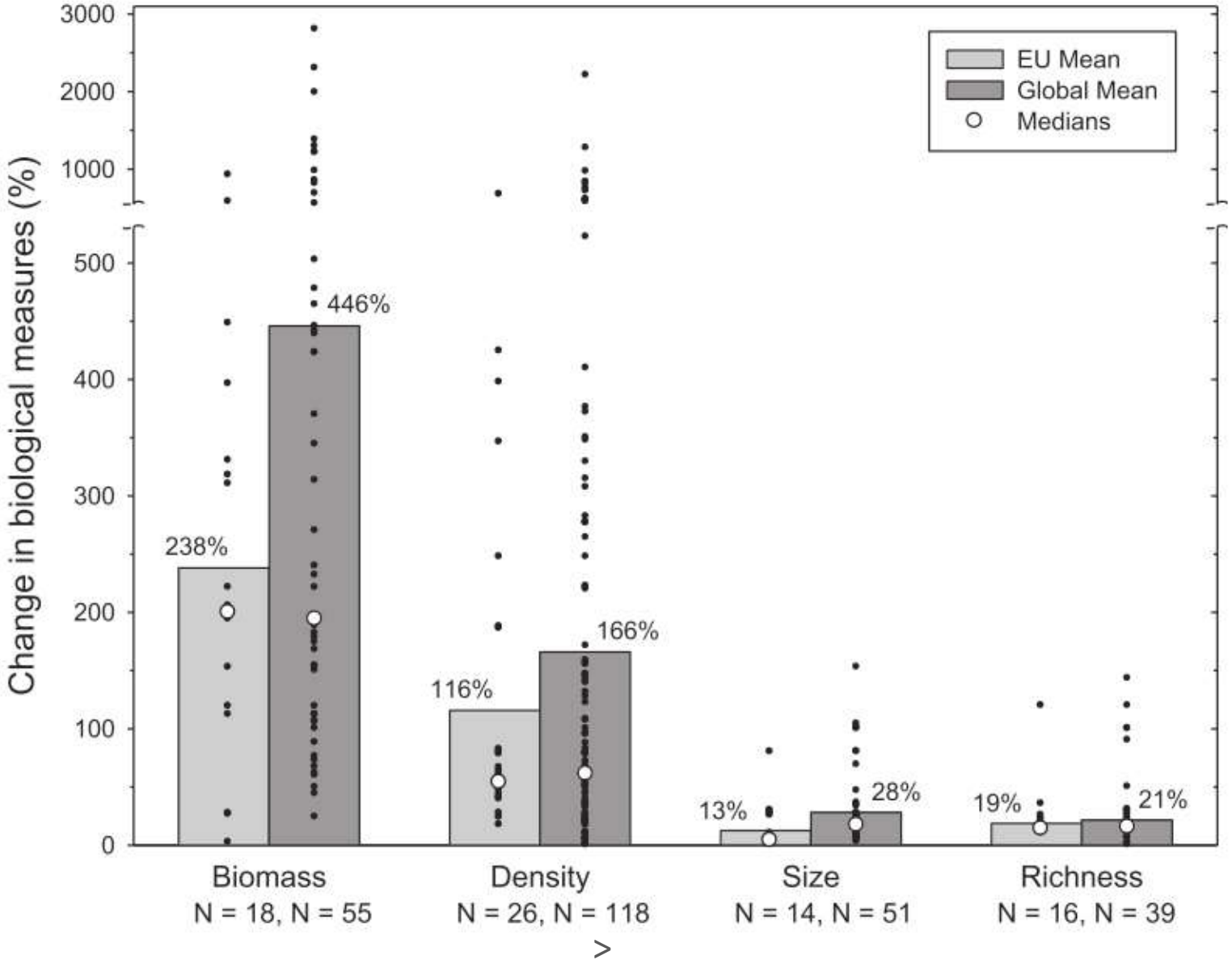
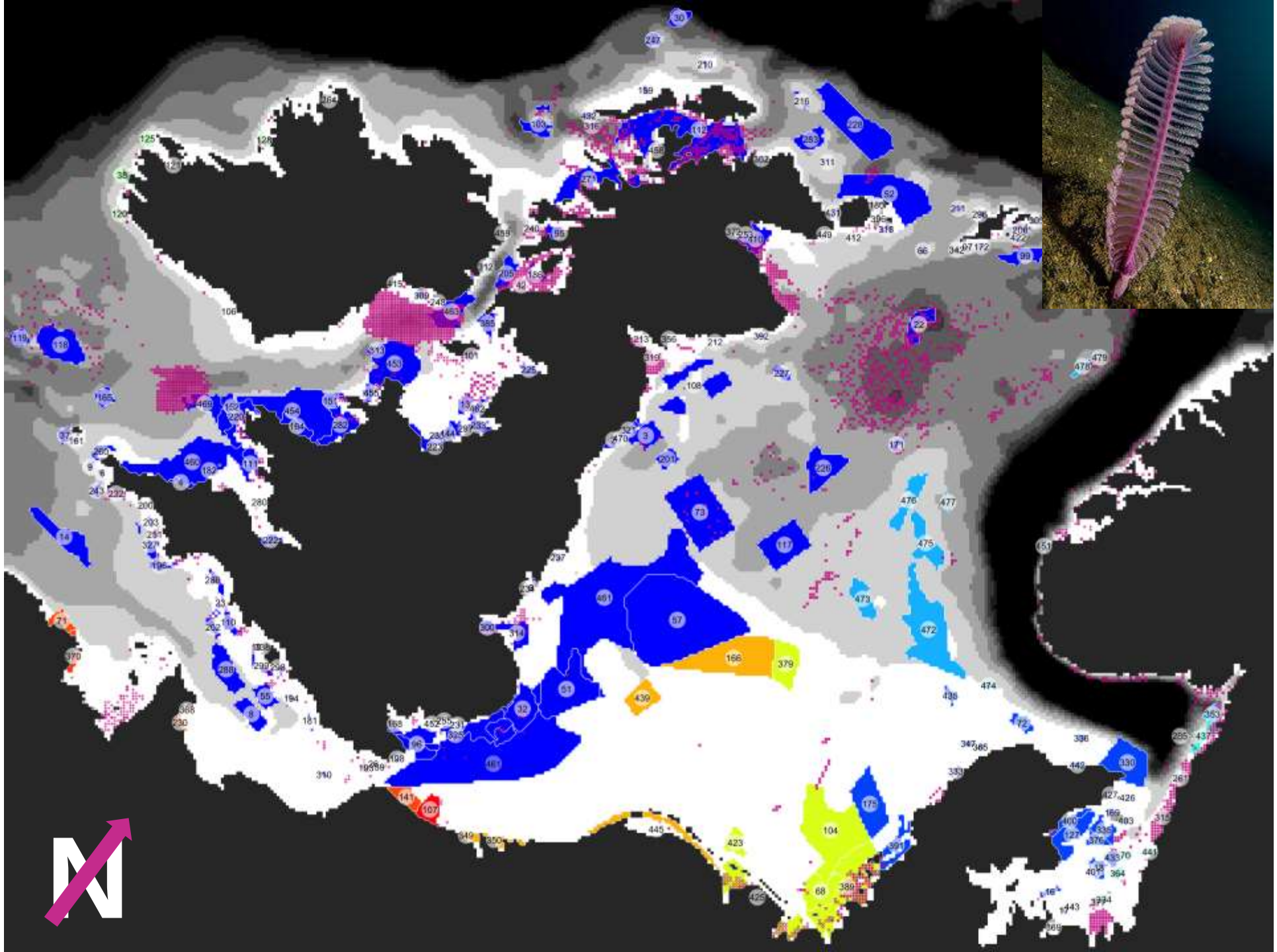
MATS HUSERBRÅTEN
EVEN MOLAND
PER ERIK JORDE
ESBEN MOLAND OLSEN
JON ALBRETSEN

Biological effect of MPAs



Fenberg et al. (2012) *Marine Policy* **36**:1012-1021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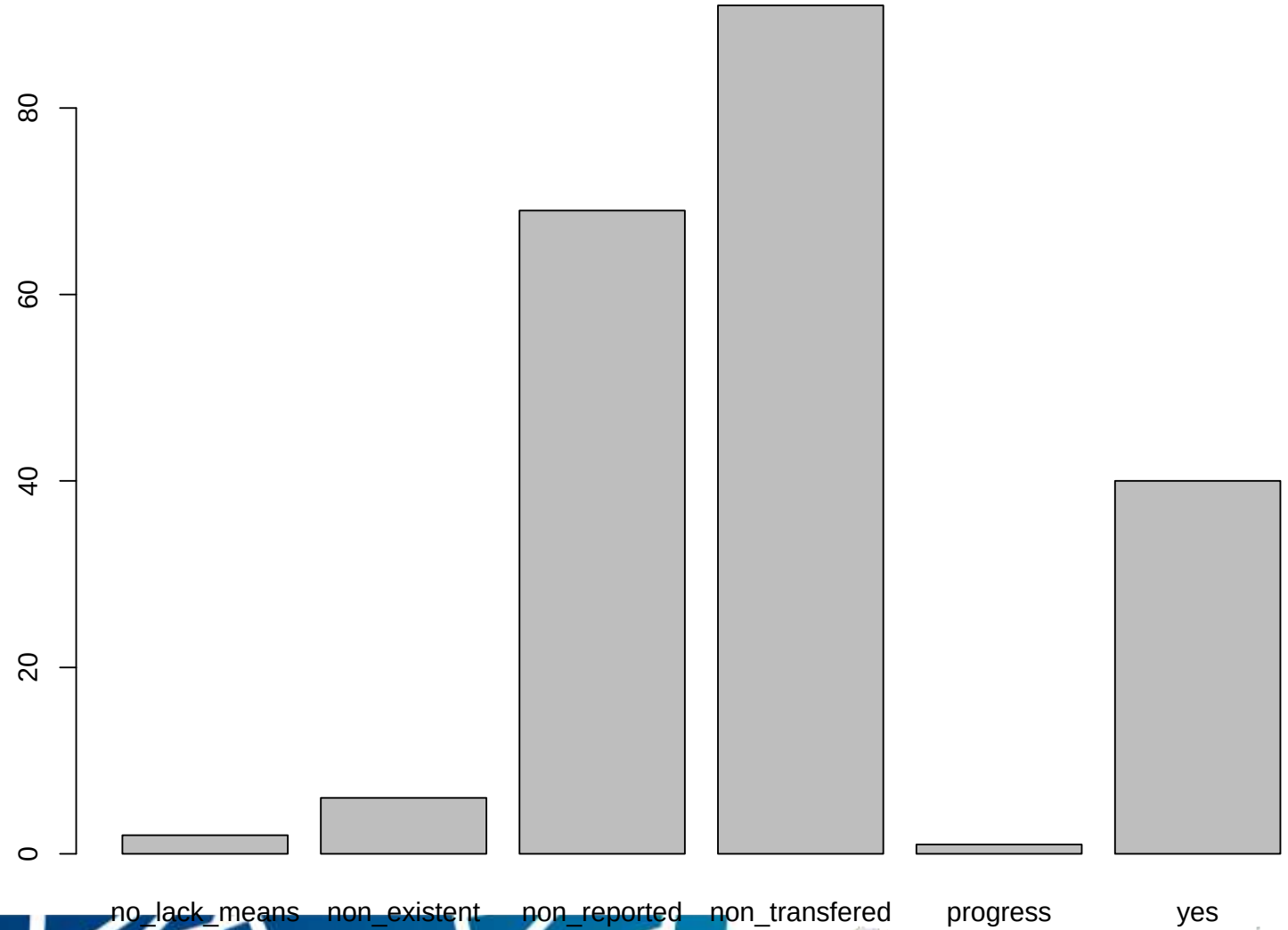
Management plan present?



What is connectivity?
and
Why is it important?

A **metapopulation** consists of a group of spatially separated populations of the same species that interact at some level …

Connectivity is the **demographic linking** of metapopulations through the **dispersal** of larvae, juveniles, or adults

Sale et al. (2005) *TREE* **20**:74-80

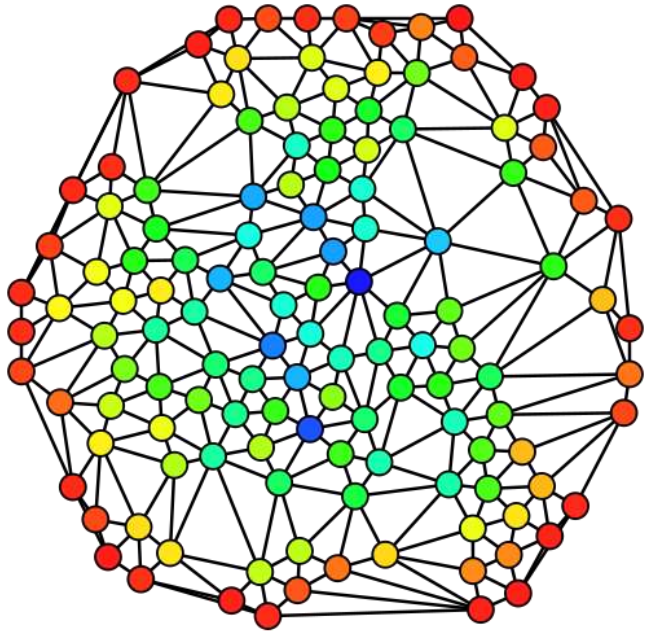
… the **extintion rate** of metapopulations is reduced by increased **connectivity** and decreased **mortality**

Hanski (1991) *Biological Journal of the Linnean Society* **42**:17-38

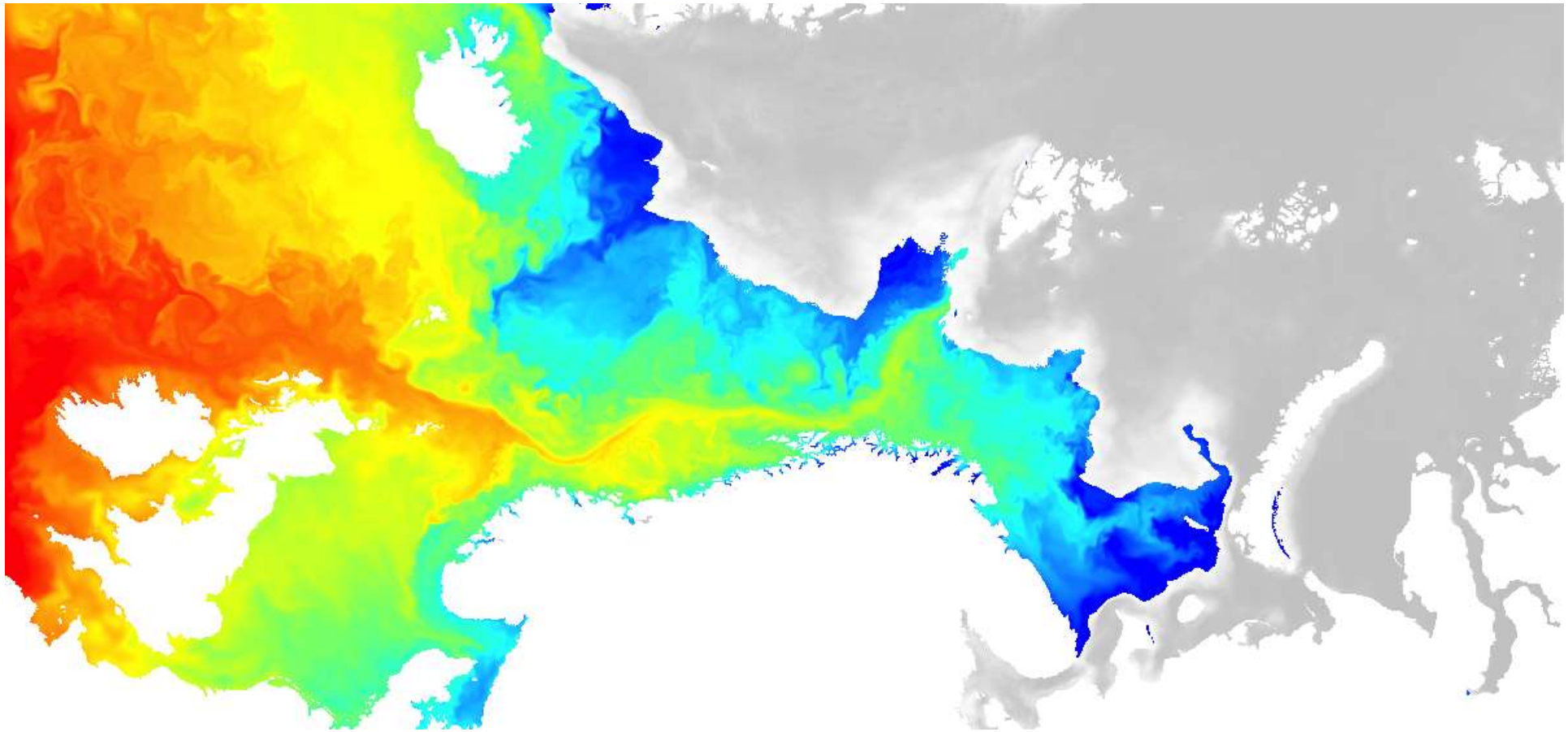
Concepts in Network Theory

- **Betweenness centrality** is the number of times a particular node (i.e., MPA) serves as a stepping-stone in the shortest paths between all other pairs of nodes in the network

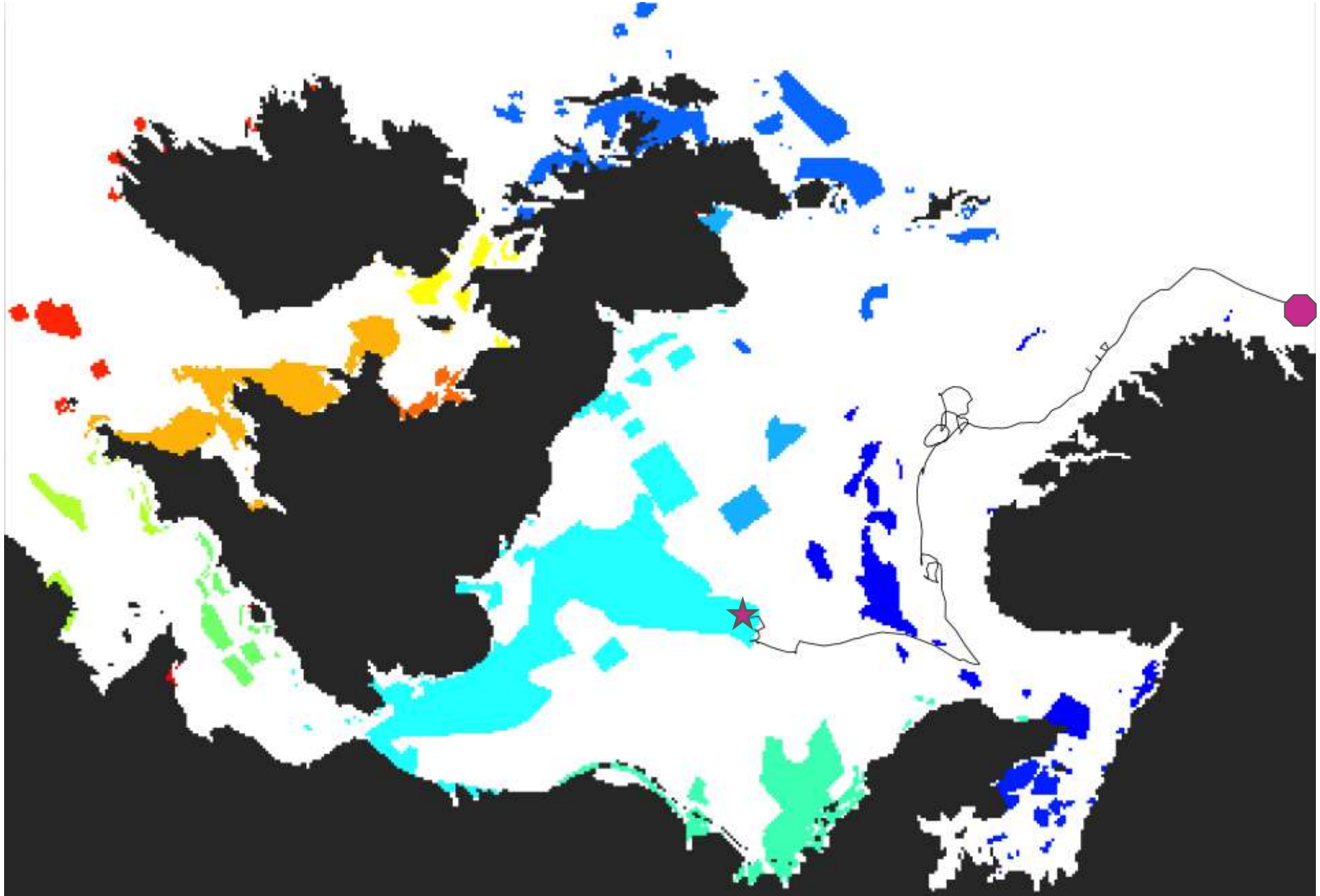
- This measure can be used to identify important stepping-stones that facilitate connectivity in a network



Numerical Ocean Model (1990-2017)
≈ **5 000 000** larval dispersal trajectories



Example of drift trajectory



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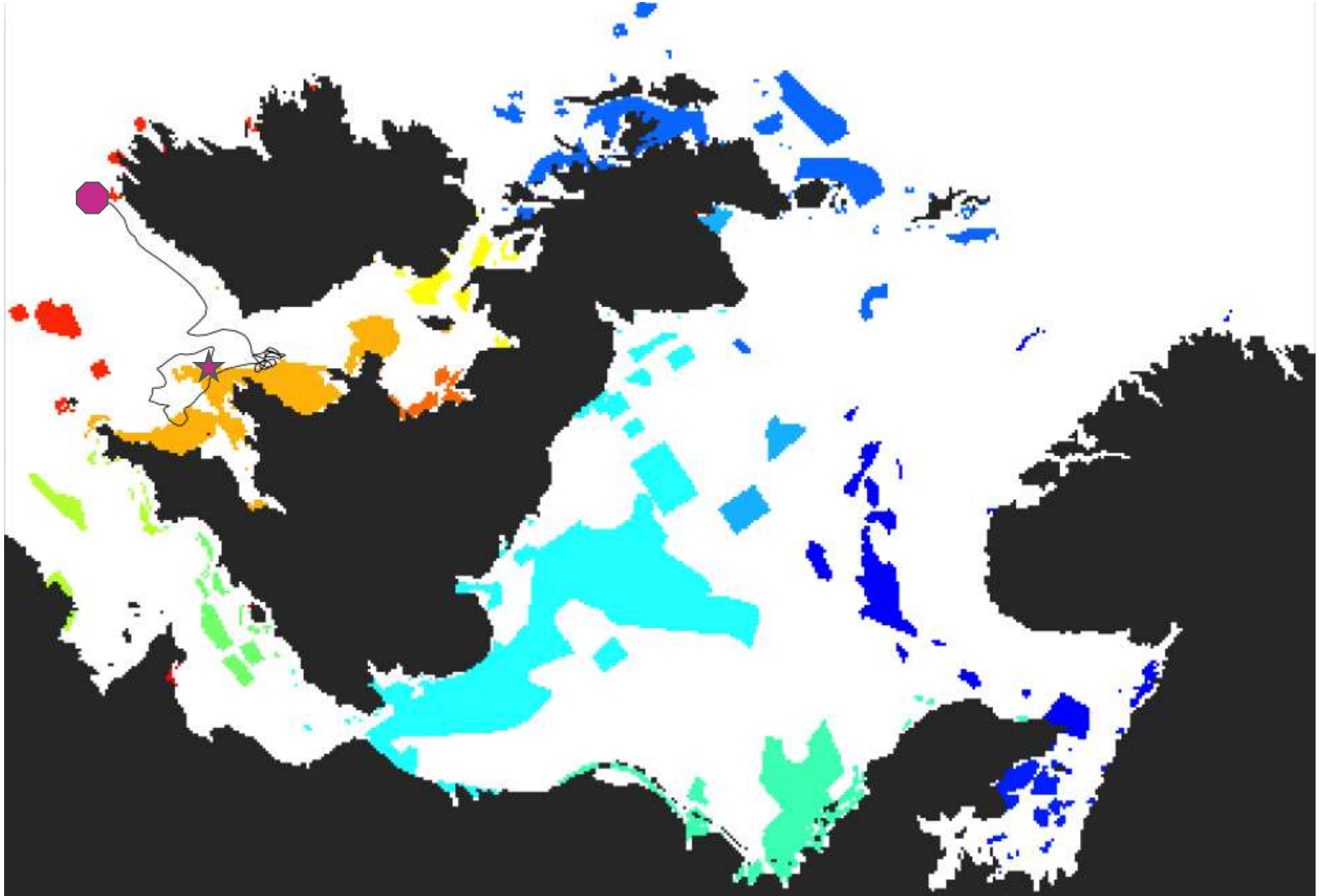

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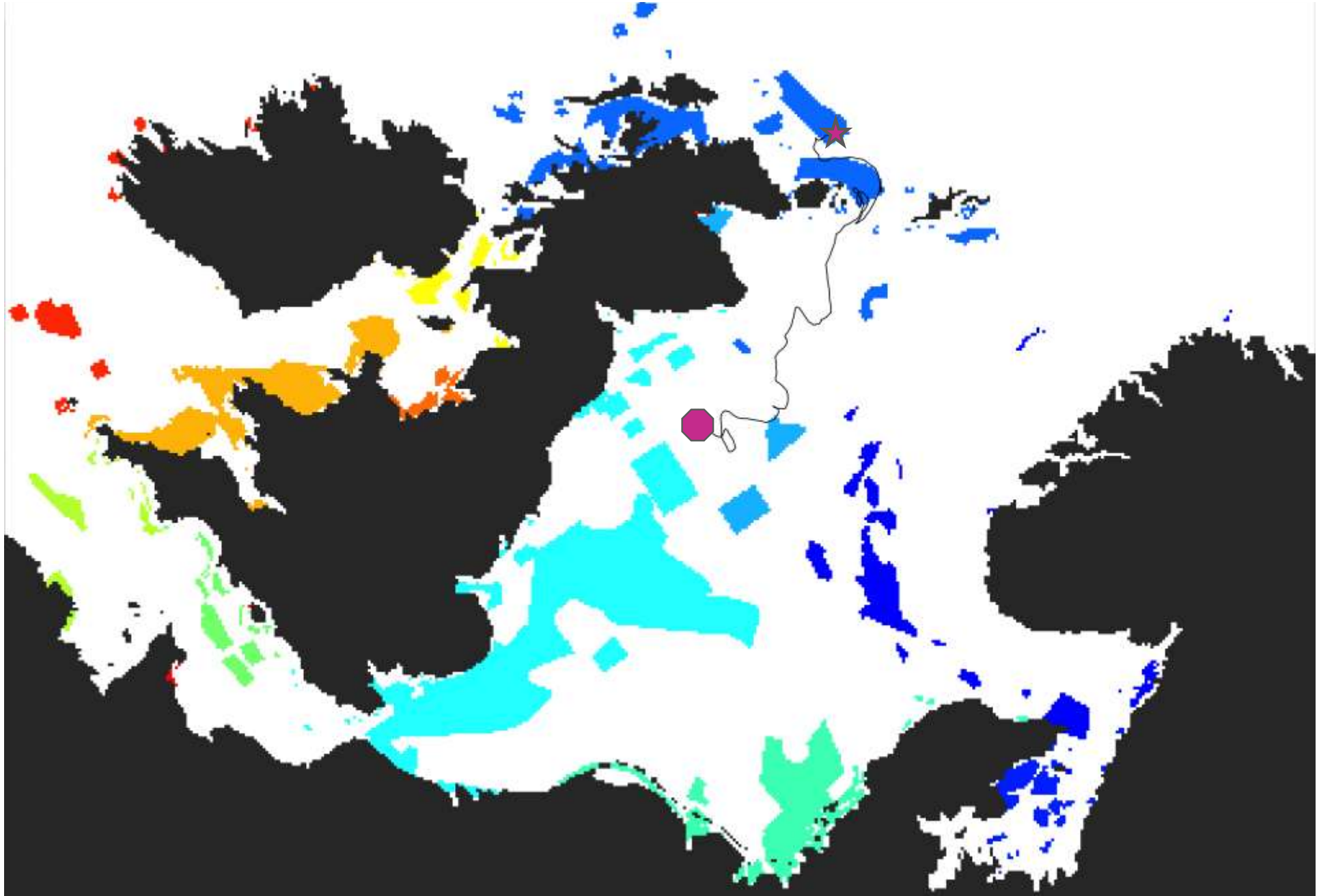
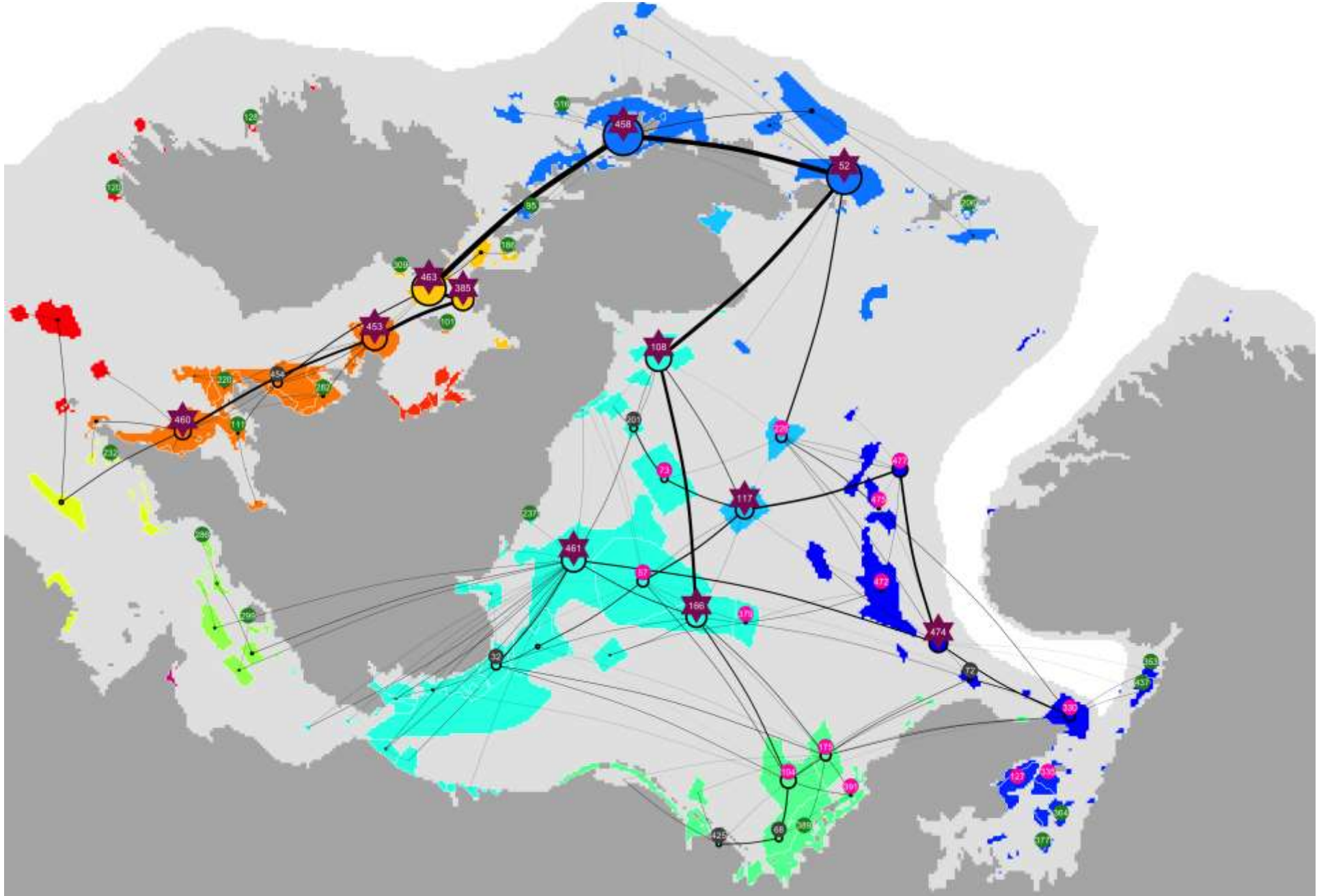


CONNECTIVITY // Betweenness



Key findings:

1) AD-HOC analyses revealed highly connected network

2) Some areas with low connectivity (Irish Coastal Current)

3) Few MPAs have associated management plan

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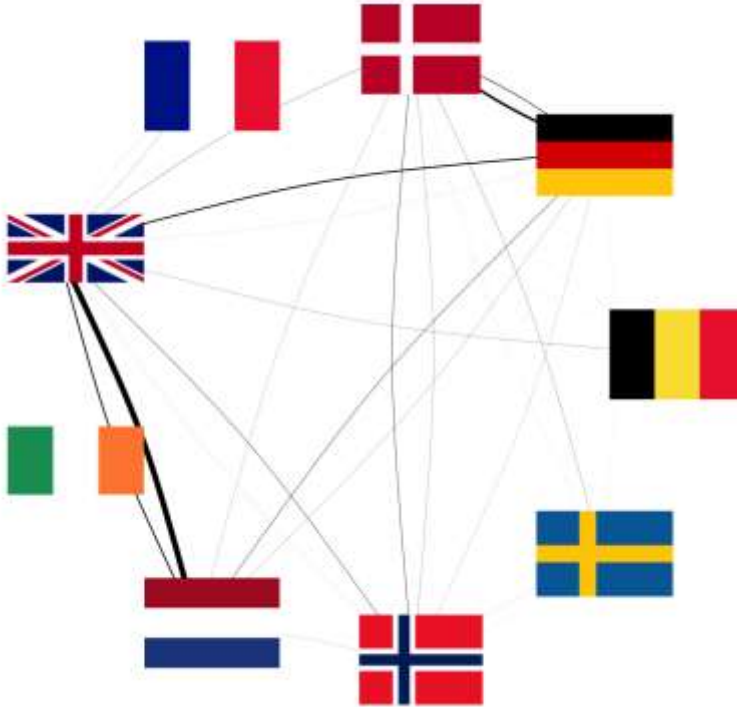
CONNECTIVITY AMONG MPAs IN THE GREATER NORTH SEA AND CELTIC SEAS REGIONS



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The HELCOM holistic assessment and development of regional cumulative impact assessments

Connecting Seas, Hamburg, 13-14 February, 2019
"Environment - planning issues, criteria and tools" workshop

lena.bergström@helcom.fi

HELCOM

The State of the Baltic Sea report was recently finalized

- Summarizes the environmental state of the Baltic Sea during 2011–2016.

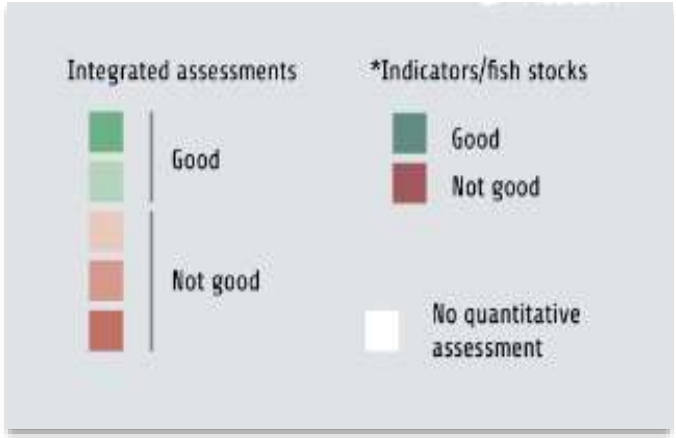
- Show that there are some signs of improvement, but that the environmental objectives of the Baltic Sea Action Plan have not been reached

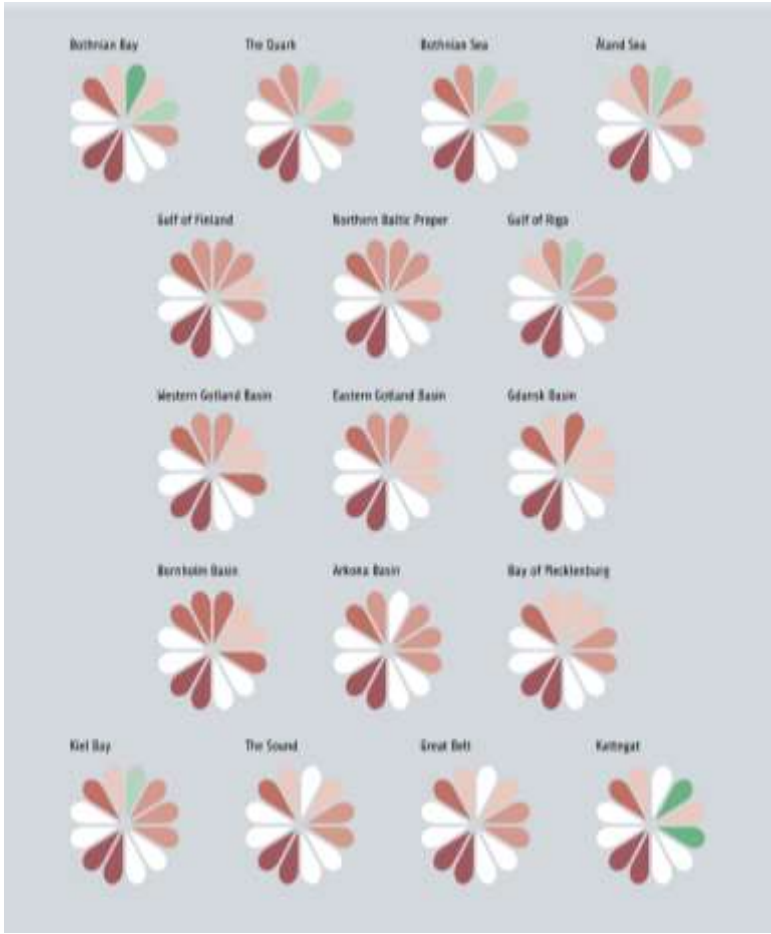
- Supports the further development of measures and the update of the Baltic Sea Action Plan

STATE OF THE BALTIC SEA
- HOLISTIC ASSESSMENT -

Assessment results by key topics and sub-basins

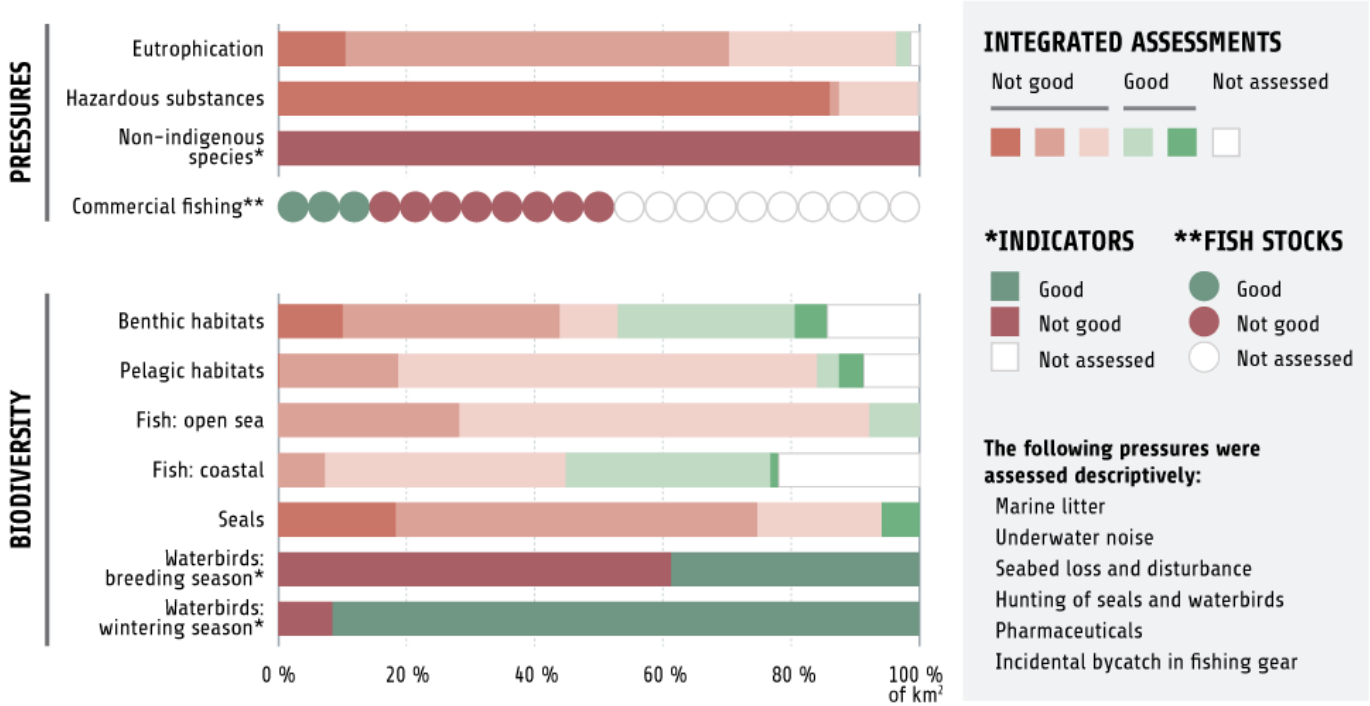
- Connected to the Baltic Sea Action Plan and the EU Marine Strategy Framework Directive
- Status assessed in relation to threshold values for good status



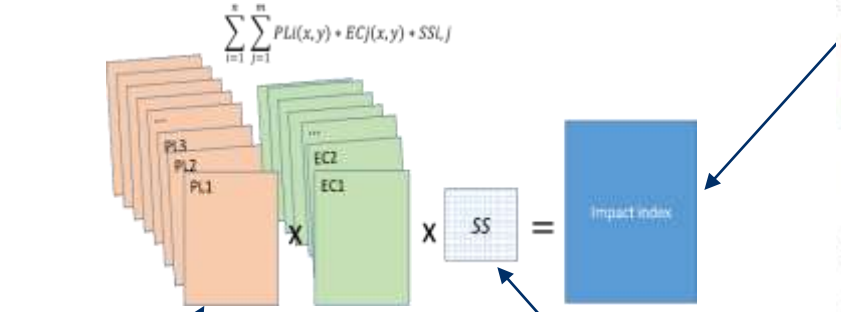


- PRESSURES: Europhication, Hazardous substances, Marine litter, Underwater sound, Non-indigeneous species, Commercial fishing, Seabed loss and disturbance
- BIODIVERSITY: Benthic habitats, Pelagic habitats, Fish, Seals, Waterbirds

The evaluations use core indicators and thematic assessments, but also include economic social analyses and cumulative impacts



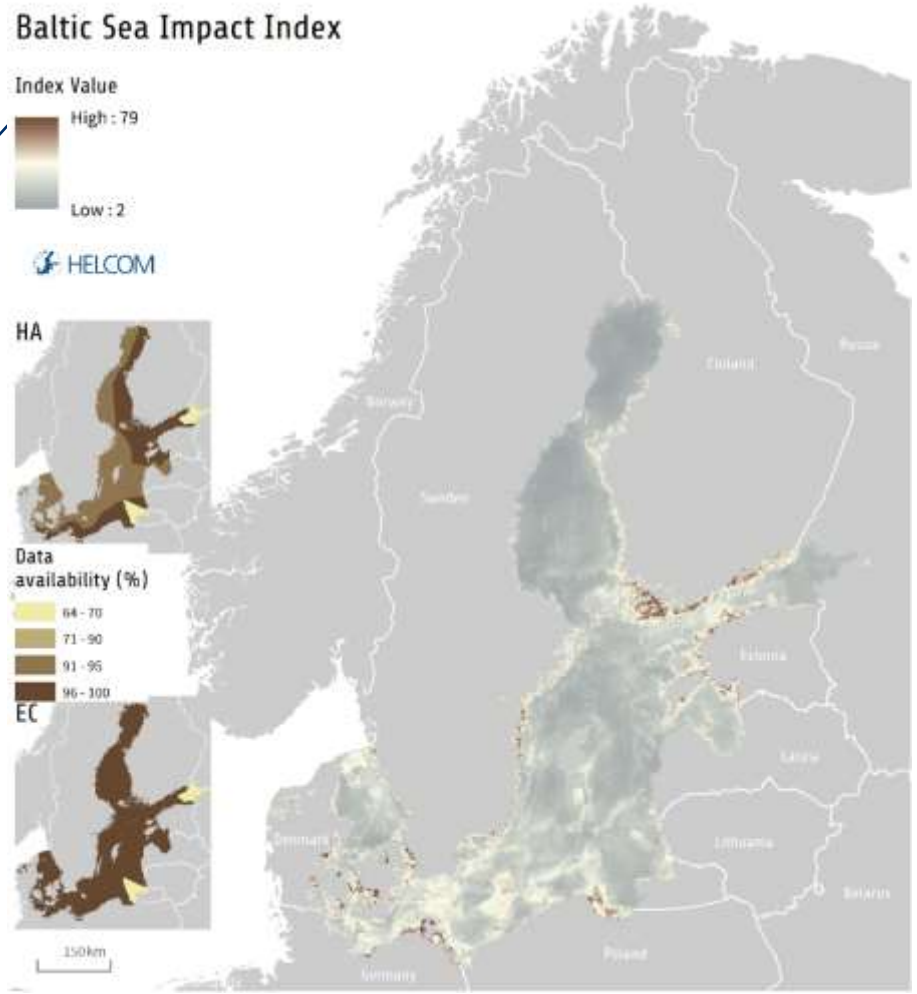
Cumulative impacts assessed by the Baltic Sea Impact Index (BSII)



19 pressure layers

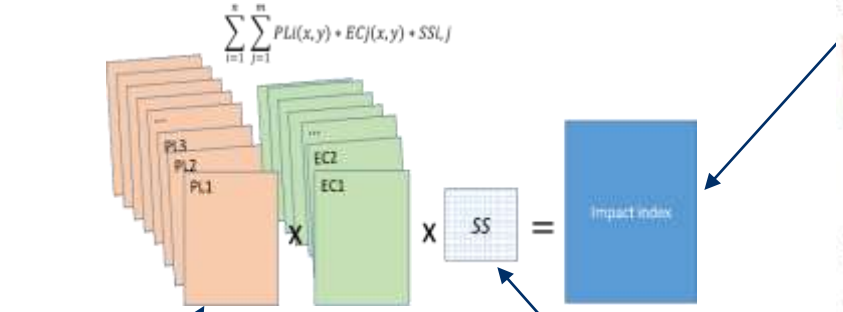
36 Ecosystem component layers

Sensitivity scores



STATE OF THE BALTIC SEA
- HOLISTIC ASSESSMENT -

Cumulative impacts assessed by the Baltic Sea Impact Index (BSII)



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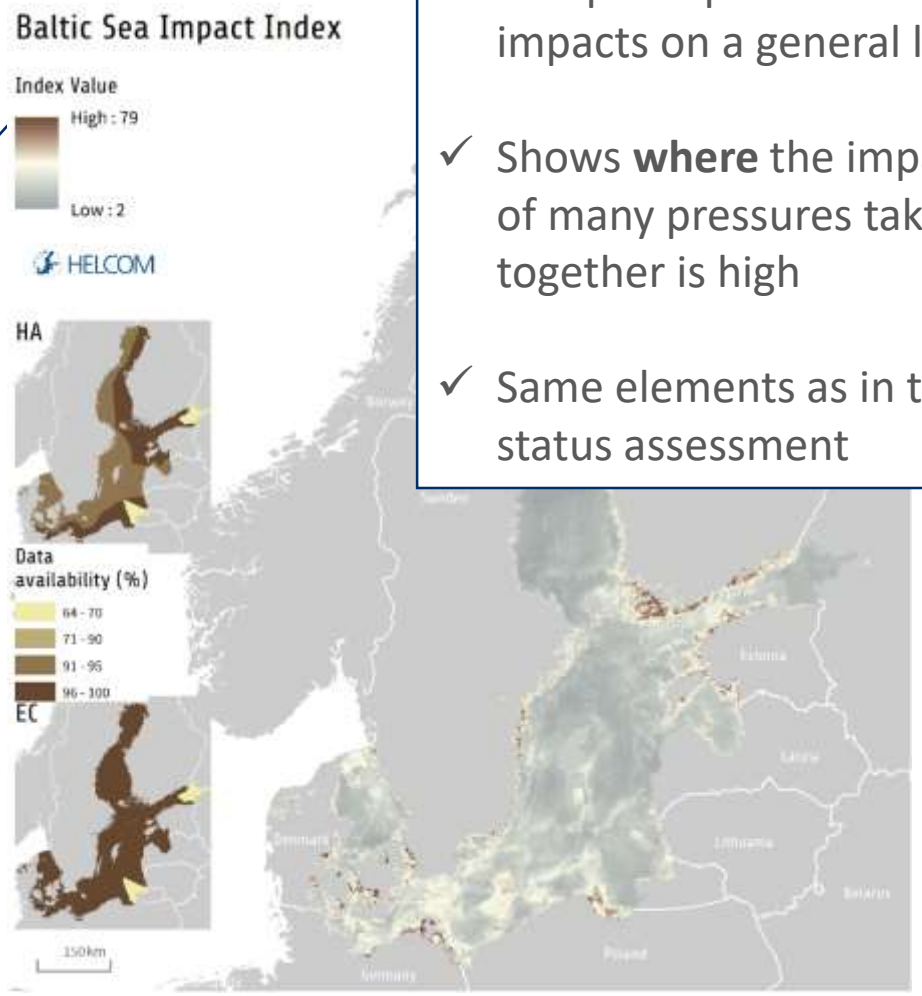
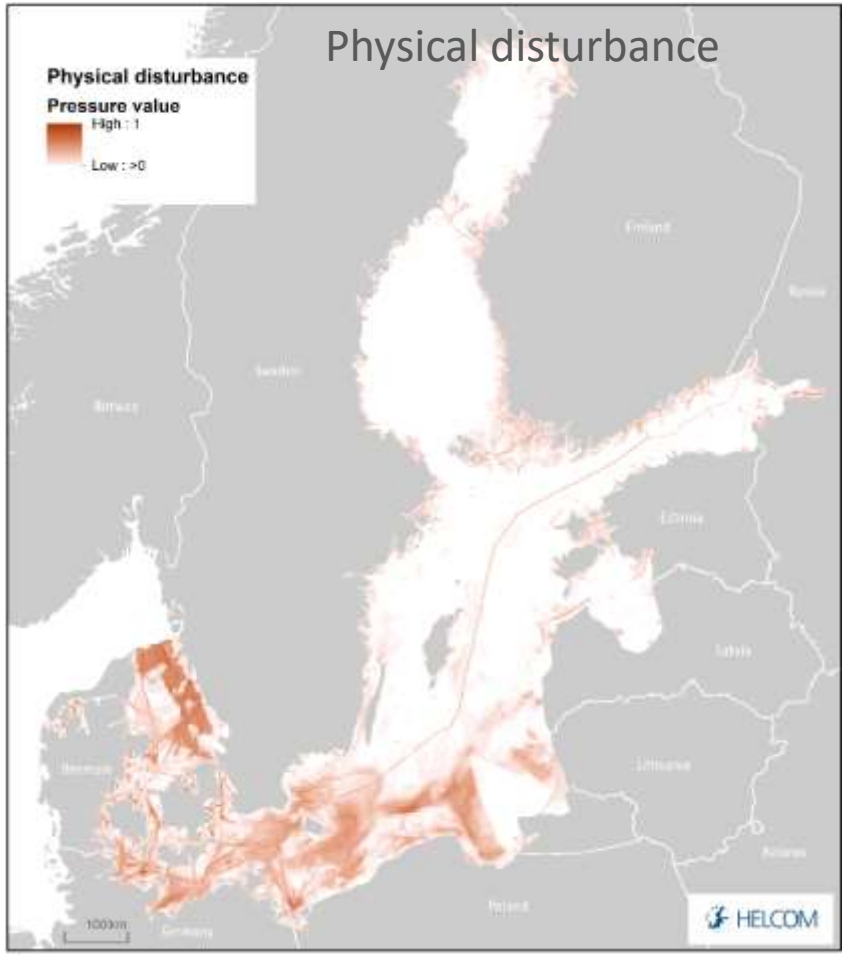
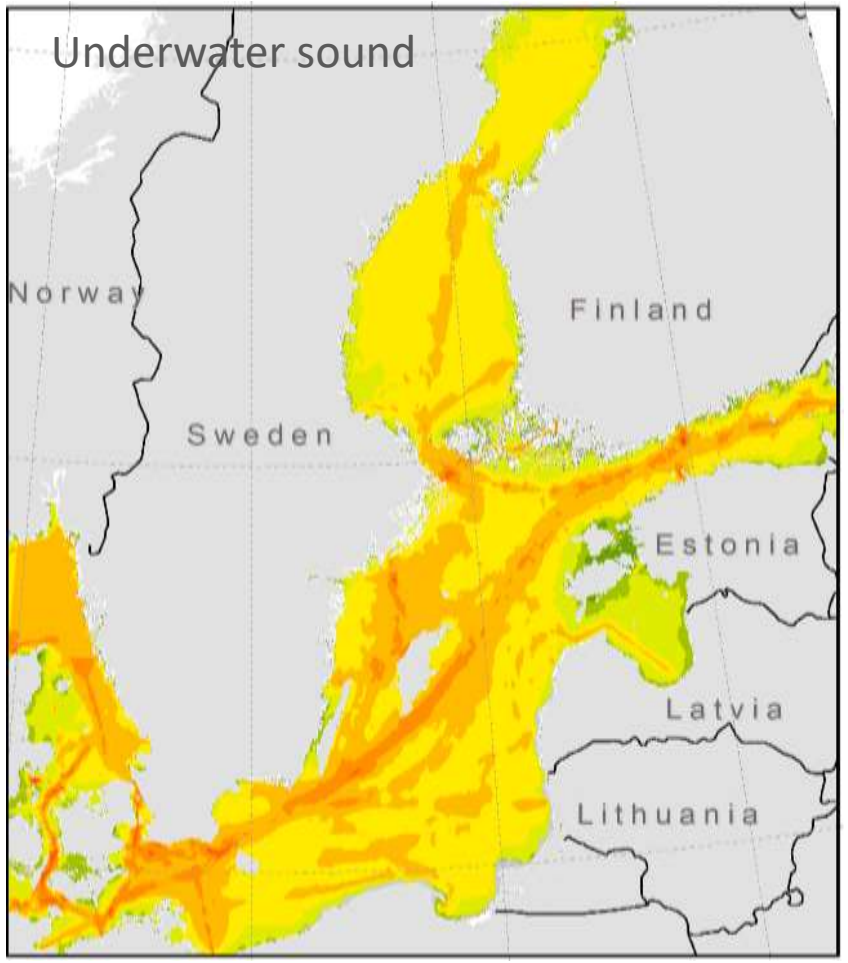


- ✓ Not a status assessment: Compares pressures and impacts on a general level
- ✓ Shows **where** the impact of many pressures taken together is high
- ✓ Same elements as in the status assessment

STATE OF THE BALTIC SEA
- HOLISTIC ASSESSMENT -

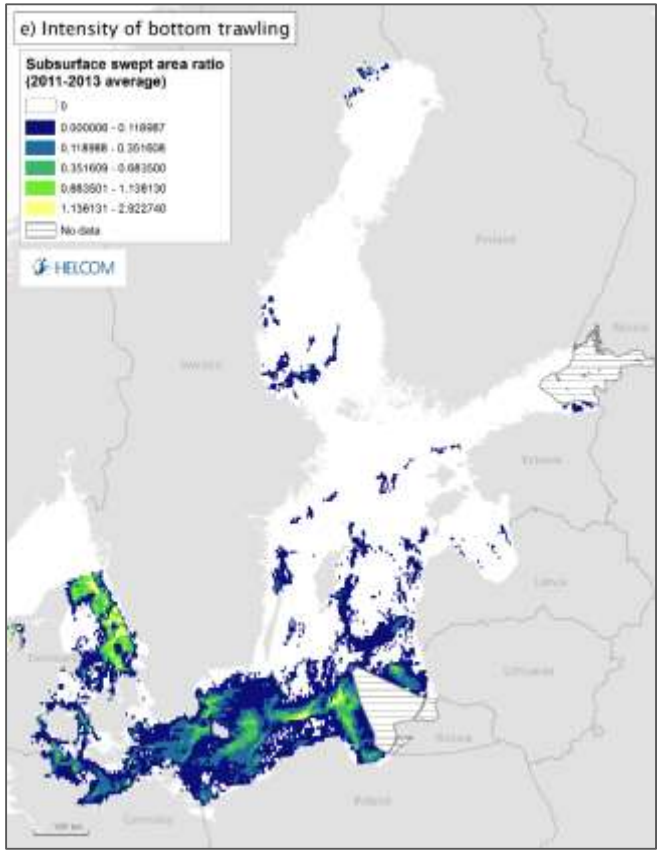
Example of regional data on pressures

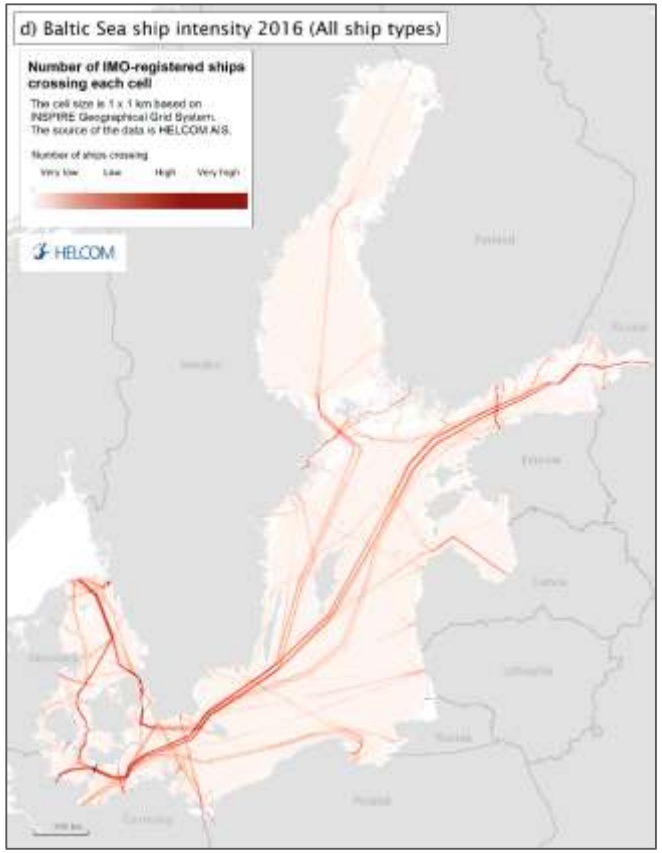




In all 19 key pressures

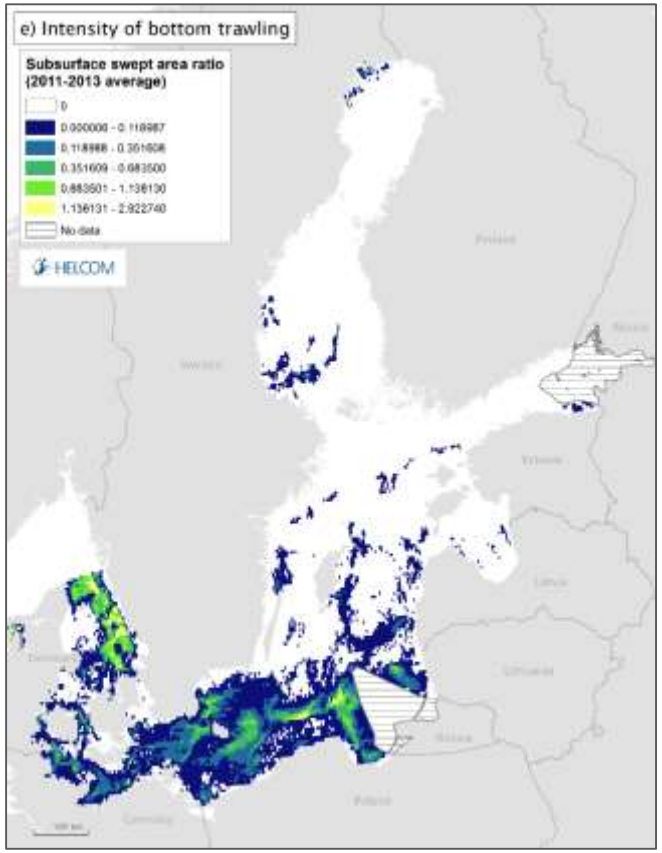
Example of data on human activities underlying the assessment

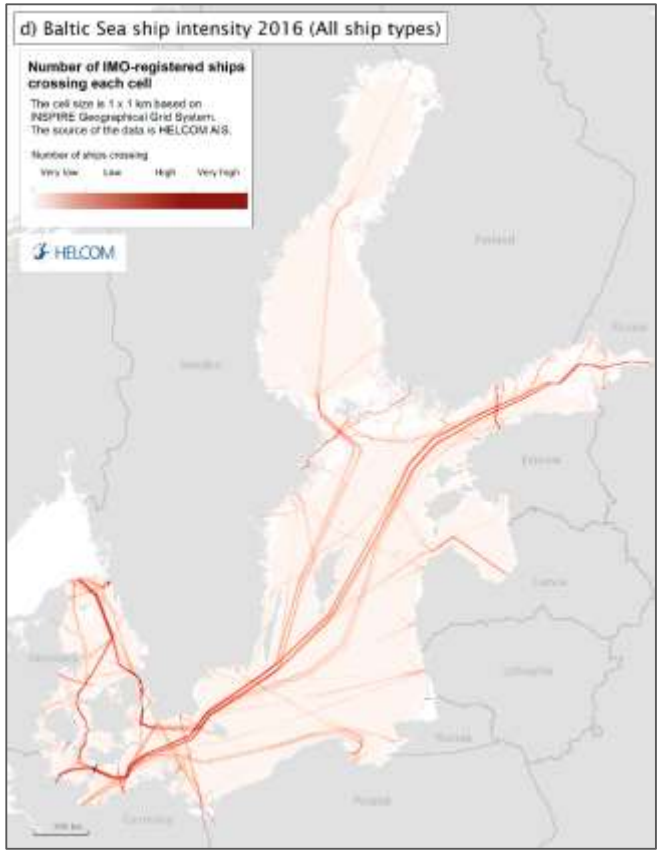




The pressures caused by the human activities are assessed, rather than the actvities

Example of data on human activities underlying the assessment





The pressures caused by the human activities are assessed, rather than the actvities

Work on cumulative impacts in Pan Baltic Scope

- Increase regional capacity and coherence in assessing cumulative impacts when doing MSP
- Connect to status assessments carried out in MSFD

  - ✓ Approaches for evaluating effects on core ecological values, green infrastructure and ecosystem services
  - ✓ Integrate with other cornerstones of the ecosystem-based approach
  - ✓ Develop openly available assessment tool
  - ✓ Improve regional data and its usability

Work on cumulative impacts in Pan Baltic Scope

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  - ✓ Integrate with other cornerstones of the ecosystem-based approach
  - ✓ Develop openly available assessment tool
  - ✓ Improve regional data and its usability

See station
Later in this session!

The State of the Baltic Sea report:
Baltic Sea Environment Proceedings 155 (2018)

Download all results, images and figures at:
http://stateofthebalticsea.helcom.fi

See the short film:
https://www.youtube.com/watch?v=B7J5g2aZrF0

Contact me at:
lena.bergström@helcom.fi

http://stateofthebalticsea.helcom.fi

www.helcom.fi

Connecting Seas

NorthSEE – Baltic LINes MSP conference

Pitches and workstations on tools for MSP

Environment – planning issues, criteria and tools

16:00 Introduction

16:05 Four presentations

16:30 Five pitches introducing the workstations

16:40 The audience choose and find their first table

16:45 1. round of workstation presentations

17:00 The audience choose and find their first table

17:05 2. round of workshop presentations

17:20 Questions and wrap up

17:00 End of session

Pitches and workstations on tools for MSP

- **Henning Sten Hansen** (Aalborg University): MYTILUS – cumulative impact assessment tool and scenario-based decision support for MSP'
- **Lena Bergström** (HELCOM): Recent applications in the Baltic Sea Impact Index, for cumulative assessments at the Baltic Sea scale
- **Jonas Pålsson** (Swedish Agency for Marine and Water Management), **Duncan Hume** (The Geological Survey of Sweden): Symphony – the Swedish approach to Spatial Decision Support for MSP
- **Daniel Depellegrin** (National Research Council – Institute of Marine Sciences, CNR-ISMAR): Tools4MSP – tools for analysis of conflicts between marine uses and the analysis of cumulative impacts (CI) of human activities on marine environments.
- **Magali Gonçalves** (Breda University of Applied Sciences), **Giovanni Romagnoni** (Oslo University), Jeroen Steenbeek (Ecopath International Initiative): Ecopath with Ecosim – combining ecosystem modelling and serious gaming to aid transnational management of marine space

Connecting Seas

NorthSEE – Baltic LINes MSP conference

MYTILUS - Decision support for MSP

Henning Sten Hansen
Professor, Aalborg University
hsh@plan.aau.dk

North SEE

Interreg North Sea Region

Baltic LINes

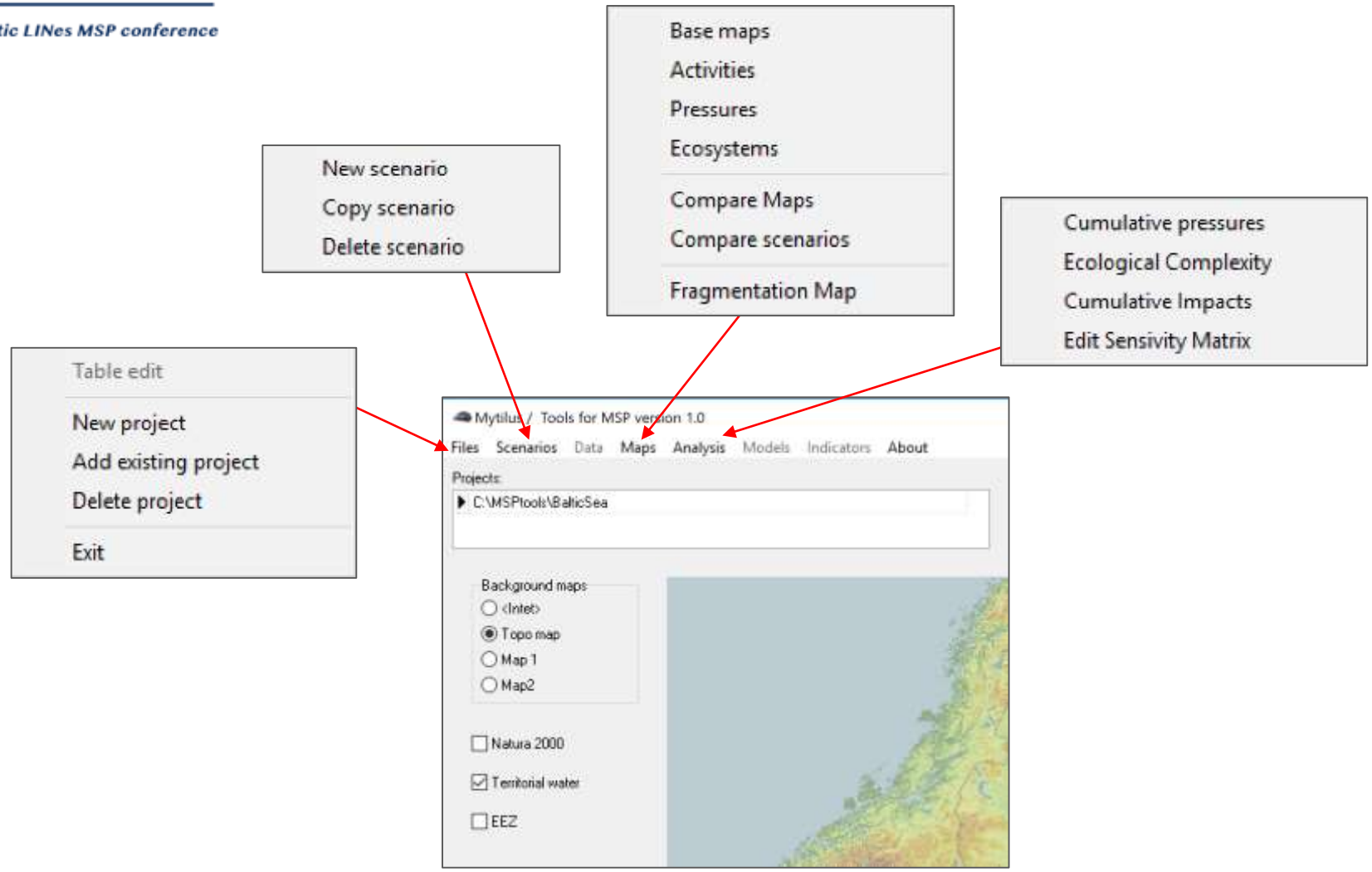
Interreg Baltic Sea Region

- MYTILUS has been developed as part of the NorthSEE and BONUS BASMATI projects and it is open source and freely available

- The aim of MYTILUS is to provide an open source tool to enable assessments of cumulative impact of various maritime activities on the marine ecosystems and its services

- MYTILUS is applying a scenario based approach to analyse the effect of various maritime spatial planning options, and the differences between scenarios can easily be visualised in a high-performance environment

- Expert users can change values directly in the sensitivity matrix, and the calculations are done very fast to facilitate its use at stakeholder events, where the effect of different spatial planning proposals can be demonstrated


Base maps
Activities
Pressures
Ecosystems
Compare Maps
Compare scenarios
Fragmentation Map
New scenario
Copy scenario
Delete scenario
Cumulative pressures
Ecological Complexity
Cumulative Impacts
Edit Sensivity Matrix
Table edit
New project
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Delete project
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Mytilus / Tools for MSP version 1.0
Files Scenarios Data Maps Analysis Models Indicators About
Projects:
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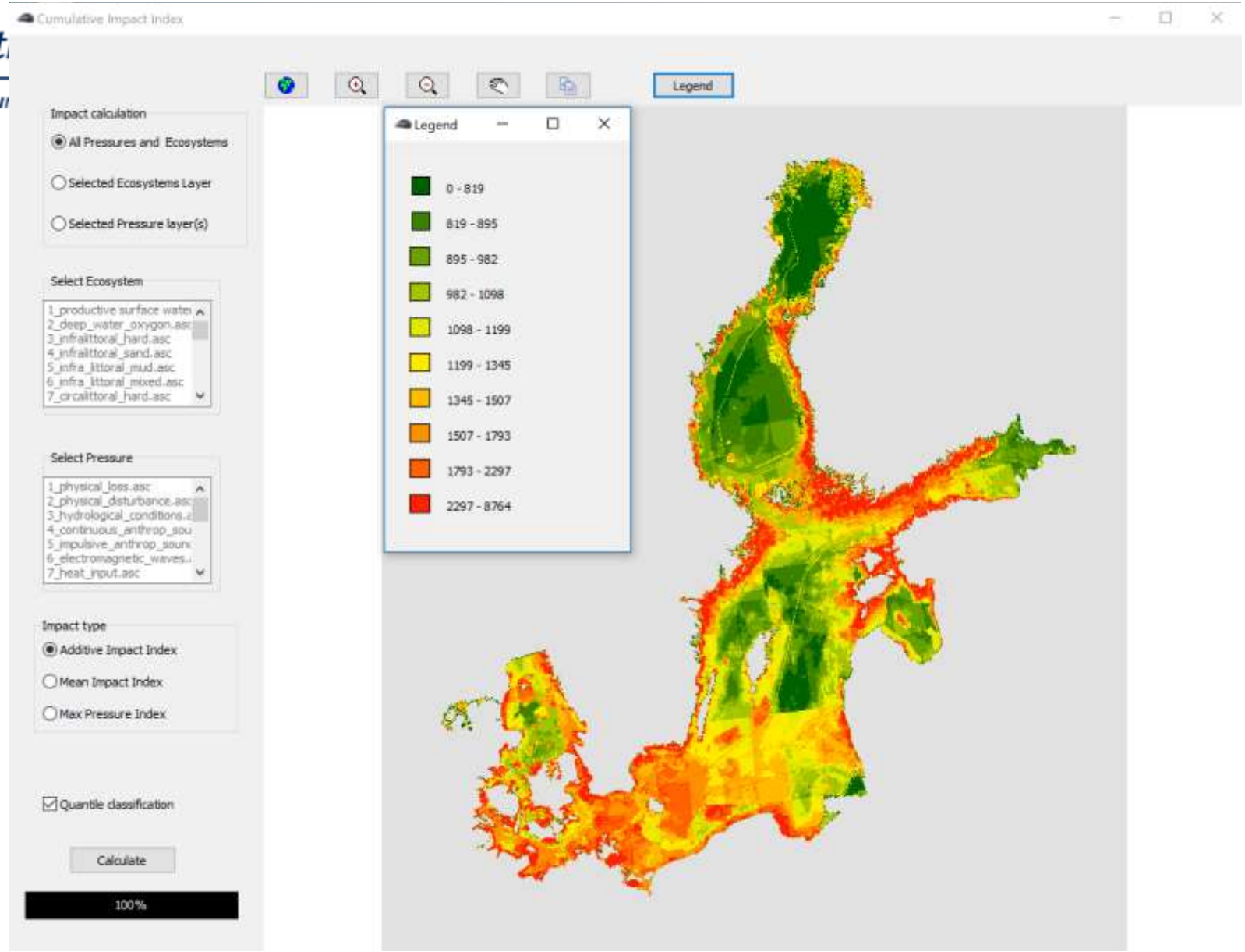
Topo map
Map 1
Map2
Natura 2000
Territorial water
EEZ


Cumulative Impact Index
Legend
Impact calculation
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7_heat_input.asc
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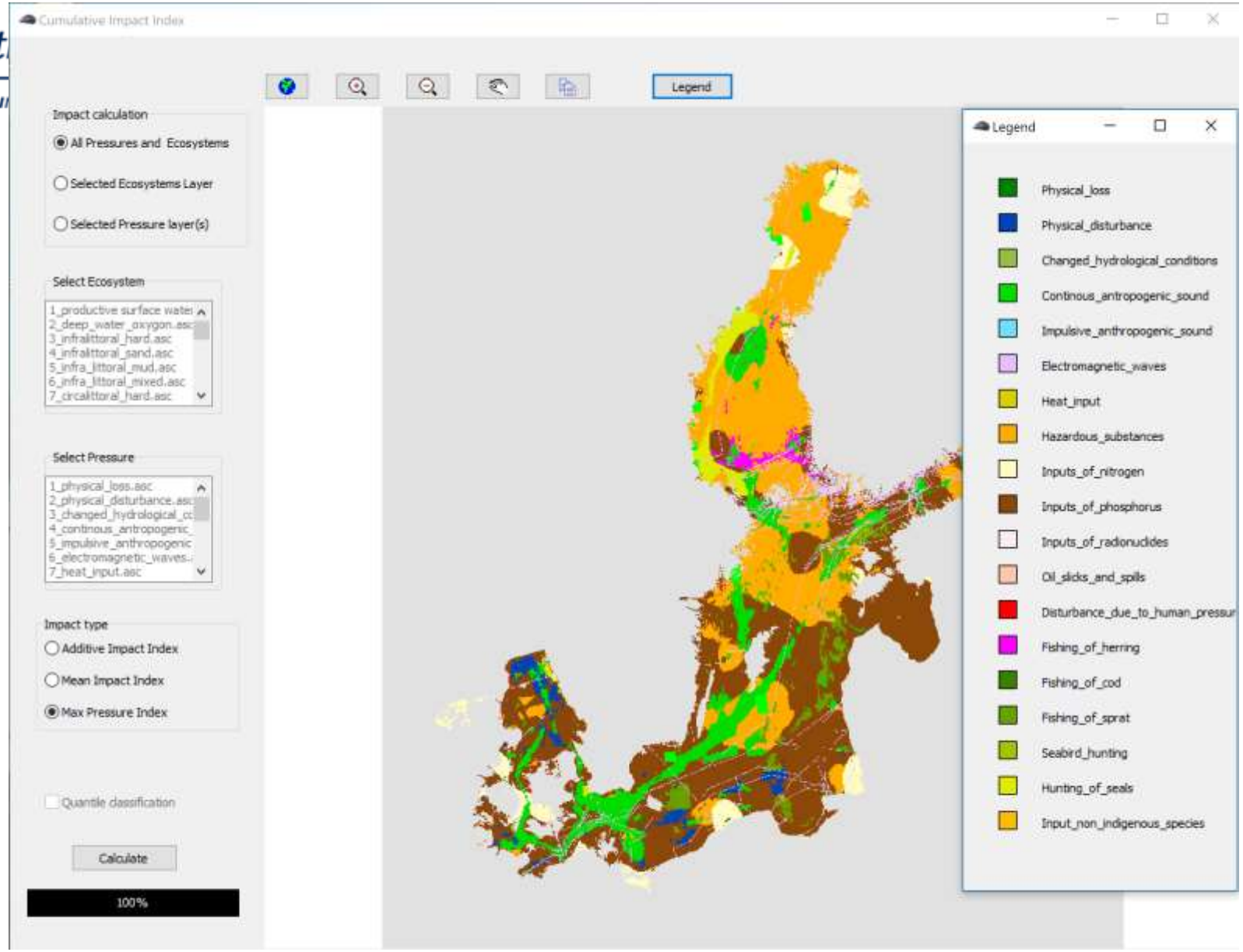
Cumulative Impact Index
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Physical_disturbance
Changed_hydrological_conditions
Continous_antropogenic_sound
Impulsive_anthropogenic_sound
Electromagnetic_waves
Heat_input
Hazardous_substances
Inputs_of_nitrogen
Inputs_of_phosphorus
Inputs_of_radionuclides
Oil_slicks_and_spills
Disturbance_due_to_human_pressur
Fishing_of_herring
Fishing_of_cod
Fishing_of_sprat
Seabird_hunting
Hunting_of_seals
Input_non_indigenous_species

Compare scenarios

Pan Baltic Scope

Co-funded by the European Maritime and Fisheries Fund of the European Union

A regional tool for assessing Cumulative Impacts

Presented by Lena Bergström and Joni Kaitaranta

Connecting seas conference, 13 February 2019, Hamburg, Germany

Swedish Agency for Marine and Water Management

Ministry of Environmental Protection and Regional Development of the Republic of Latvia

Danish Maritime Authority

VASAB

Republic of Estonia Ministry of Finance

Satakuntaliitto The Regional Council of Satakunta

SYKE

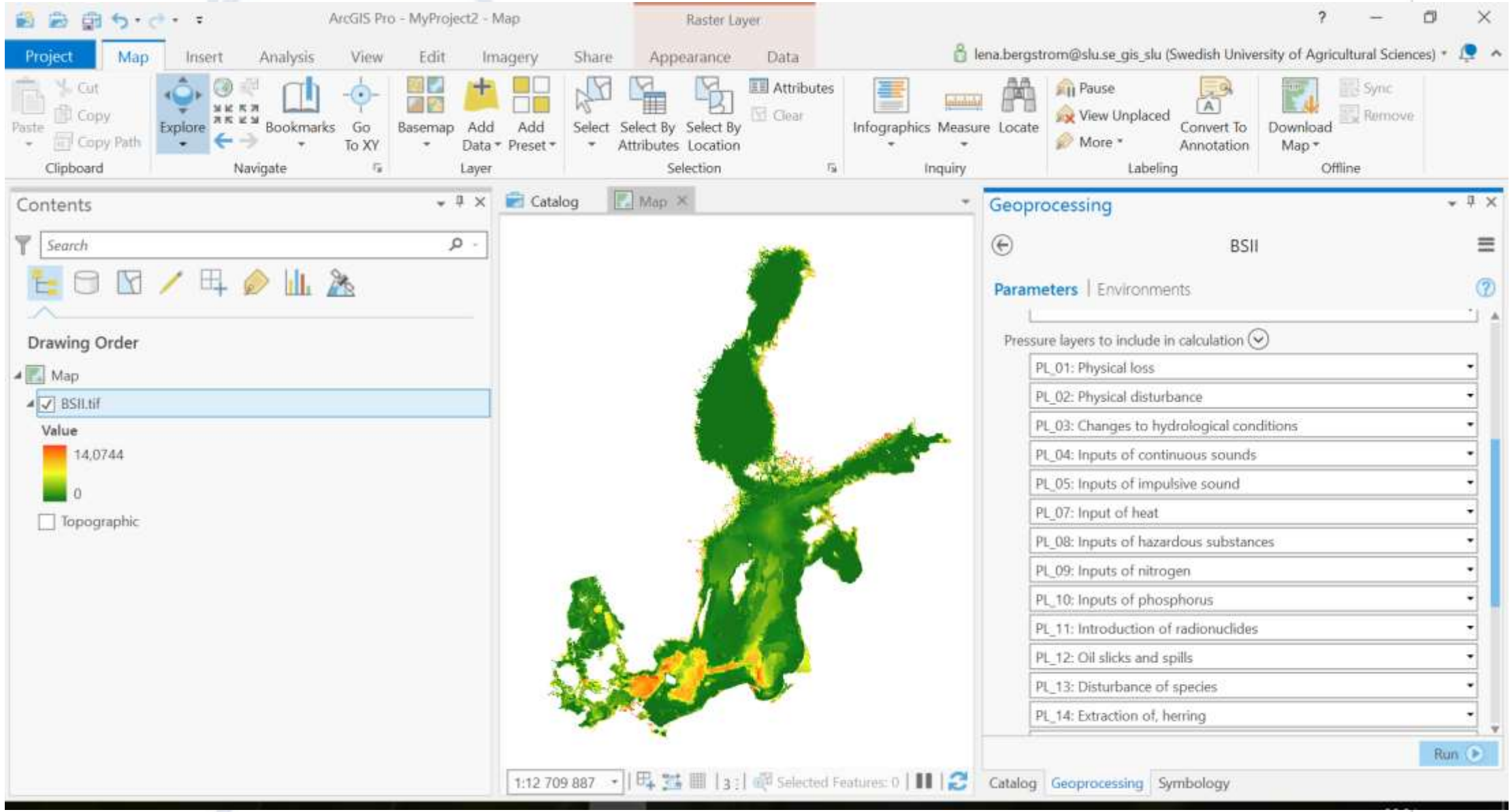
Nordregio

Ålands landskapsregering

What is the tool?

- Based on the Baltic Sea Impact Index as applied in HOLAS II (State of the Baltic Sea report)

- Developed in Pan Baltic Scope to be
  - Faster
  - More flexible (what do users need!?)
  - More user friendly
  - Available!


ArcGIS Pro - MyProject2 - Map
Raster Layer
Project
Map
Insert
Analysis
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Edit
Imagery
Share
Appearance
Data
lena.bergstrom@slu.se_gis_slu (Swedish University of Agricultural Sciences)
Cut
Copy
Paste
Copy Path
Clipboard
Explore
Bookmarks
Go To XY
Navigate
Basemap
Add Data
Add Preset
Layer
Select
Select By Attributes
Select By Location
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Geoprocessing
BSII
Parameters
Environments
Pressure layers to include in calculation
PL_01: Physical loss
PL_02: Physical disturbance
PL_03: Changes to hydrological conditions
PL_04: Inputs of continuous sounds
PL_05: Inputs of impulsive sound
PL_07: Input of heat
PL_08: Inputs of hazardous substances
PL_09: Inputs of nitrogen
PL_10: Inputs of phosphorus
PL_11: Introduction of radionuclides
PL_12: Oil slicks and spills
PL_13: Disturbance of species
PL_14: Extraction of, herring
Run
Catalog
Geoprocessing
Symbology

Tools4MSP: A modelling framework for cumulative effects assessment and conflict analysis

Daniel Depellegrin, Stefano Menegon, Giulio Farella, Alessandro Saretta, Alessandro Mulazzani, Amedeo Fadini, Andrea Barbanti

National Research Council – Institute of Marine Sciences (CNR-ISMAR)

Contact: daniel.depellegrin@ve.ismar.cnr.it; tools4msp@ismar.cnr.it

Connecting Seas Conference, Hamburg, 13-14 February, 2019
"*Environment - planning issues, criteria and tools*" Workshop

www.tools4msp.eu

What is Tools4MSP?

- **Core development team** (Data specialists, modelers, ecologicst and policy & planning expert) at CNR-ISMAR
- Open source modelling framework for **MSP-oriented data collection, analysis and knowledge sharing** within the Adriatic-Ionian Sea
- It is composed by a Geoplatform and a set of **webtools that can assist decision-makers** and strategists in undertaking MSP-oriented case studies and scenario analysis
- The Tools4MSP Geoplatform (www.tools4msp.eu) uses **Tools4MSP Python library as Plugin** for the following modelling functionalities:
  - Cumulative Effects Assessment Tool
  - Maritime Use Conflict Tool
- A user can use **Tools4MSP in 2 MODES**:
  - Mode 1: The Tools4MSP Geoplatform (www.tools4msp.eu) providing a Graphical User Interface
  - Mode 2: The Tools4MSP Standalone Library for Experienced Users

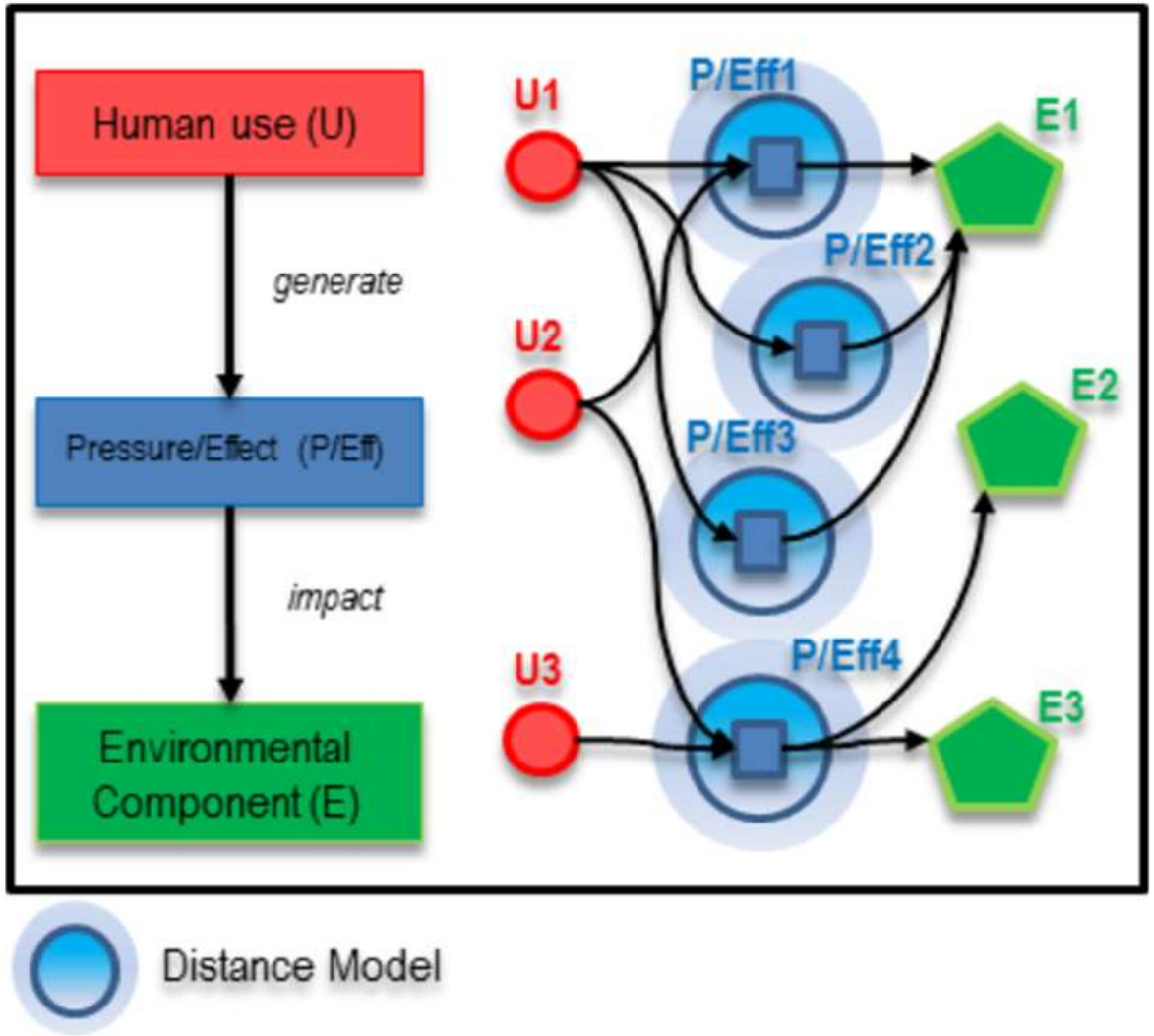
www.tools4msp.eu

Conceptual framework

- CEA works on a Impact Chain Model:

HUMAN USES ->PRESSURES->ENV.COMPONENT

- **U, P and E can be flexibly applied for a given study area context**

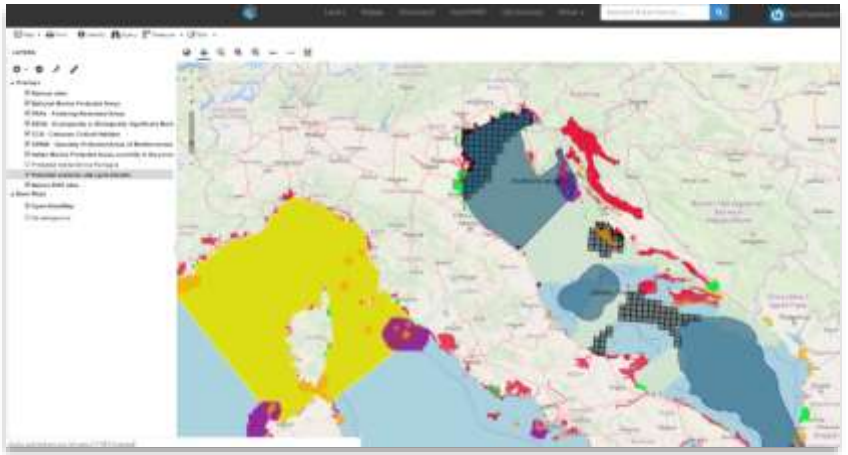


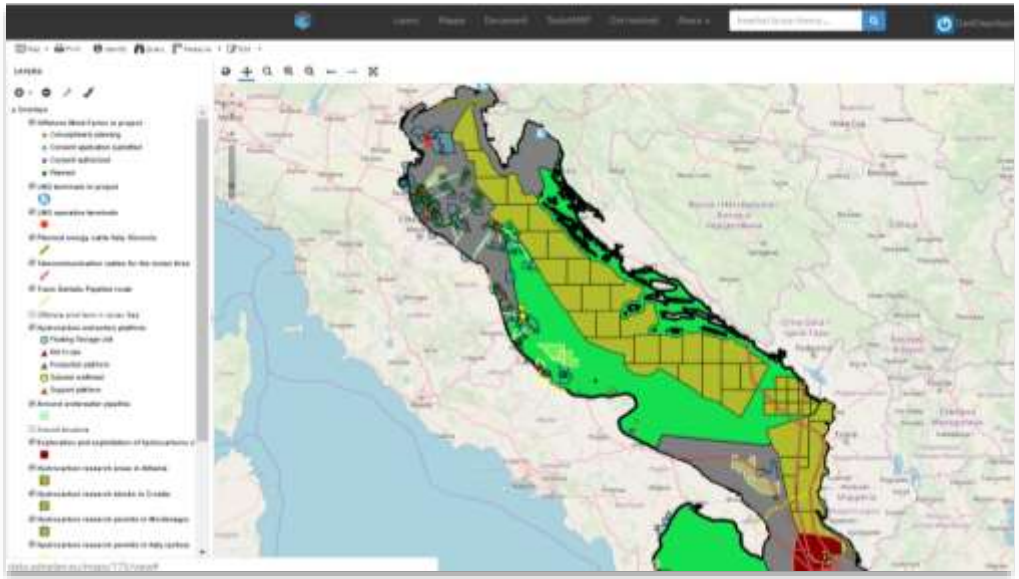
MSP data stocktake

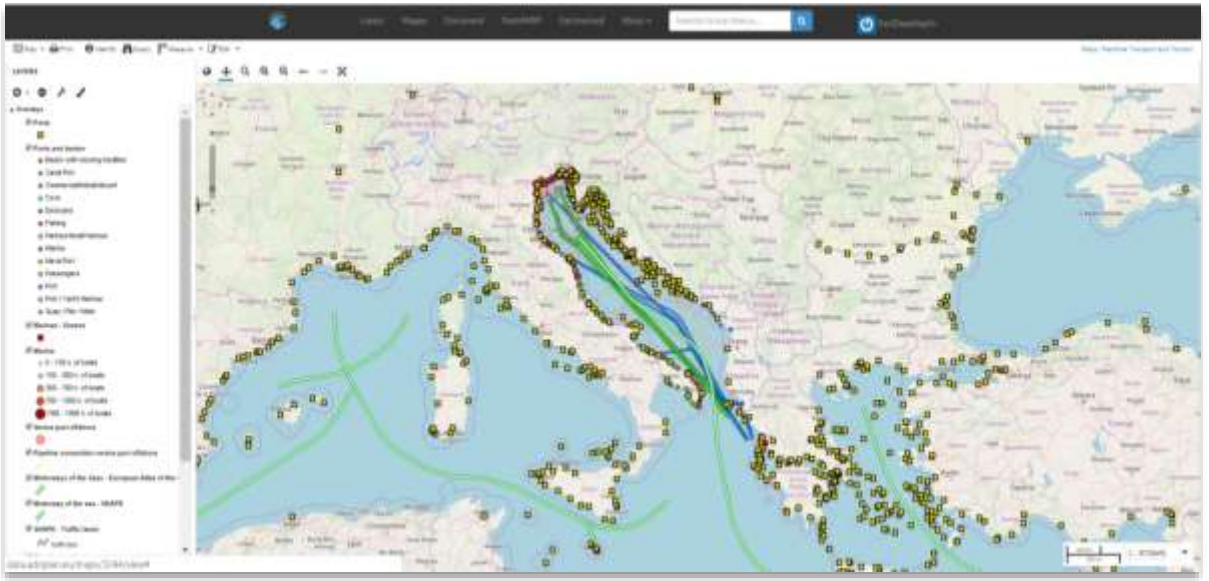
www.tools4msp.eu

Table 1
MSP stocktake for CI assessment and SUC analysis (P/A = presence/absence; I = normalized intensity indicator; PR = proxy; w P/A weighted presence/absence) retrieved from Menegon et al., 2017a. Note: The seabed habitats include 23 layers as presented in the Table 2.

Dataset	Indicator
Aquaculture[a–c], cables and pipelines[b–d], coastal defence work[b,e], dumping area for dredging[b], LNGs[f], military areas[b,g], off-shore sand deposit [a,g–i,r], oil and gas extraction[b,j–m], oil and gas research[b,j–m], renewable energy facilities (offshore wind FARMS)[r,t,u]	P/A
Coastal and maritime tourism[o]	I/PR – distance from the marinas and number of boats/marinas
Coastal and maritime tourism[n]	I/PR – distance from the marinas and number of boats/marinas
Naval based activities[o]	I/PR – distance from the cargo ports and port capacity
Maritime transport[h]	I – Traffic density (vessels/year)
Small scale fishery[h]	I – fishing effort expressed in 5 classes of intensity: from very low to high)
Trawling[p]	I – hours of activities calculate through Vessel Monitoring System (VMS)
Marine mammals[q], giant devil ray[q], nursery habitats[r], turtles[q], seabed habitats[s]	P/A
Seabirds[v]	wP/A



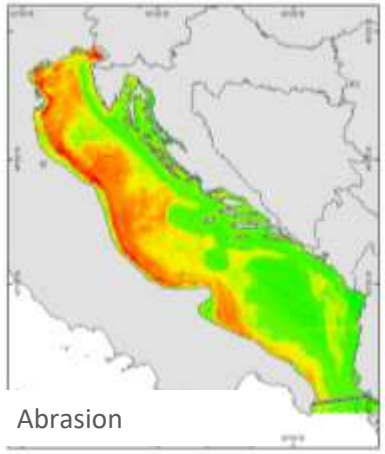




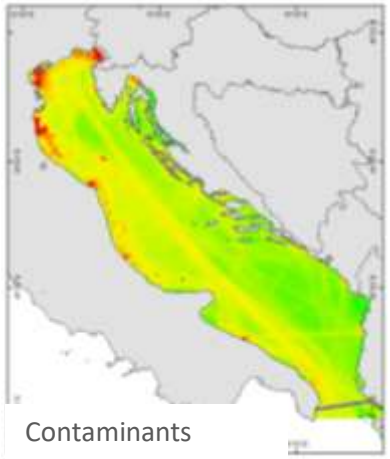
www.tools4msp.eu

Multiple pressures different model approaches

- **15 MSFD Pressures**



Abrasion

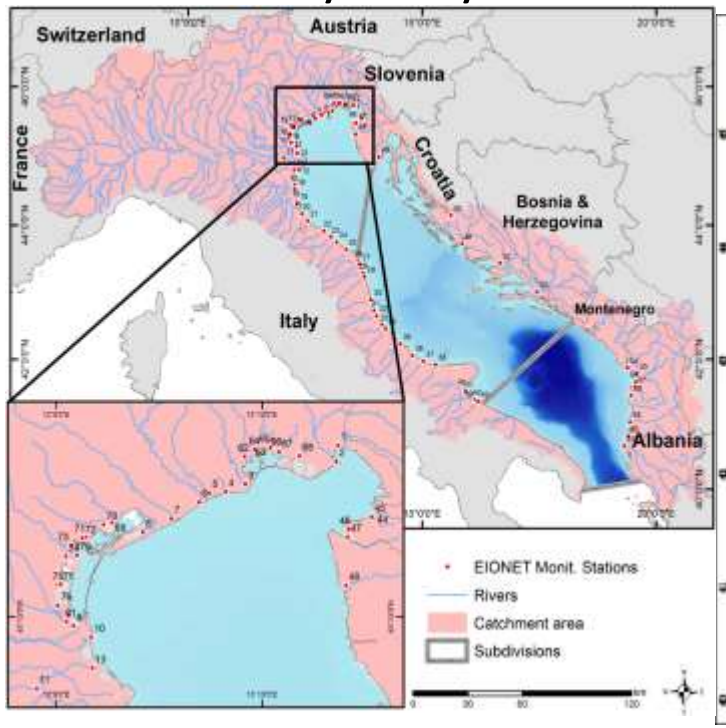


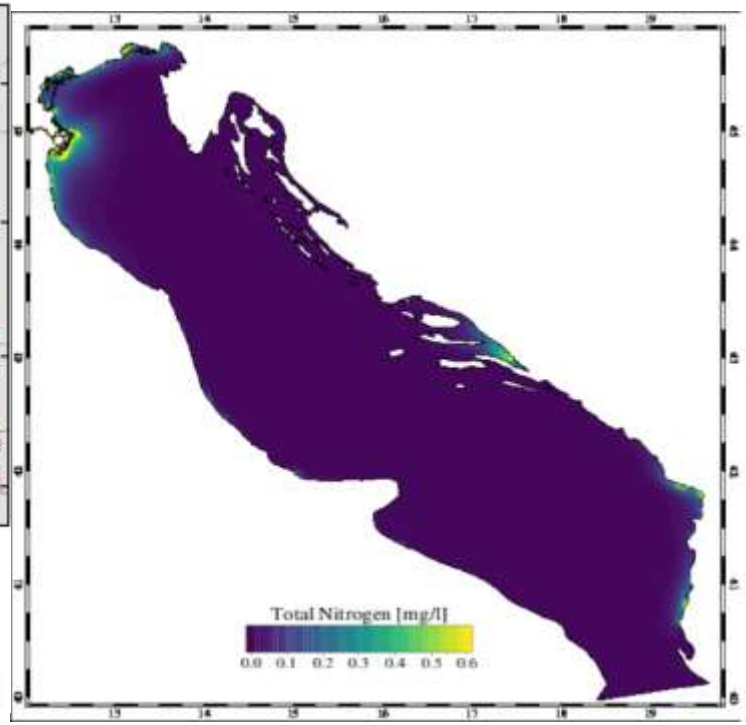
Contaminants

Underwater noise

Coastal tourism

- **Land-based pressures (nutrients)** modelled with high resolved hydrodynamic model modelled SHYFEM



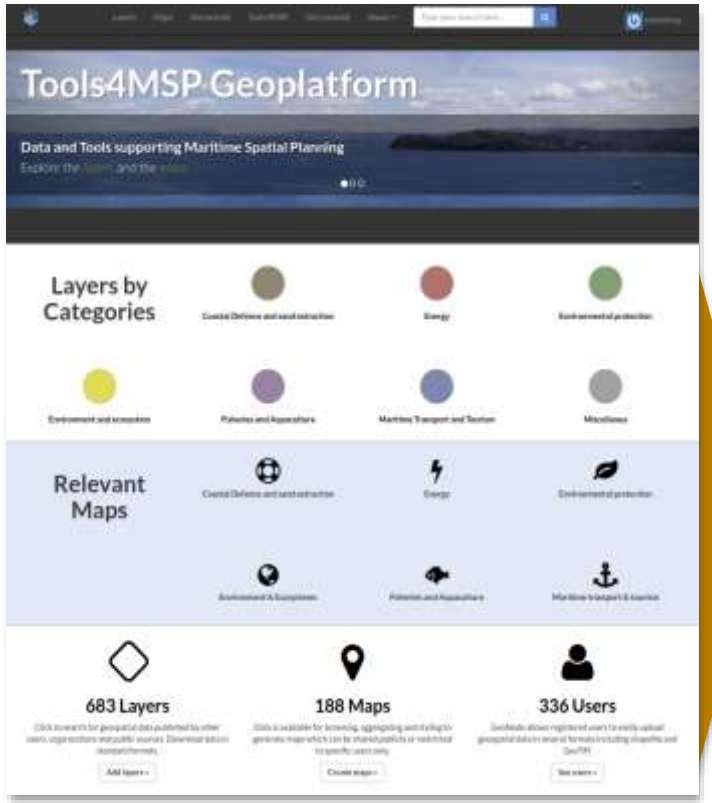


- **For the Adriatic Sea:**
  - 75 rivers
  - > 40 coastal urban areas

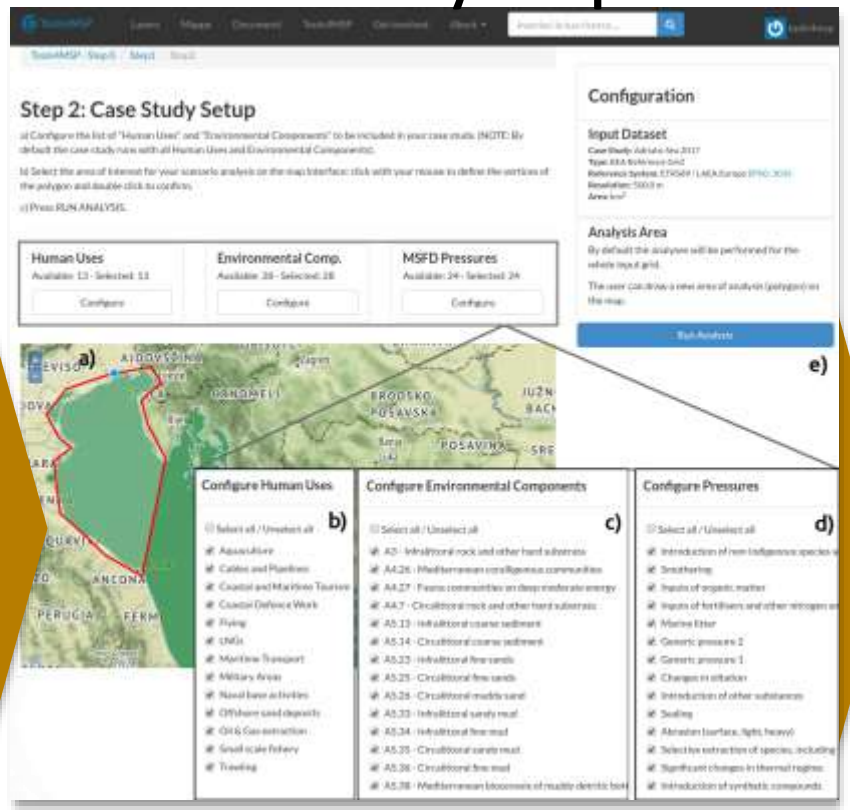
www.tools4msp.eu

Mode 1: Tools4MSP application through Graphical User Interface

TooIs4MSP Geoplatform

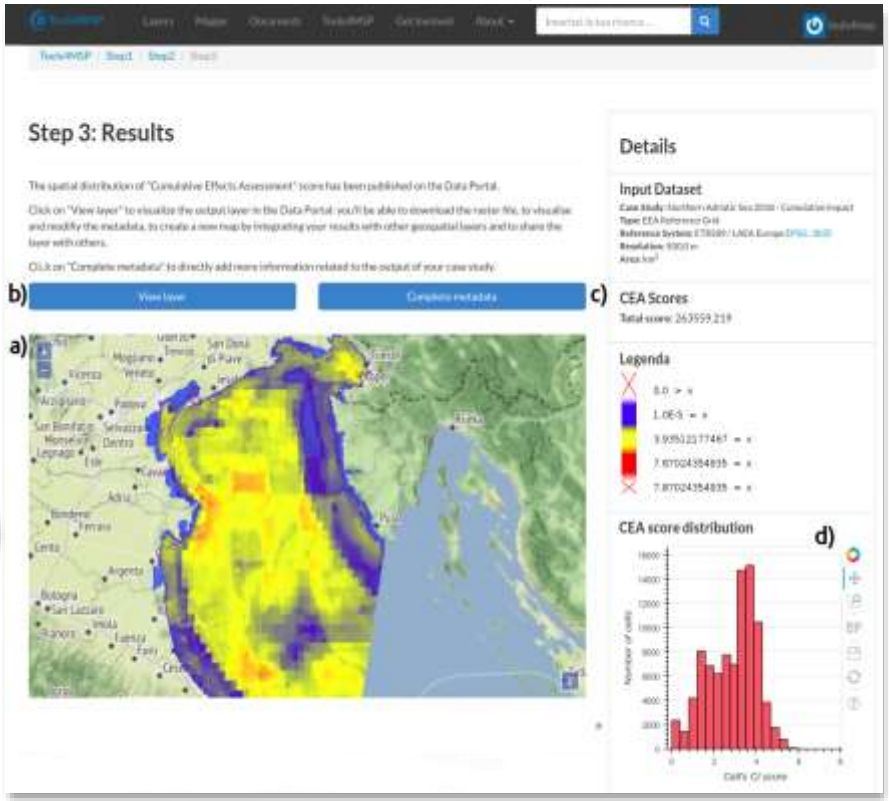


Case study setup



- Define case study area
- Select Human Uses, Pressure and Environmental Components

Model Outputs

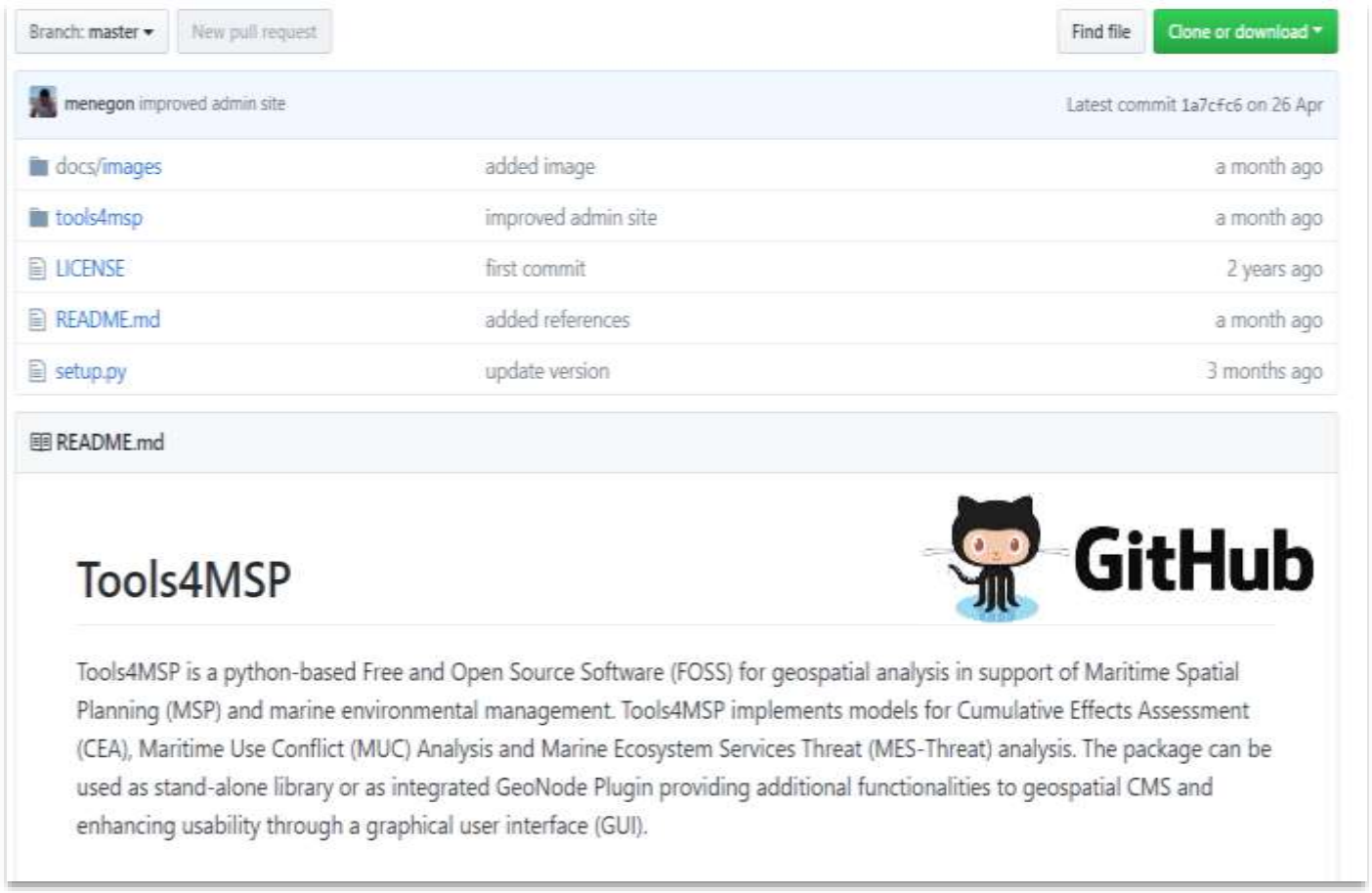


- Geospatial Results Viewer
- Share results with user community
- Add metadata of the model
- Download results (Geotiff, statistics)

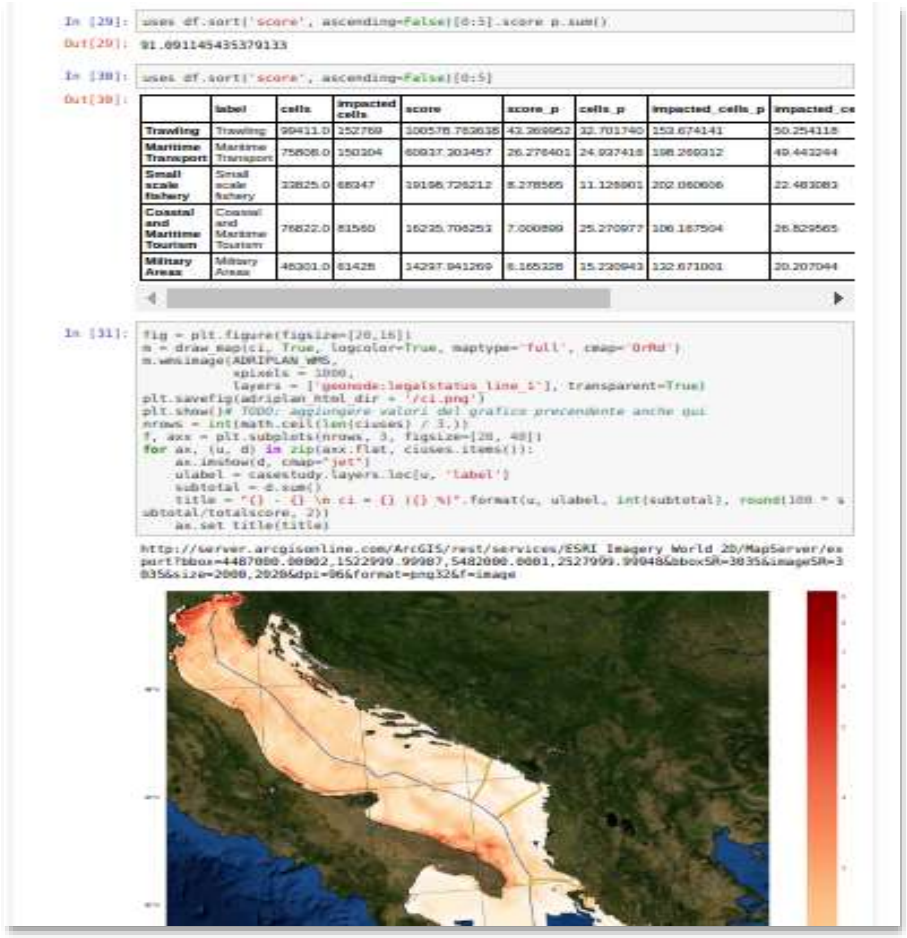
Mode 2: Tools4MSP as standalone Library

www.tools4msp.eu

- Open source library regularly updated with new functionalities
- Download at https://github.com/CNR-ISMAR/tools4msp



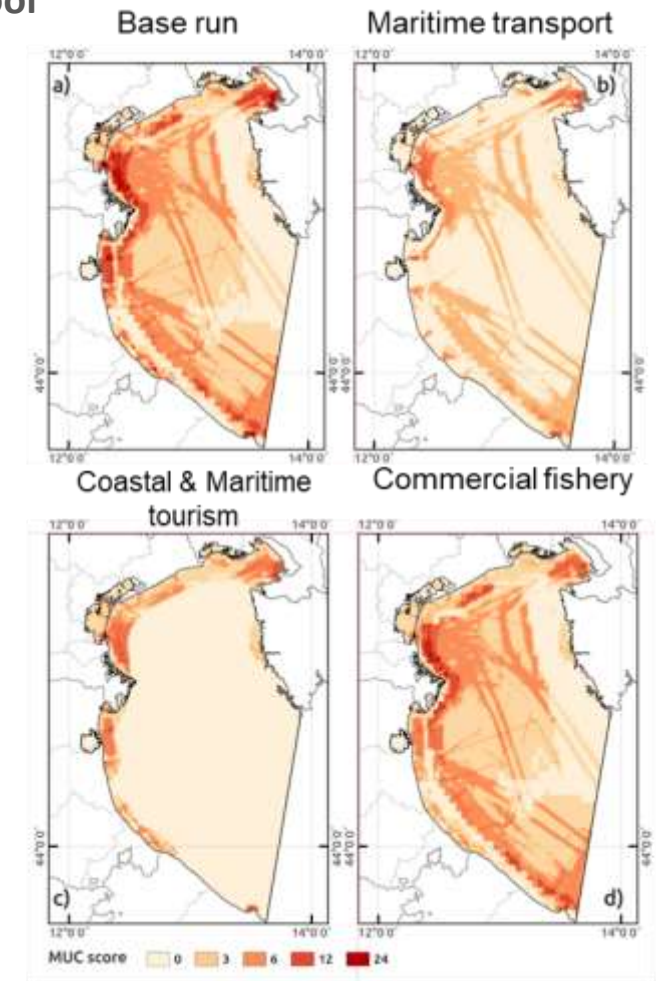
- Tools4MSP **standalone Geopython library** allows rapid prototyping of CEA and MUC
- For example using Jupyter interactive computing environment

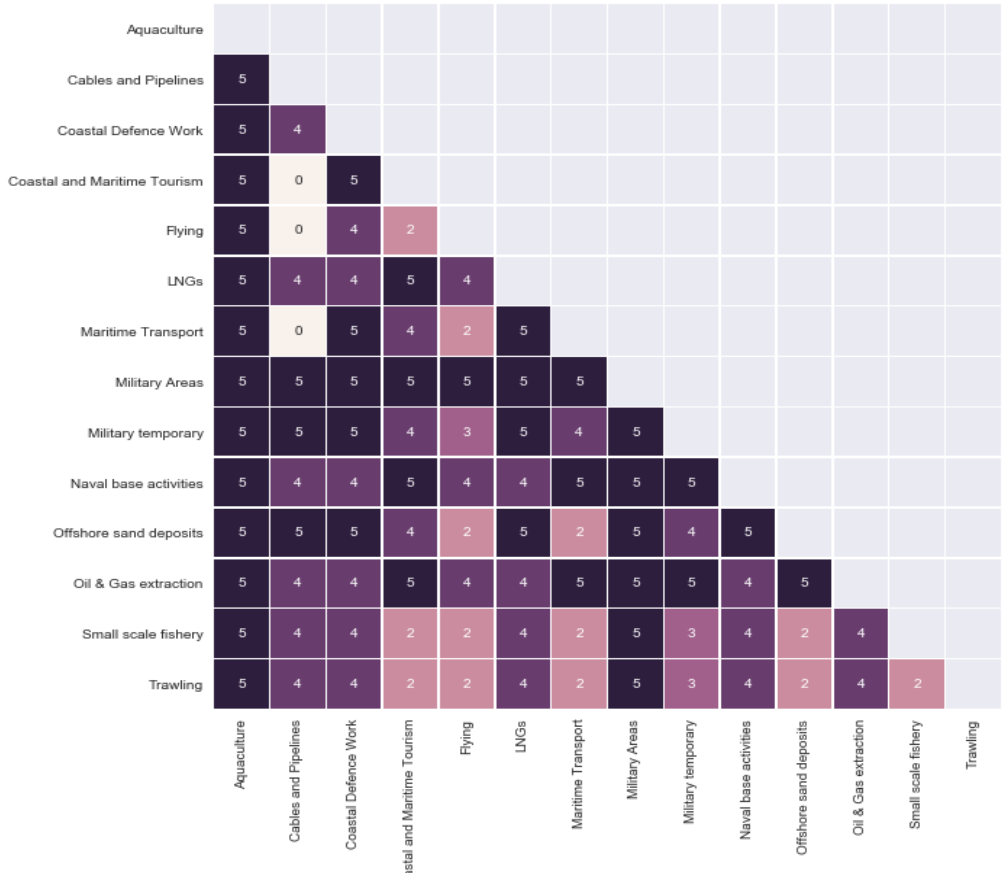


www.tools4msp.eu

Maritime Use Conflict Analysis

- Maritime Use Conflict Analysis is based on COEXIST methodology and can be accessed in **Mode 1 & 2 as for the Cumulative Effect Assessment Tool**

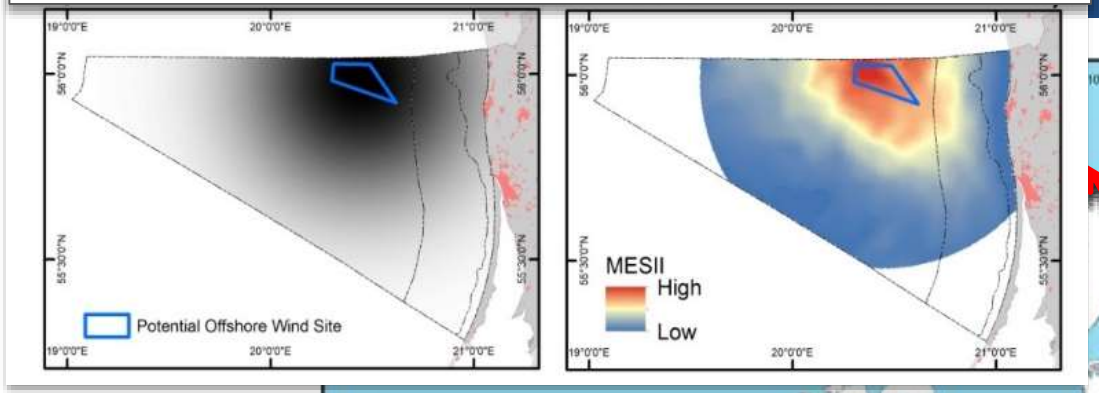




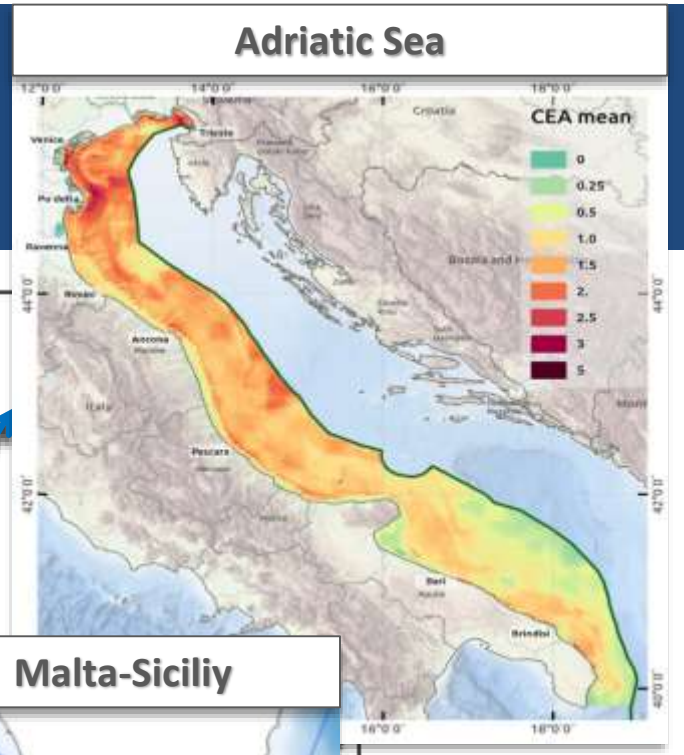
- Conflict Score Matrix

Application domains

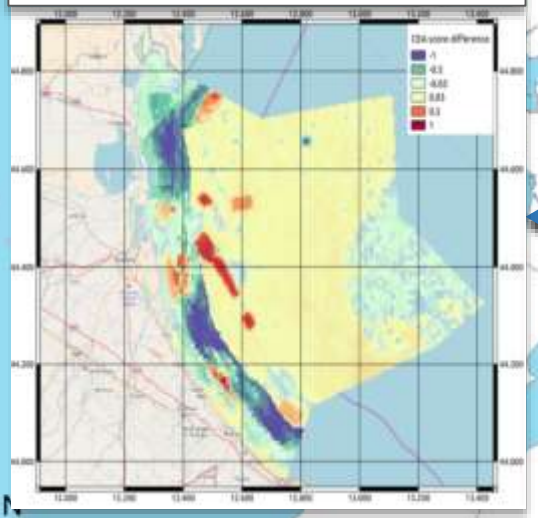
Lithuanian Sea Space



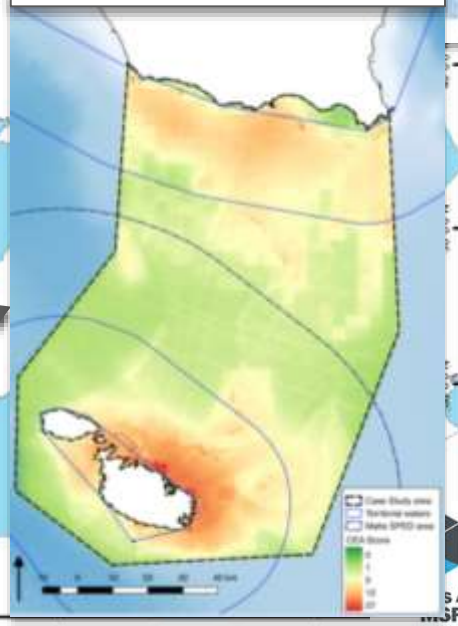
Adriatic Sea



Emilia-Romagna Region



Malta-Siciliy



www.tools4msp.eu

Capitalization and continuous development

Acknowledgement:

Connecting Seas

NorthSEE – Baltic LINes MSP conference

Workshop on "Environment - planning issues, criteria and tools"

Combining ecosystem modelling and serious gaming to aid transnational management of marine space

Giovanni Romagnoni, Jeroen Steenbeek, Magali Goncalves

North SEE

Interreg North Sea Region

Baltic LINes

Interreg Baltic Sea Region

MSP Challenge Simulation Platform

Ecopath International Initiative

Breda University of Applied Sciences
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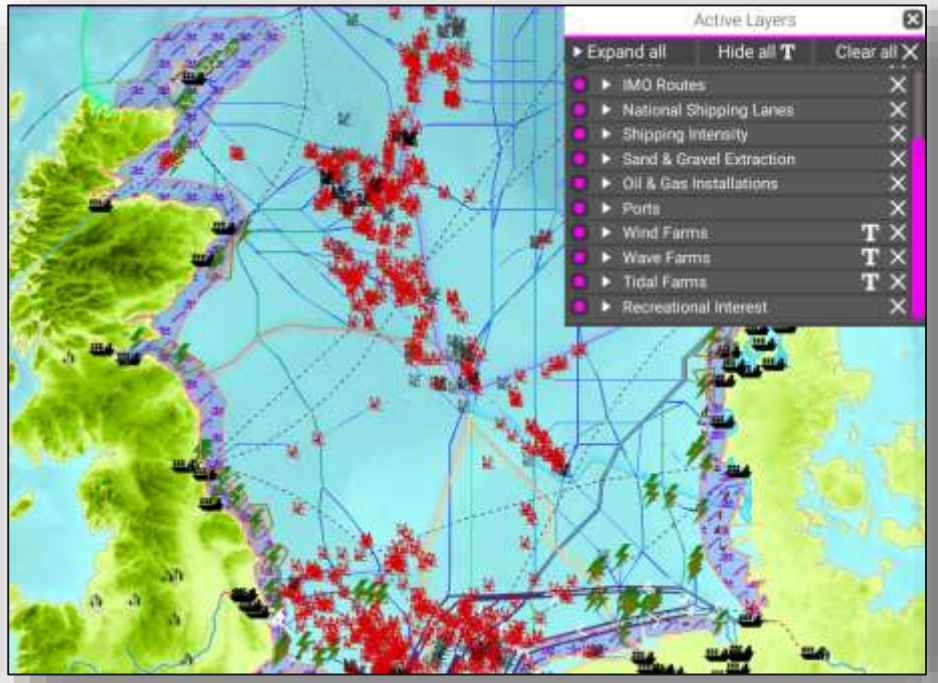
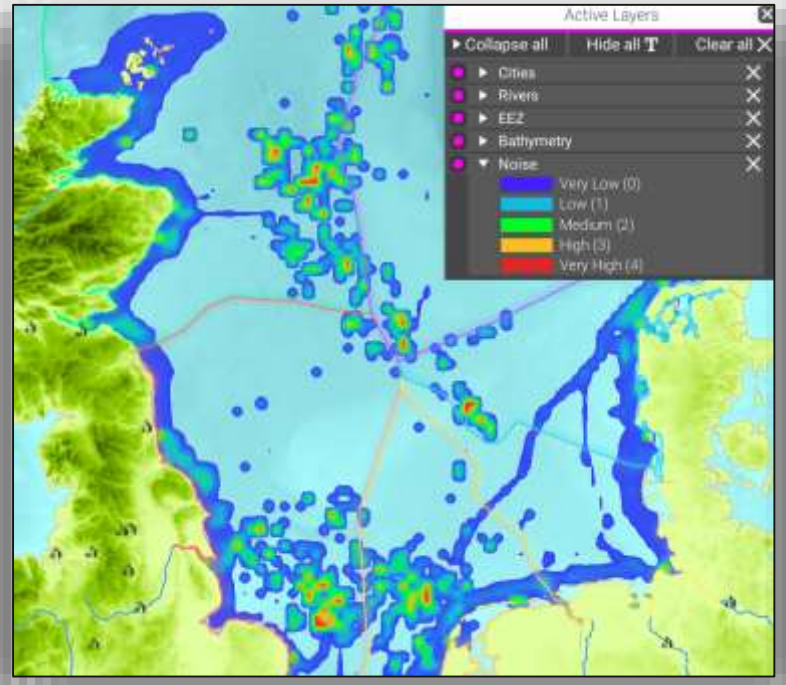
MSP – EwE integration

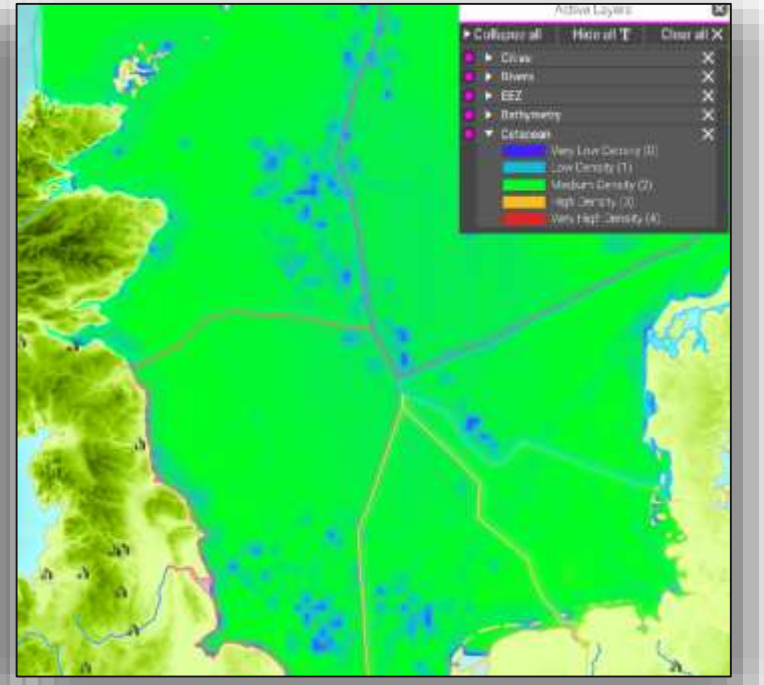
Activities



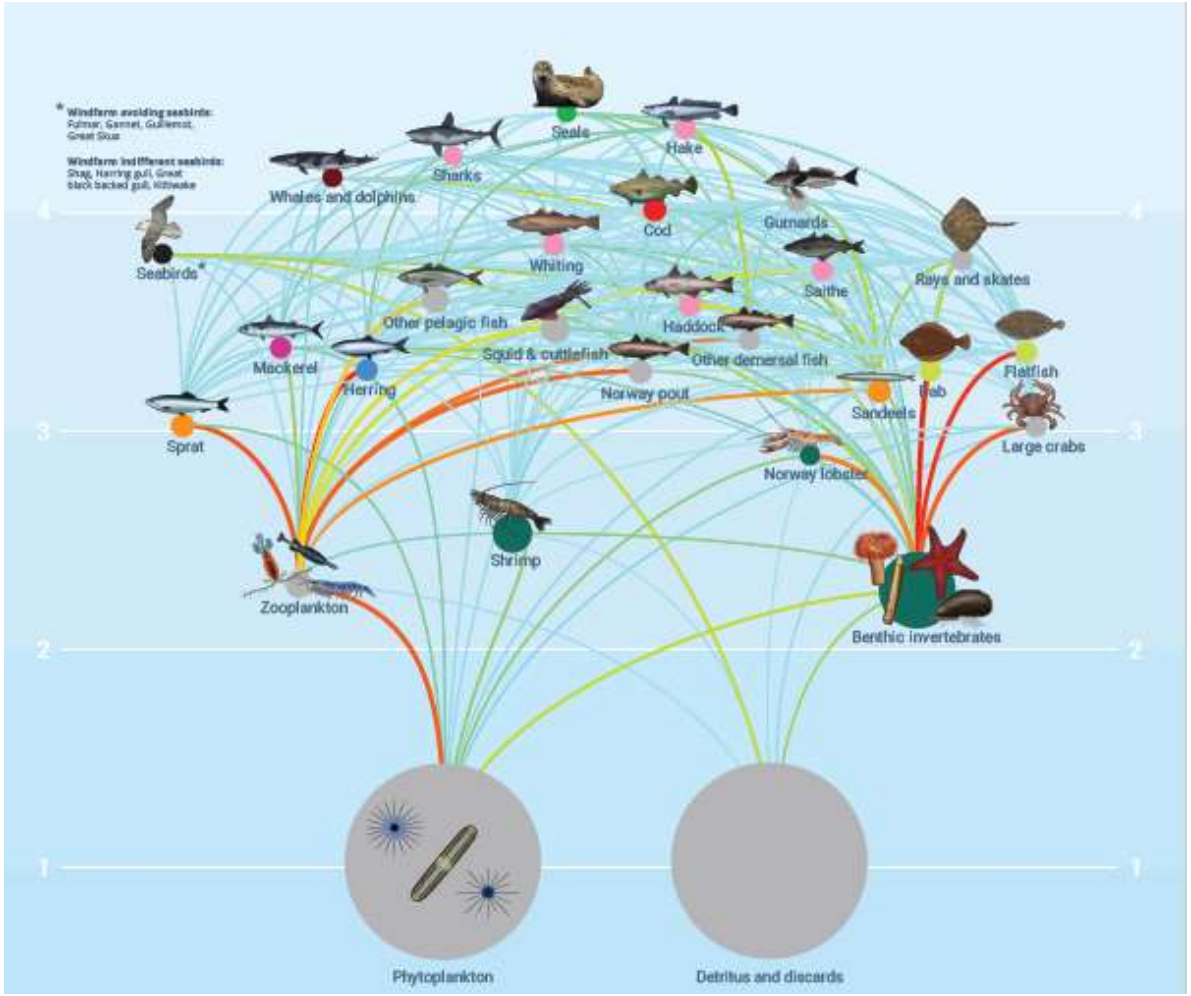
Pressures



Impacts



The ecosystem model: Ecopath with Ecosim



Come see our platform

Thank you!

Breda University of Applied Sciences
DISCOVER YOUR WORLD
formerly known as NHTV

Ecopath International Initiative

North SEE
Interreg North Sea Region
European Regional Development Fund
EUROPEAN UNION
Baltic LINes
Interreg Baltic Sea Region
EUROPEAN REGIONAL DEVELOPMENT FUND
EUROPEAN UNION

Additional information

MSP – EwE integration

- Each player planning action influences the ecosystem
- During game play, all planning actions at a given time are converted to pressure intensity maps of different categories
- These pressures impact ecology

Pressure	Ecological impact
Surface disturbance	Affects local attractiveness
Bottom disturbance	Affects local attractiveness
Noise	Affects local attractiveness
Artificial habitat	Provides shelter, forbids all fishing
Protection*)	Forbids fishing (per fleet)
Effort intensity	Affects amount of fishing (per fleet)

*) *Protection is a pressure as it impacts the ecosystem, with beneficial effects for some groups, but negative effects for others*

MSP – EwE integration

Actions are translated to pressures via a conversion matrix

Action \ Pressure	Artificial habitat	Noise	Bottom Disturbance	Surface Disturbance	Sites protected against fishing		
					Bottom trawl	Industrial and Pelagic trawl	Drift and fixed nets
Aquaculture	0.1	0	0	0.1	0	0	0
Anchorages	0	0	0.1	0.1	0	0	0
Gravel Extraction	0	0.3	1	0	0	0	0
Electricity Cables	0.1	0	0.1	0	1	0	0
Telecom Cables	0.1	0	0.1	0	1	0	0
Unused Cables	0.1	0	0	0	0	0	0
Electricity Cables (construction phase)	0	0.5	0.1	0	1	1	1
Telecom Cables (construction phase)	0	0.5	0.1	0	1	1	1
Oil & Gas Installations	0.2	0.2	0.1	0.2	1	1	1
Wind farm (construction phase)	0.4	0.8	0.6	0.5	1	1	1
Wind Farms	0.4	0.2	0	0	1	1	0
Pipelines	0.1	0	0.05	0	1	0	0
Recreational Areas	0	0.1	0	0.2	0	0	0
Dredging Deposit Areas (only open)	0	0	0.8	0	0	0	0
Shipping Intensity	0	1	0	1	1	1	1
Tidal Farm (construction phase)	0.2	0.5	0.5	0.5	1	1	1
Tidal Farms	0.2	0.1	0	0.1	1	1	1
…	…	…	…	…	…	…	…

MSP – EwE integration

Actions are translated to pressures via a conversion matrix

Action \ Pressure	Artificial habitat	Noise	Bottom Disturbance	Surface Disturbance	Sites protected against fishing		
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...	...	...	...	...	...	...	...

MSP – EwE integration

- Functional groups respond differently to MSP pressures (1/2)

Functional group	Noise	Surface disturbance	Bottom disturbance
Cetacean	High impact	Low impact	
Seal	High impact	Low impact	
Windfarm avoiding seabirds	High impact	Low impact	
Windfarm indifferent seabirds	High impact	Low impact	
Cod	Low impact		Low impact
Commercial gadoids	Low impact		
Demersal predators	Low impact		Low impact
Pelagic small gadoids	Low impact	Low impact	
Herring	High impact	Low impact	
Sandeel and Sprat	Low impact	Low impact	Low impact
Mackerel	Low impact	Low impact	
Small pelagic fish	Low impact	Low impact	
Flatfish	Low impact		Low impact
Large demersal fish	Low impact		Low impact

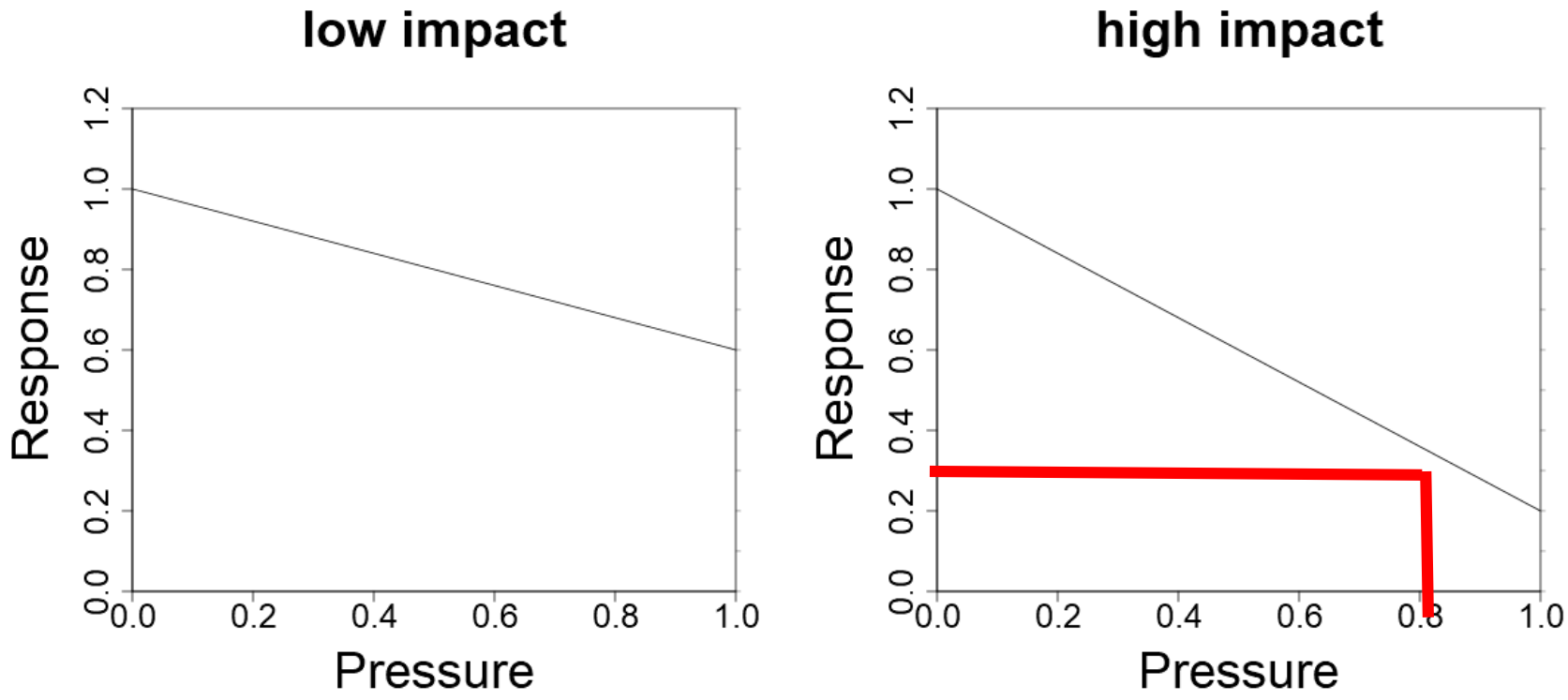
MSP – EwE integration

Functional groups respond differently to MSP pressures (2/2)

Functional group	Noise	Surface disturbance	Bottom disturbance
Small demersal fish	Low impact		Low impact
Squid & cuttlefish			
Zooplankton		Low impact	
Large crabs			High impact
Large benthic invertebrates			High impact
Small benthic invertebrates			High impact
Microflora (incl. Bacteria protozoa)			
Phytoplankton			
Detritus and discards		Positive impact	

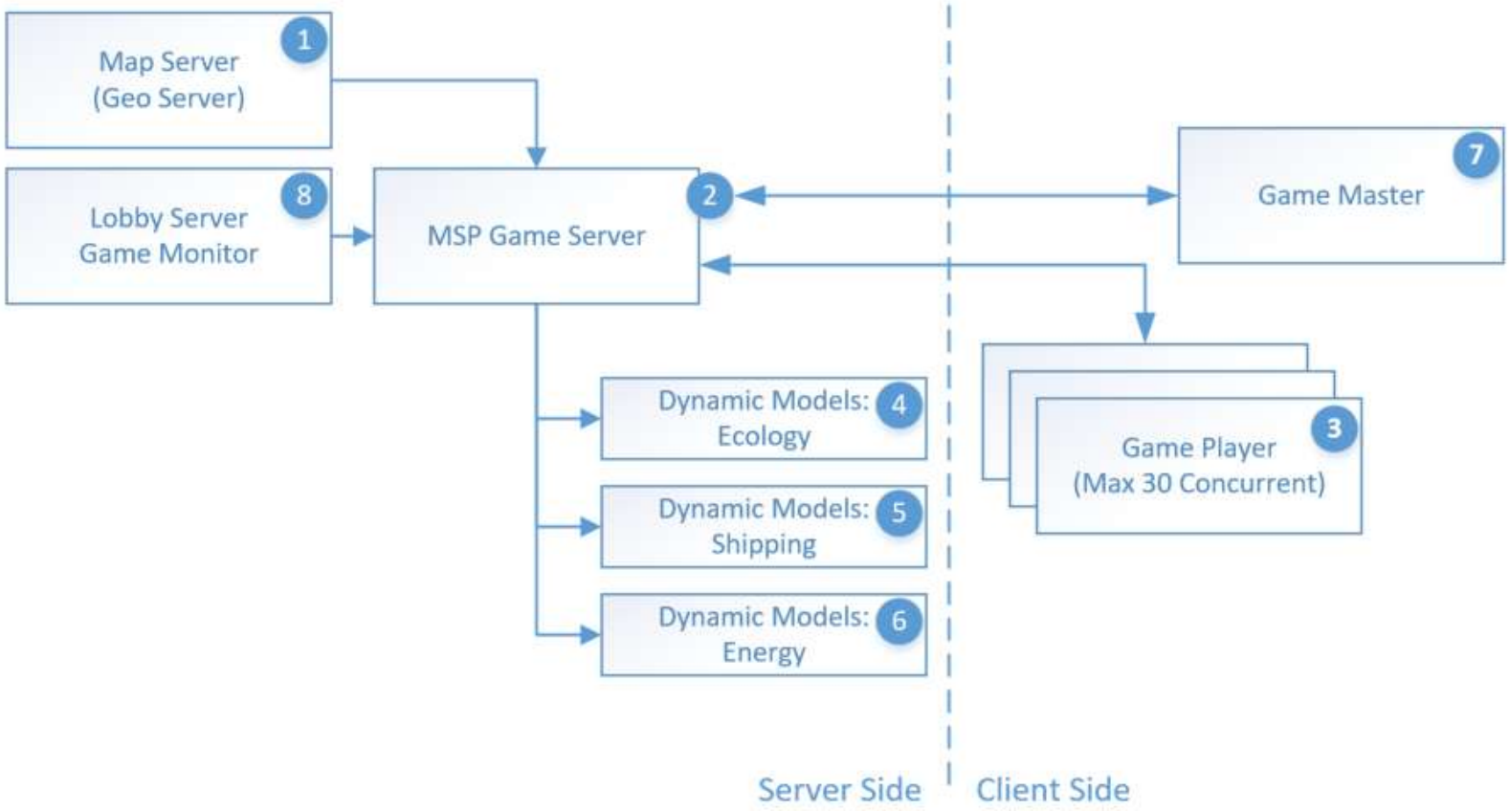
MSP – EwE integration

Linear response functions translate pressure to ecological impact



Response: habitat attractiveness

MEL Architecture



Connecting Seas

NorthSEE – Baltic LINes MSP conference

16:45-17:00 1. round of workstation presentations

Choose and find your first table

Workstations on tools for MSP

- **Henning Sten Hansen** (Aalborg University): MYTILUS – cumulative impact assessment tool and scenario-based decision support for MSP'
- **Lena Bergström** (HELCOM): Recent applications in the Baltic Sea Impact Index, for cumulative assessments at the Baltic Sea scale
- **Jonas Pålsson** (Swedish Agency for Marine and Water Management), **Duncan Hume** (The Geological Survey of Sweden): Symphony – the Swedish approach to Spatial Decision Support for MSP
- **Daniel Depellegrin** (National Research Council – Institute of Marine Sciences, CNR-ISMAR): Tools4MSP – tools for analysis of conflicts between marine uses and the analysis of cumulative impacts (CI) of human activities on marine environments.
- **Magali Gonçalves** (Breda University of Applied Sciences), **Giovanni Romagnoni** (Oslo University), Jeroen Steenbeek (Ecopath International Initiative): Ecopath with Ecosim – combining ecosystem modelling and serious gaming to aid transnational management of marine space

Connecting Seas

NorthSEE – Baltic LINes MSP conference

17:05-17:20 2. round of workstation presentations

Choose and find your first table

Workstations on tools for MSP

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Connecting Seas

NorthSEE – Baltic LINes MSP conference

Questions and wrap up

Questions

To have confidence in a tool for international use, what must be fulfilled?

- Must be openly available
- Transparent method
- Must communicate limitations
- Premises must come from (authorized) users
- Sufficient amount of authorized data with metadata
- Must be independent of national organisations

Thank you

for your participation!