Maritime Spatial Planning Forum

Global Meets Regional

# Cumulative impacts in MSP

## Workshop Session 4

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

# Our schedule & our tasks

- Presentations and ask questions
- Discussion
- Recommendations

- Talk or write on screen!

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# Cumulative impact assessments in MSP of the Baltic Sea

Lena Bergström, HELCOM

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

# Why should we worry about cumulative impacts?

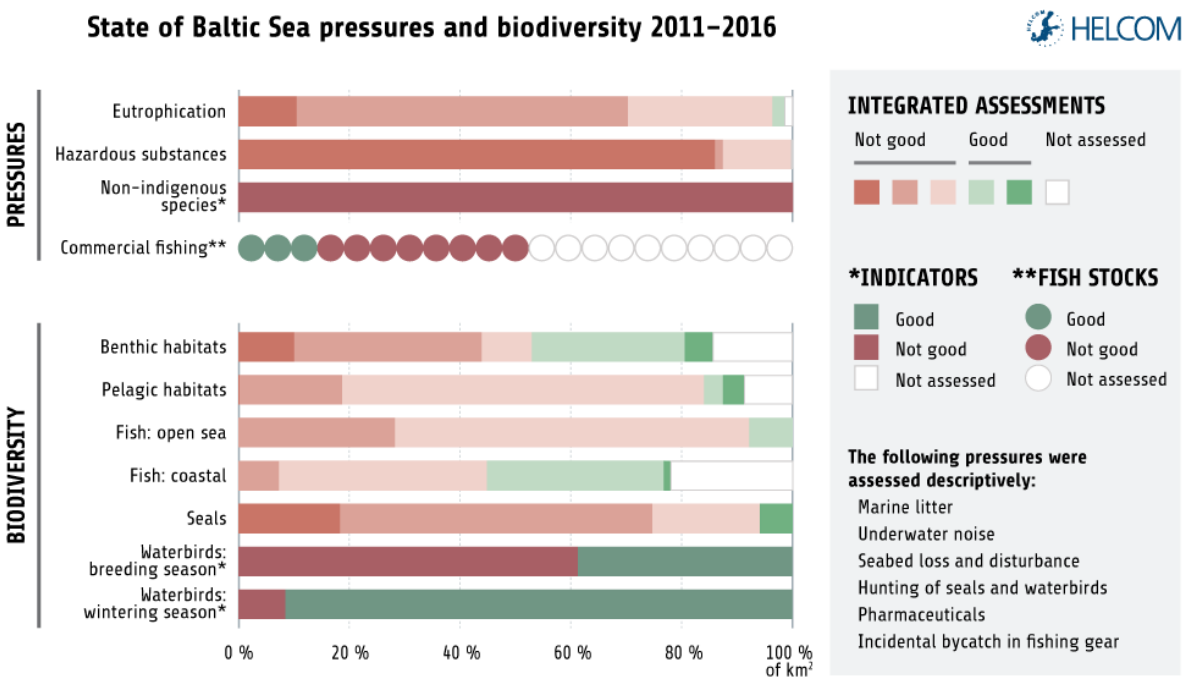
## Our use of the sea have impacts on marine ecosystems

Cumulative impact assessment is:

- a way to support long-term sustainability
- an integrated aspect of the ecosystem-based approach
- a legal necessity in many countries

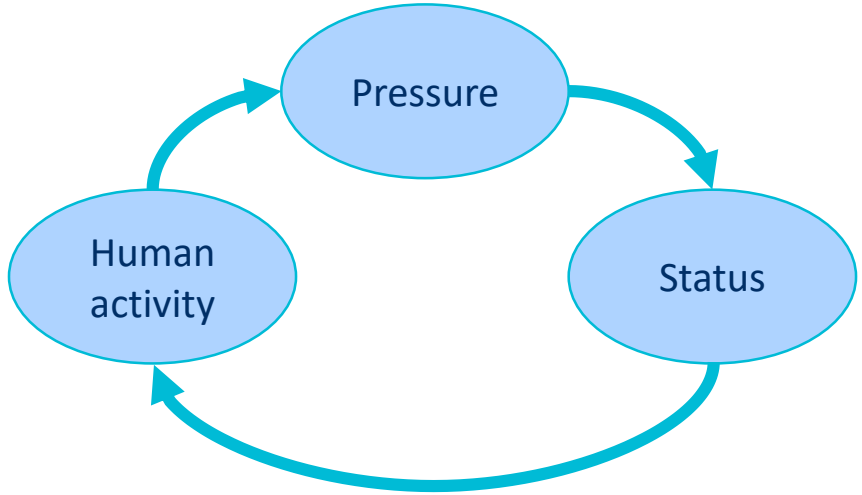
# What is the Problem?

- The environmental status of the sea is not good enough




Source: stateofthebalticsea.helcom.fi

- Environmental issues are important for human well-being and transboundary



# Cumulative impact assessment in Pan Baltic Scope


A way to understand how past, current and foreseeable future human activities may affect the marine environment

to help us minimise risks and support long-term sustainability

Pan Baltic Scope

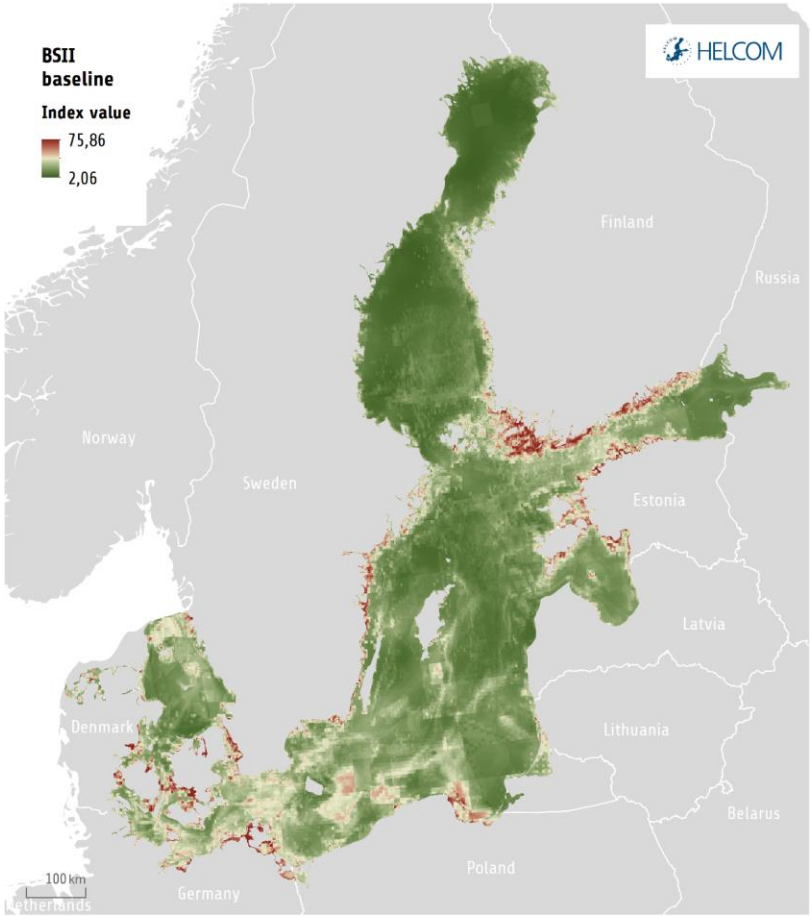
Co-funded by the European Maritime and Fisheries Fund of the European Union

# What did we do?

- ✓Share understanding of how cumulative impacts can be assessed with available tools today (and to what extent)
- ✓Outline key concepts of cumulative impact assessment
- ✓Develop on relationships between cumulative impact assessment in MSP & Marine environmental assessment

# Coherent assessment approaches

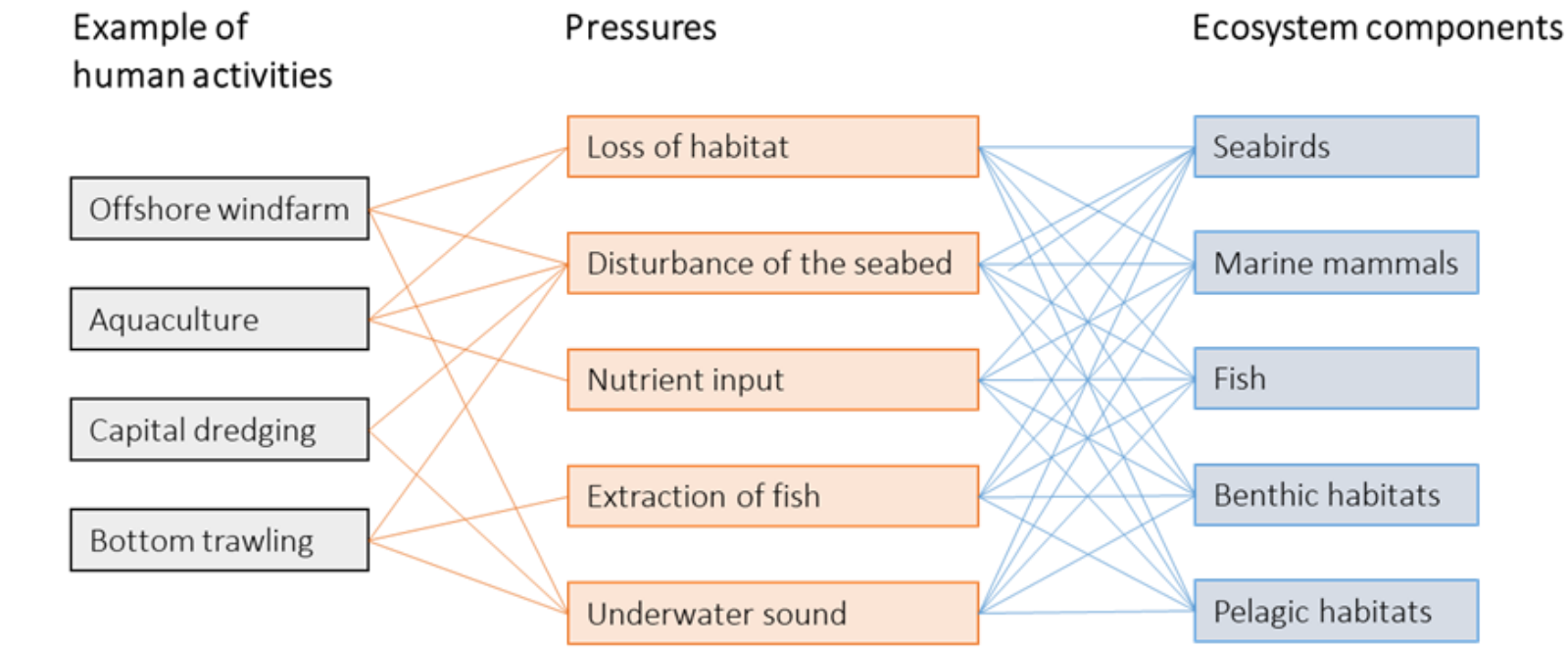
- Common concepts (!)
- Embedded in a shared tool




The **BSII-CAT** hosted by HELCOM

- ”Baltic Sea Impact Index Cumulaive impacts Assessment Tool”
- Openly available including code and regional data

# Linkage models to connect and explore coherence of policies

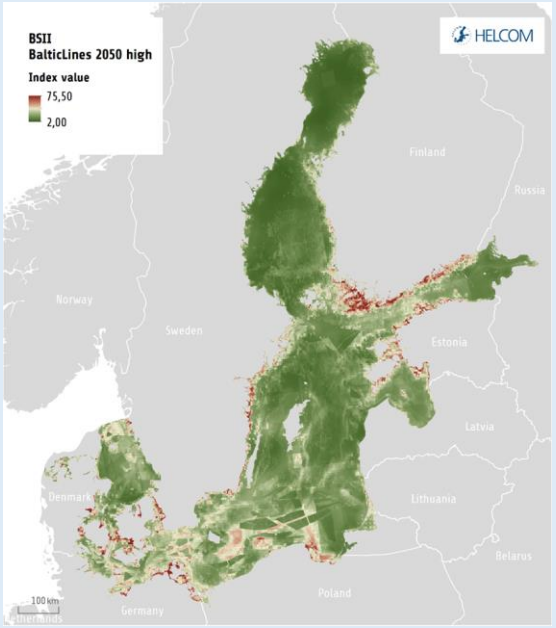



MSP

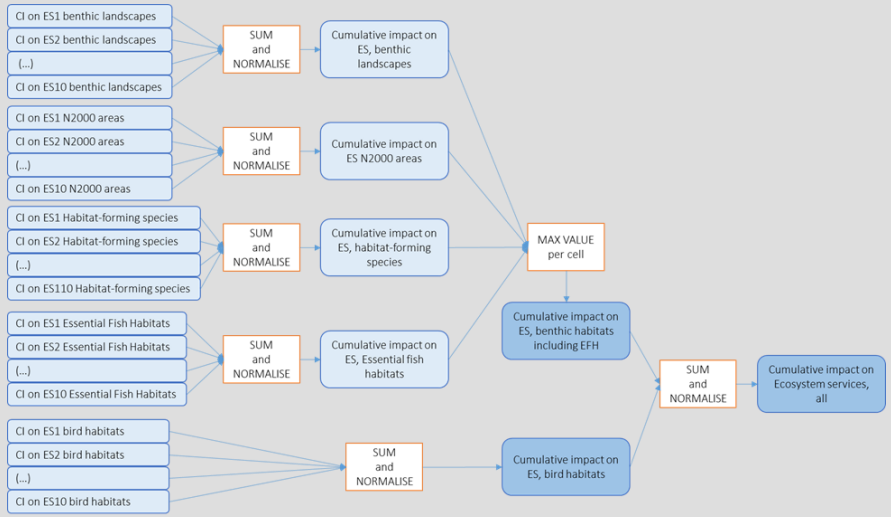
MSFD

# Case studies to test the concepts
## - applications of the BSII CAT

### A. Cumulative impacts under scenarios for off shore windfarm development




### B. Approach to address cumulative impacts on Green infrastructure using maps




**Green infrastructure** =
key areas for ecological value & ecosystem services

# Achievements and findings

Enhance data-driven analyses , so that planning can be supported by data and avoid opinion-based decisions

Follow coherent assessment approaches - to improve comparability of policies and geographical areas

- Continued need to refine assessment methods
- Data availability and knowledge on ecological relationships are still major knowledge gaps

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# Thank you!

Find out more in our report:
Cumulative Impact Assessment for Maritime Spatial Planning in the Baltic Sea Region
Available at panbalticscope.eu

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

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# PlanWise4Blue
# A model for better decisions at sea

Triin Lepland

Estonian Ministry of Finance

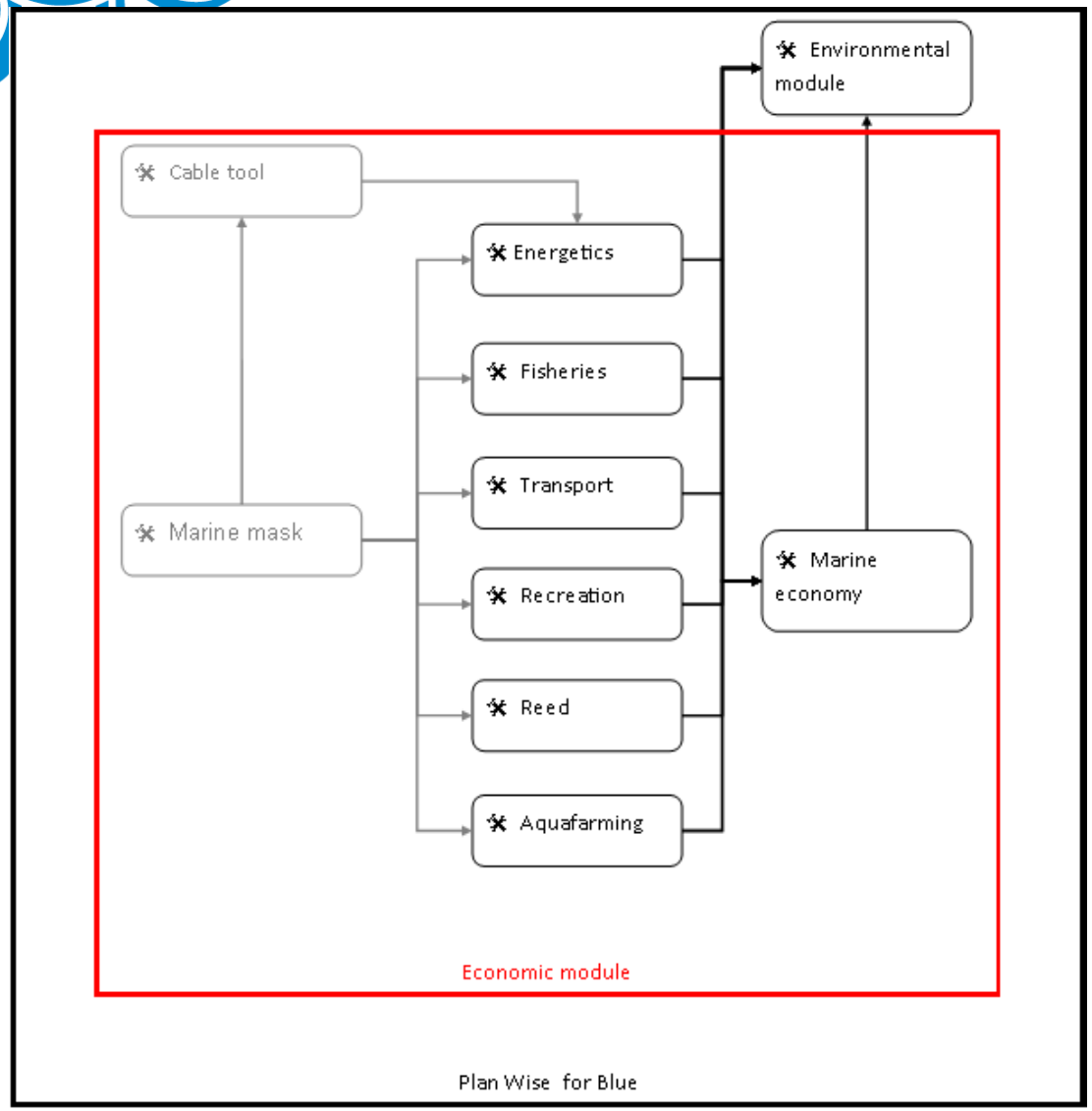
Co-funded by the European Maritime and Fisheries Fund of the European Union

# Why we needed a model?

- How can we assess economic impacts and how to conduct cumulative impact assessment?
- Experts can make assessments and assumptions about impacts
- How can we make it understandable for decision makers and for public?

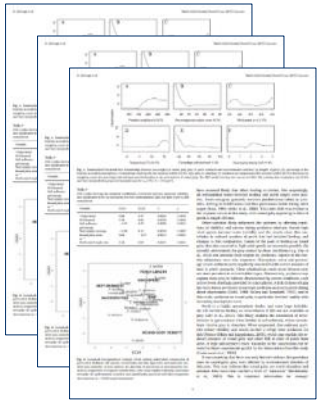
- **We need something tangible and simple to understand for everybody– we need a model!**

# PlanWise4Blue

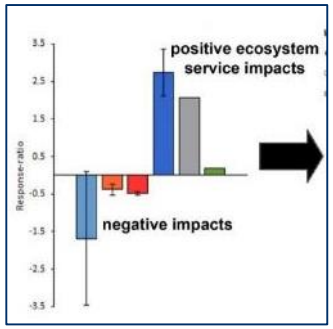



- Combines models of marine economy and cumulative impact assessment;
- Spatial resolution: 1 $km^2$
- Temporal timescale 1 year

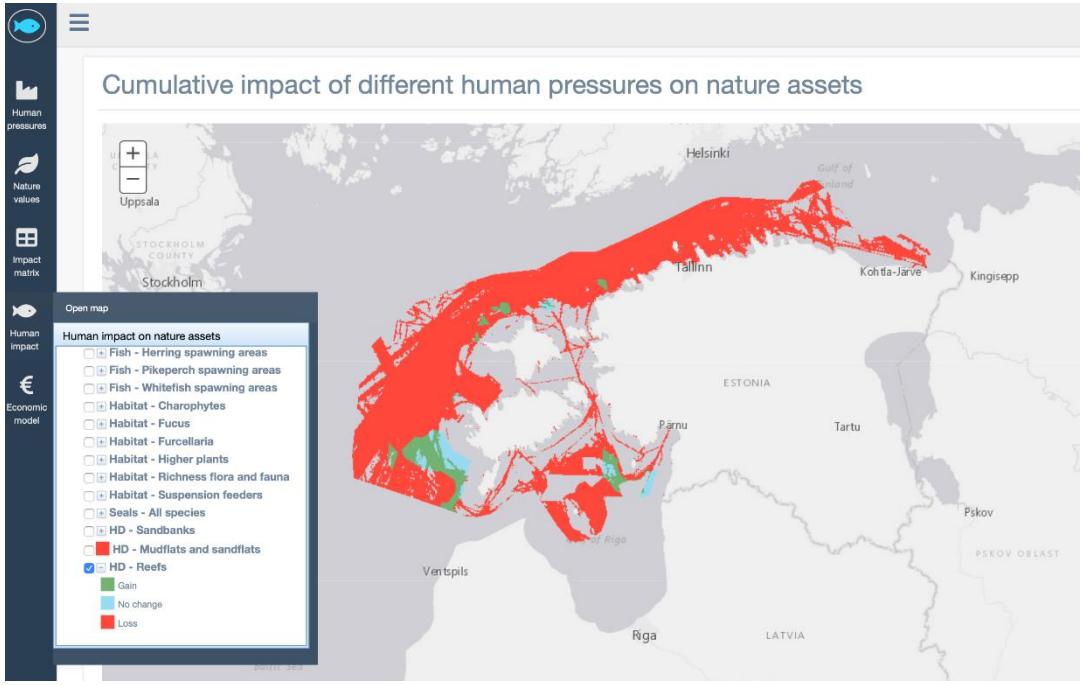
# Algorithm for cumulative impact assessment



**Extract** data from existing relevant publications




**Meta-analyses** and calculation of effect sizes

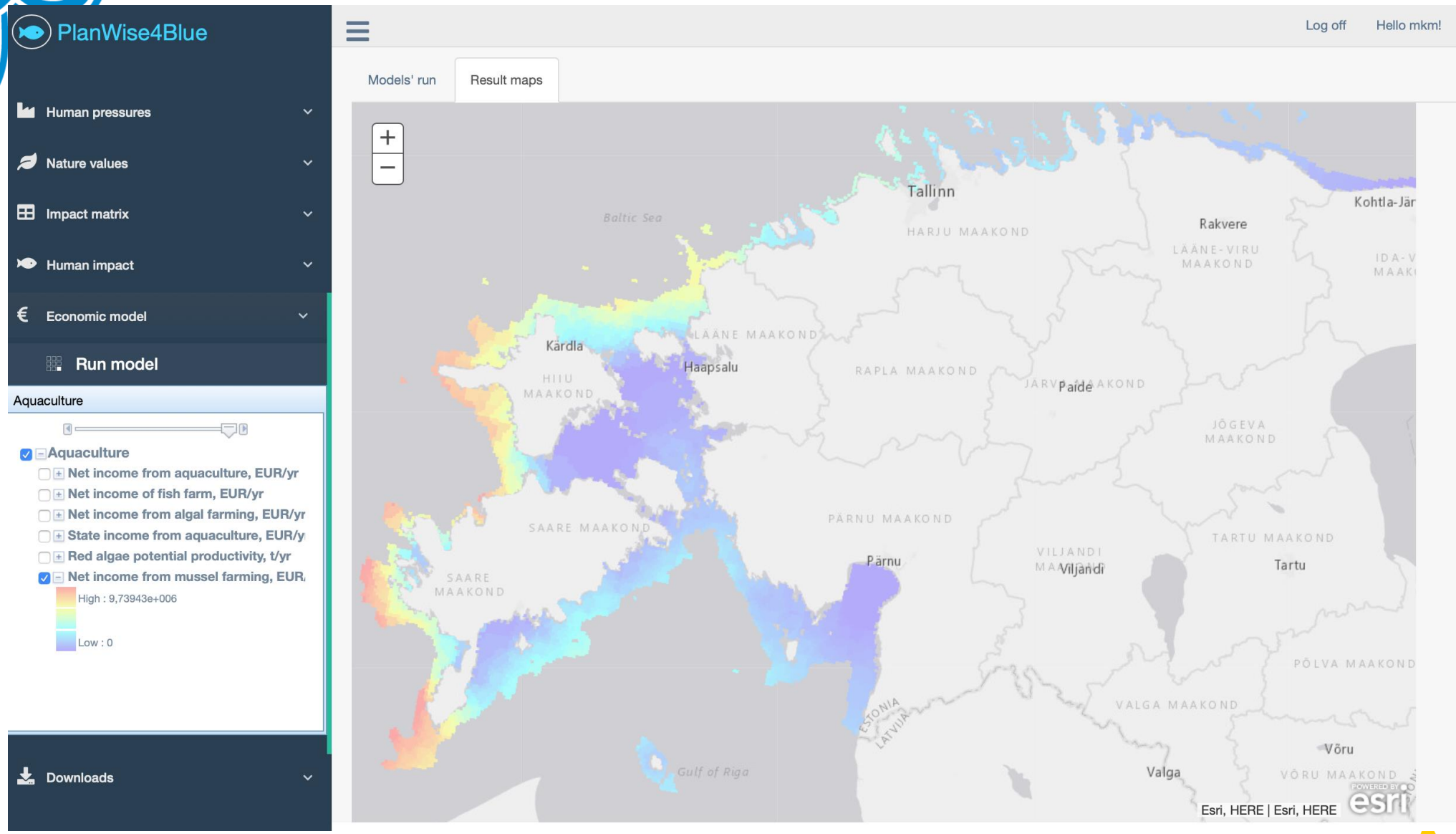



**Combine effect coefficients** with **distributions** in impact assessment tool

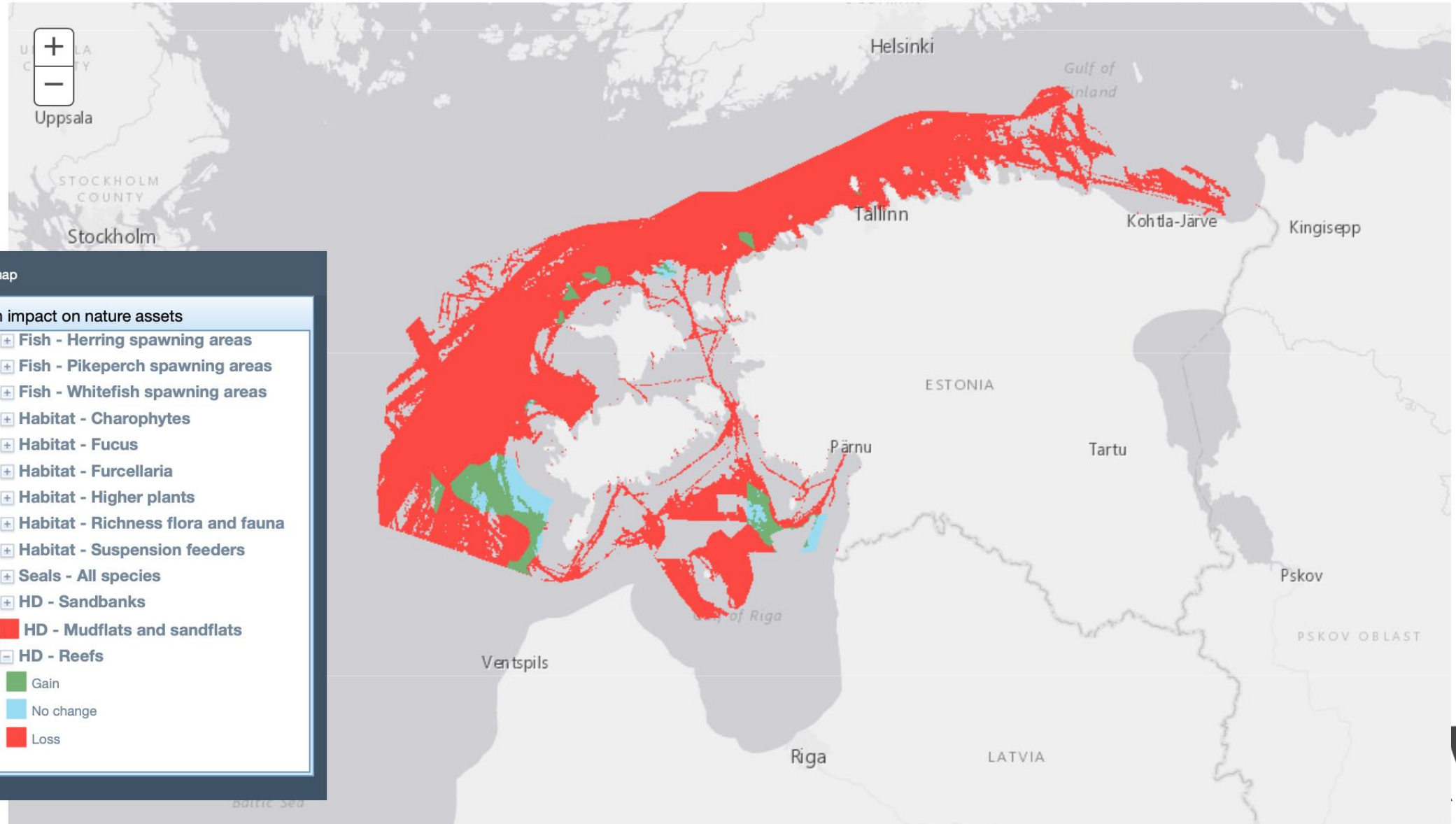
# Uses of the model

- Assesses economic benefits of sectors such as fisheries, aquaculture, reed harvesting, wind energy, maritime transport and recreation;
- Assesses cumulative impacts of human uses on various natural resources;
- Displays values of ecosystem service (provisioning, regulating and maintenance services) indicators across Estonian sea space;
- Assesses the effect of various scenarios to model output.

# Aquaculture economic model output



# Cumulative impact of different human pressures on nature assets




Human pressures

Nature values

Impact matrix

Human impact

Economic model

Open map

Human impact on nature assets

- Fish - Herring spawning areas
- Fish - Pikeperch spawning areas
- Fish - Whitefish spawning areas
- Habitat - Charophytes
- Habitat - Fucus
- Habitat - Furcellaria
- Habitat - Higher plants
- Habitat - Richness flora and fauna
- Habitat - Suspension feeders
- Seals - All species
- HD - Sandbanks
- HD - Mudflats and sandflats
- HD - Reefs
  - Gain
  - No change
  - Loss

## Limitations

- usable rather as a discussion platform
- 1 $km^2$ might not be enough for managing coastal areas
- Does not account for indirect benefits to the economy
- Only accounts for Estonian sea space and does not consider cross-border effects

## Enhancements

- Periodically update input data layers and algorithms;
- Enhance predictive capacity and reduce uncertainty;
- Analyse model sensitivity;
- Add a component to account for value added chain in the economy model;
- Integrate new economic developments into the model;
- Expand the model spatially .

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BALTIC 3rd FORUM MSP

## Thank you!

triin.lepland@fin.ee

European Commission

United Nations Educational, Scientific and Cultural Organization

Intergovernmental Oceanographic Commission

Sustainable Development Goals

VASAB VISION & STRATEGIES AROUND THE BALTIC SEA

UNIVERSITY OF LATVIA ANNO 1919

Pan Baltic Scope

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# Methods for cumulative effects assessment of wind farm development in the North Sea

Marie Dahmen & Rob Gerits

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

# Wind energy development in the North Sea

**Political Declaration on energy cooperation between the North Sea countries in 2016**

- to facilitate the further cost-effective deployment of offshore renewable energy, in particular wind, through **voluntary cooperation**, with the aim of ensuring a **sustainable, secure and affordable energy supply** in the North Seas countries

- Wind energy installed: 15 GW > Planned for 2030: 50 GW > Scenario 2050: 180/250 GW

Work areas for energy cooperation

**SG1: Maritime Spatial Planning + CEAF**
SG2: Development and Regulation Offshore Grids
SG3: Support Framework and Finance
SG4: Standards, Technical Rules and Regulations

Dec 2019: Decision on new declaration

SEANSE

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

# **S**trategic **E**nvironmental **A**ssessment on **N**orth **S**ea **E**nergy

DG Mare Project: 02.2018 – 01.2020

**Objective**: To develop a coherent approach to Strategic Environmental Assessments with a focus on renewable energy in support of the development and effective implementation of MSPs.

- Developing a coherent approach to SEAs, with a focus on renewable energy and **testing it in practice through case studies**;
- Creating a coherent understanding of how and when to use **SEA as a support tool for decision-making** in MSP through knowledge transfer and information exchange;
- Demonstrating the benefits of the implementation of a coherent SEA approach […]

# A Common Environmental Assessment Framework

**CEAF** = a tool for cumulative ecological effect assessment of wind farm developments in the North Seas to support MSP decision making

## Approach

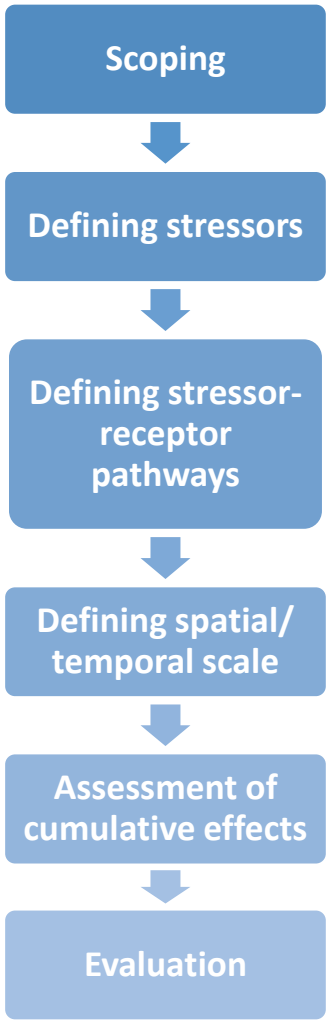
- Stepwise approach based on OSPAR approach
- Effect assessment of wind farm developments per (selected) species

## Input

- Species specific information of the biogeographic population
- Technical, temporal and spatial characteristics of all wind farms developed in this biogeographic region

## Results

- Total and national numbers of disturbed or killed animals (birds), population impacts (harbour porpoise)



# SEANSE case studies

Different scenarios of North Sea wide wind farm developments – 2023, 2030, 2030 +

- for prioritized pressures: pile driving noise, collision, displacement
- RWS/BSH study on 5 representative species of international concern;

**Harbour porpoise** (*Phocoena phocoena)* on underwater sound during construction;

➢ tools: Aquarius + iPCOD and DEPONS

**Black-legged kittiwake** (*Rissa tridactyla*) and **lesser black-backed gull** (*Larus fuscus*) on collision risk;

➢ tools: SOSS Band (2012) and Stochastic CRM (2018)

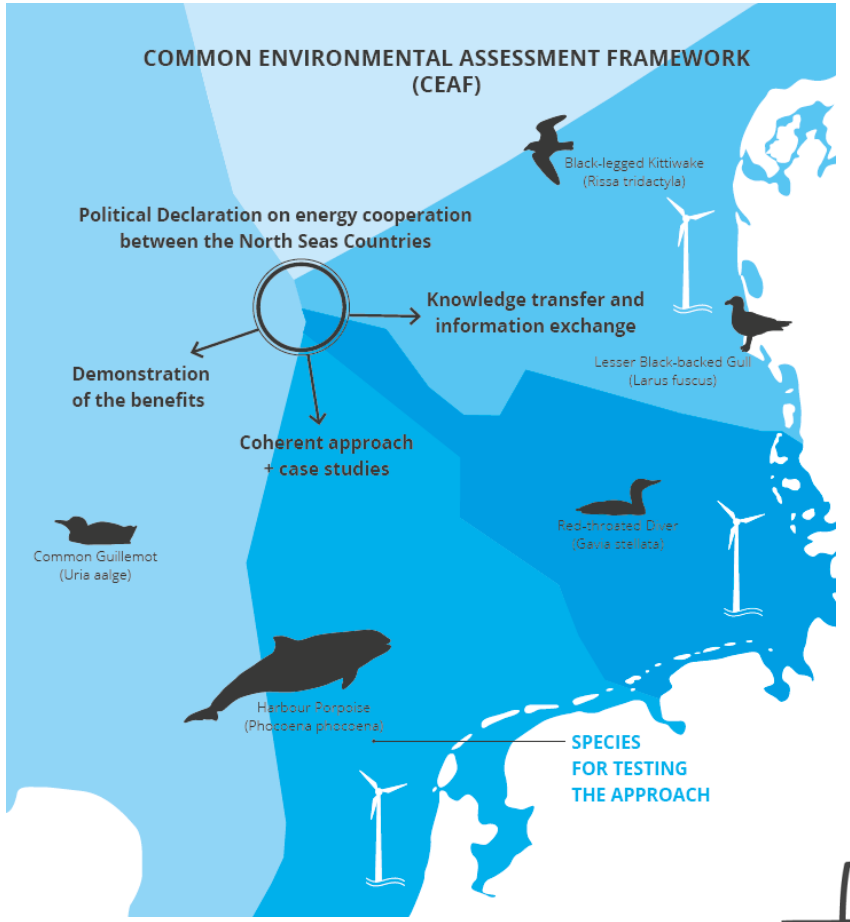
**Red-throated diver** (*Gavia stellata*) and **common guillemot** (*Uria aalge*) for displacement/habitat loss

➢ tools: SeaBord/Matrix (MSS), BSH/RWS calculation approaches

# Expert workshop on cumulative effects offshore wind

## Goals

- Gain a broader and deeper understanding of the variety of methods and models used for marine wildlife and environmental assessments
- Map out different experiences in working with these methods and models
- Explore complementarities, conflicts and common grounds between these methods and models and their application
- Identify concrete and immediate steps for improving and integrating these methods and models



# Conclusions and points for discussion

| | |
|---|---|
| Complexity of the ecosystem | Need to measure environmental impacts |
| Models can help to assess environmental impact | Models can be misleading if results are used for SEA |
| Red lines for the decline of population size are needed | Thresholds only apply for a certain location and are not transferable |
| Precautionary approach on ecosystems should be 'the default setting' of EIA | Renewable energy development as a means to combat the global climate crisis includes rapid upscaling of offshore-wind |

- Modelling approaches can be applied under conditions for comparing MSP options on national and international level
- The results of the case studies do not facilitate evaluations on acceptability of effects on international level

# Recommendations and further steps

- **Applying an adaptive management approach and developing a roadmap** to improve existing methods and models that support decision-making in MSP
- **Improving data accuracy** by acknowledging existing gaps and generating further data on distribution and behavior through monitoring and research cooperation
- **Comparing outcomes of different models** (e.g. DEPONS and iPCoD) and potentially integrating them (e.g. CRM and displacement approaches)
- **Developing individual-based models:** Taking individual behavior into account can be complex, but could increase the understanding of environmental impacts over time
- **Providing guidance for authorities** on how to use model results (data processing and advice by environmental working group)
- **Discussing alternative approaches** to assess and manage cumulative environmental effects, e.g. through mapping of sensitive habitats
- **Institutionalizing the dialogue** among authorities, researchers and model builders on how to assess, evaluate, monitor and mitigate cumulative effects of offshore wind energy development

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**SEANSE Final Conference**

9-10 January 2020

Rotterdam

## Thank you!

More information:
https://northseaportal.eu

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# Climate change as pressures for cumulative impact assessments

Dr Jonas Pålsson

Swedish Agency for Marine and Water Management

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

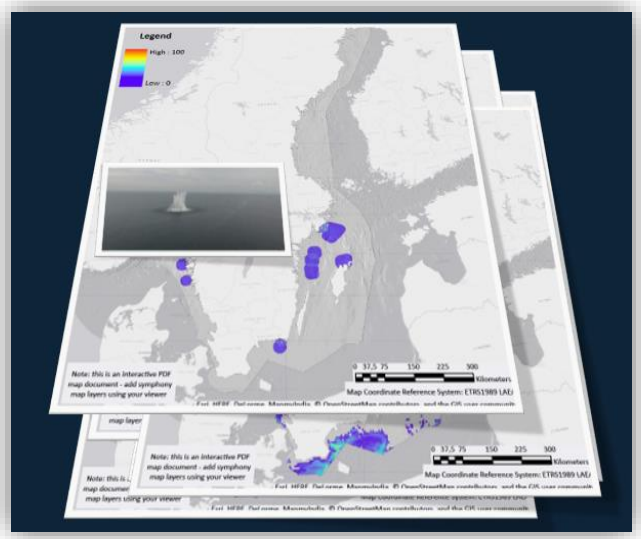
# Symphony

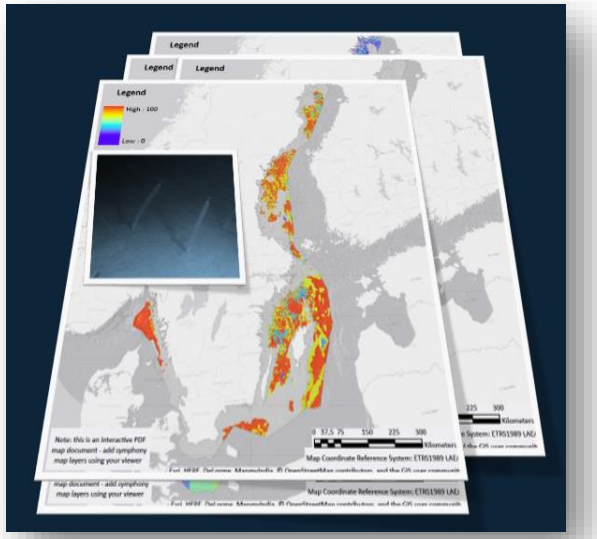
Equation

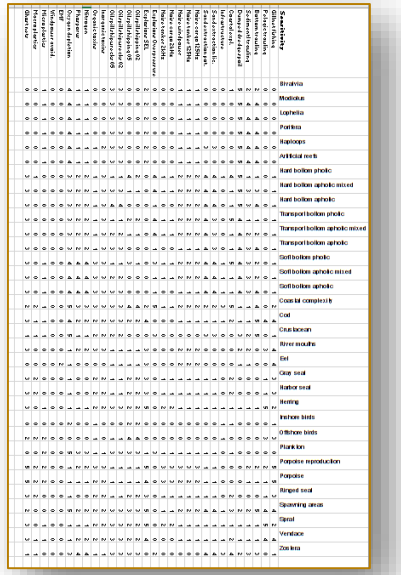
$$P_{sum} = \sum_{i=1}^{n} \sum_{j=1}^{m} B_i \times E_j \times K_{i,j}$$

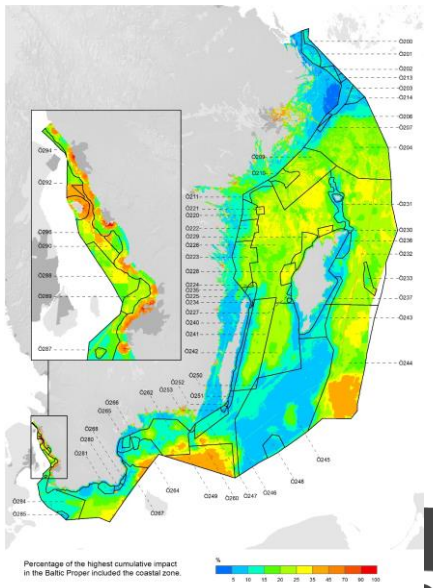
**Cumulative impact** (*P*) is calculated as the sum of the product of all pressures' (*B*) effects on all ecosystem components (*E*), given the particular sensitivity (*K*) of every ecosystem component to every pressure.

40 pressures × 32 nature values × Sensitivity matrix = Results

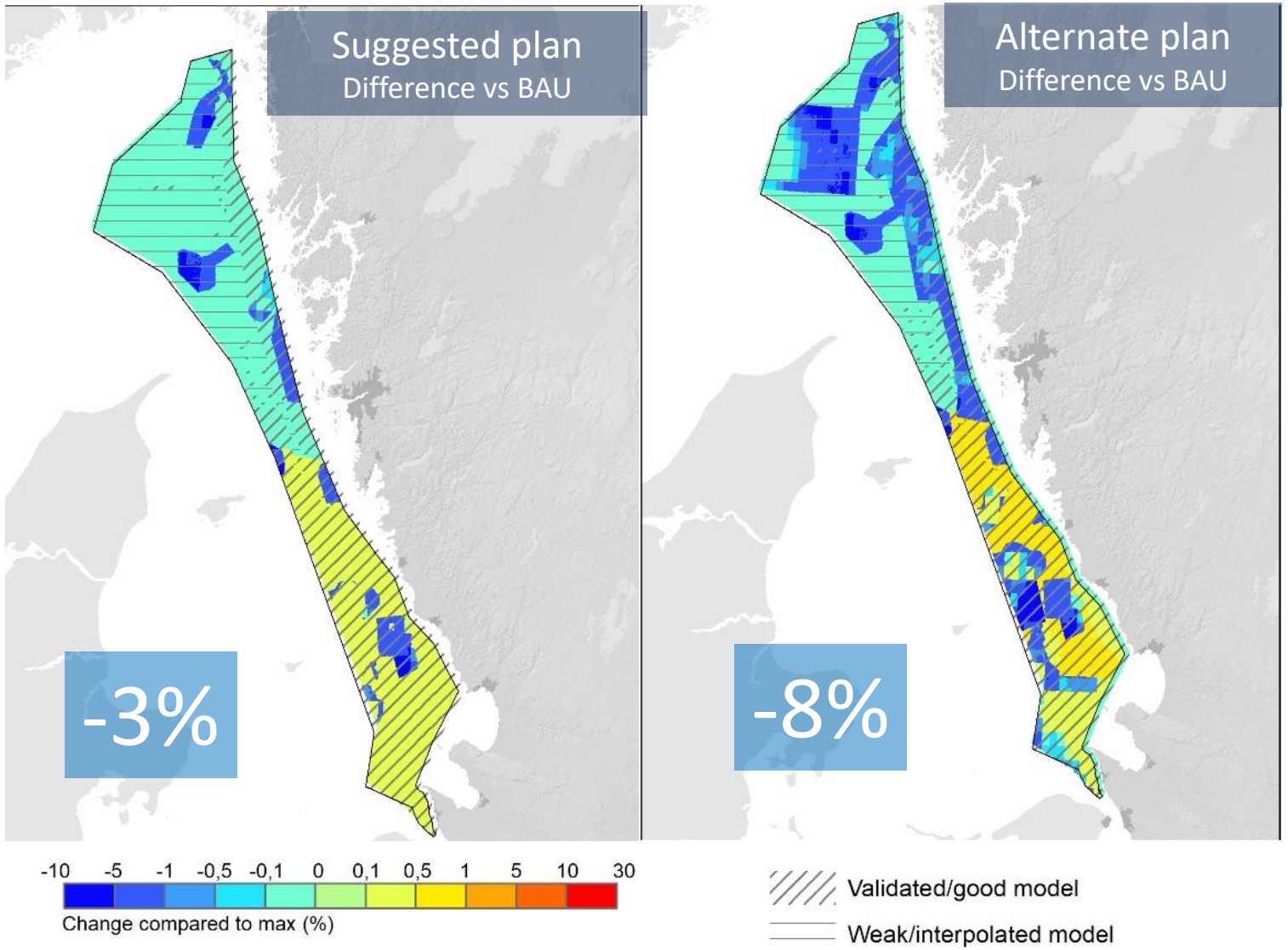








# Scenariobuilding

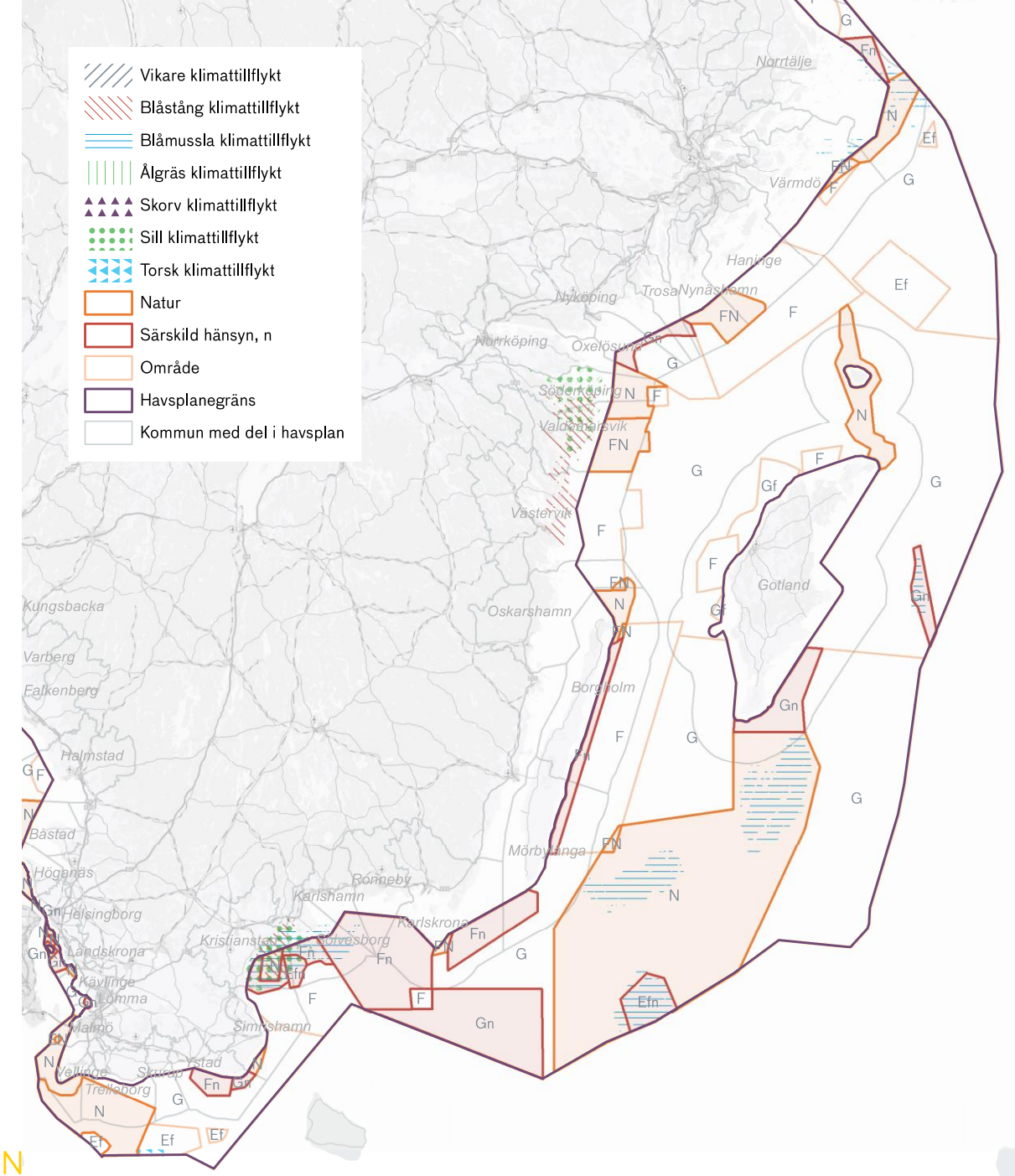


# Climate refuges

- Climate into MSP 2017

- Simple habitat model
- IPCC 2007 adaptation
  - SMHI 2011

- Special consideration nature
- Future protection?



# Update

- IPCC 2014
- SMHI 2019 adaptation
  - (Saraiva et al., 2019)

- 2085
- RCP 4.5
- RCP 8.5

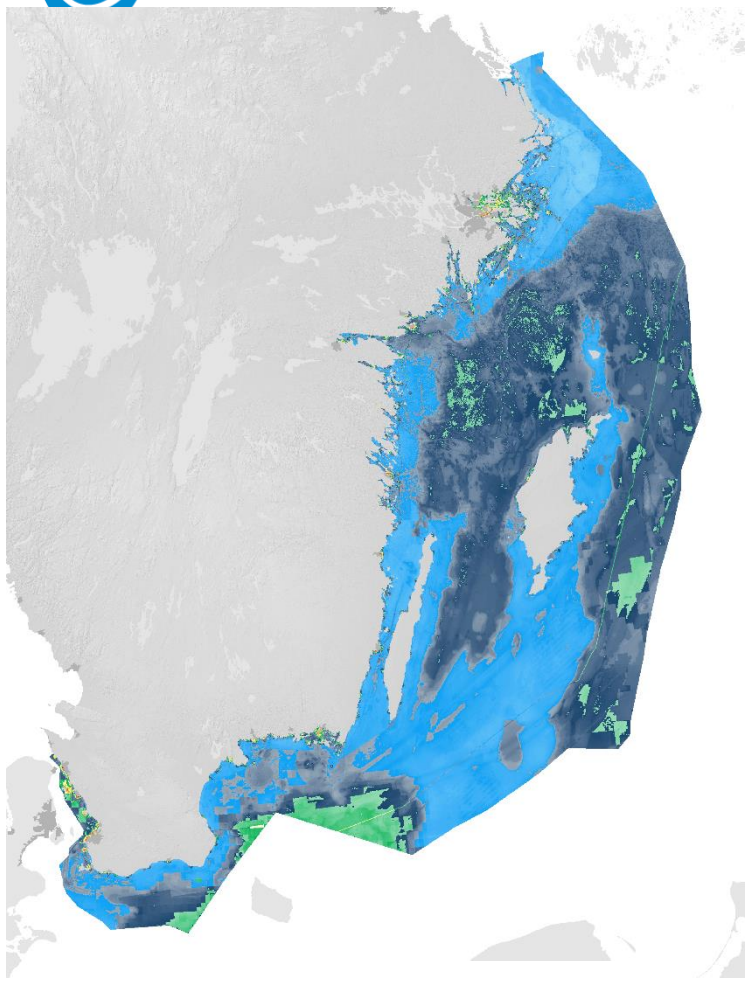
- New pressures
  - Salinity (bottom/surface)
  - Temperature (bottom/surface)
  - Ice cover

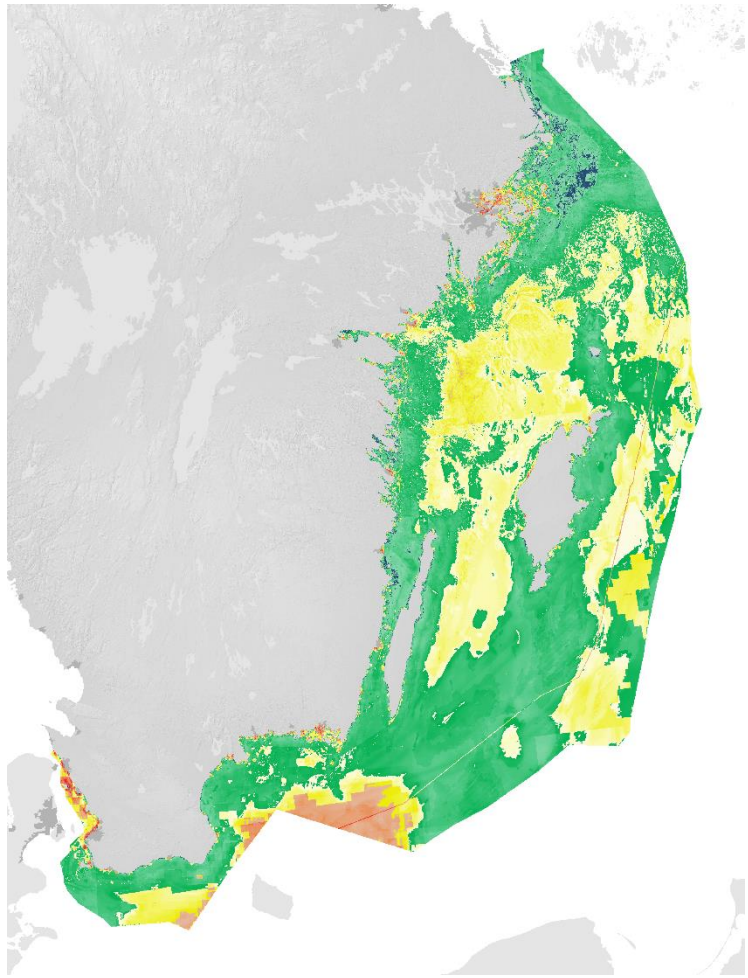
# Baltic Sea 2085

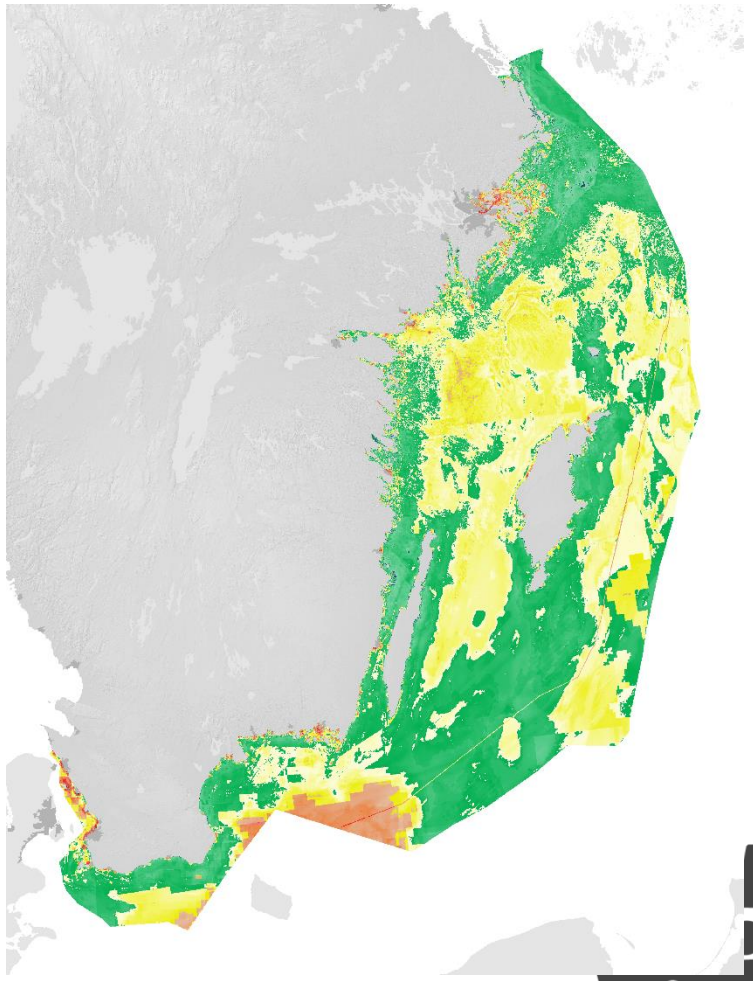
Now

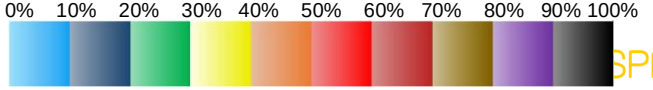
RCP 4.5

RCP 8.5



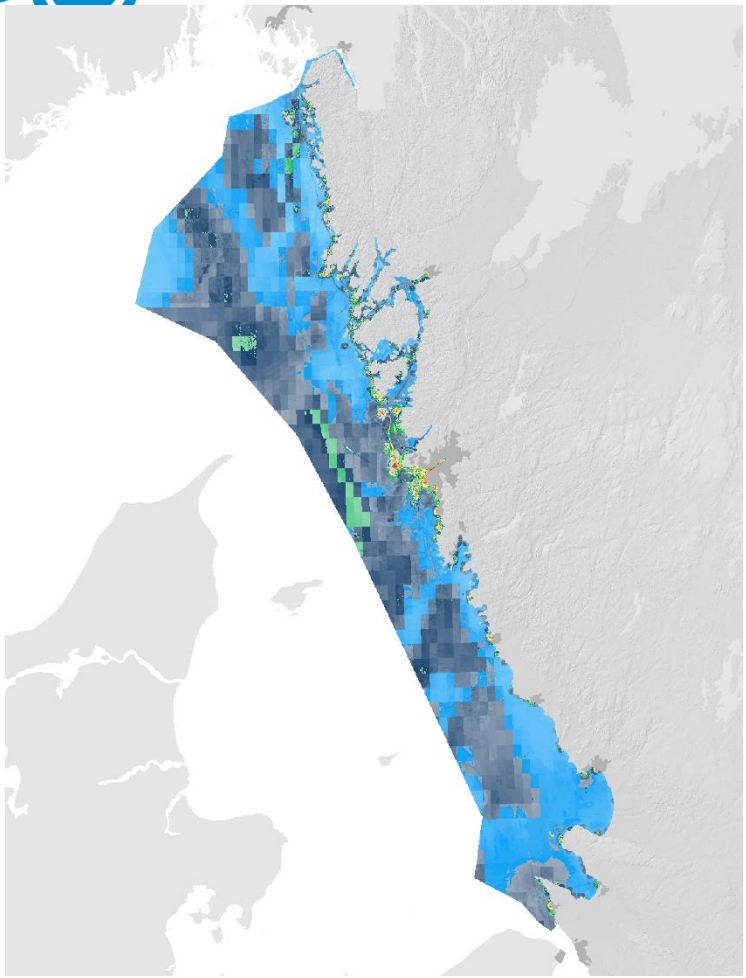




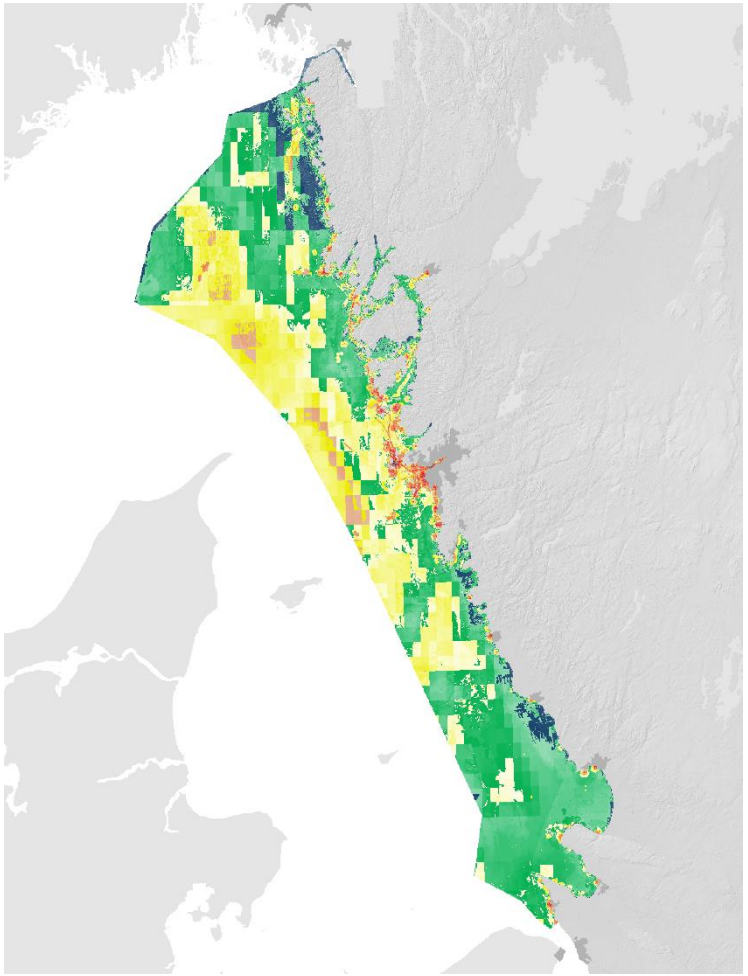


# West coast 2085

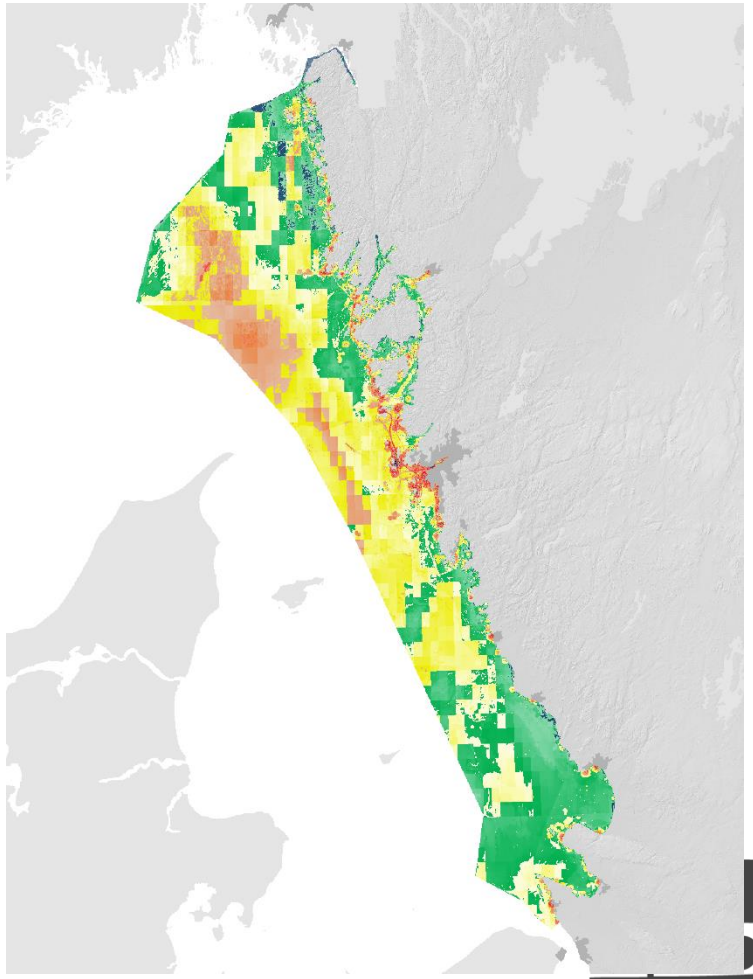
**Now**



**RCP 4.5**



**RCP 8.5**



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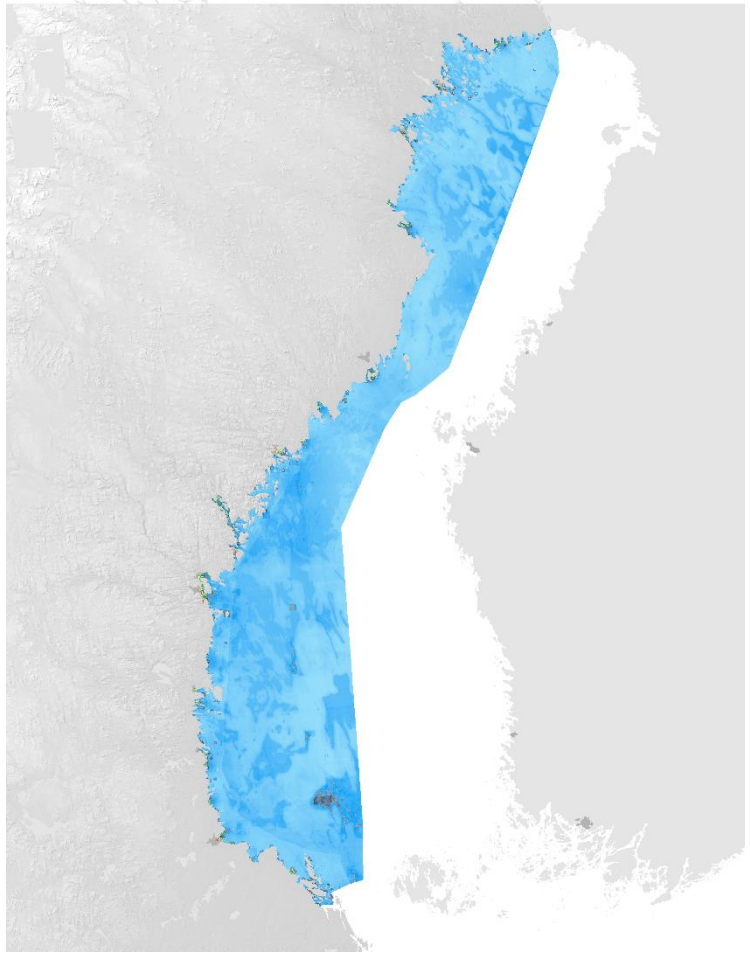
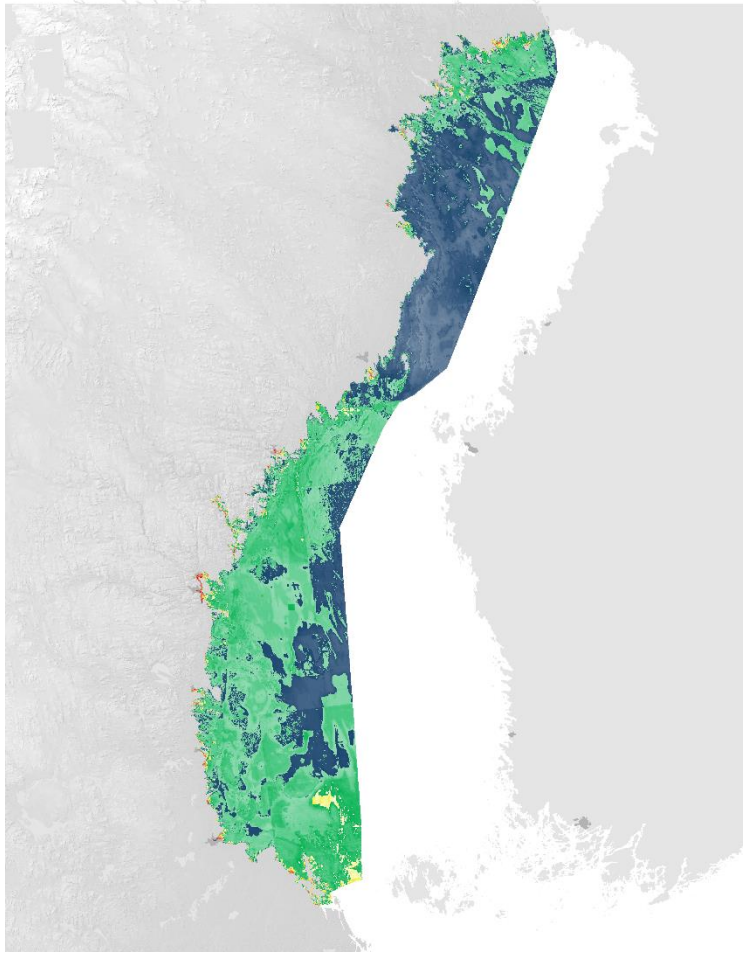
# Bothnian Bay 2085

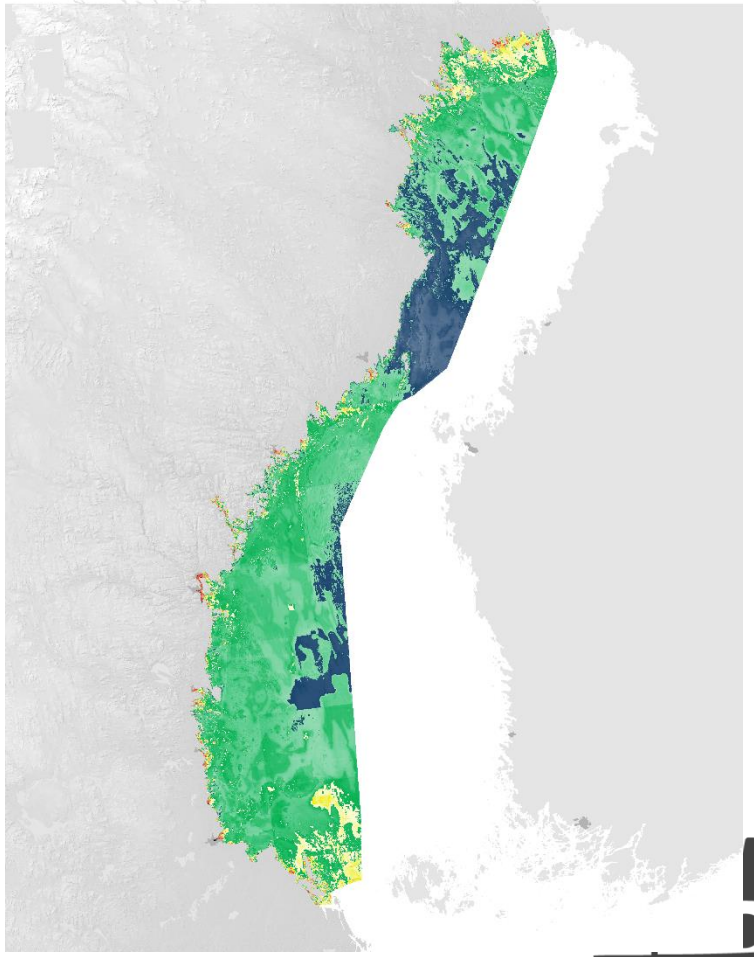
**Now**



**RCP 4.5**



**RCP 8.5**



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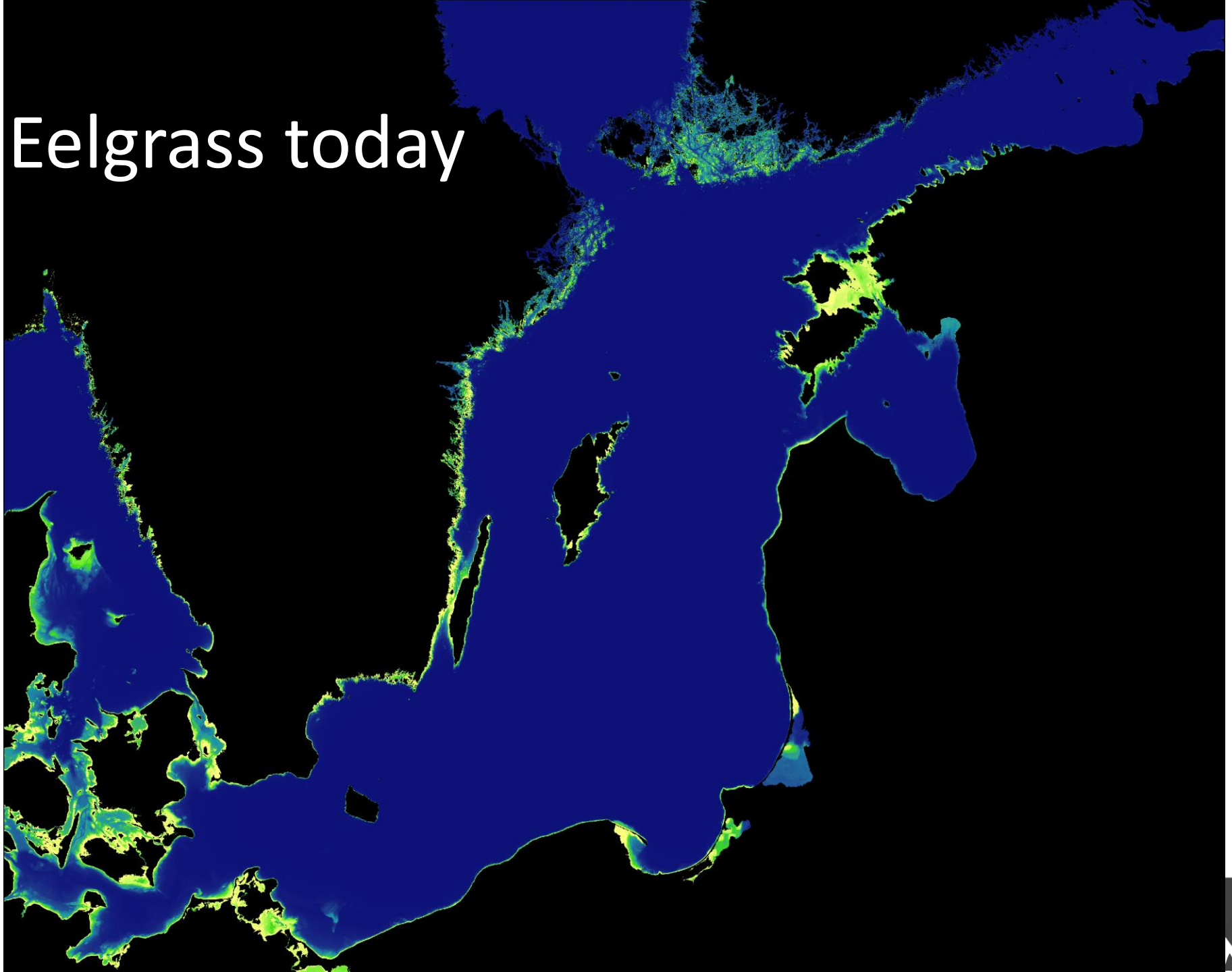
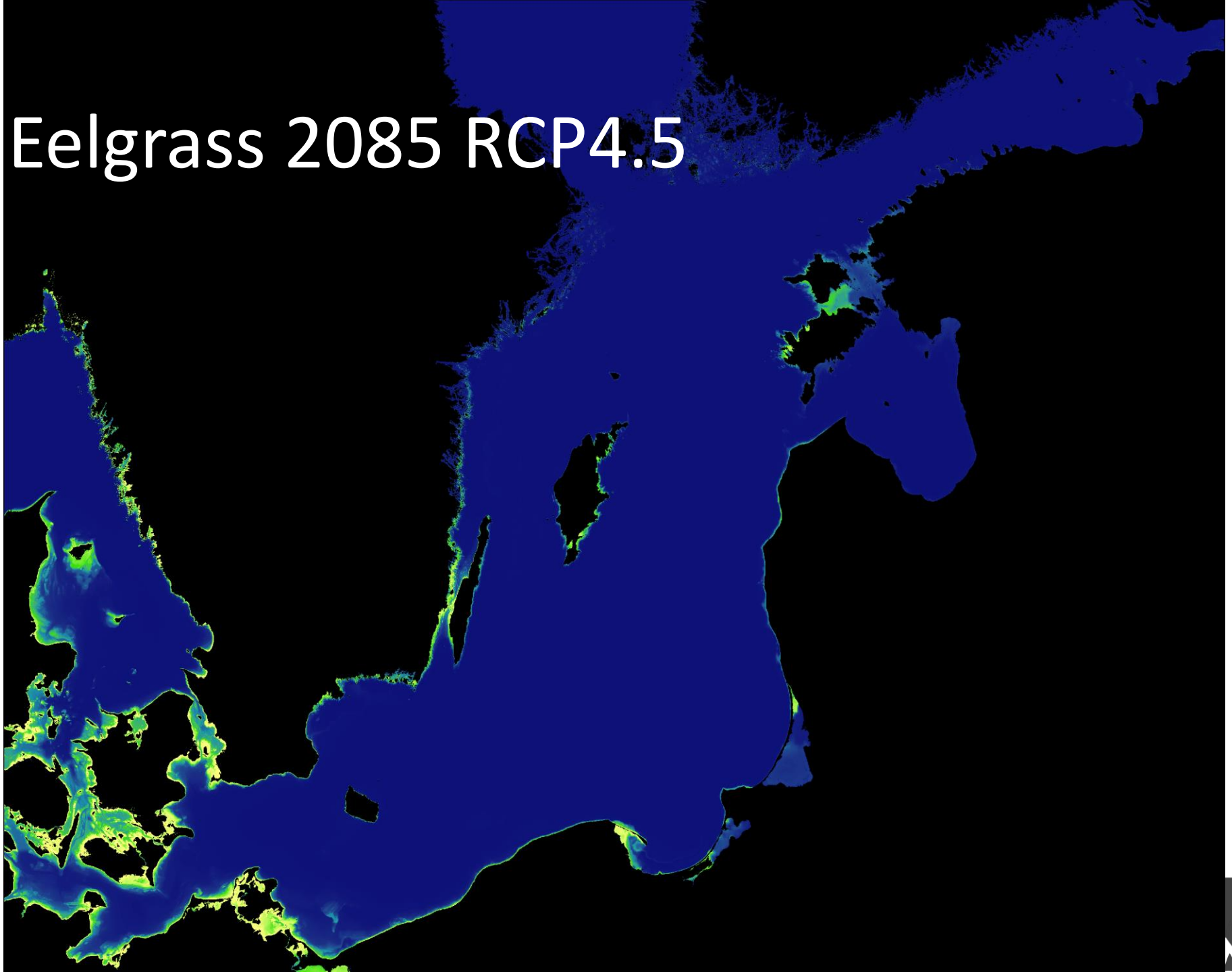
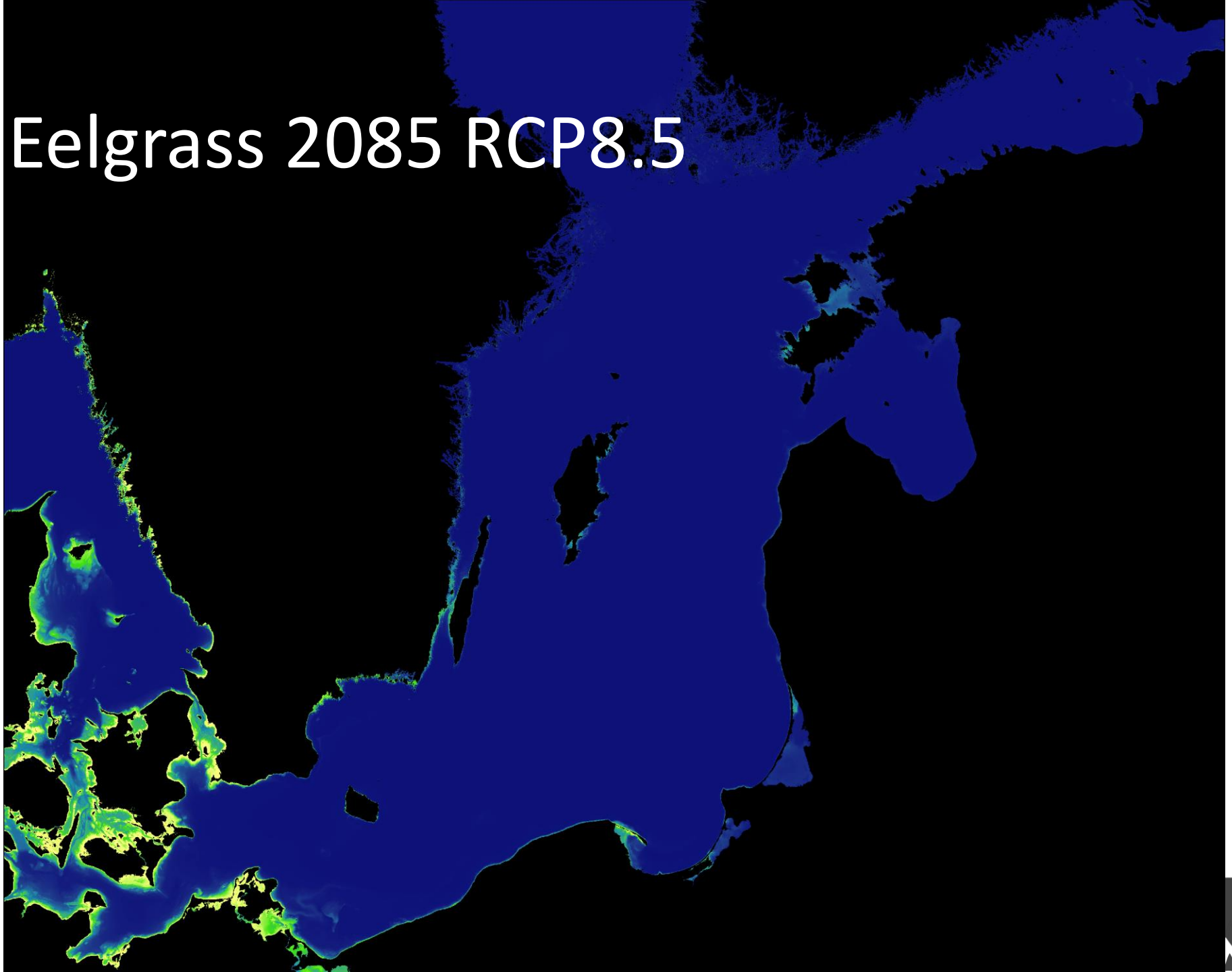
# Eelgrass today



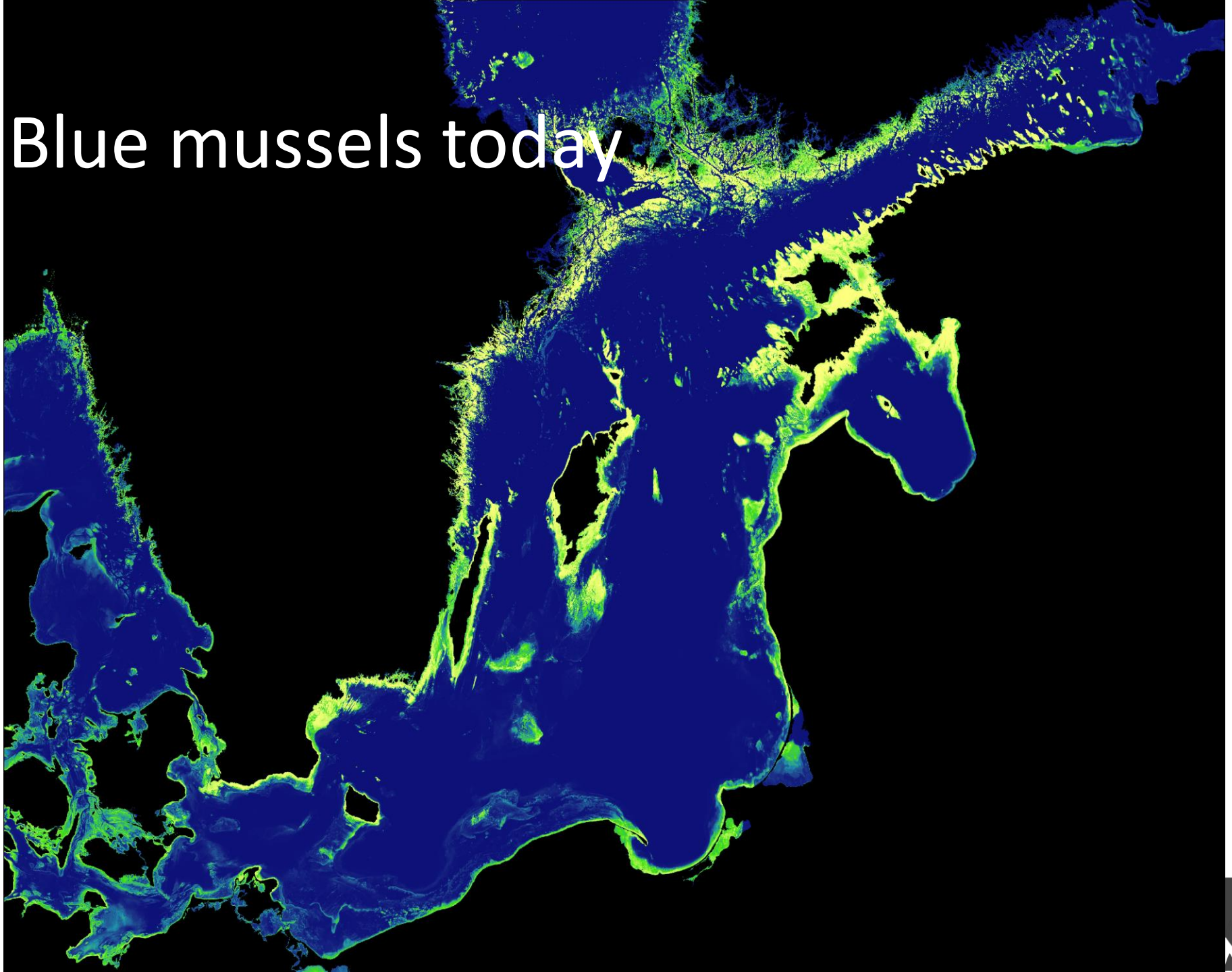
# Eelgrass 2085 RCP4.5



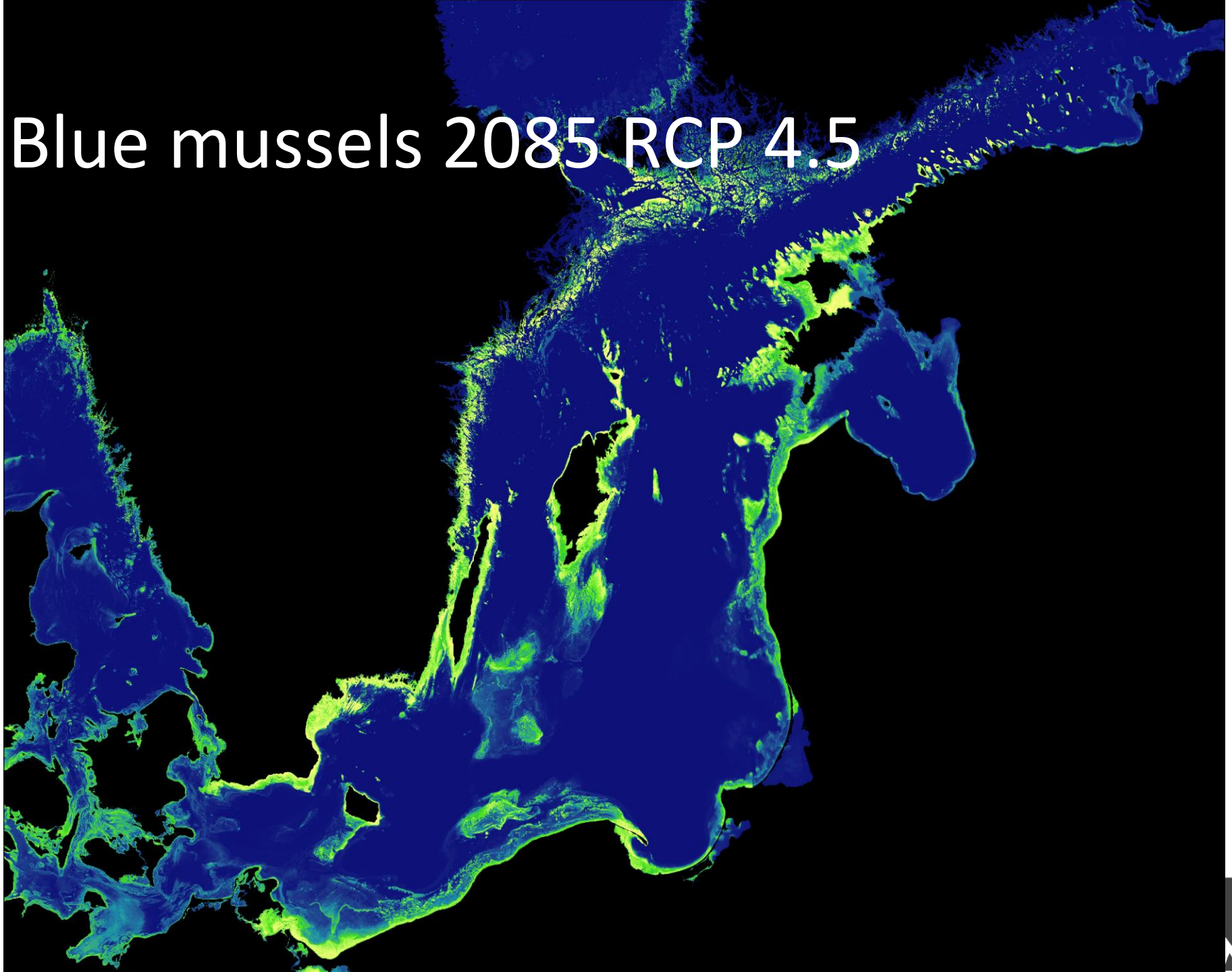
# Eelgrass 2085 RCP8.5



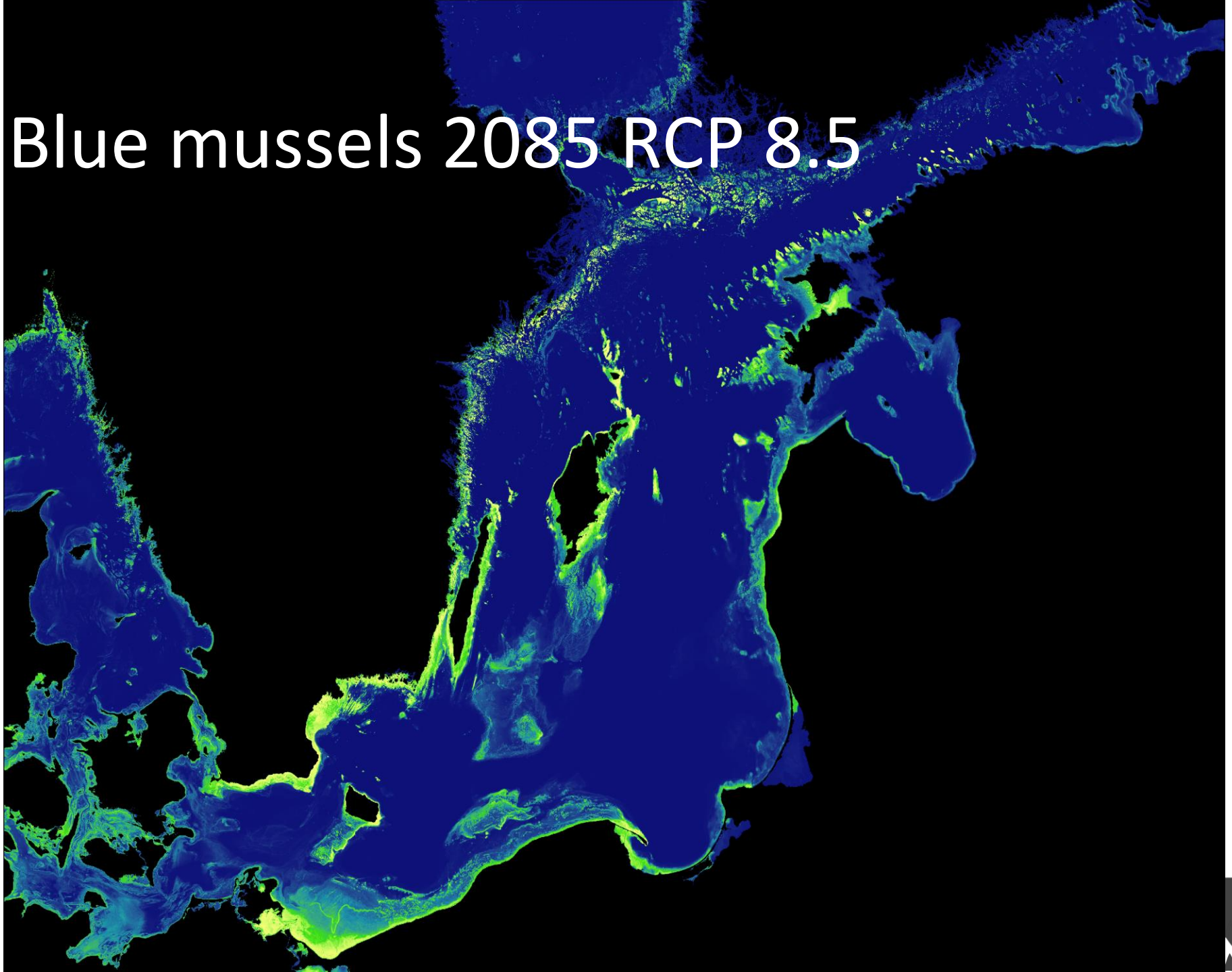
# Blue mussels today



# Blue mussels 2085 RCP 4.5

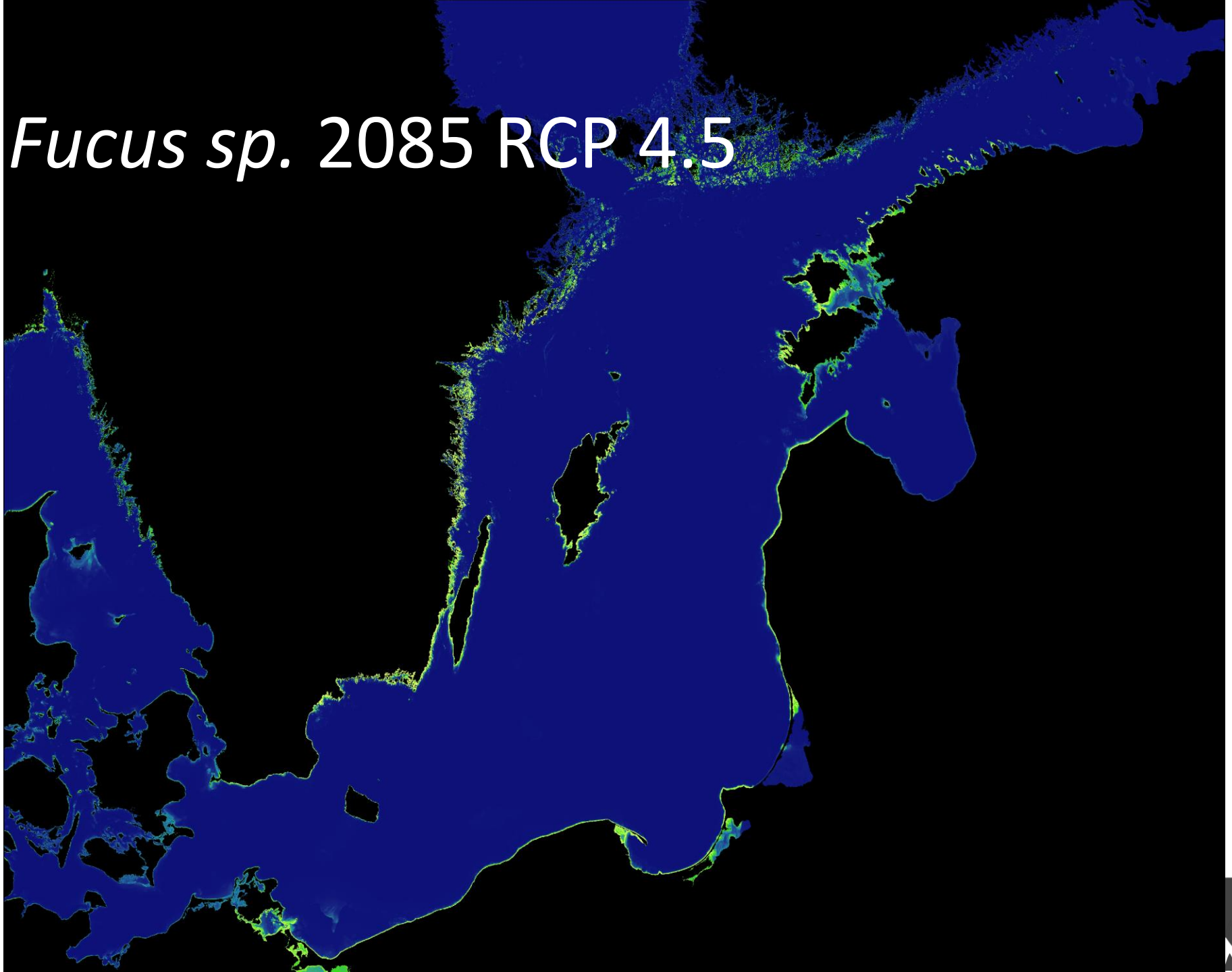


# Blue mussels 2085 RCP 8.5

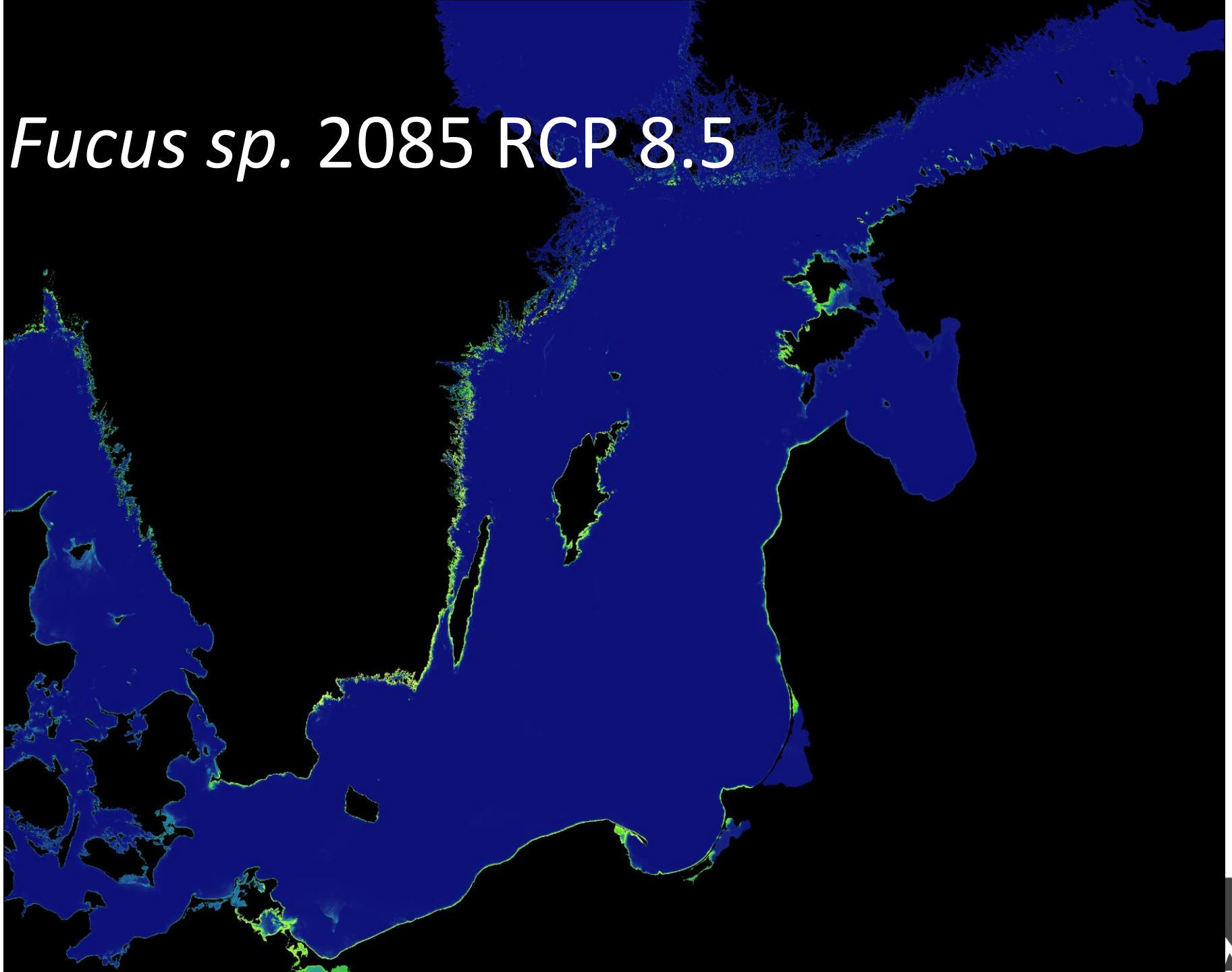


# *Fucus sp.* today

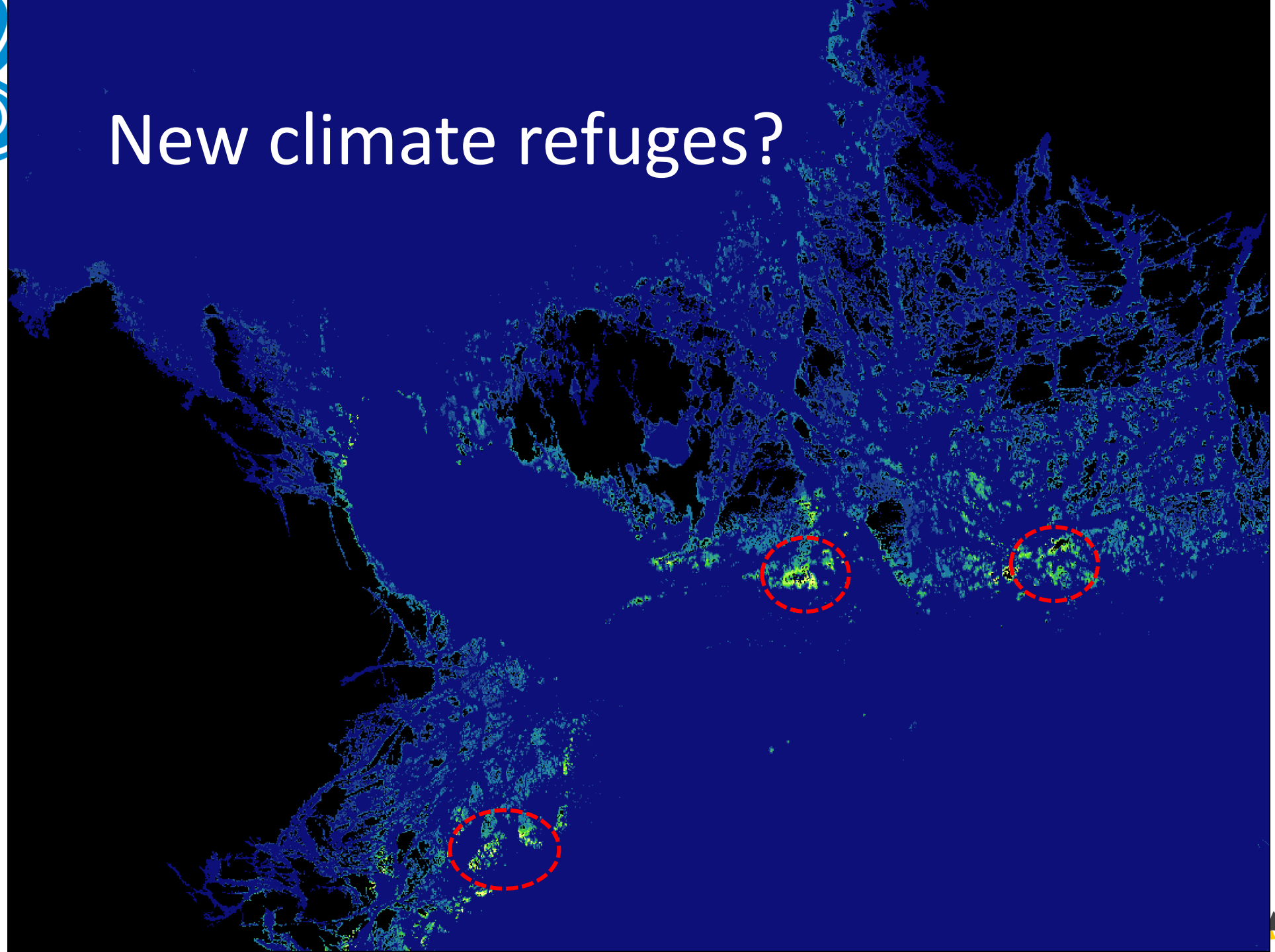
# *Fucus sp.* 2085 RCP 4.5



# *Fucus sp.* 2085 RCP 8.5



# New climate refuges?



# Conclusion

- **Climate as new pressures?**
  - Simple modelling
  - Problems setting sensitivity scores
    - Expert opinion
    - What is impact of mean change?
  - Overestimates impact?
    - Everything is affected

- **Climate as new layers?**
  - Lots of modelling
  - More accurate
    - Data driven
    - Species specific models
  - Underestimates impacy?
    - Species disappear – less impact

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# Global Meets Regional

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## Thank you!

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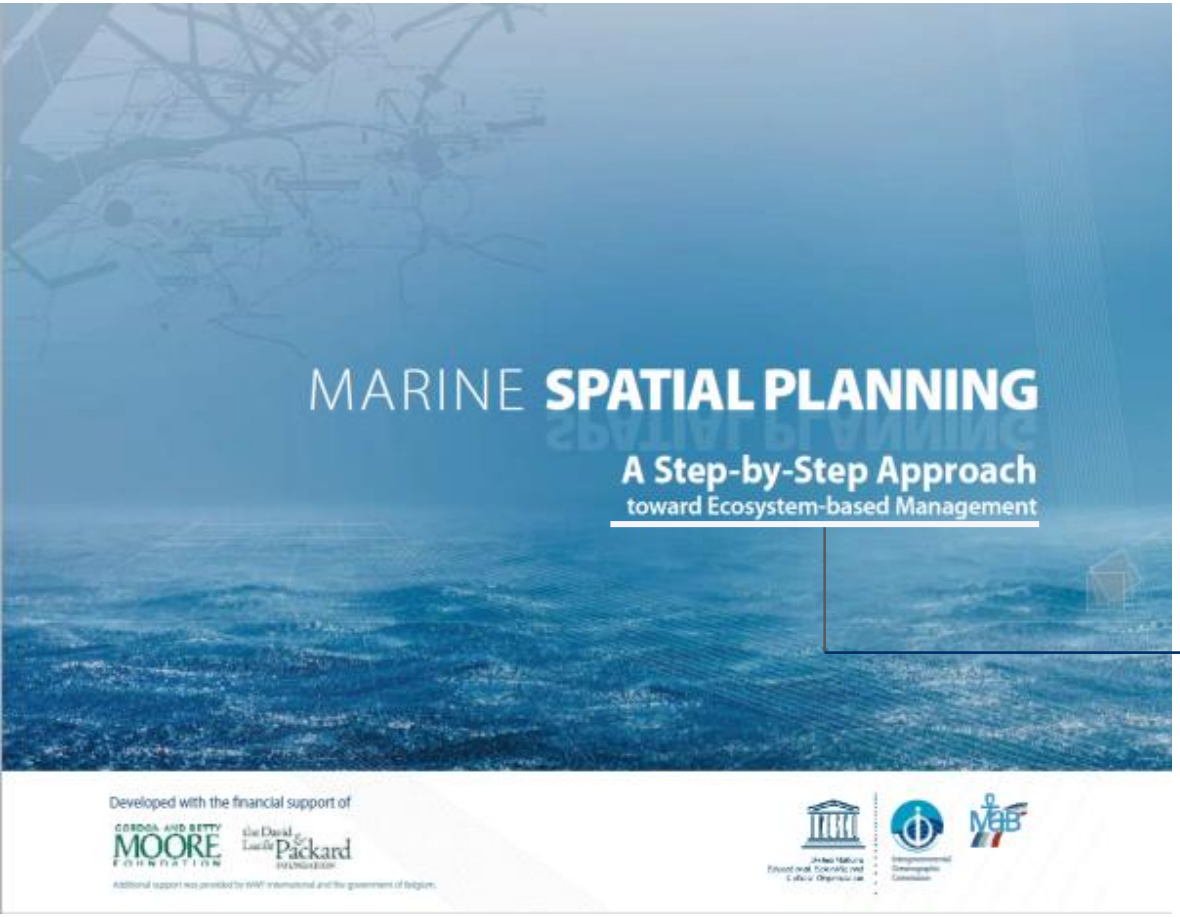
# Conceptual understanding and applicability of cumulative impact assessment in MSP. The Western Mediterranean case.

Cristina Cervera Núñez, IOC-UNESCO

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

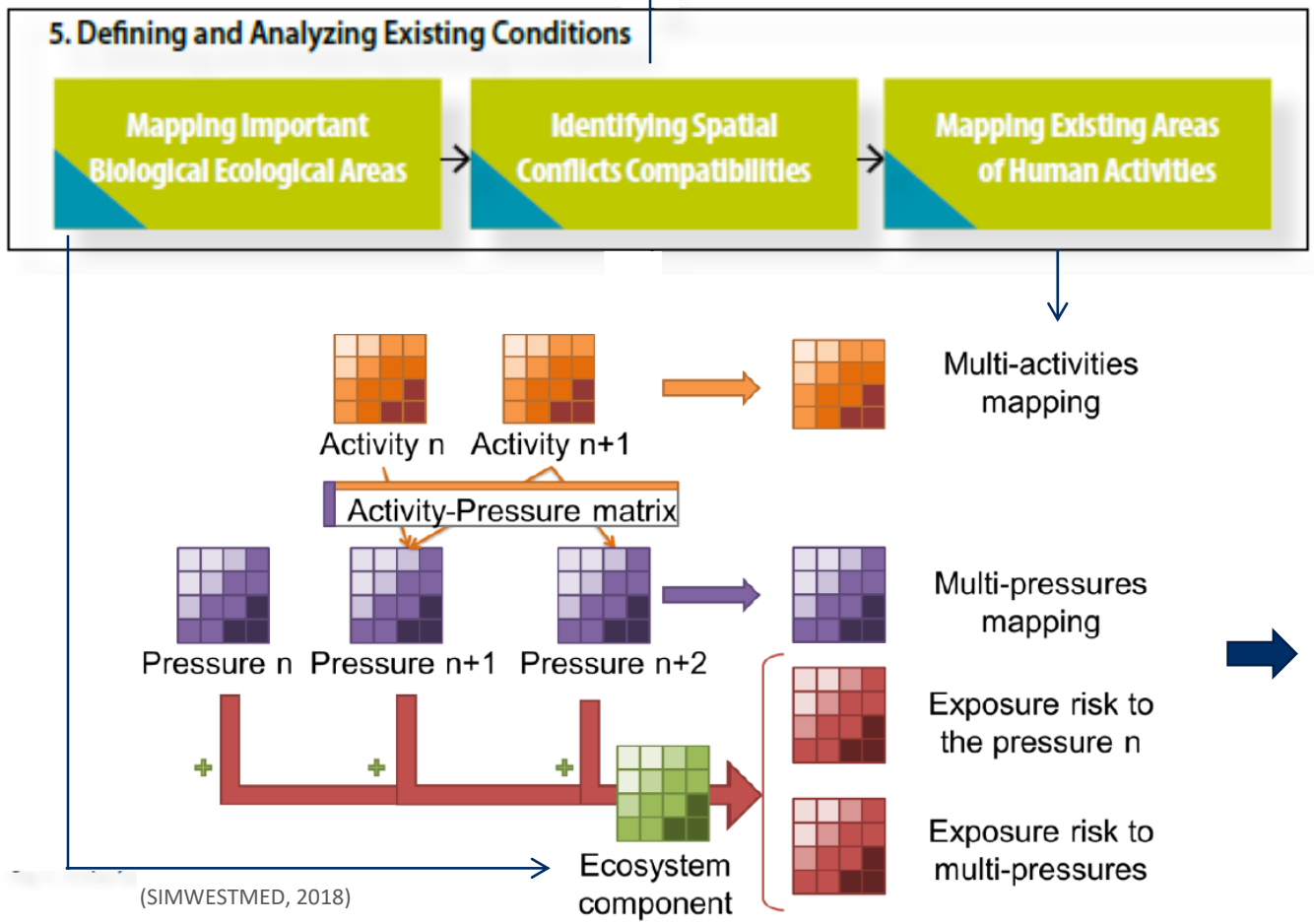
# Cumulative impacts in the MSP process




- Not a specific section, but
- Cited:
  - The identification of CI one of the **benefits** of MSP
  - Criteria for selecting a spatial use **scenario**
  - Criteria for selecting **spatial management measures**
  - One of the components of the **evaluation** of the spatial management plan

"Ecosystem – based management considers the **cumulative impacts** of different sectors"

# Which is the place of CIA in the MSP process?




(SIMWESTMED, 2018)

Interactions…

Activity – Activity (Conflicts /synergies)

Multiple use – environment

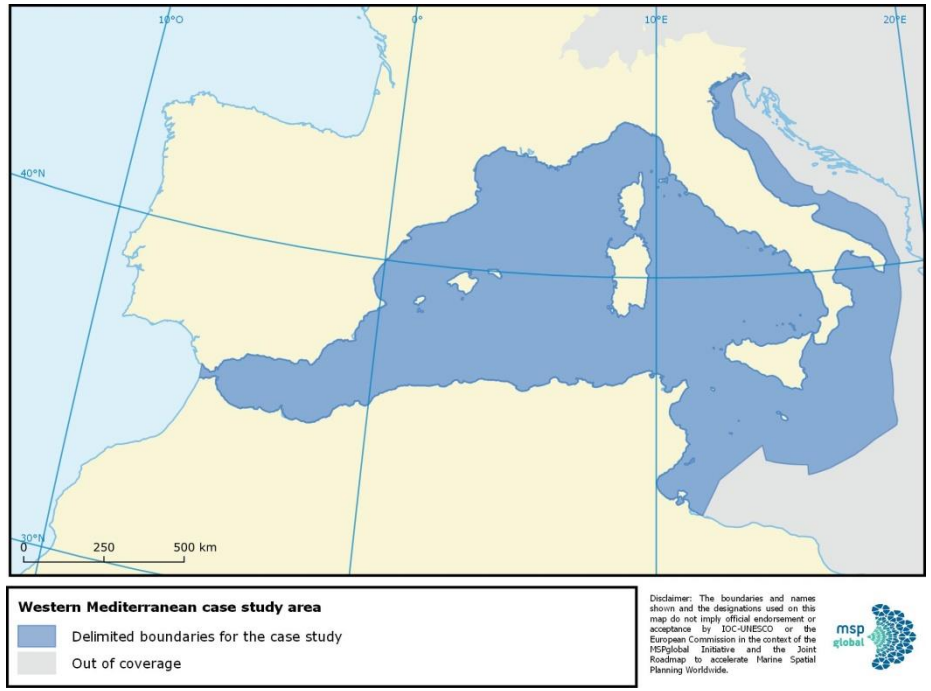
+

Value (Pressures /Impacts)

Cumulative Impact Assessment

# The Western Mediterranean case

- MSPglobal pilot project

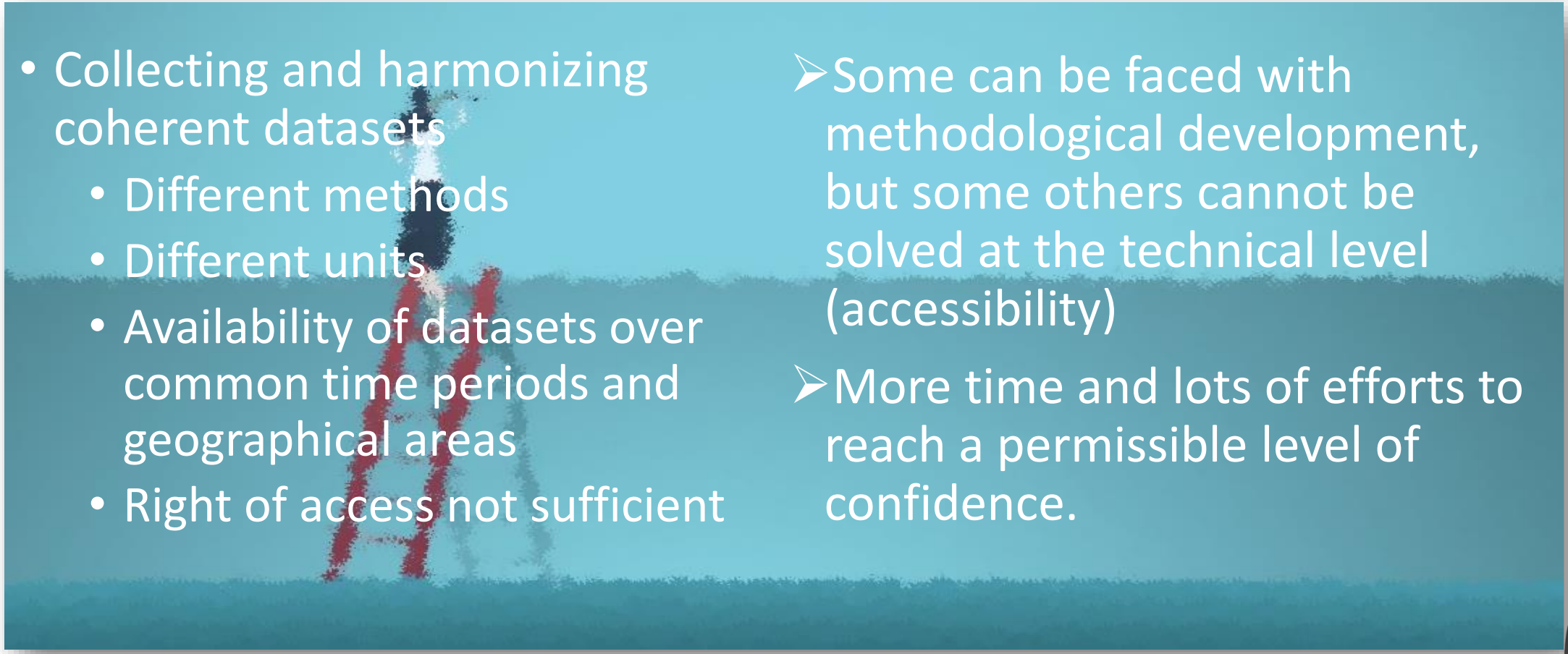



- SIMWESMED Gulf of Lion case study


  - Maps of potential exposure risk for marine mammals and seabirds regarding pressures of navigation, fishing, marine litter and marine noise.
  - Seasonal data
  - Modelization of habitats of marine mammals and seabirds

(Delleau, C. et al, 2018)

# Transboundary challenges (SIMWESTMED example)



- Collecting and harmonizing coherent datasets
  - Different methods
  - Different units
  - Availability of datasets over common time periods and geographical areas
  - Right of access not sufficient

➢ Some can be faced with methodological development, but some others cannot be solved at the technical level (accessibility)

➢ More time and lots of efforts to reach a permissible level of confidence.

# Needs for an applicable CIA in the transboundary dimension of MSP

- Building trust, create partnership, establish coordination
  1. Technical level
  2. Political level
- Common standards
  - Terminology
  - Formats
  - Methodology
- Assess limitations of methods
- Appropriate communication of methods and results

# The importance of data (analysis) in MSP


- Data analysis is an essential (and continuous) principle, but **not an end** in itself.
- Accuracy and confidence levels are essential in determining how valid the data analysis is **to support decision making**.

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¡Muchas gracias!

Merci!

Thank you!

Спасибо

谢谢

MSPglobal@unesco.org
mspglobal2030.org
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