

Mussel mitigation farming

Scalability and nutrient removal capacity under different placement scenarios

Andreas Holbach – Aarhus University

THEME: Blue biomass production in the region

MUSSEL GROWTH POTENTIAL



A spatial model for nutrient mitigation potential of blue mussel farms in the western Baltic Sea

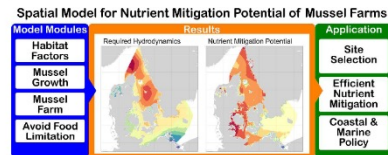
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HIGHLIGHTS

A new modular spatial model for mussel mitigation farms is developed and presented. The model is flexible with respect to different farm setups and harvest times. Variability, uncertainty, food limitation and required hydrodynamics are considered. The model can become important for implementing coastal and marine policies.

GRAPHICAL ABSTRACT



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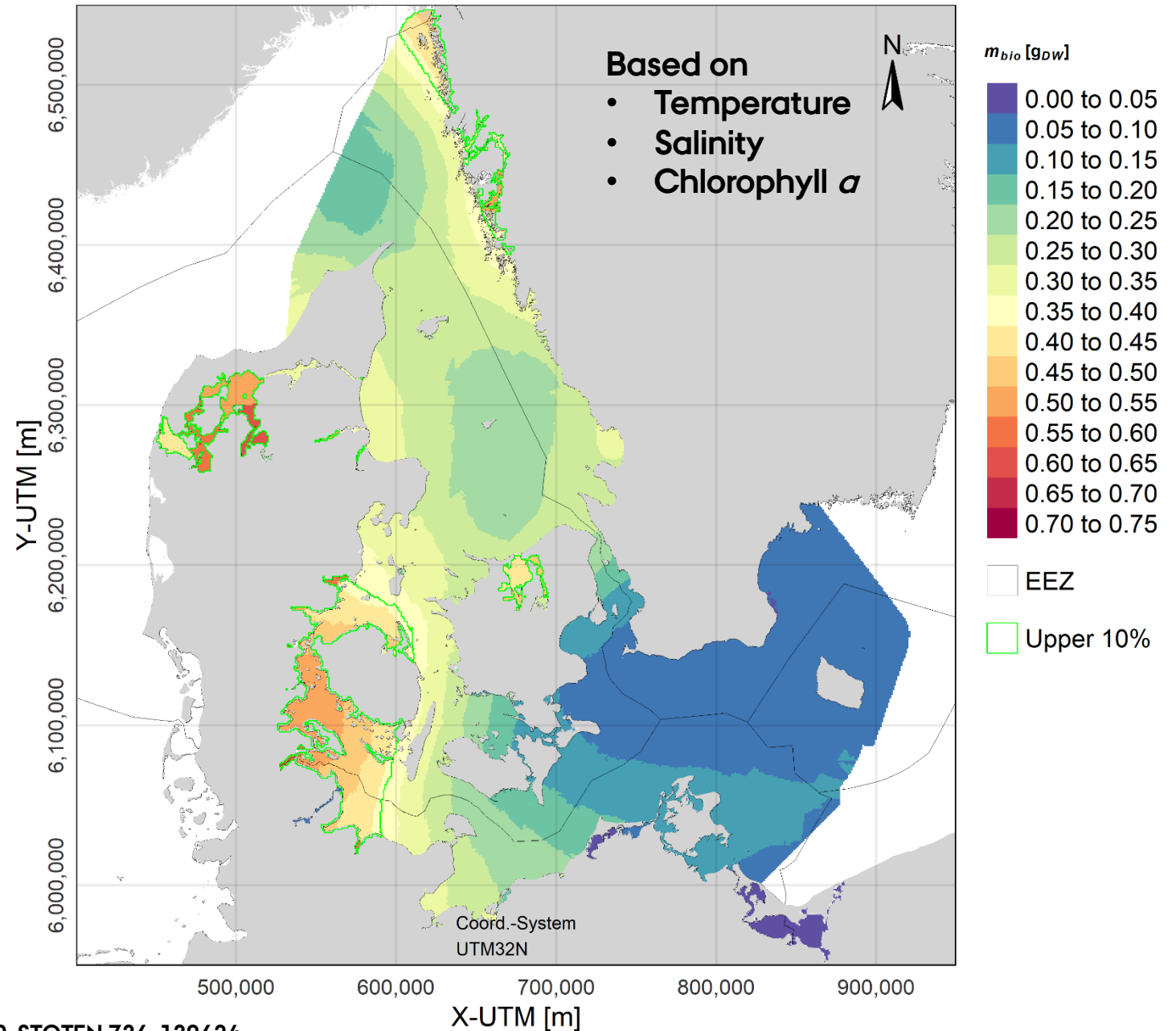
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(a) Biomass Dry-Weight of Individual Mussels



Spatial Model for Nutrient Mitigation Potential of Mussel Farms

Model Modules

Habitat
Factors

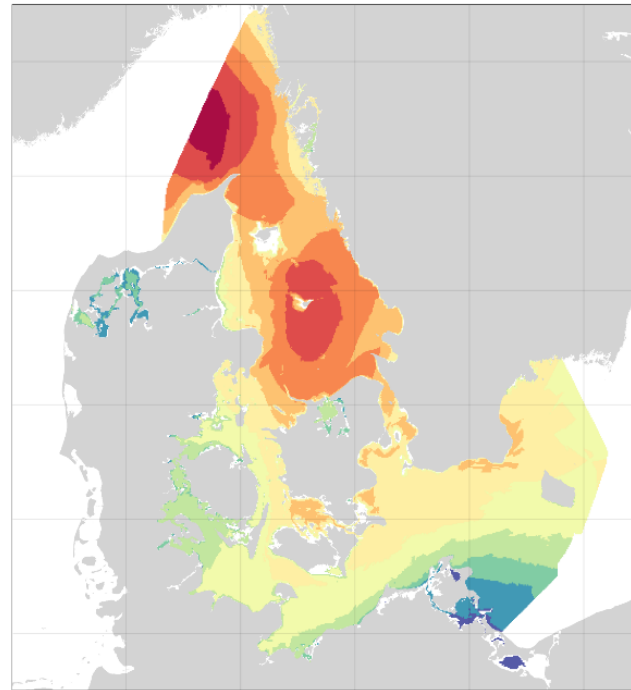
Mussel
Growth

Mussel
Farm

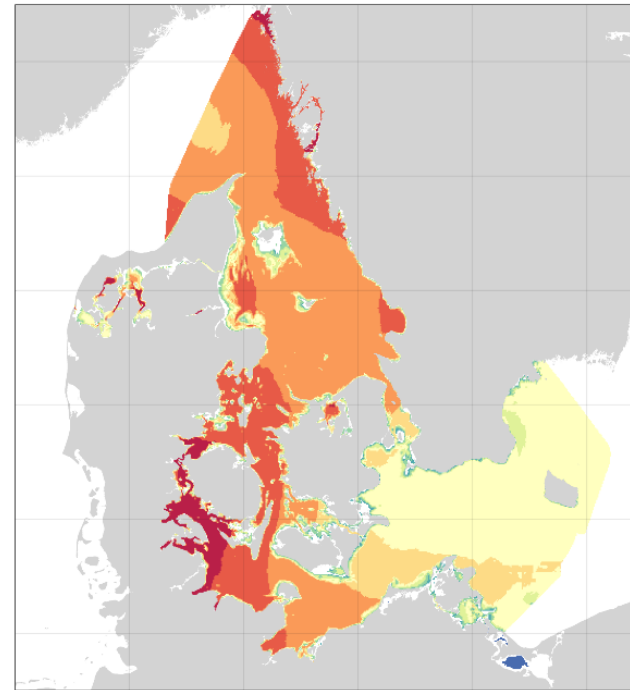
Avoid Food
Limitation

Results

Required Hydrodynamics



Nutrient Mitigation Potential



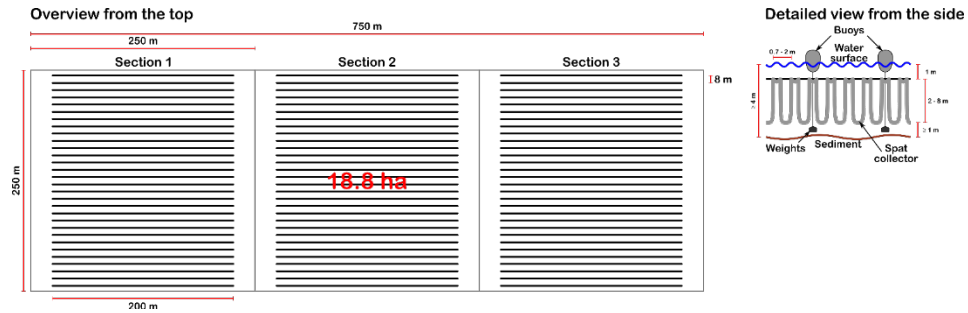
Application

Site
Selection

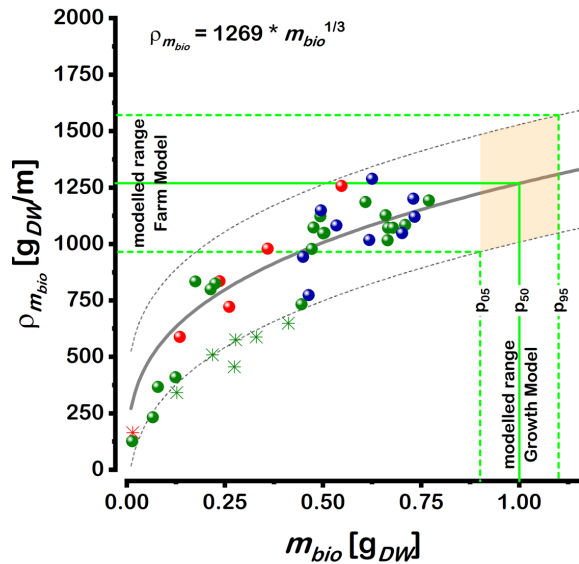
Efficient
Nutrient
Mitigation

Coastal &
Marine
Policy

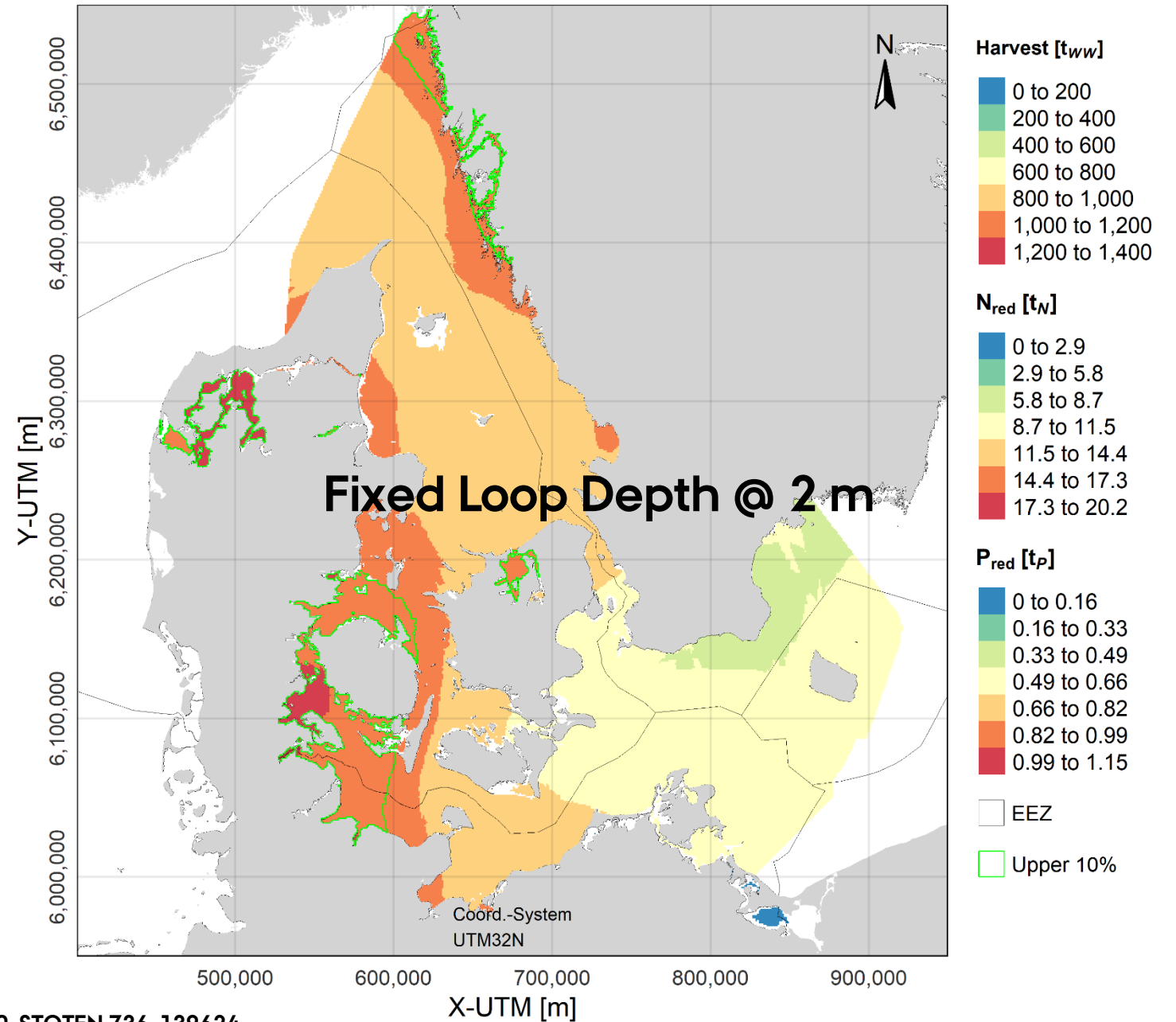
HARVEST POTENTIAL & MITIGATION



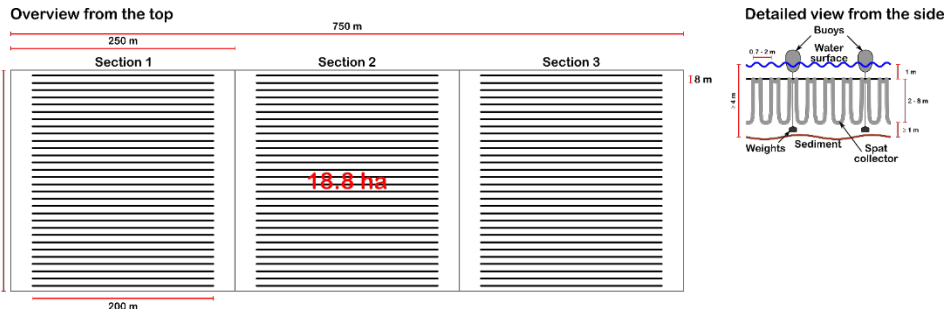
c) Biomass Density vs. Mussel Dry-Weight



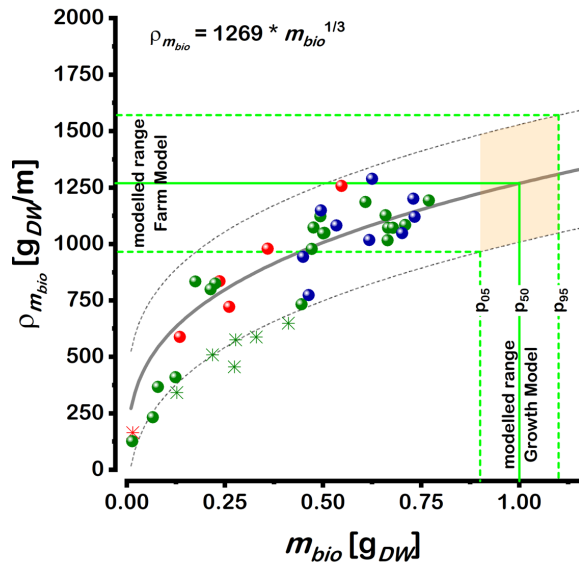
(a) Harvest & Nutrient Reduction: 2-2_0.7 Farm



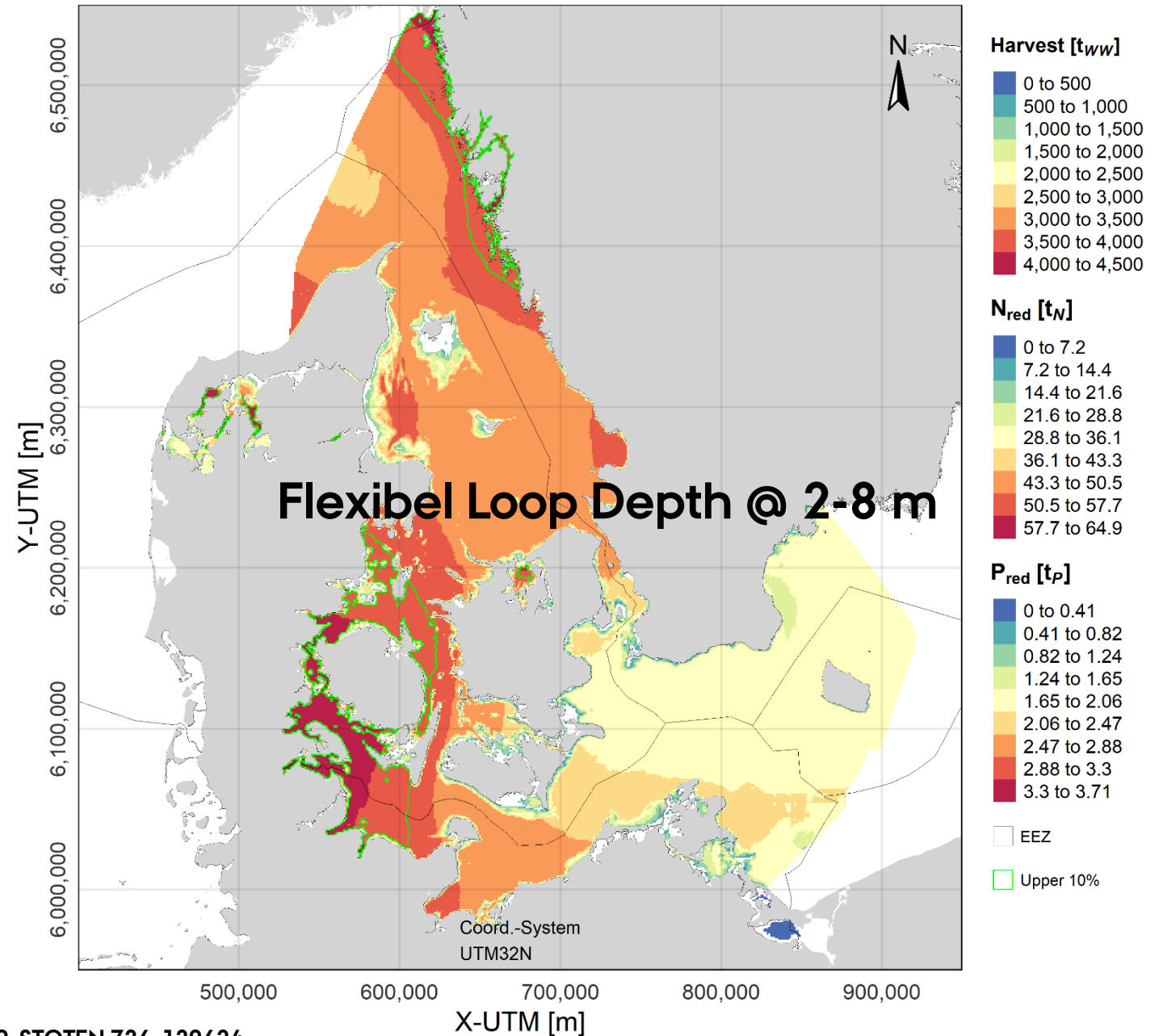
HARVEST POTENTIAL & MITIGATION



c) Biomass Density vs. Mussel Dry-Weight



(b) Harvest & Nutrient Reduction: 2-8_0.7 Farm



MULTI-CRITERIA DECISION SUPPORT TOOL

Web-GIS tool

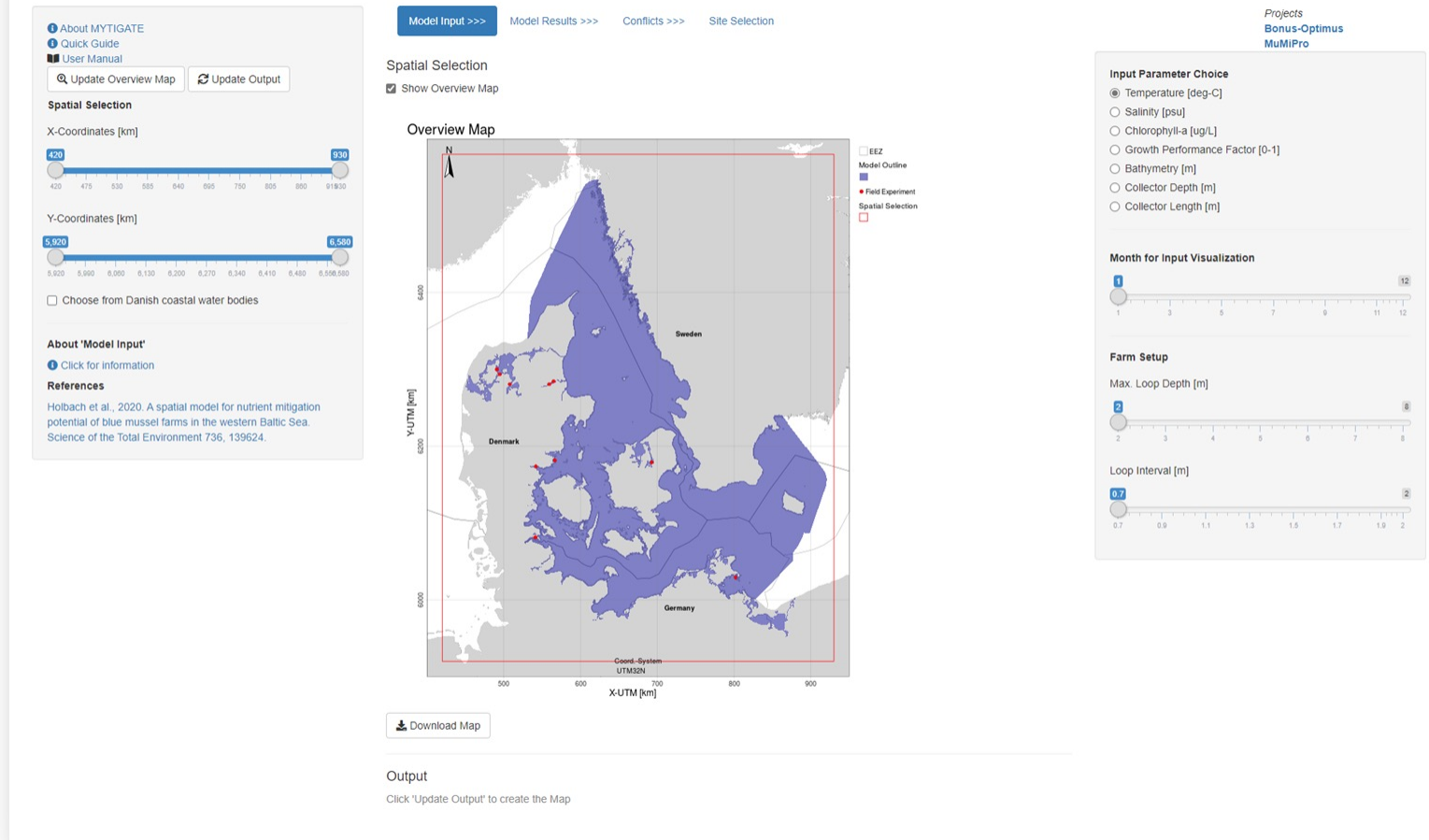
MYTIGATE

Mytilus edulis (Blue Mussel)
Mitigation Farm Site Selection
Tool for the Western Baltic Sea

<https://au-bios-model.shinyapps.io/MYTIGATE/>

Customized Interactive Site Selection
Scenarios

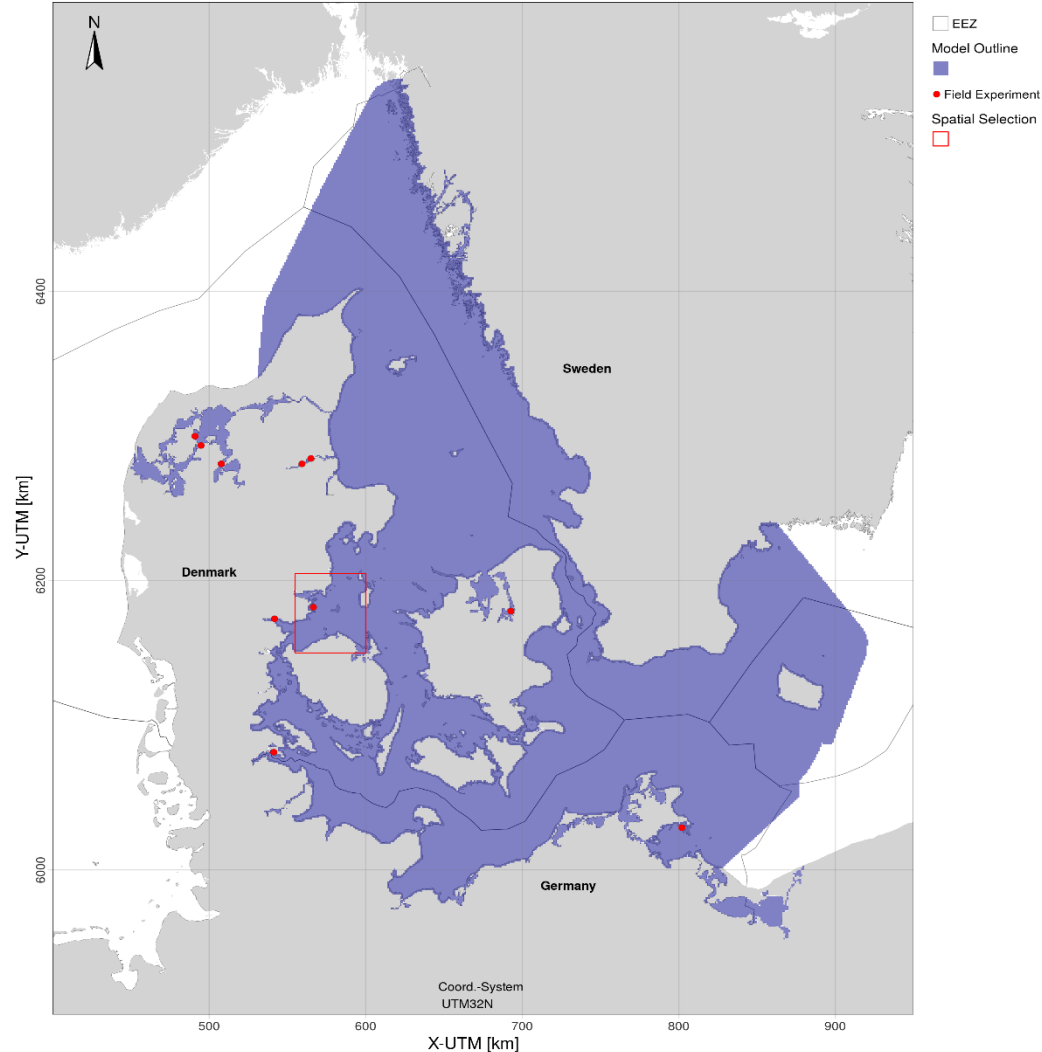
MYTIGATE - *Mytilus edulis* (Blue Mussel) Mitigation Farm Site Selection Tool for the Western Baltic Sea



STAKEHOLDER SCENARIOS: EXAMPLE

Spatial Selection

Overview Map



Scenario Description

➤ Farm setup

- 18.8 ha/farm
- Max. 1 farm/km²
- Fixed loop depth @ 2 m
- Loop interval @ 0.7 m

➤ Site selection

- Maximize farm harvest
- Target: 200 t Nitrogen reduction

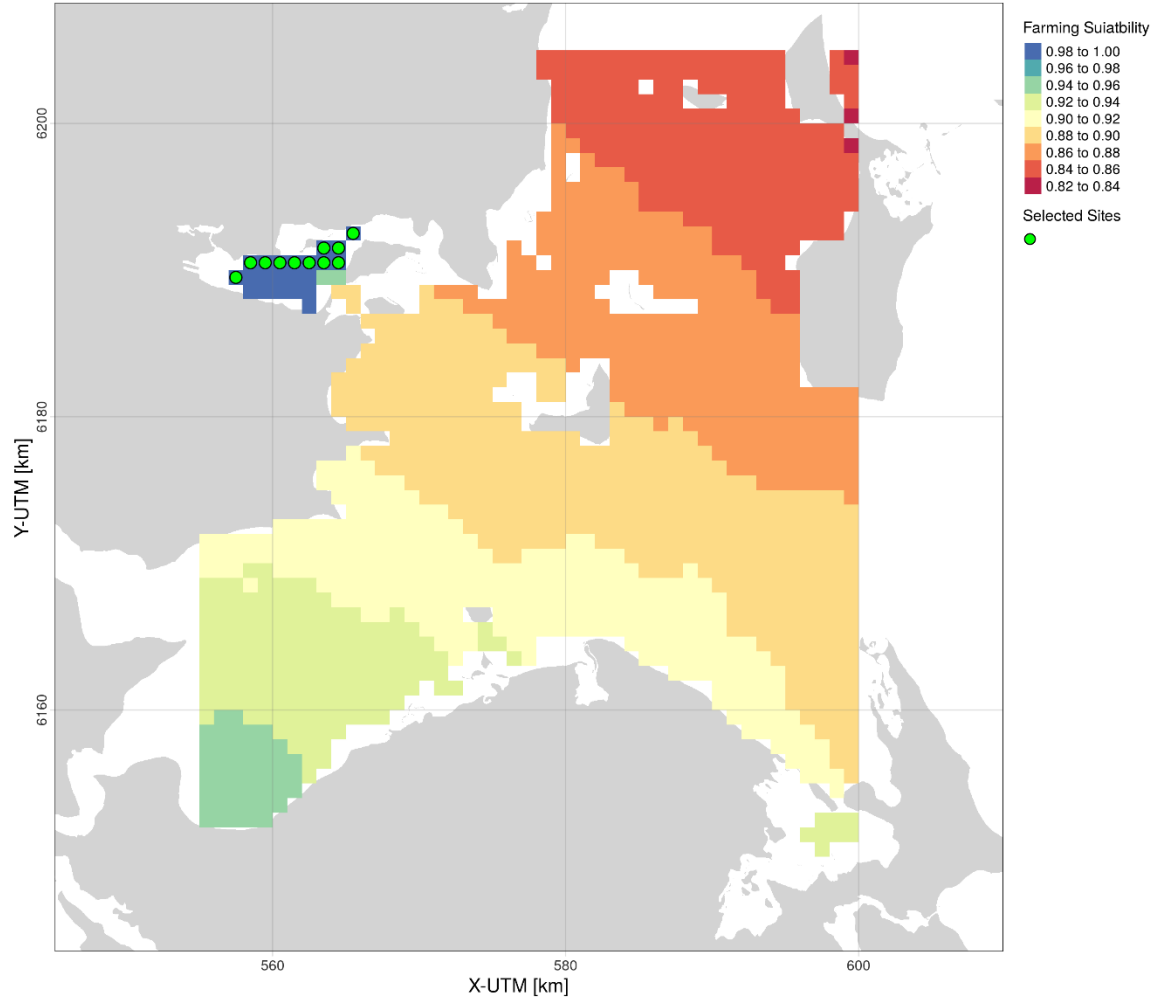
➤ Stakeholder scenarios

- Individual definition of spatial exclusion and conflict criteria

STAKEHOLDER SCENARIOS: EXAMPLE

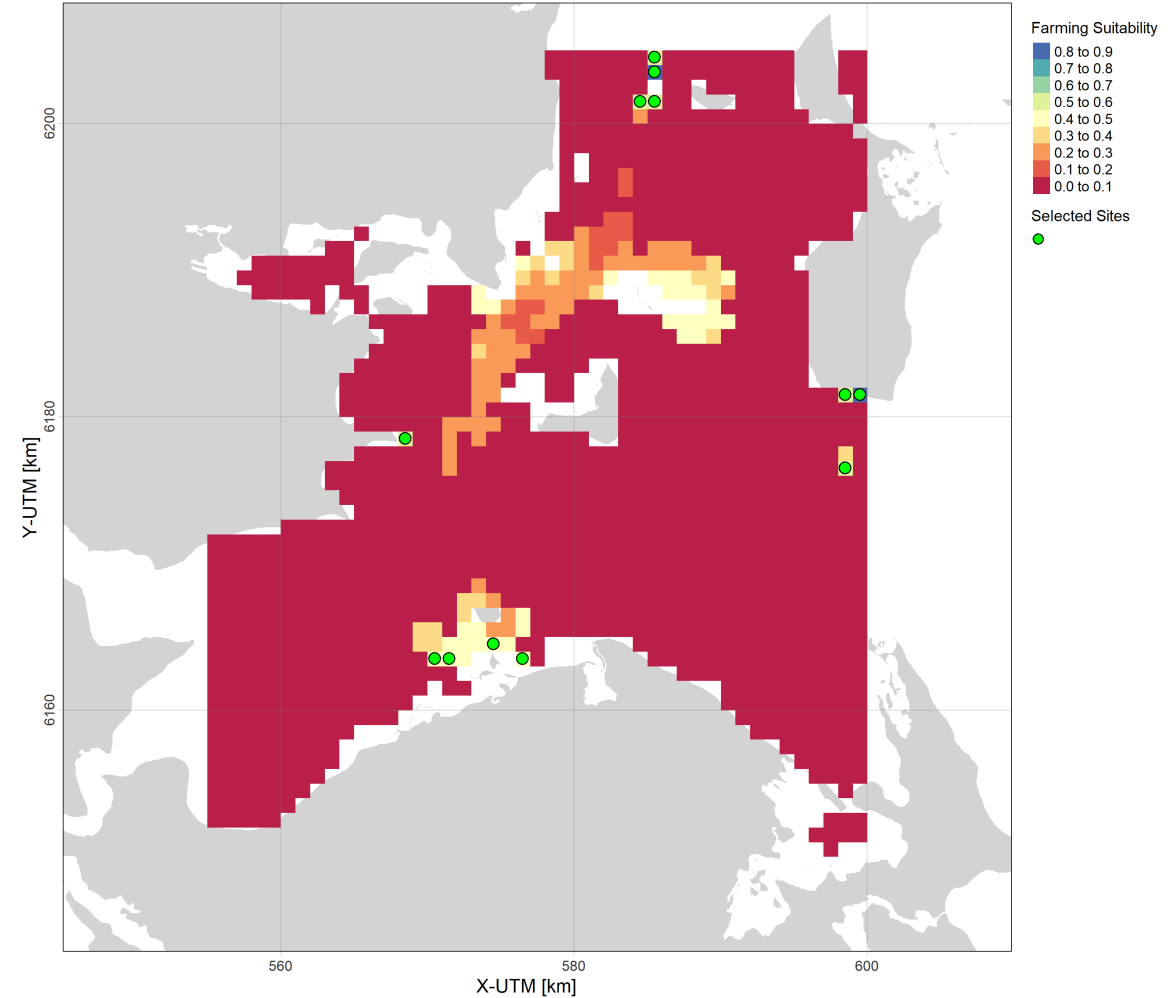
Environmental Optimum – No Restrictions

Model Map



Local Citizen – Max. Restrictions

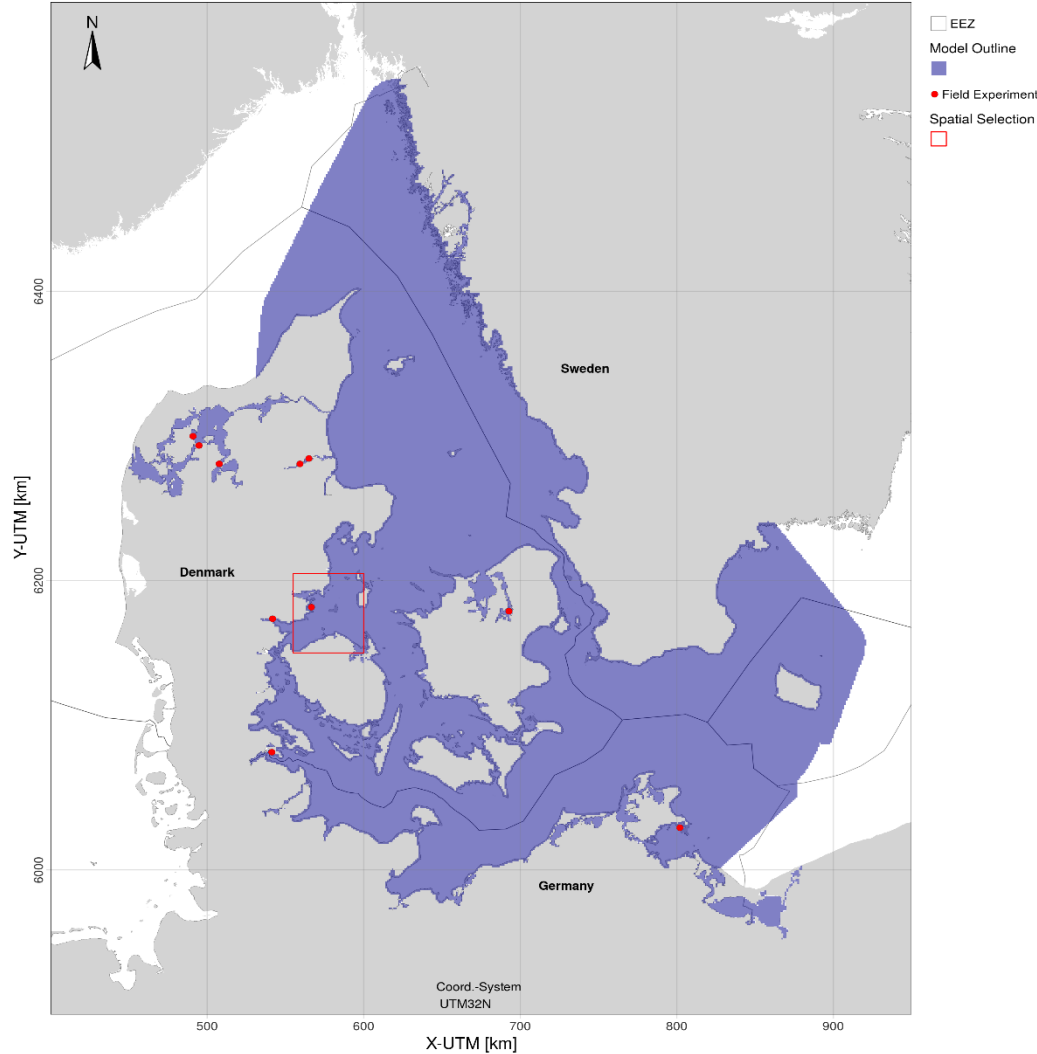
Model Map



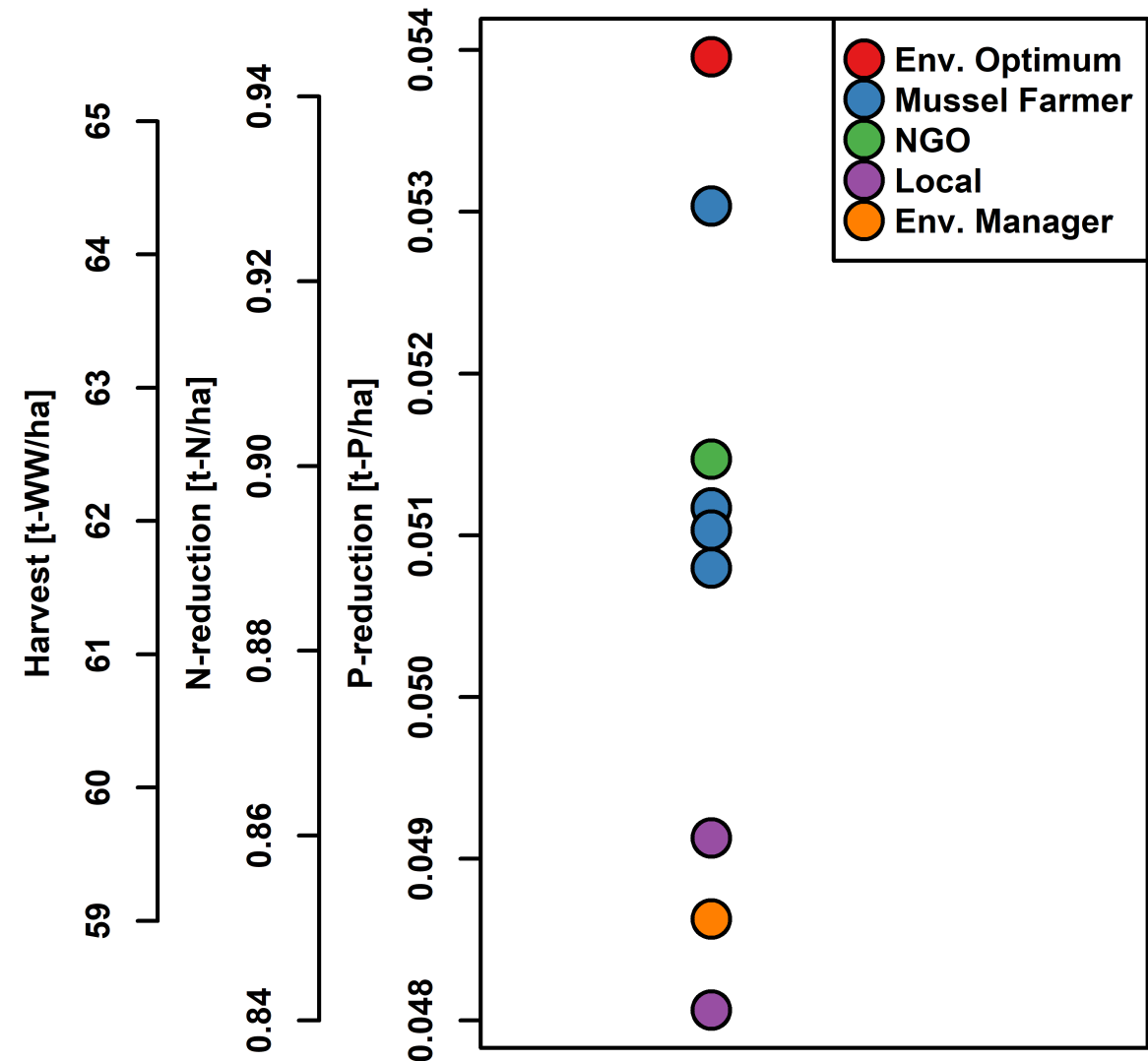
STAKEHOLDER SCENARIOS: EXAMPLE

Spatial Selection

Overview Map



Scenarios' Area Efficiency



OFFSHORE WIND FARMS MULTI-USE SCENARIO

Wind Farm Specific Potential: Low Trophic Aquaculture Harvest

