How spatial planning constrains transnational fisheries: the bio-economic DISPLACE evaluation on the Baltic Sea

Francois Bastardie fba@aqua.dtu.dk

J. Rasmus Nielsen, Ole R. Eigaard, Heino Fock, Patrik Jonsson, Valerio Bartolino

Baltic MSP Forum, 17-18 June 14, Riga, Latvia

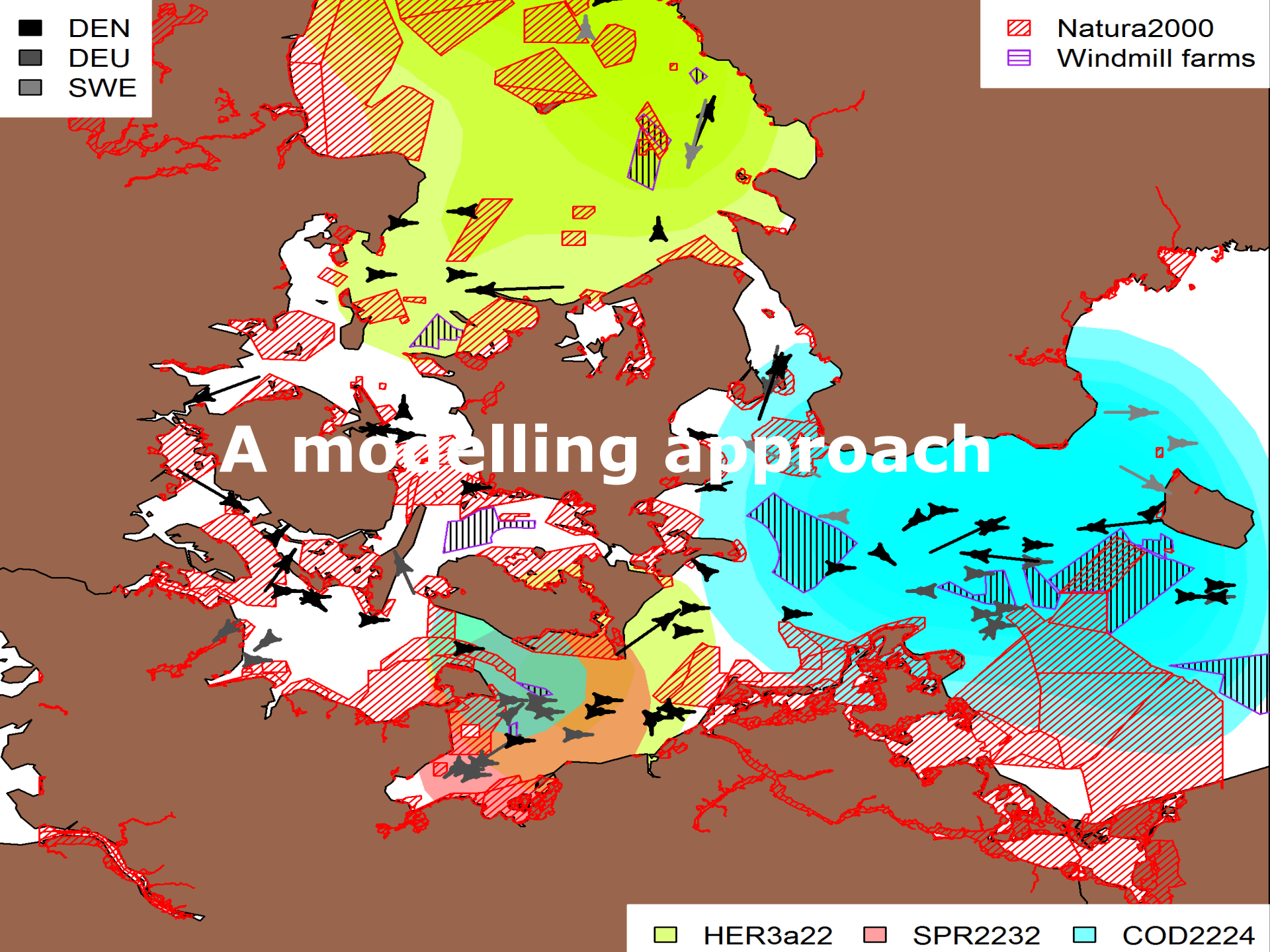
SOCIOEC
SOCIO ECONOMIC EFFECTS OF MANAGEMENT MEASURES OF THE FUTURE CFP

image
- a strategic alliance

SLU

vTI
Johann Heinrich von Thünen-Institut

DTU Aqua
National Institute of Aquatic Resources


DEN
DEU
SWE
Natura2000
Windmill farms
A modelling approach
HER3a22
SPR2232
COD2224

Summary

- **Maritime spatial planning (MSP) constrains fisheries** which require empowering the fishing industry and managers with the right tools and knowledge to engage in MSP dialogues.

- **Impact assessment** of planned offshore windmills farms and conservation zonation in the Baltic Sea is conducted with the DISPLACE model-based approach.

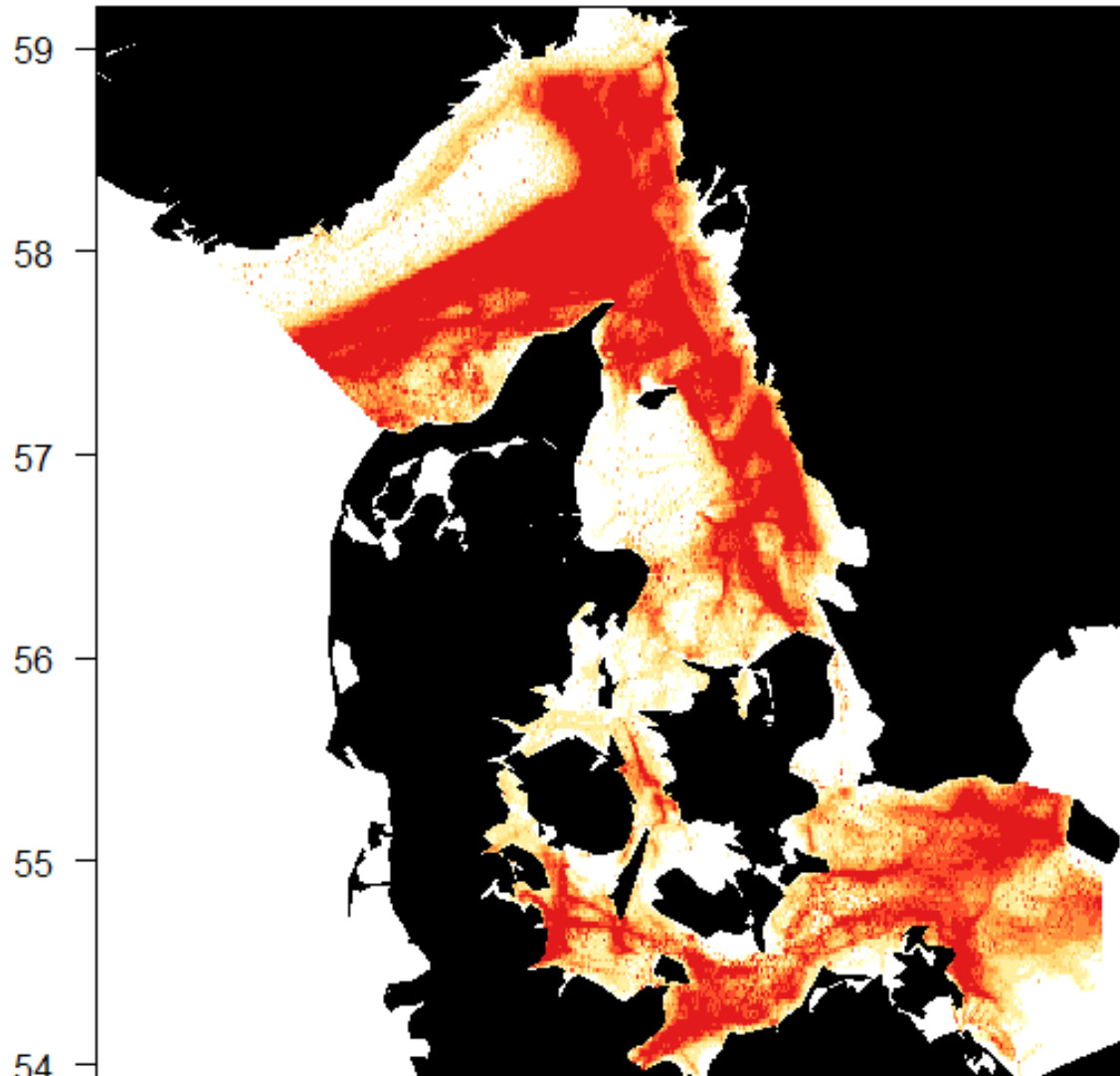
- **Interlinked dynamic of vessels and stocks** show higher revenue from catches over the medium term which offset the additional costs from effort displacement, with released pressure on the stocks and habitats.

- **At the individual scale**, some vessels are strongly affected, not able to maintain catch rates, also creating new opportunities for competitors.

Newest available data

Fine scale mapping of fishing pressure

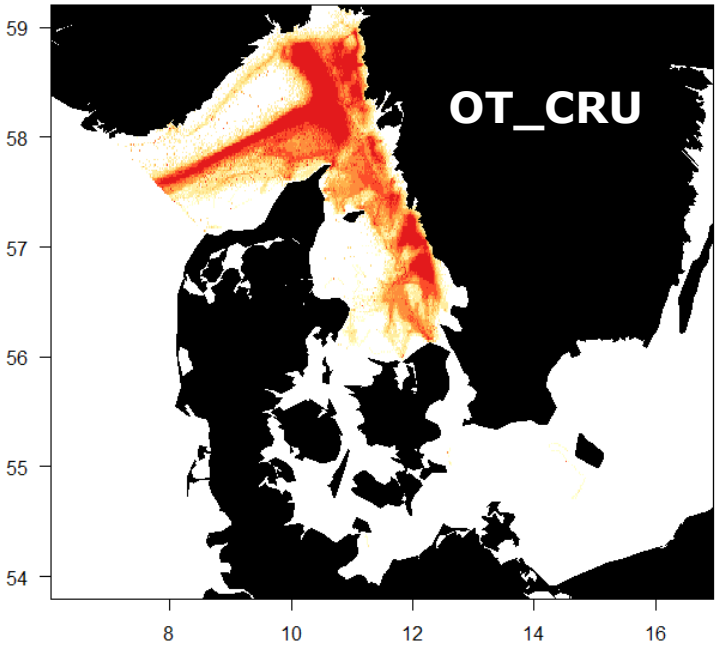
DEN+GER+SWE In Western Baltic



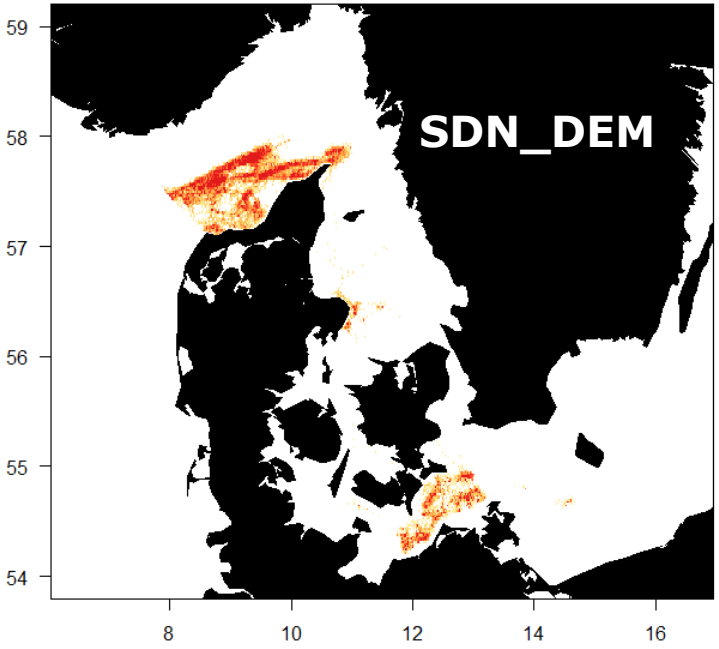
VMStools in

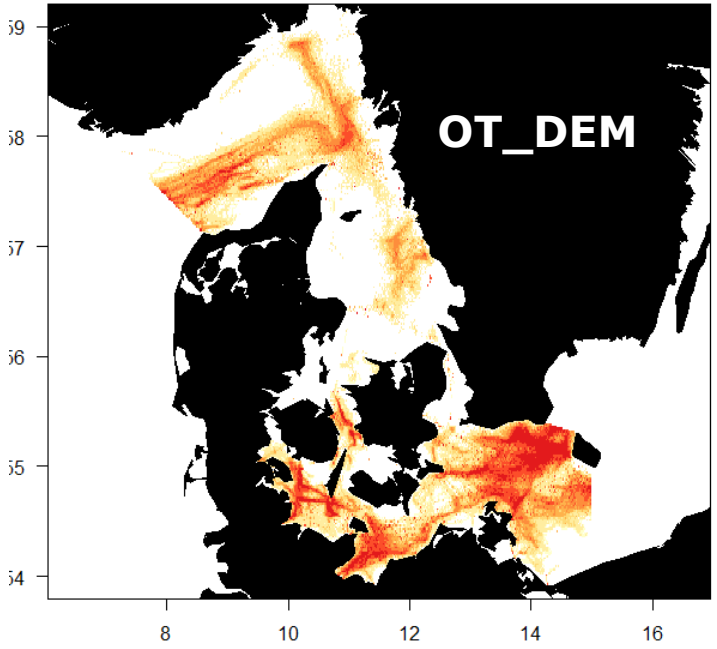
Newest available data

Fine scale mapping of fishing pressure



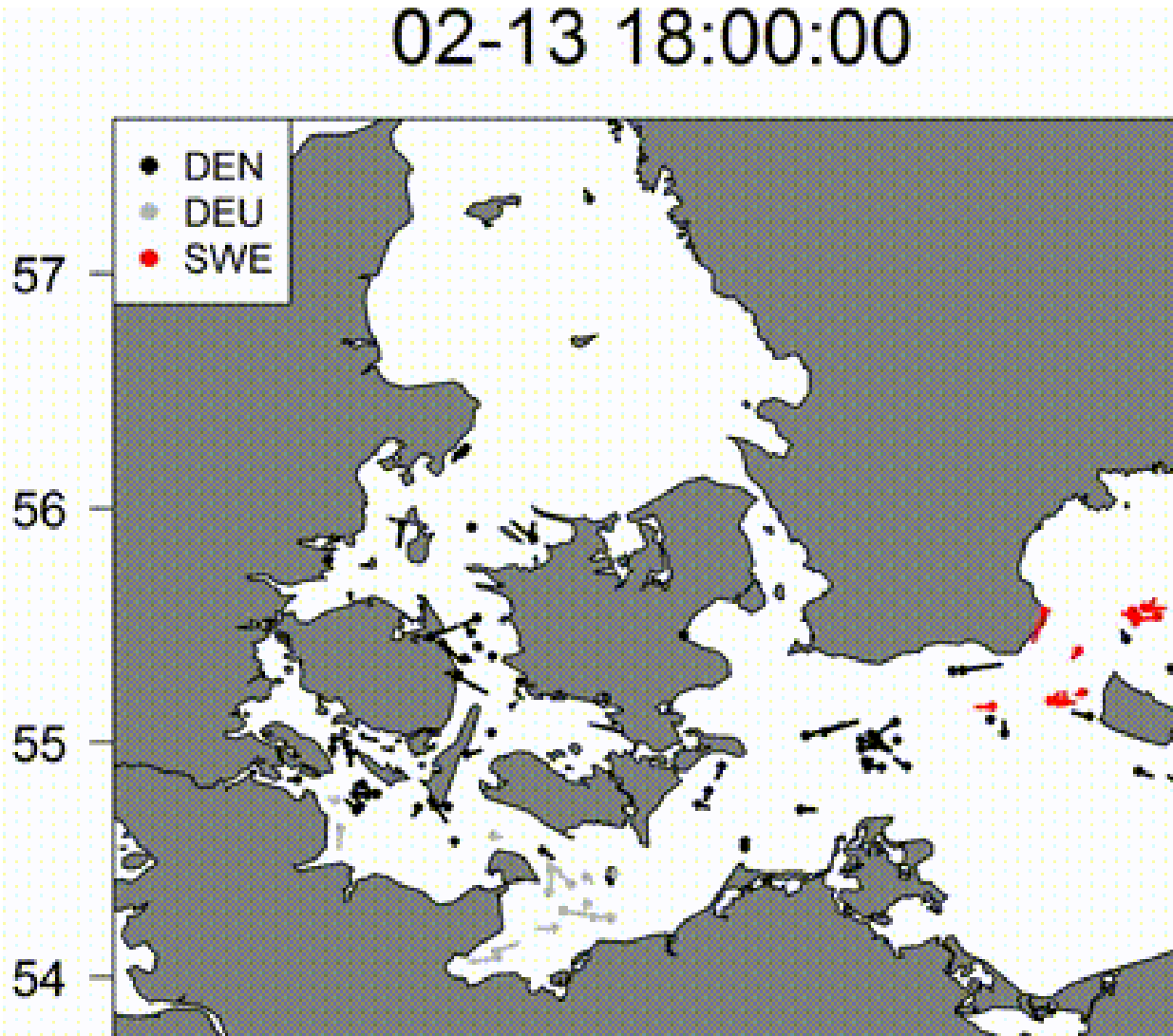
VMStools in BENTHIS





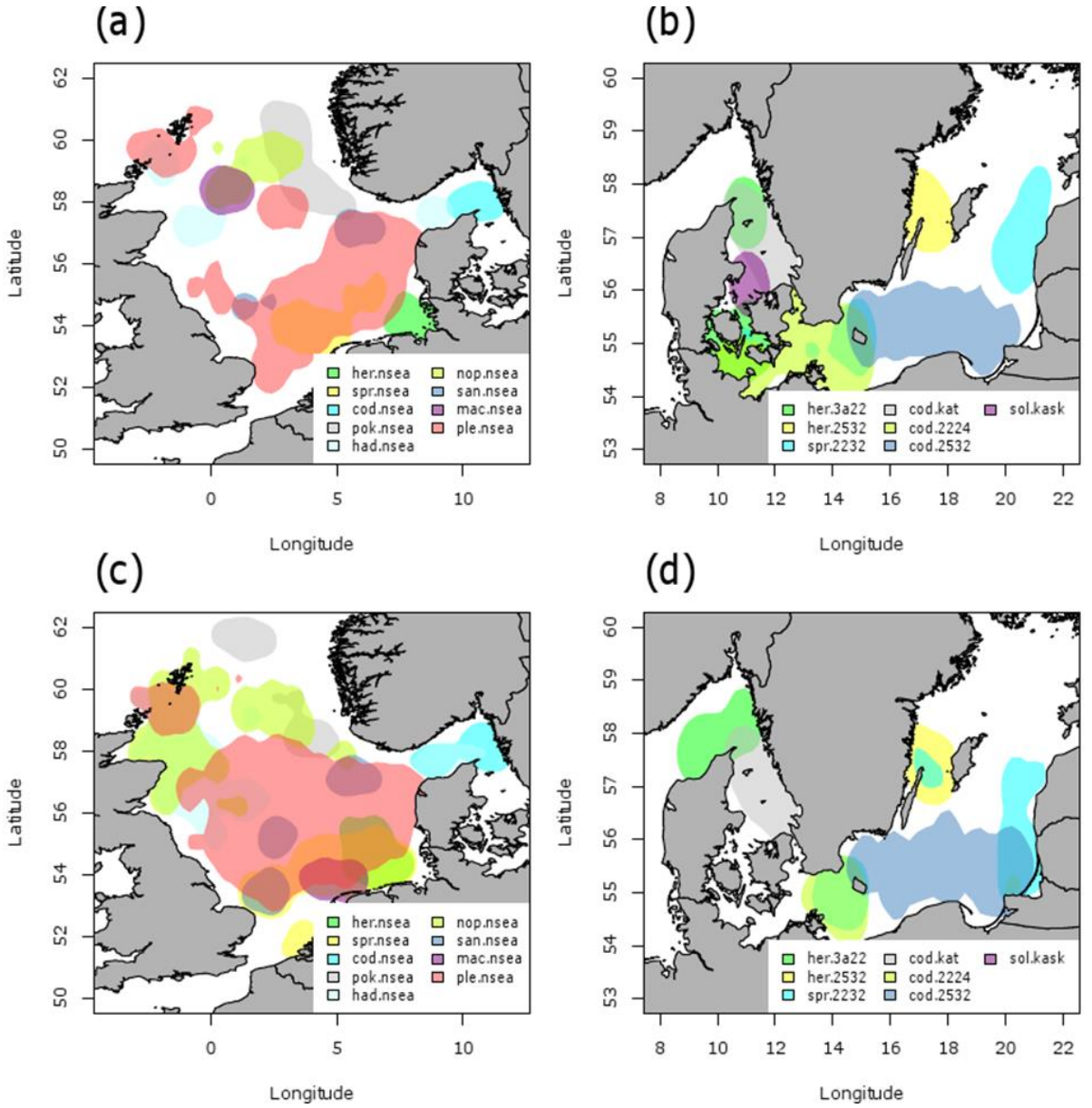
Newest available data

Individual vessel activities

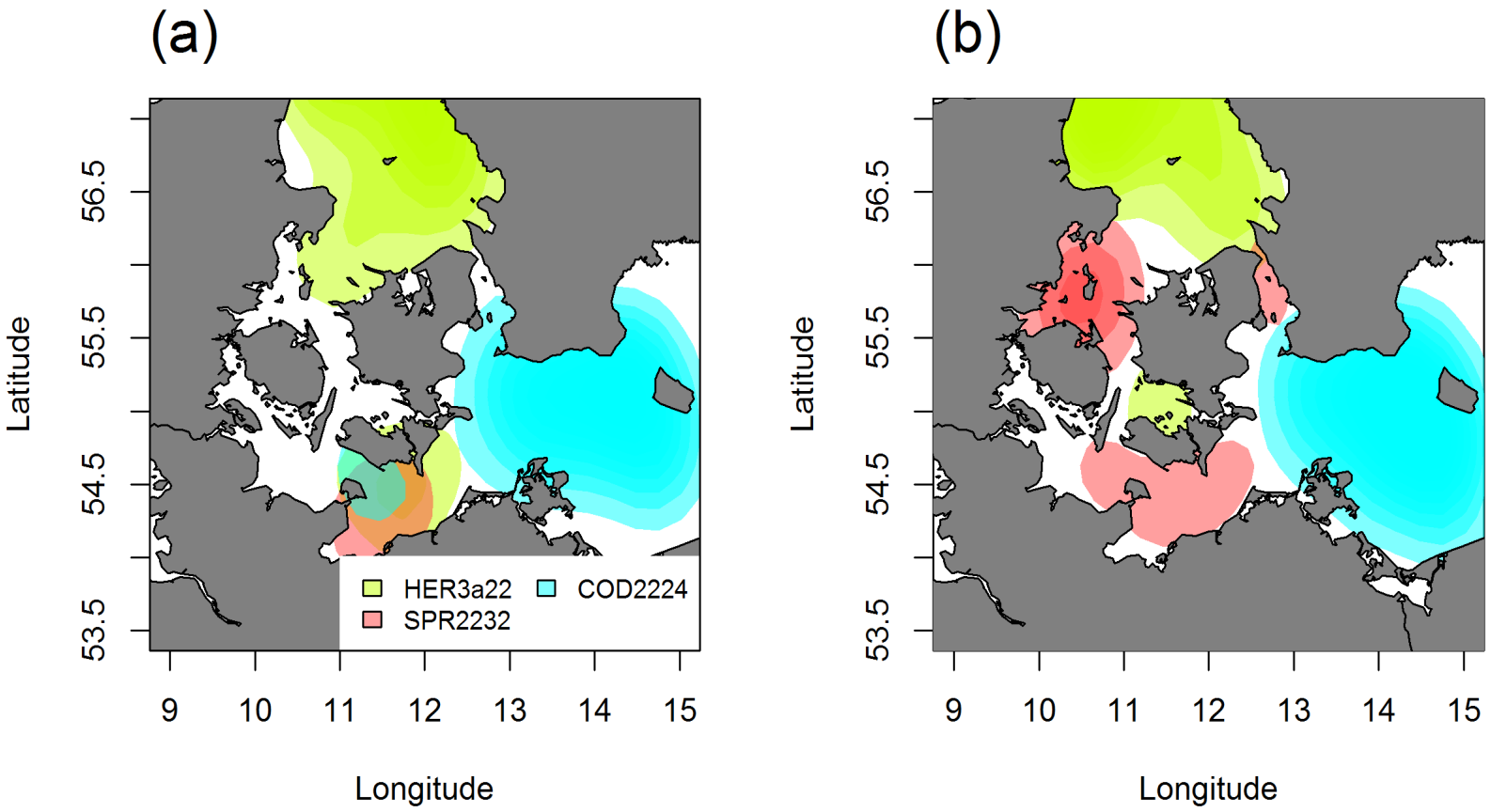


Newest available data

Spatial resource availability of different stocks based on research surveys data



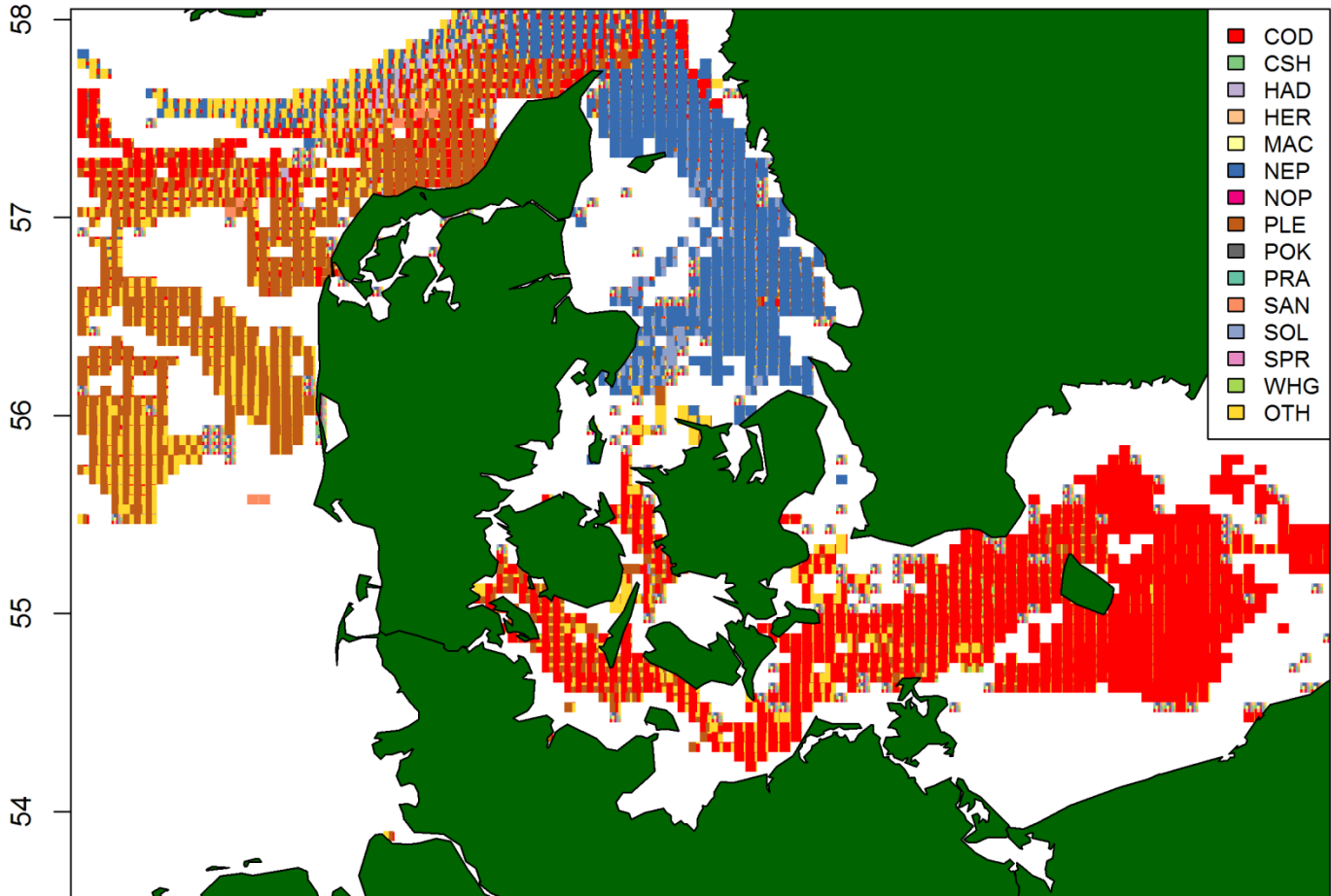
Newest available data



Cod, herring and sprat, the most commercially important stocks in the Baltic Sea area

Newest available data

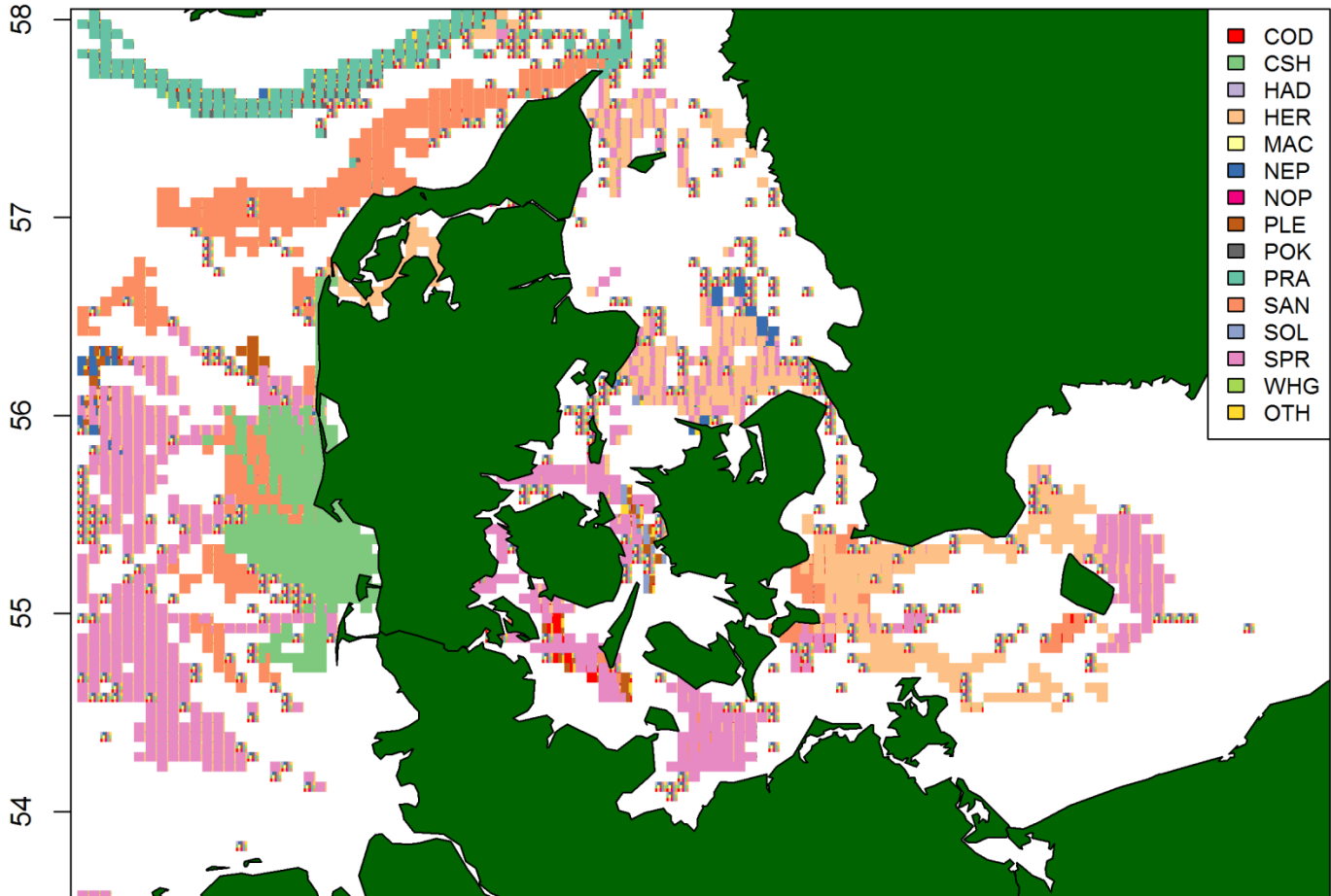
Mapping origin of landings x effort to deduce spatial catch rates



VMStools
>100mm,
0-24m

Newest available data

Mapping origin of landings x effort to deduce spatial catch rates



VMStools
<100mm,
0-24m

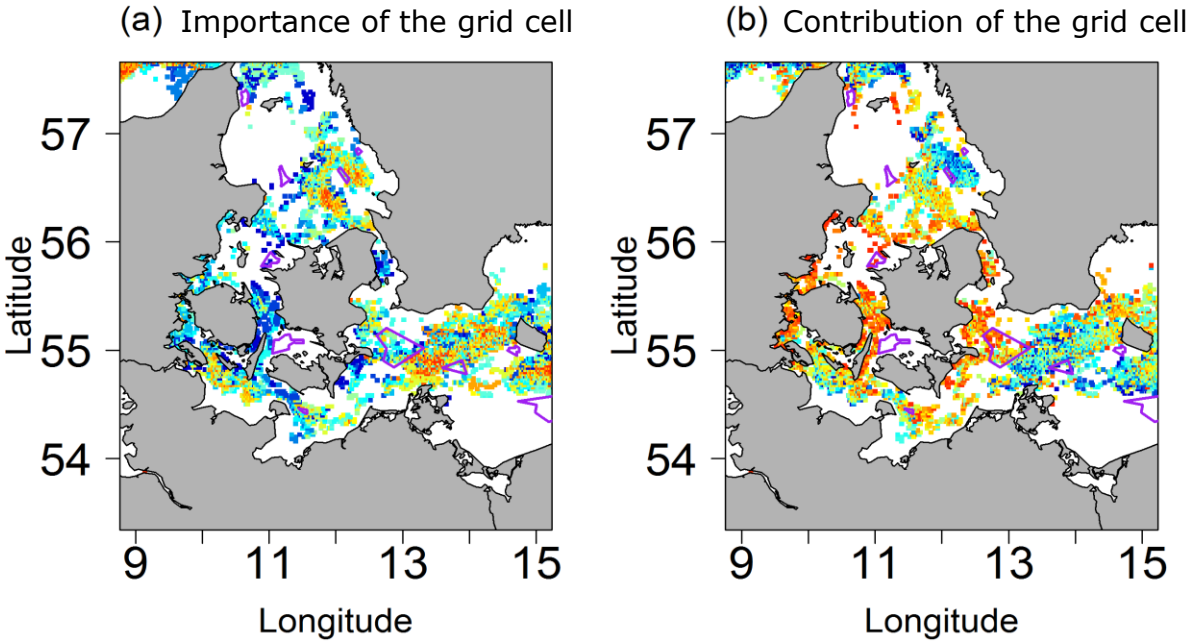
A static evaluation – W. Baltic Sea

Displacement from implementation offshore windmill parks

Sustainability of the cod, sprat and herring exploitation (mngt targets) and evaluation of the economic viability including consequences on cost for fishing

Here, a static view at time t…

…but can the closures be compensated when accounting for medium-long term dynamics?



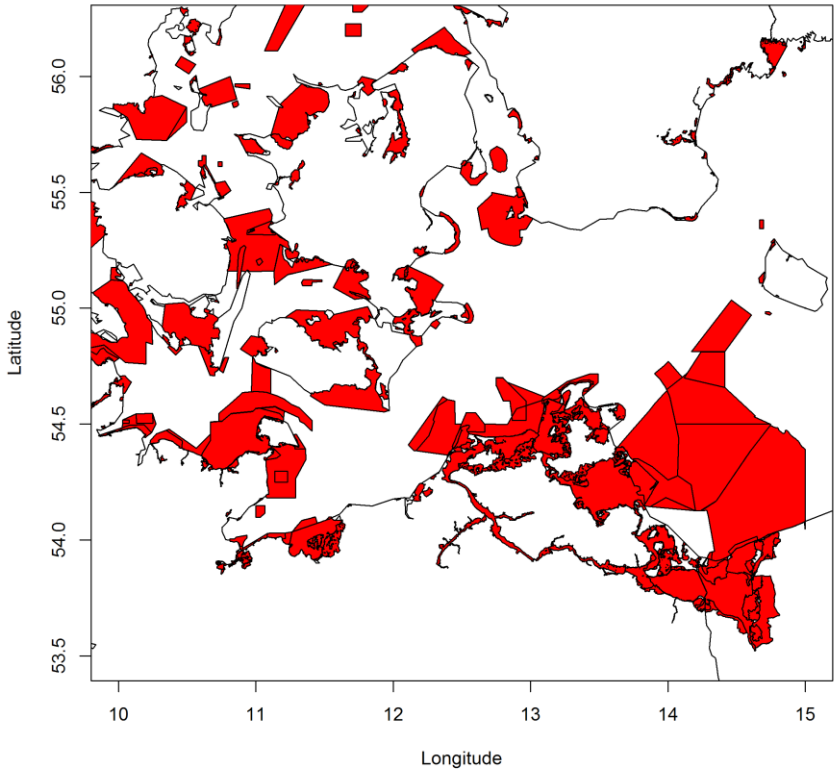
A static evaluation – W. Baltic Sea

Fishing activities constrained by the BSAPs/NATURA 2000 sites (seabirds directive; habitat directive)

Reduced fishing activities within the areas?

(…to be defined among
* Strict nature reserve,
* Protected areas with sustainable use of natural resources,
* etc.)

Target is to develop and apply by 2015, management plans and/or measures for already existing BSAPs.

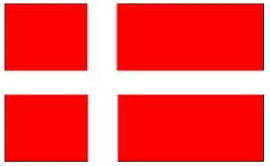


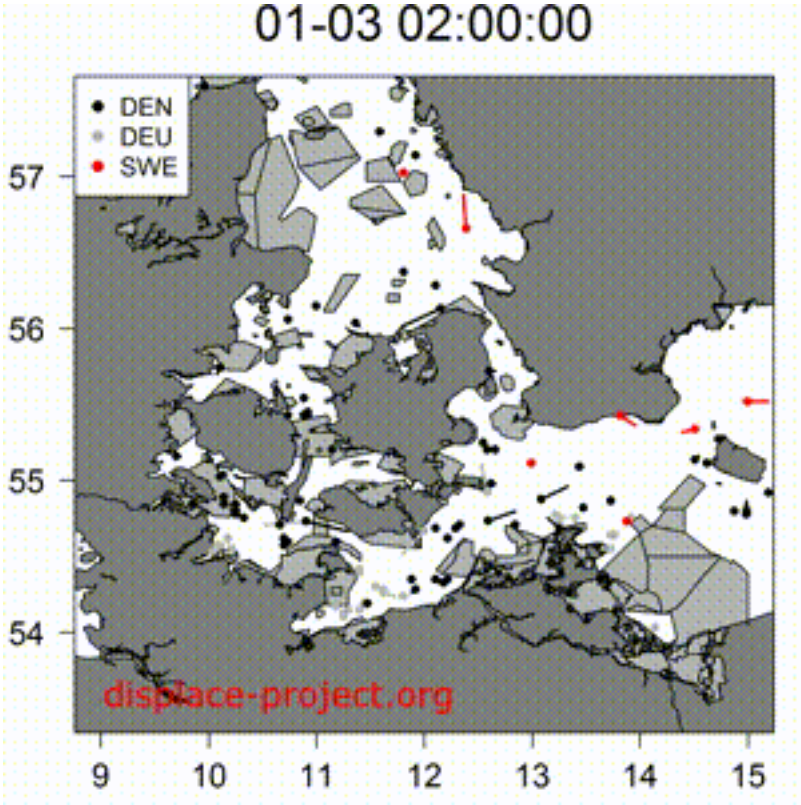
A DISPLACE evaluation – Baltic Sea

- Parameterization of DISPLACE for the international western Baltic Sea fisheries (>12m, DEN, SWE and GER)
- Scenario evaluation under spatial constraints from offshore windmill plans and NATURA 2000 zonation
- Sustainability of the cod, sprat and herring exploitation and evaluation of the economic viability including consequences on cost for fishing
- (MSE framework incorporating trophic interactions with coupling to the SMS multistock stochastic model)

A DISPLACE evaluation – Baltic Sea

- Parameterization of DISPLACE for the international western Baltic Sea fisheries (>12m, DEN, SWE and GER)





DTU

SLU

vTI
Johann Heinrich von Thünen-Institut

A DISPLACE evaluation – Baltic Sea

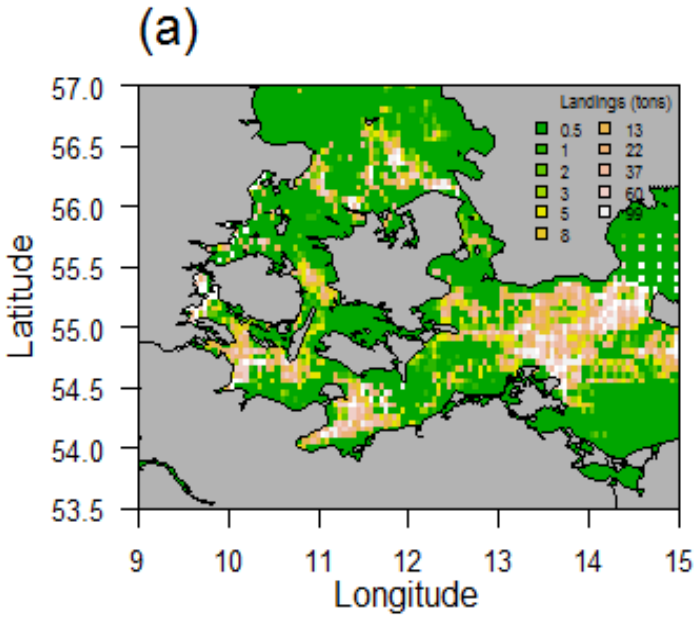
(a) Origin of landings

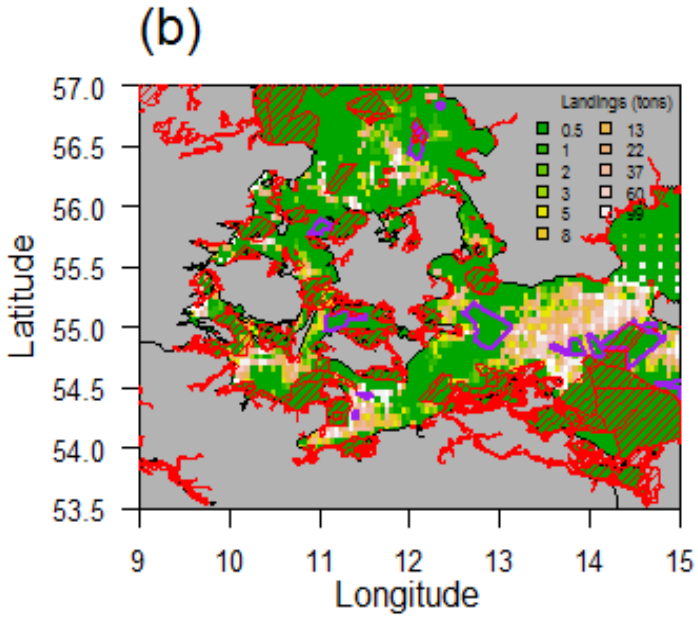
(b) Origin of landings with spatial restrictions

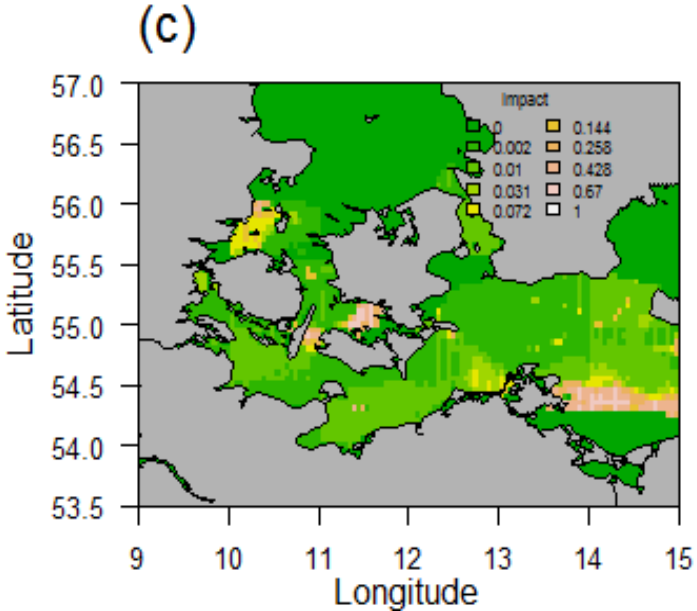
(c) Ratio harvest/avai. biomass

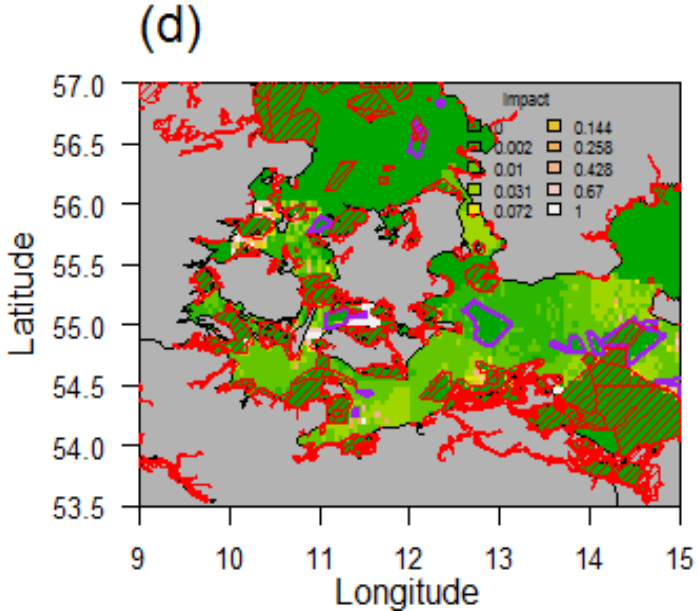
(d) Ratio harvest/avai. Biomass with spatial restrictions

Wind+Nat2000 and cod









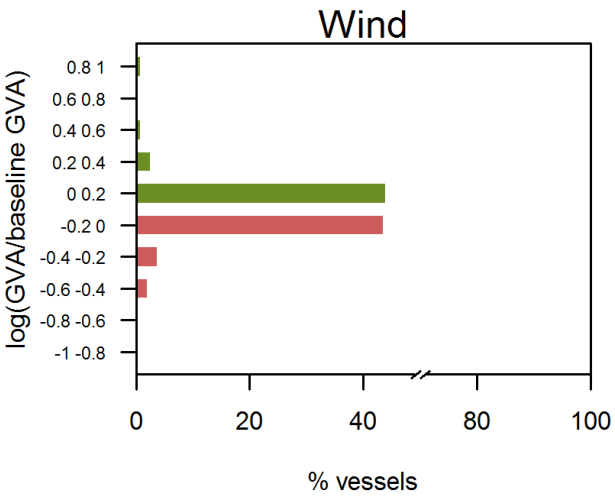
Consequences on fisheries of alternative scenarios – trip patterns

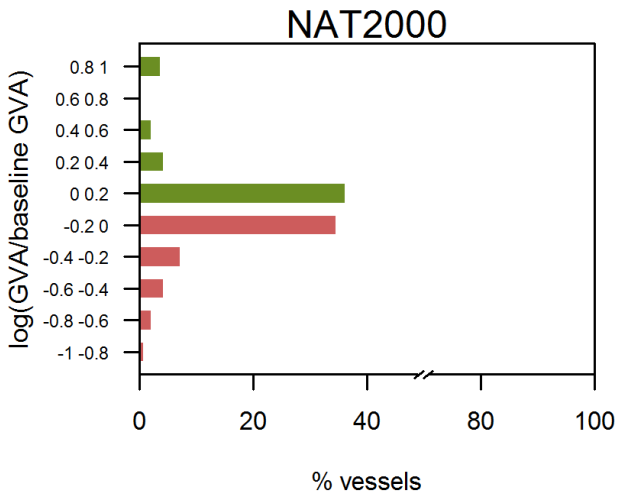
Scenario	Total effort (%)	Steaming Effort (%)	Number of trips (%)	Average trip duration (%)
Wind	-1.0 ± 0.5**	0.2 ± 0.2**	-0.5 ± 0.2***	-0.2 ± 0.3
NAT2000	-1.9 ± 0.5***	1.0 ± 0.2***	-4.8 ± 0.2***	4.5 ± 0.3***
Wind+NAT2000	-2.5 ± 0.6***	1.1 ± 0.2**	-4.7 ± 0.2***	4.0 ± 0.3***
LowProd	0.5 ± 0.5	0.1 ± 0.2	-0.3 ± 0.2**	0.6 ±0.3**
NAT2000+LowProd	-1.8 ± 0.5***	+1.0 ± 0.2***	-5.2 ± 0.2**	4.9 ± 0.3**
Wind+NAT2000+LowProd	-2.2 ± 0.6***	1.2 ± 0.3***	-5.1 ± 0.2***	4.7 ± 0.4***
Wind+NAT2000+20%FuelPrice	-1.3 ± 0.4***	-0.9 ± 0.2***	-4.7 ± 0.2***	3.8 ± 0.3***

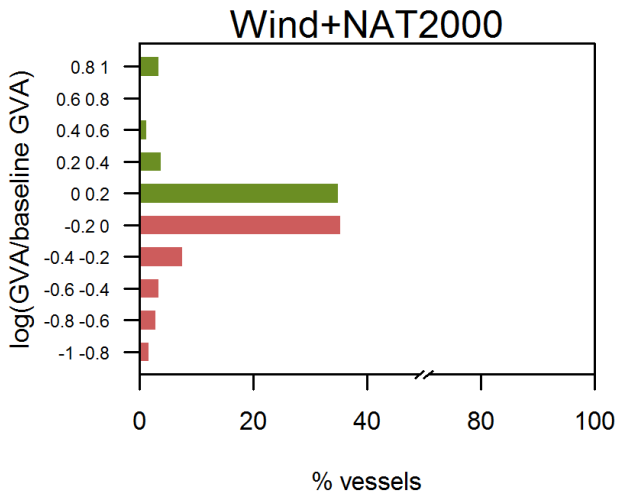
Consequences on fisheries of alternative scenarios – revenue, cost and energy efficiency

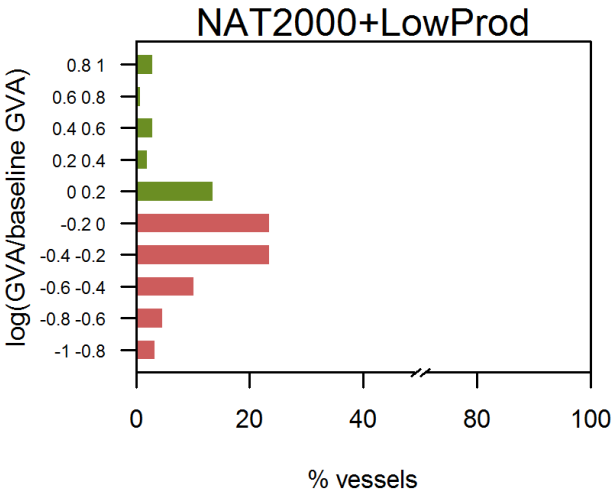
Scenario	Revenue (%)	Fuel cost (%)	CPUE cod only	CPUE cod sprat herring stocks (%)	CPUE other stocks (%)	GVA (%)	VPUF (%)
Wind	1.0 ±1.6	0.1 ± 0.5	-1.1 ± 0.7**	2.2 ± 3.2	-0.8 ± 1.2	1.3 ± 2.0	1.7 ±1.8
NAT2000	-2.4 ± 2.0*	-0.5 ± 0.5*	-2.4 ± 0.7***	5.9 ±3.4**	-15.0 ± 1.2***	-2.8 ± 2.6**	-8.9 ± 1.8***
Wind+NAT2000	-1.2 ± 1.8	-0.9 ± 0.5**	-2.7 ±0.7***	8.4 ± 3.1***	-13.7 ± 1.4***	-1.2 ± 2.5	-4.6 ± 2.0***
LowProd	-13.0 ±1.9***	-0.1 ± 0.6	-21.0 ±0.6***	-34.6 ± 1.7***	-1.0 ± 1.5	-16.3 ± ±2.3***	-7.5 ± 1,4***
NAT2000+LowProd	-15.3 ± 1.3***	-0.6 ± 0.5*	-22.3 ± 0.5***	-33.4 ± 1.6***	-14.5 ± 1.3***	-19.0 ± 1.5***	-14.7 ± 1.6***
Wind+NAT2000+LowProd	-13.4 ± 1.7***	-0.5 ± 0.5*	-22.6 ± 0.5***	-32.8 ± 1.6***	-13.0 ± 1.2***	-16.6 ± 2.1***	-11.0 ± 2.0***
Wind+NAT2000+20%FuelPrice	-4.3 ± 1.6***	18.3 ± 0.7***	5.5 ± 0.7***	31.2 3.4***	-19.2 ± 1.2***	-9.9 ± 1.8***	-8.9 ± 1.4***

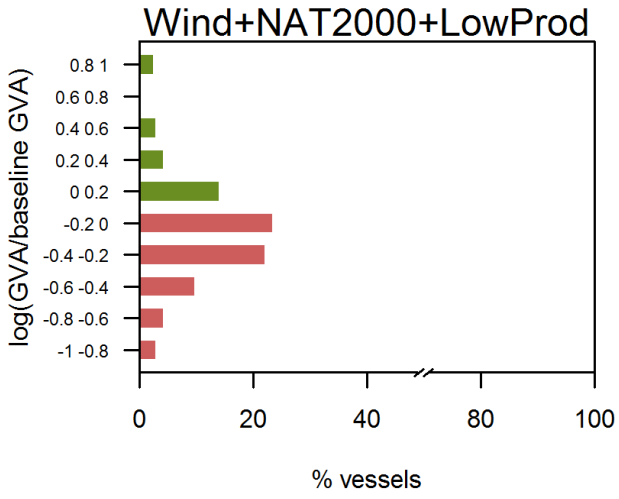
Individual consequences – stress levels

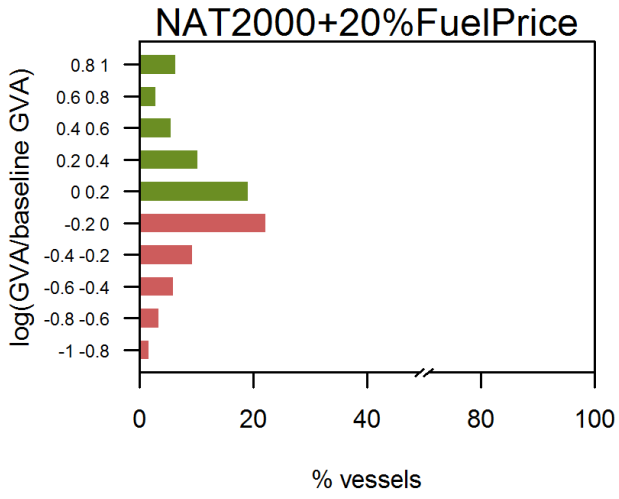




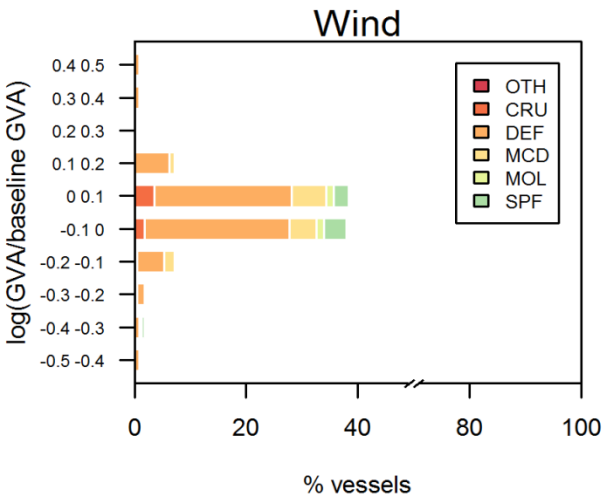


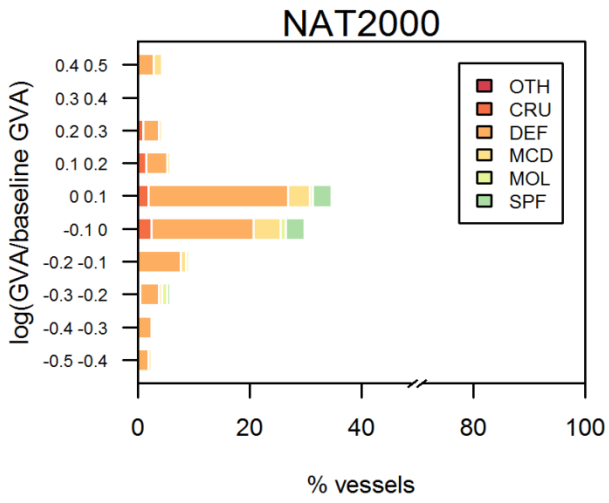


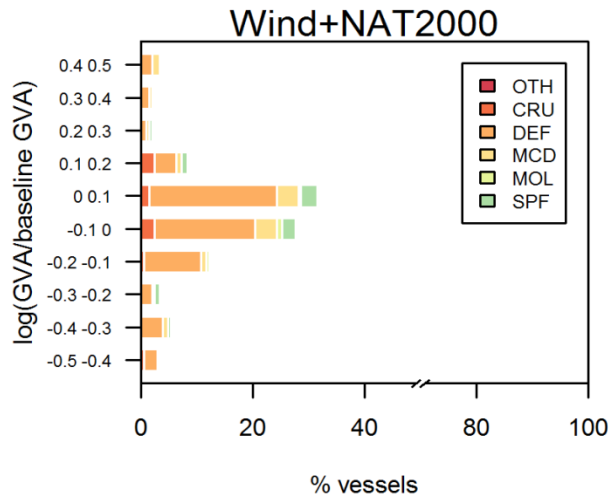


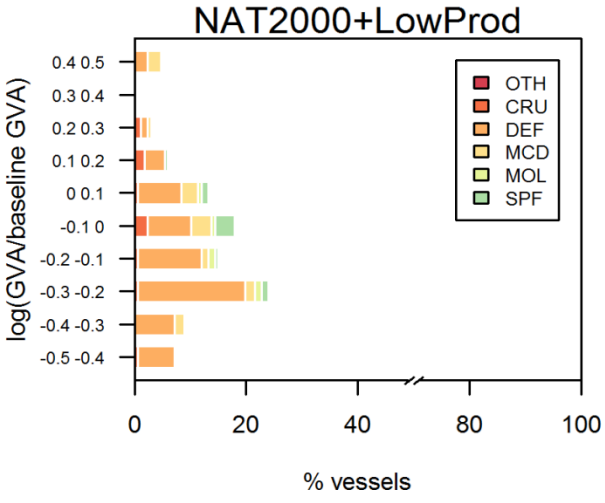


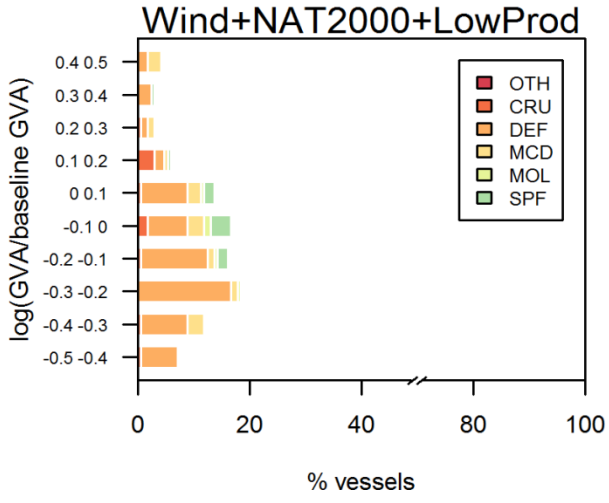
Individual consequences – stress levels – target assemblage

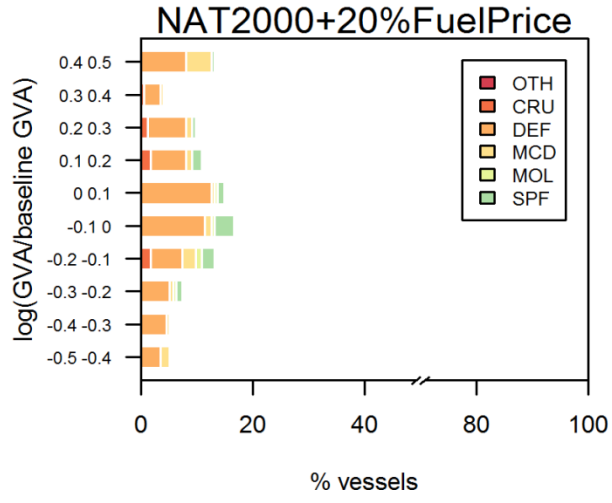




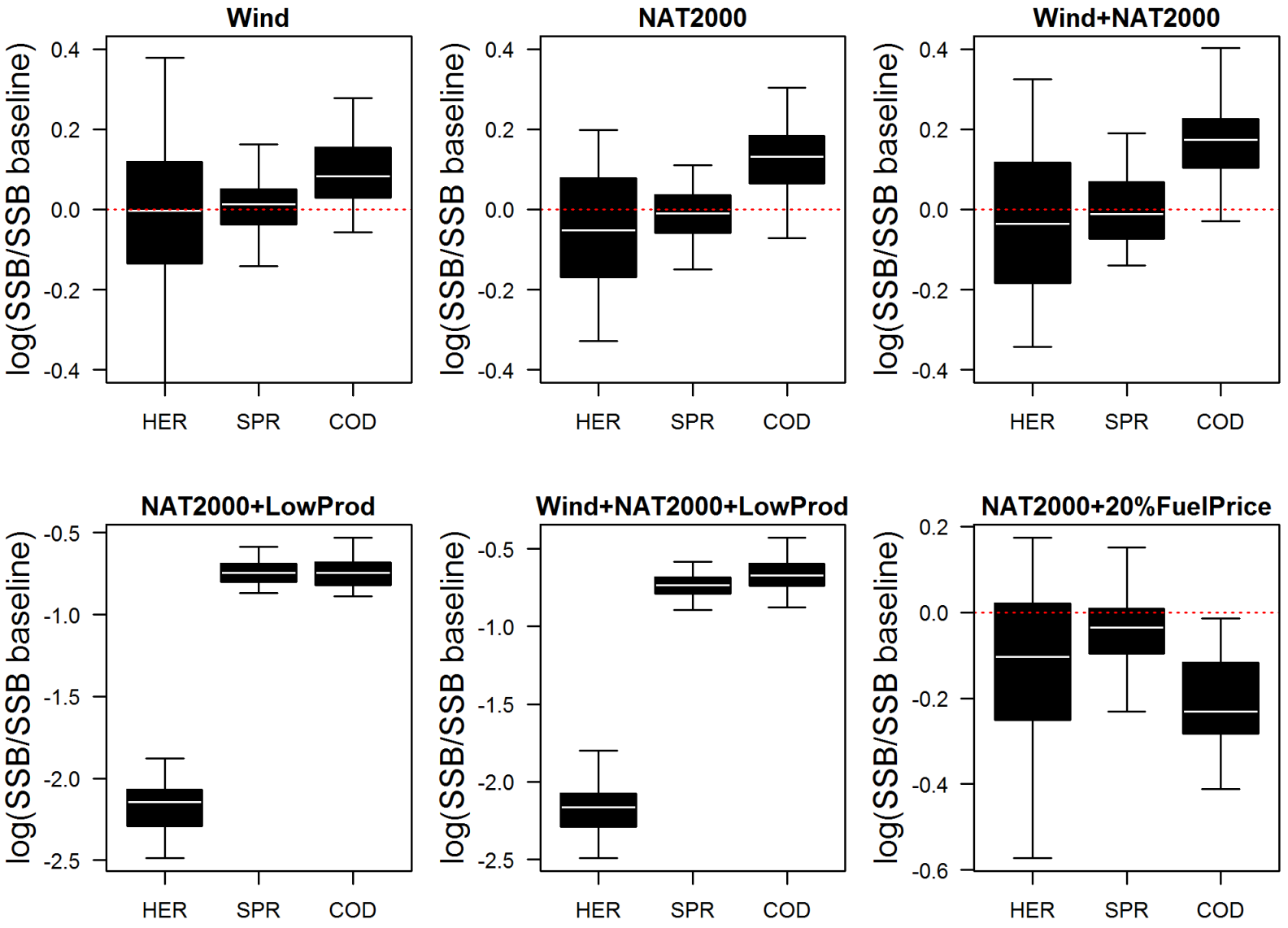




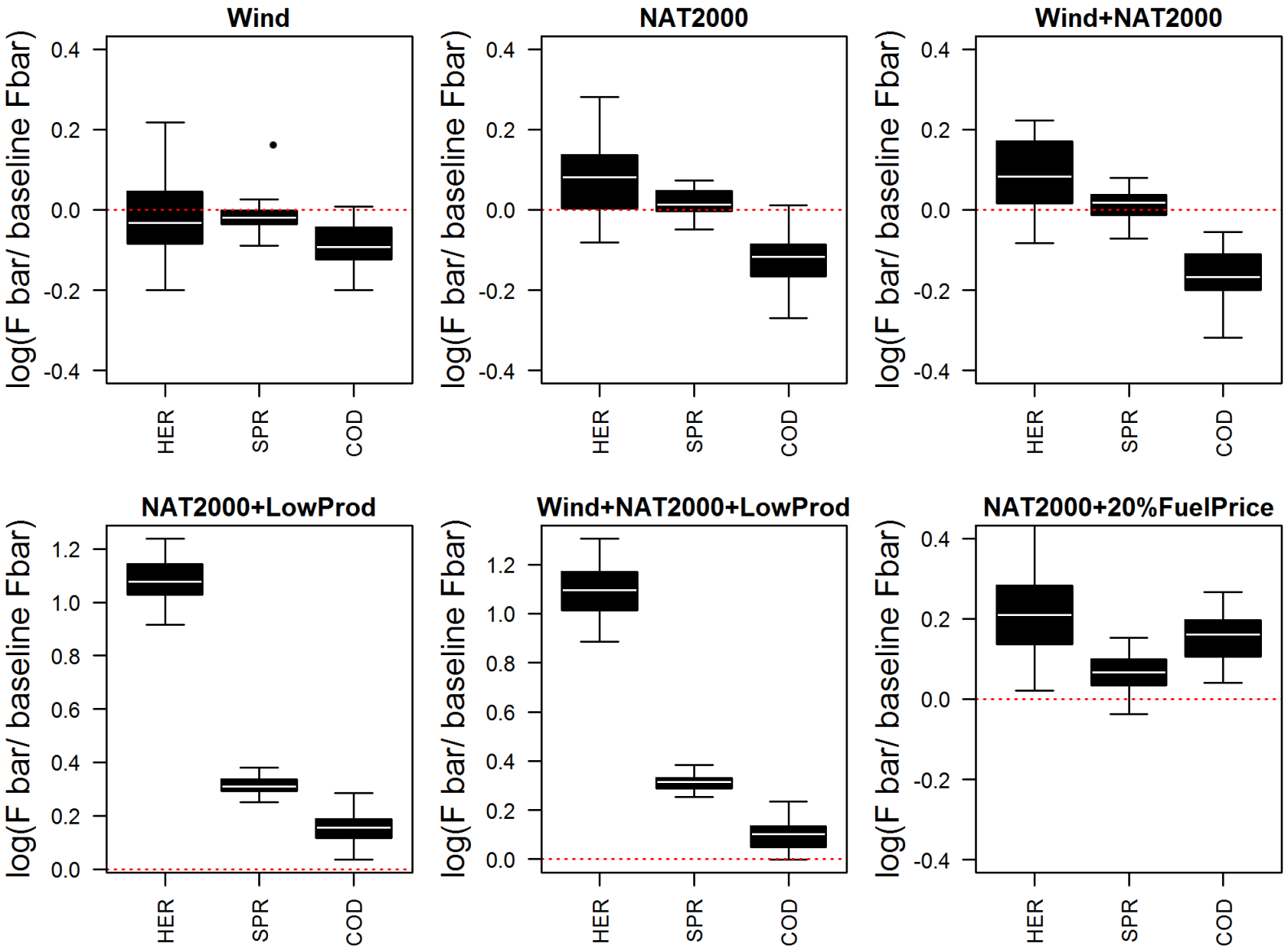




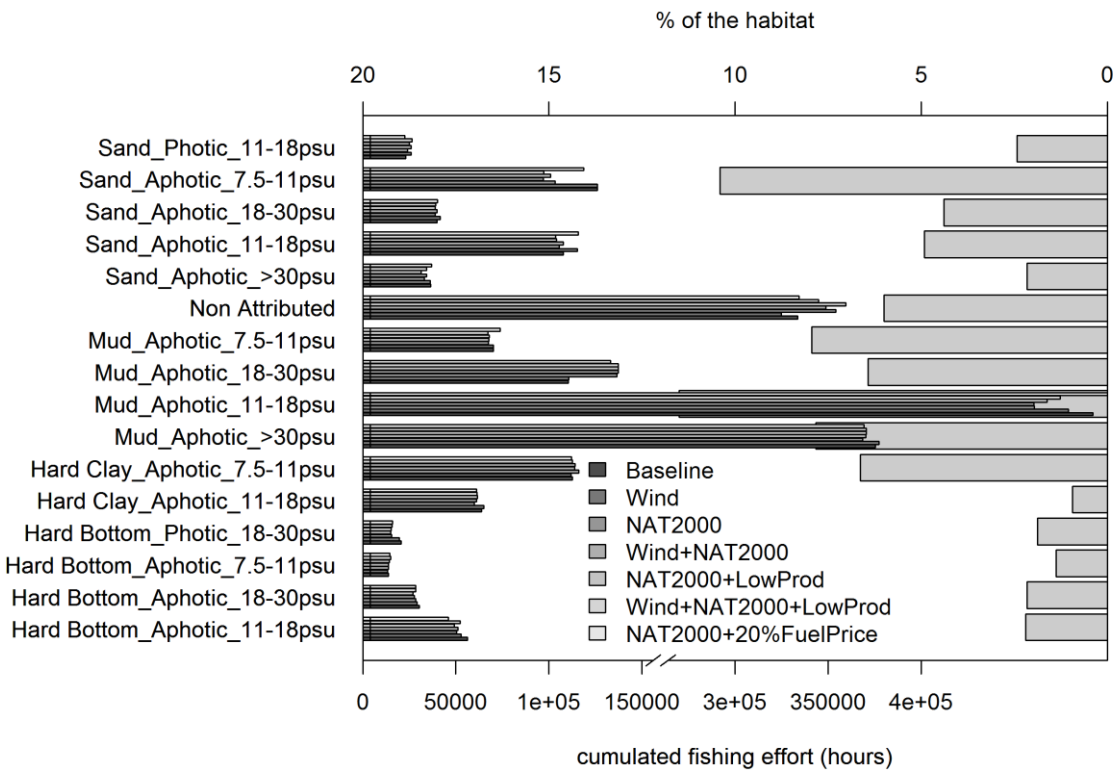
Biological sustainability - SSB

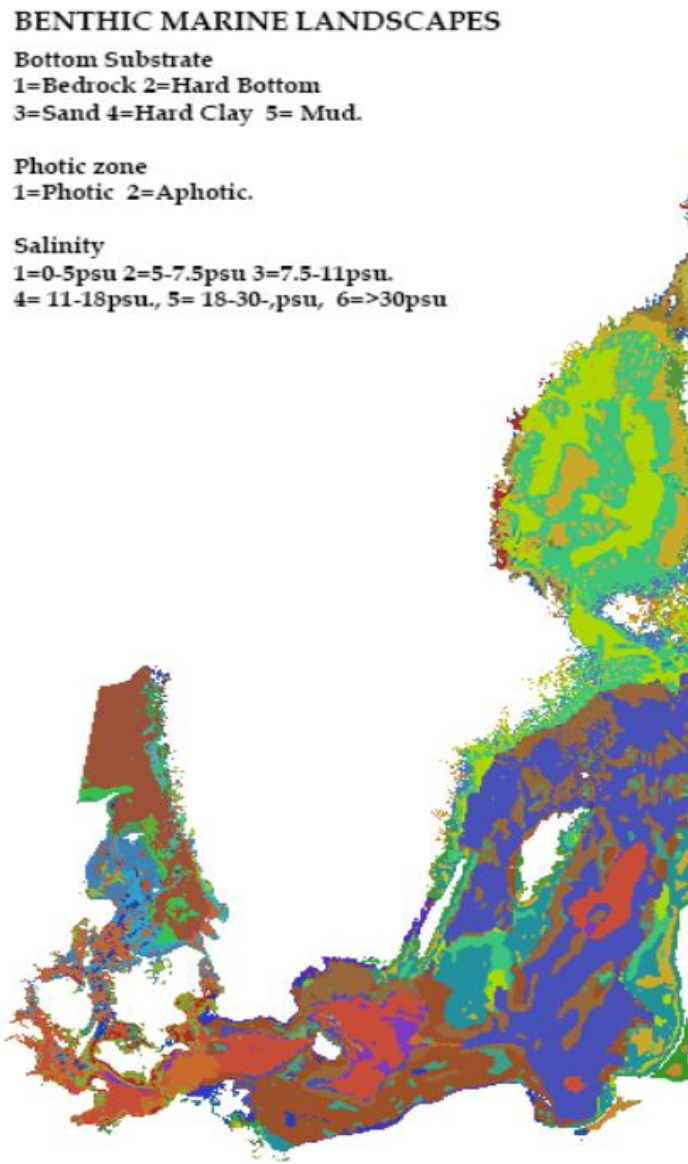


Biological sustainability - F



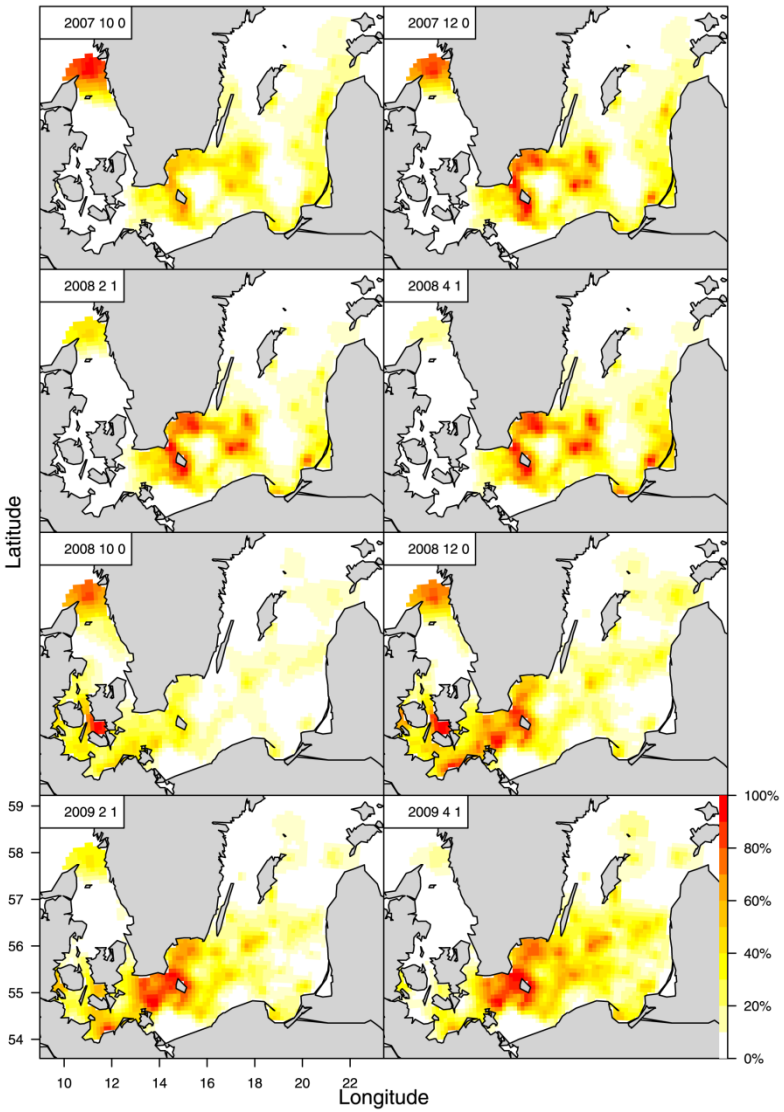
Is effort displaced on sensitive habitats?





Take home messages

- **Stable profit from compensation** are possible even if opportunities for fishing grounds are constrained
- Some **individual vessels strongly affected** by management while winners make profit to the detriment of others
- **Higher costs** from increased steaming time balanced out by higher revenue from healthier stocks, and **decreased energy efficiency**
- Redirection towards certain habitats from **effort displacement not impacting**
- **Positive global effect** on stocks and concentration of effort towards high catch rate grounds
- **DISPLACE = support tool** for fisheries and management for facilitating understanding of dynamics, reproducing observed patterns and evaluating alternative scenarios



Evaluate the robustness of the outcomes by investigating various productivity levels (…and impact of the trophic interactions on the system)

Toward ecosystem modelling, incl. benthic habitats

Have your say on how spatial restrictions affect your fishing

May 19, 2014 displaced fishing effort fishermen decisions, stakeholder engagement Edit

In relation to present simulations performed under the Baltic case study of the SOCIOEC project, the stakeholder feed-back is expected to provide information on (and contribute to) what the stakeholders consider to be the most important risk factors in such spatial management. Furthermore, they are expected to contribute with information on

navigate4sea

@navigate4sea

Portugal bans deep-sea t
/L2l3CMPNnC & http://t.c
@Oceana @osparcomm

@navigate4sea

Ports & blue economy - S
ing in Cherbourg, FR, 18t
http://t.co/QIycf5189s

@navigate4sea

Effects of fishing on bentl
and ecosystem function h
/Cgyq7TJXB1 Tromsø, No
June 2014 @ICES_ASC

How spatial planning constrains transnational fisheries: the bio-economic DISPLACE evaluation on the Baltic Sea

Francois Bastardie fba@aqua.dtu.dk @navigate4sea

www.displace-project.org

SOCIOEC
SOCIO ECONOMIC EFFECTS OF MANAGEMENT MEASURES OF THE FUTURE CFP

image
- a strategic alliance

SLU

vTI
Johann Heinrich von Thünen-Institut

DTU Aqua
National Institute of Aquatic Resources