Spatial fisheries management in the Adriatic Sea: DISPLACE model

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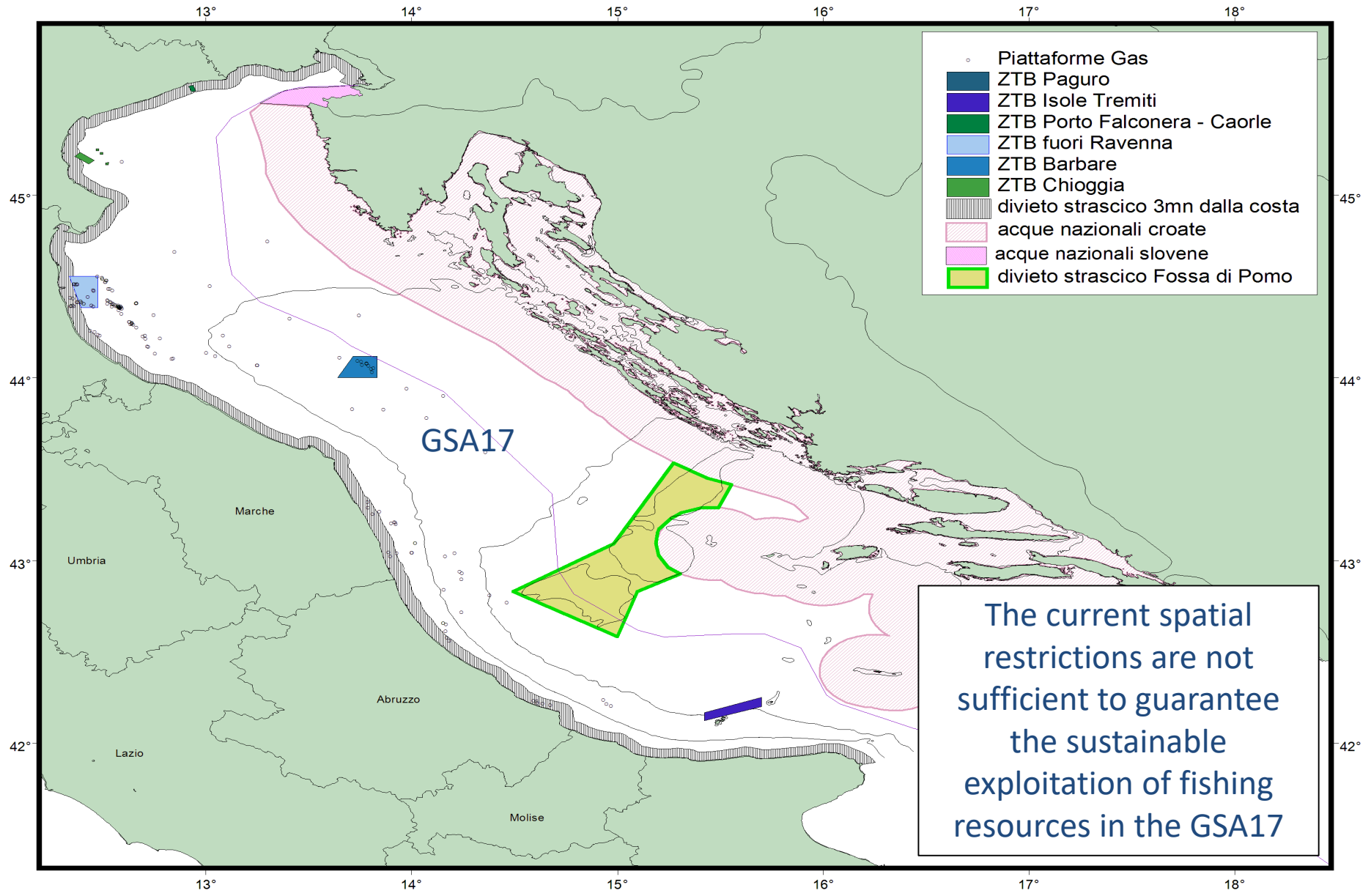


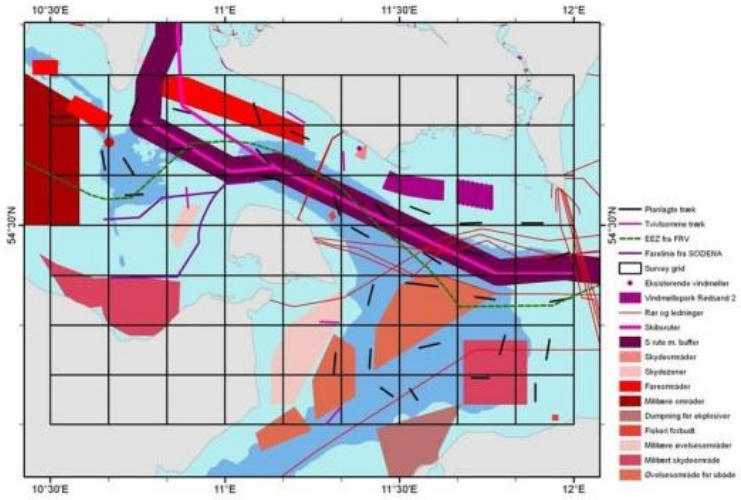
The current spatial restrictions are not sufficient to guarantee the sustainable exploitation of fishing resources in the GSA17

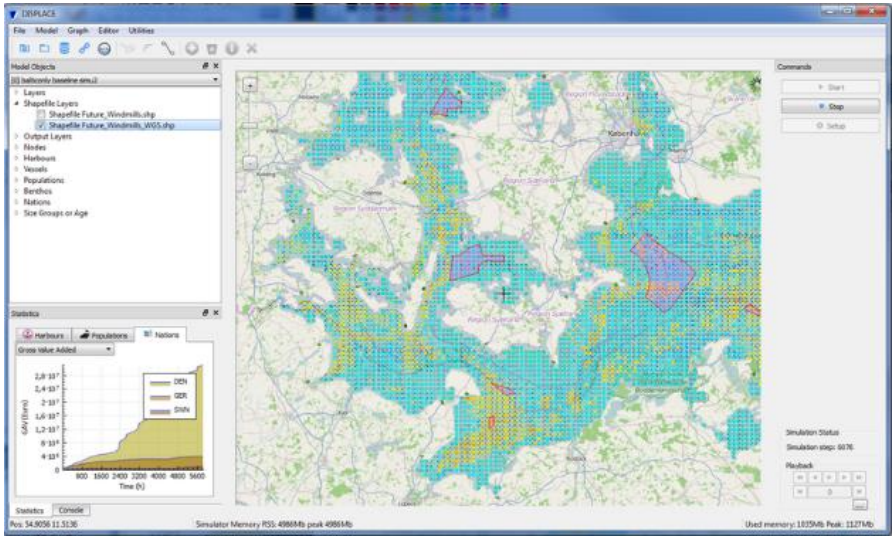
DISPLACE

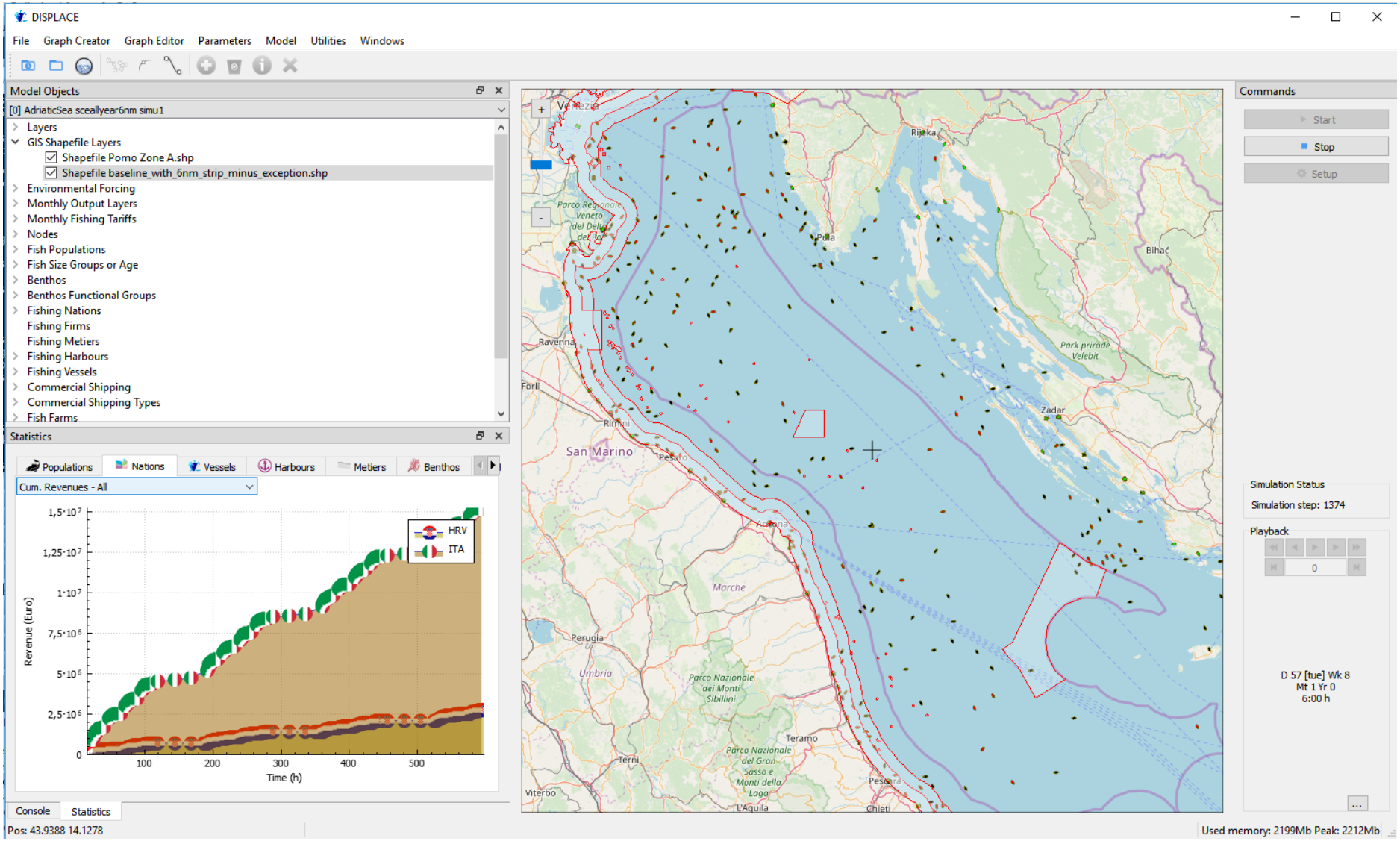
A spatial model of fisheries to help maritime spatial planning

- *A bi-directional model:* it combines fishing activities and resource dynamics with very high resolution in time and space.
- *An agent-based simulation model:* aim to consider the socio-economic processes at the individual scale (e.g., fishing vessel or group of vessels).

With DISPLACE it is possible to simulate spatial restrictions for fisheries and to evaluate the bio-economic consequences of fishing effort displacement.






DISPLACE
File
Graph Creator
Graph Editor
Parameters
Model
Utilities
Windows
Model Objects
[0] AdriaticSea sceallyear6nm simu1
Layers
GIS Shapefile Layers
Shapefile Pomo Zone A.shp
Shapefile baseline_with_6nm_strip_minus_exception.shp
Environmental Forcing
Monthly Output Layers
Monthly Fishing Tariffs
Nodes
Fish Populations
Fish Size Groups or Age
Benthos
Benthos Functional Groups
Fishing Nations
Fishing Firms
Fishing Metiers
Fishing Harbours
Fishing Vessels
Commercial Shipping
Commercial Shipping Types
Fish Farms
Statistics
Populations
Nations
Vessels
Harbours
Metiers
Benthos
Cum. Revenues - All
HRV
ITA
Revenue (Euro)
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Console
Statistics
Pos: 43.9388 14.1278
Commands
Start
Stop
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Simulation Status
Simulation step: 1374
Playback
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Mt 1 Yr 0
6:00 h
Used memory: 2199Mb Peak: 2212Mb

Spatial planning for fisheries in the Northern Adriatic: working towards viable and sustainable fishing

Francois Bastardie[a], Silvia Angelini[b], Luca Bolognini[b], Federico Fuga[c], Chiara Manfredi[d], Michela Martinelli[b], J. Rasmus Nielsen[a], Alberto Santojanni[b], Giuseppe Scarcella[b], Fabio Grati[b]

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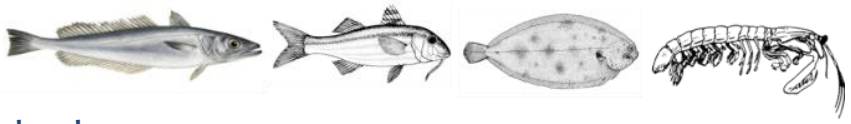
[c] Studiofuga, Verona, Italy
[d]University of Bologna, Laboratory of Marine Biology and Fishery, Fano, Italy

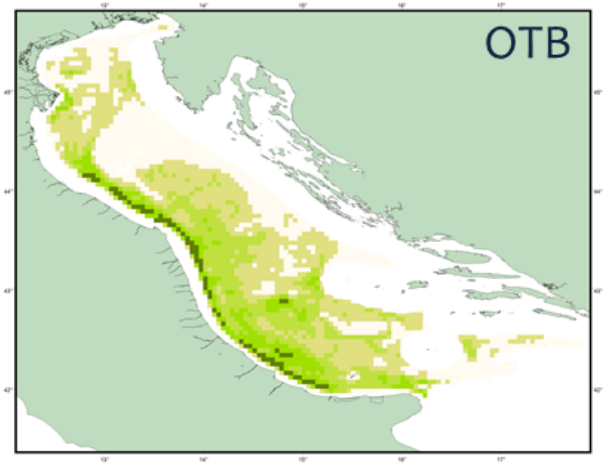
EcoSea

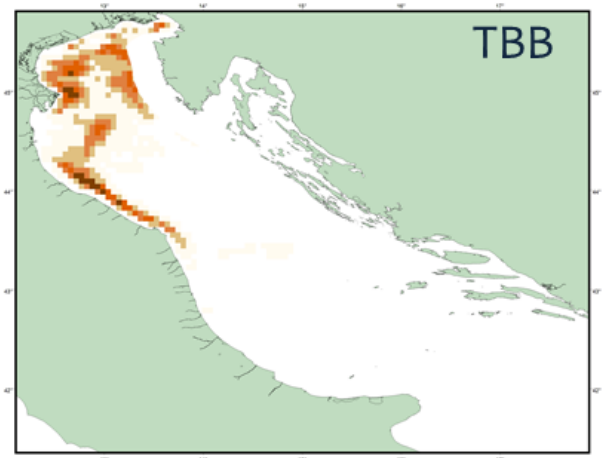
ECOAST
ERA-net COFASP

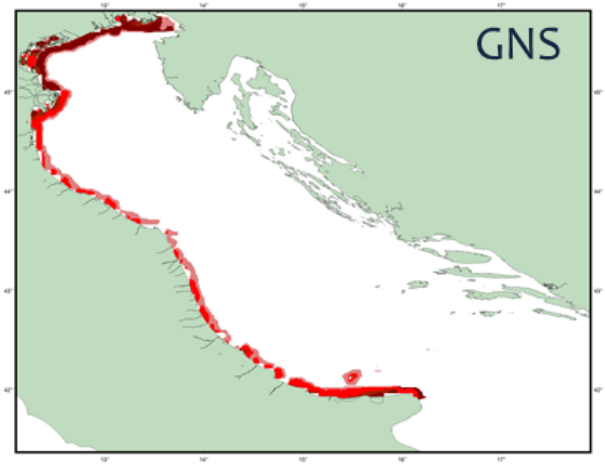


Data input (Italian fleet of GSA17):

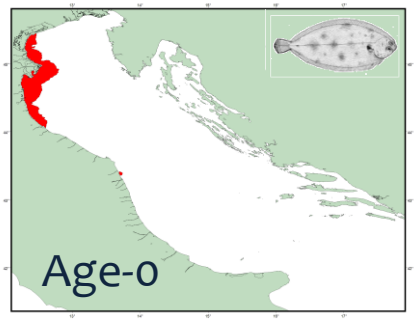
- n. vessels (Loa, GT, kW) using OTB, TBB and GNS per harbour;
- fishing areas (VMS for OTB and TBB, model of Stefanos Kavadas for GNS);
- fuel consumption by vessel type (fishing, navigation and neutral) and price;
- landings, CPUE, assessment and market prices for hake, red mullet, common sole and mantis shrimp;
- spatial distribution of the four target species by survey data (MEDITS and SOLEMON).







- ❖ 5-year simulation horizon
- ❖ 50 replicates (Monte-Carlo simulations)
- ❖ A single agent included 4 vessels («super-individuals»)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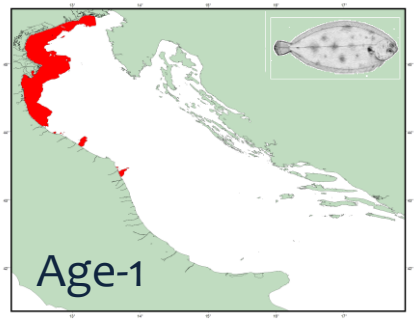
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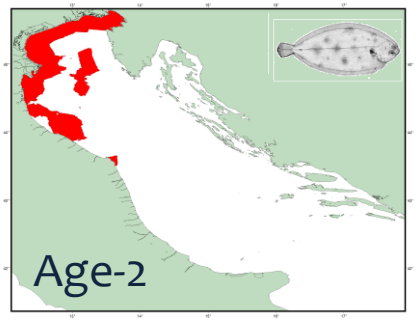
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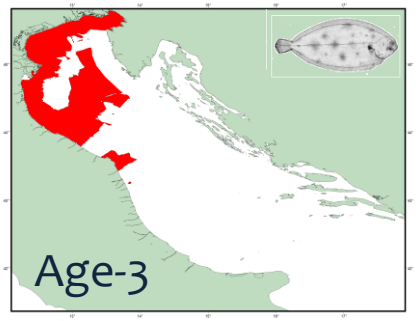
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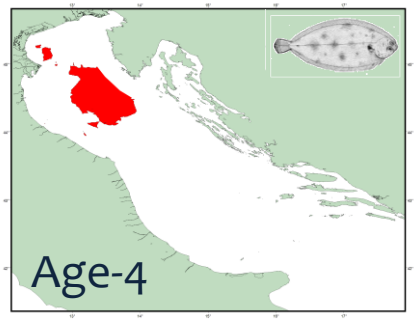
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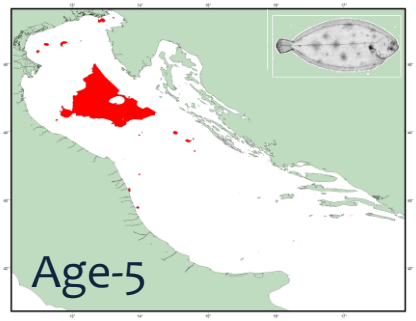
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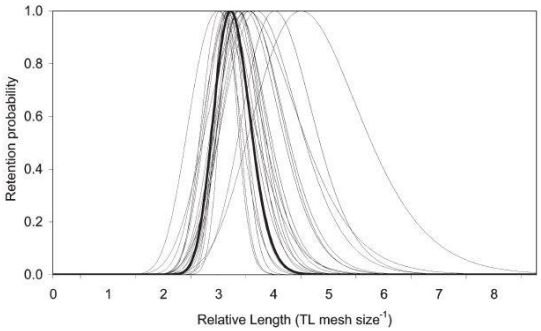
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2
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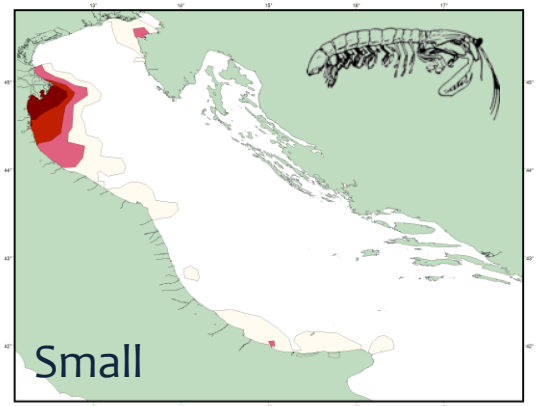
7
8
Relative Length (TL mesh size-1)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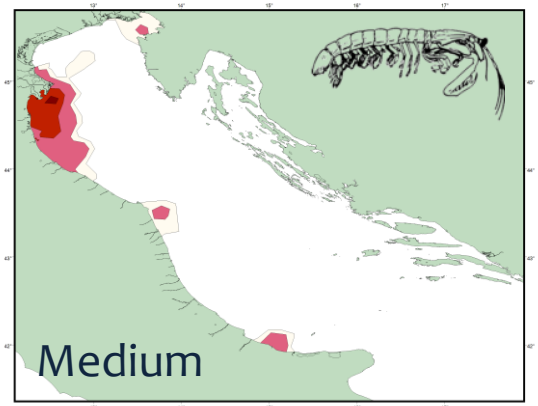
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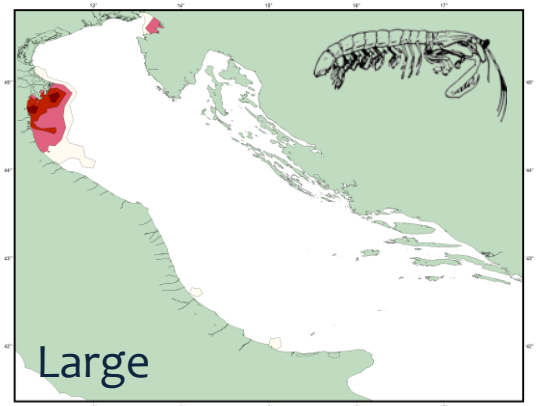
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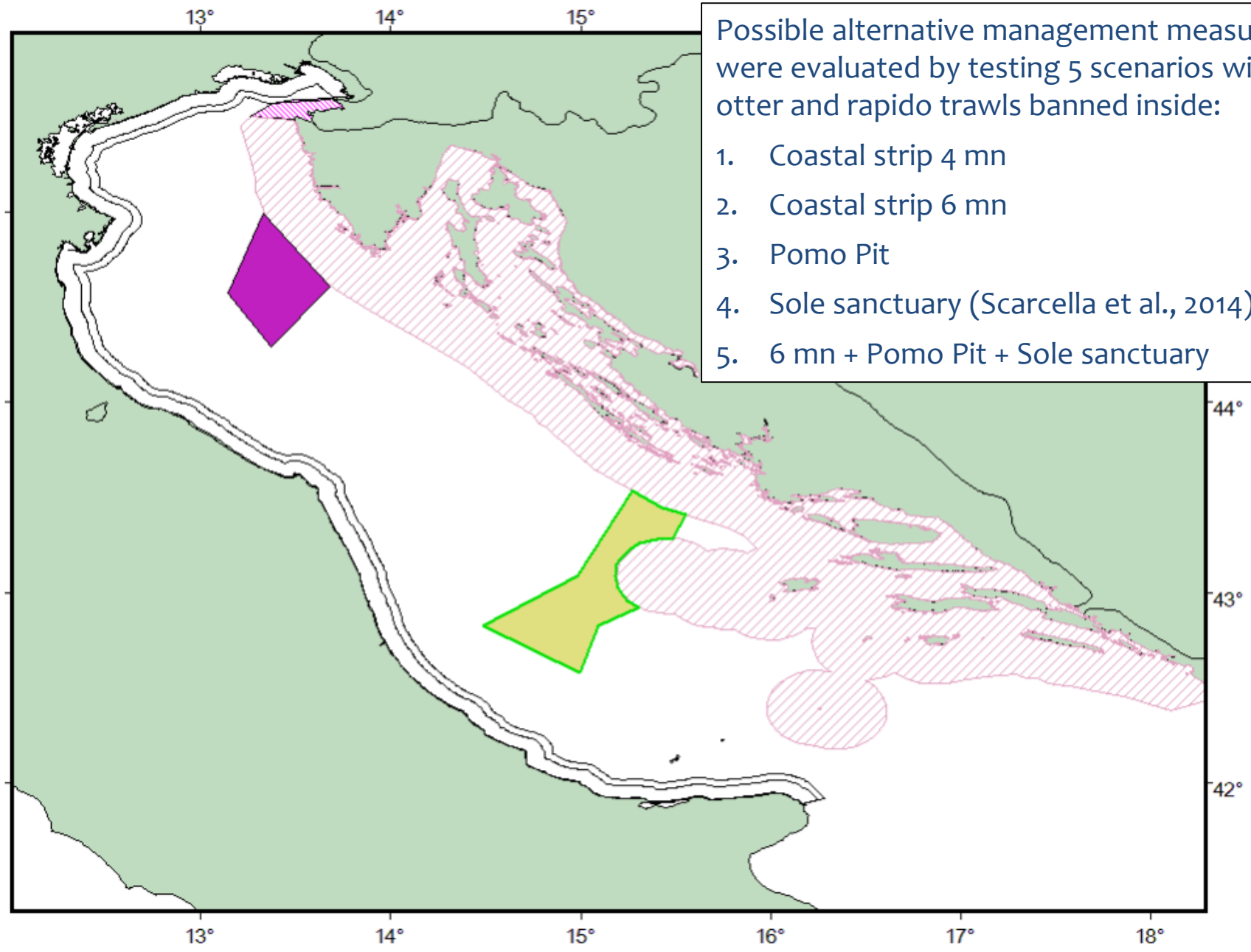
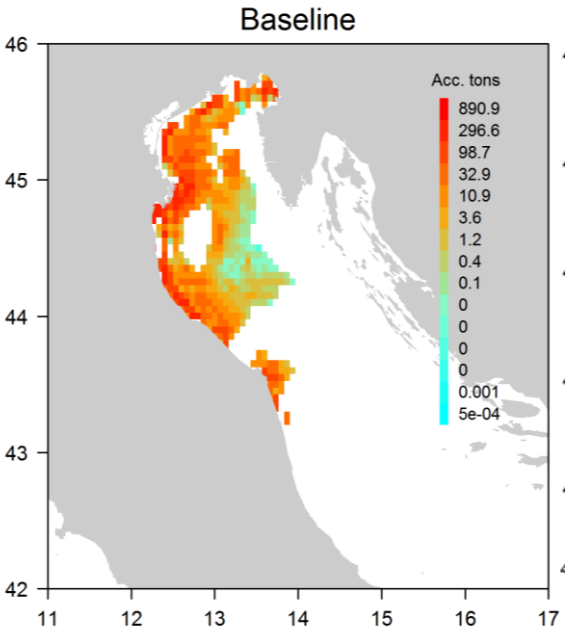
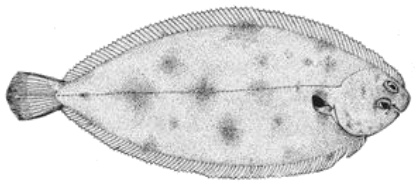


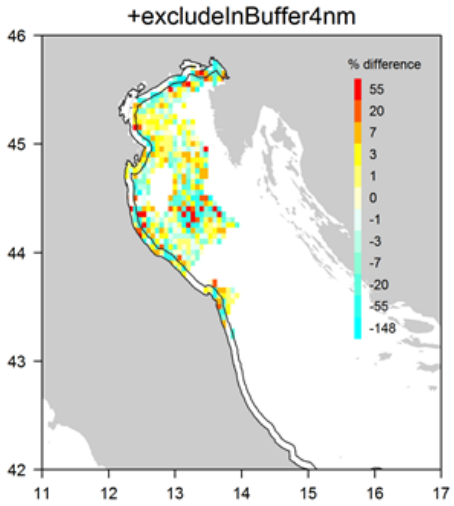
Possible alternative management measures were evaluated by testing 5 scenarios with otter and rapido trawls banned inside:

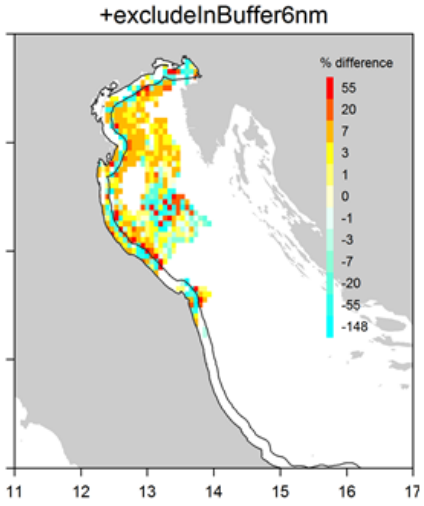
1. Coastal strip 4 mn
2. Coastal strip 6 mn
3. Pomo Pit
4. Sole sanctuary (Scarcella et al., 2014)
5. 6 mn + Pomo Pit + Sole sanctuary

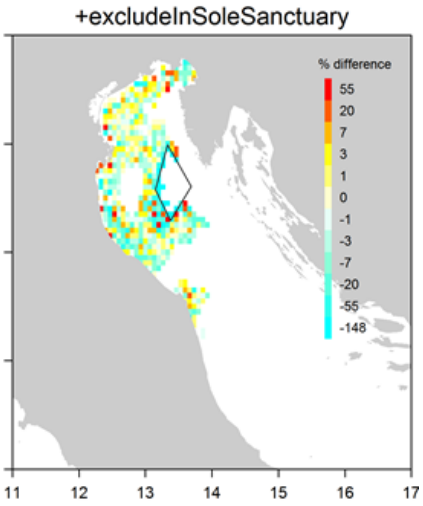
Redistribution of common sole catches

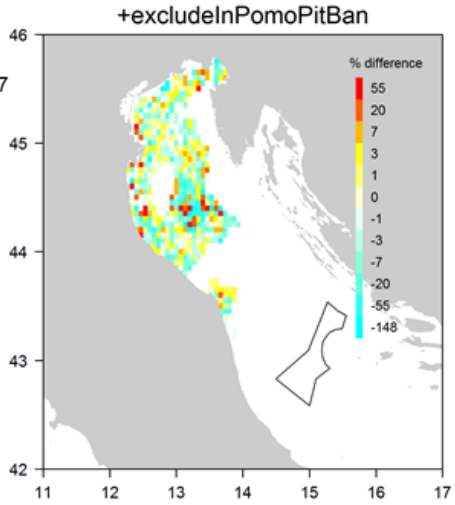


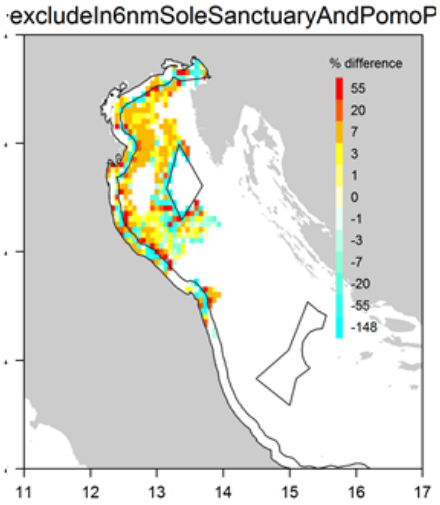




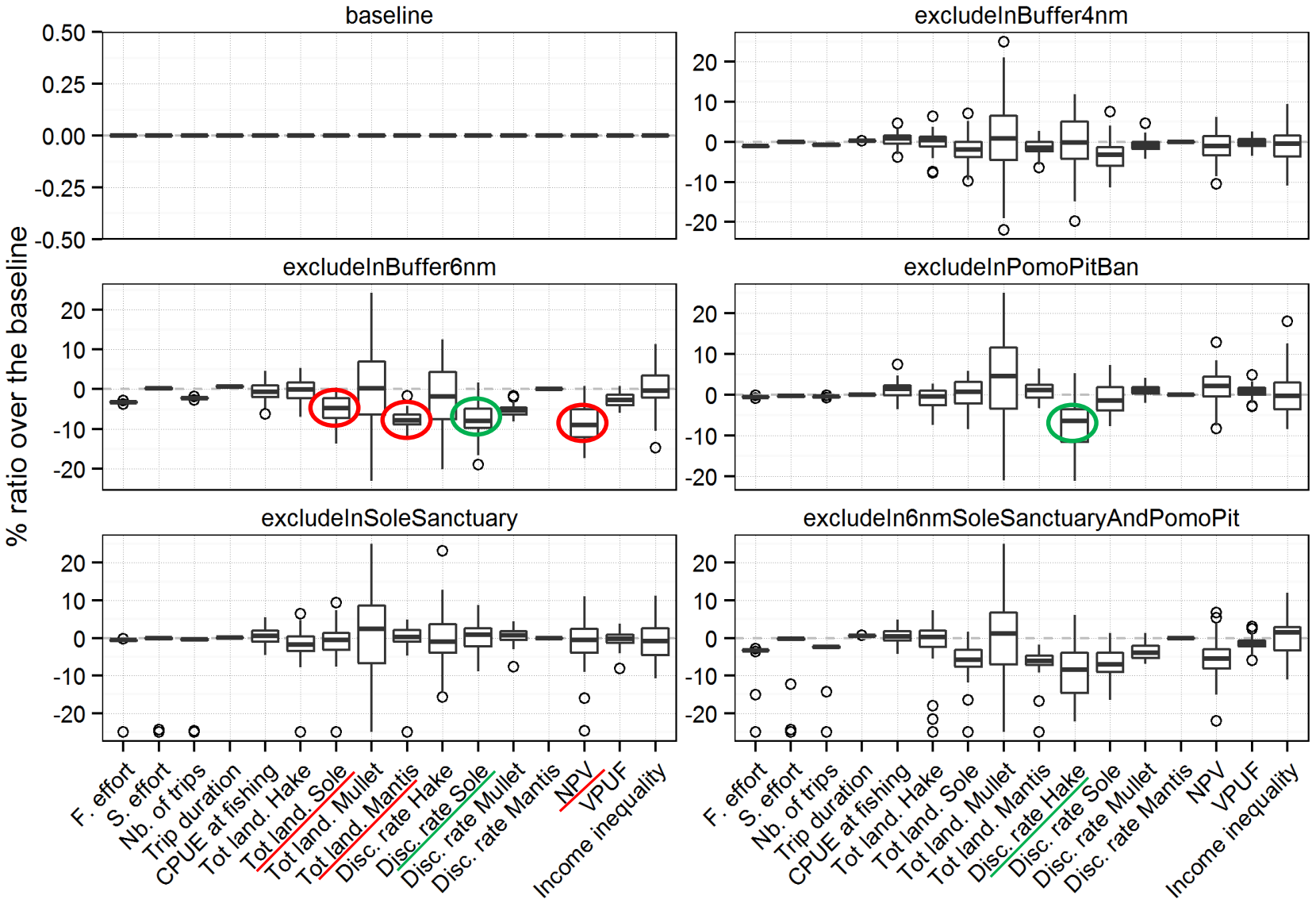




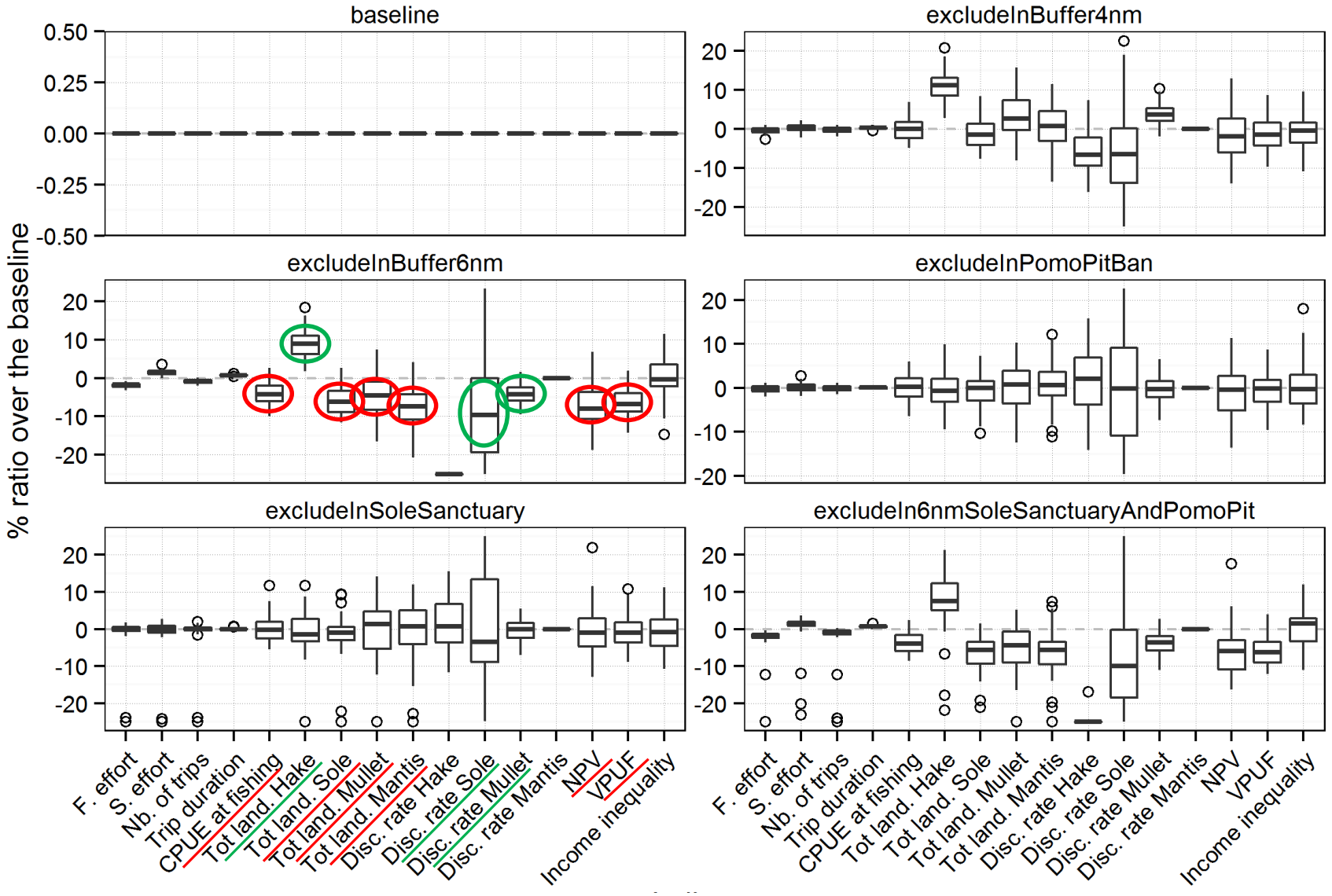




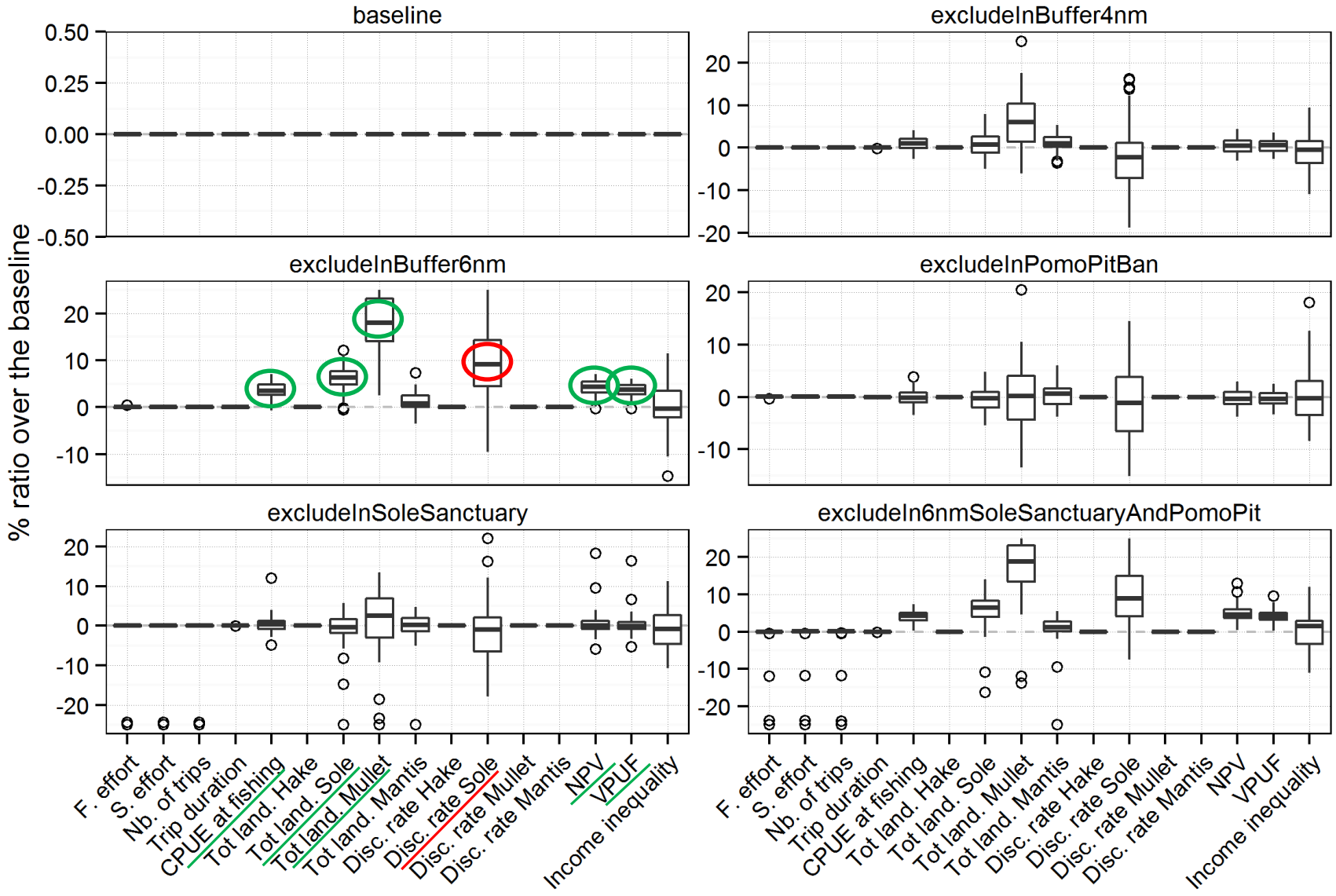
Indicators for Bottom Otter Trawl

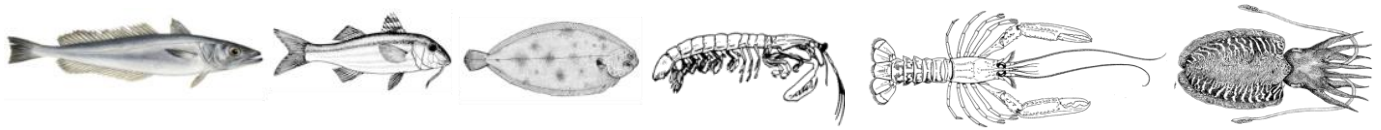


Indicators for Rapido Trawl



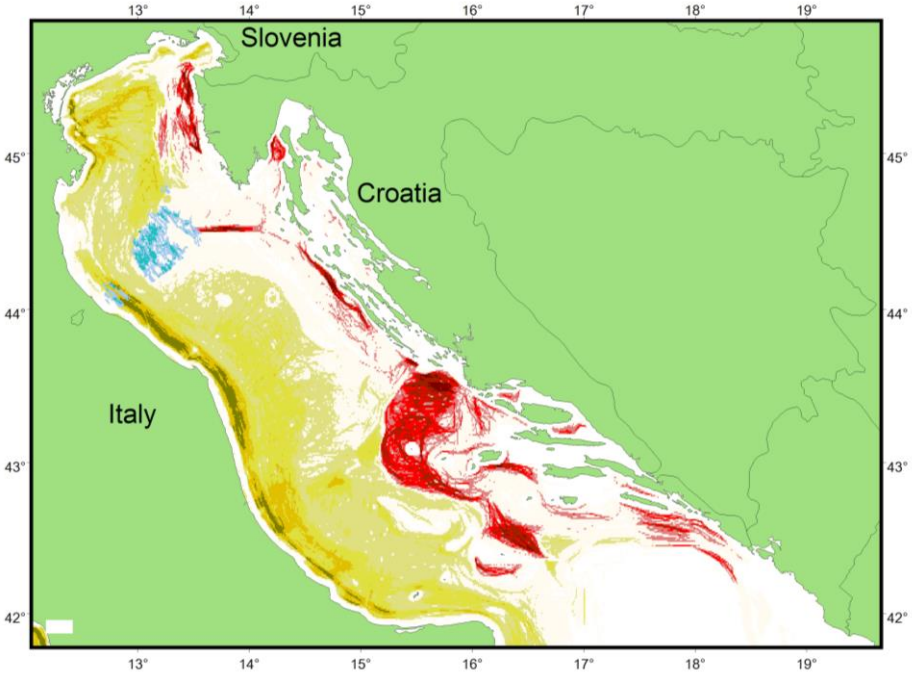
Indicators for Gillnets



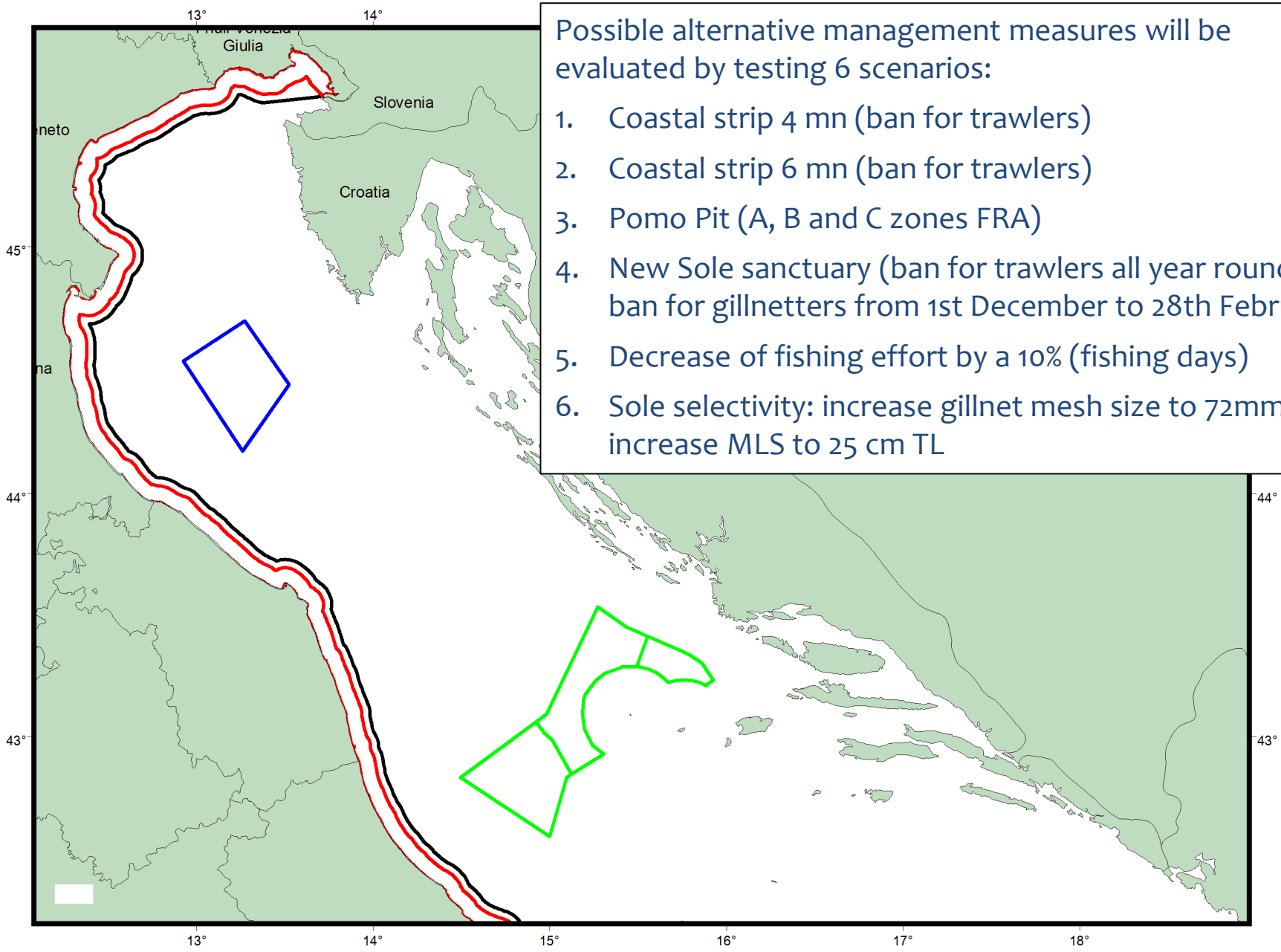


NEW INPUT DATA

- n. vessels (Loa, GT, kW) using OTB, TBB and GNS per harbour in Italy GSA17 and Croatia;
- fishing areas (AIS data for OTB and TBB, model of S. Kavadas + participatory appproach for SSF);
- fuel consumption by vessel type (fishing, navigation and neutral) and price;
- landings, CPUE, assessment (except *N. norvegicus*) and market prices for hake, red mullet, common sole, mantis shrimp, Norway lobster and cuttlefish;
- spatial distribution of the six target species by survey data (MEDITS and SOLEMON).



Interreg
Italy - Croatia
DORY
European Regional Development Fund
EUROPEAN UNION

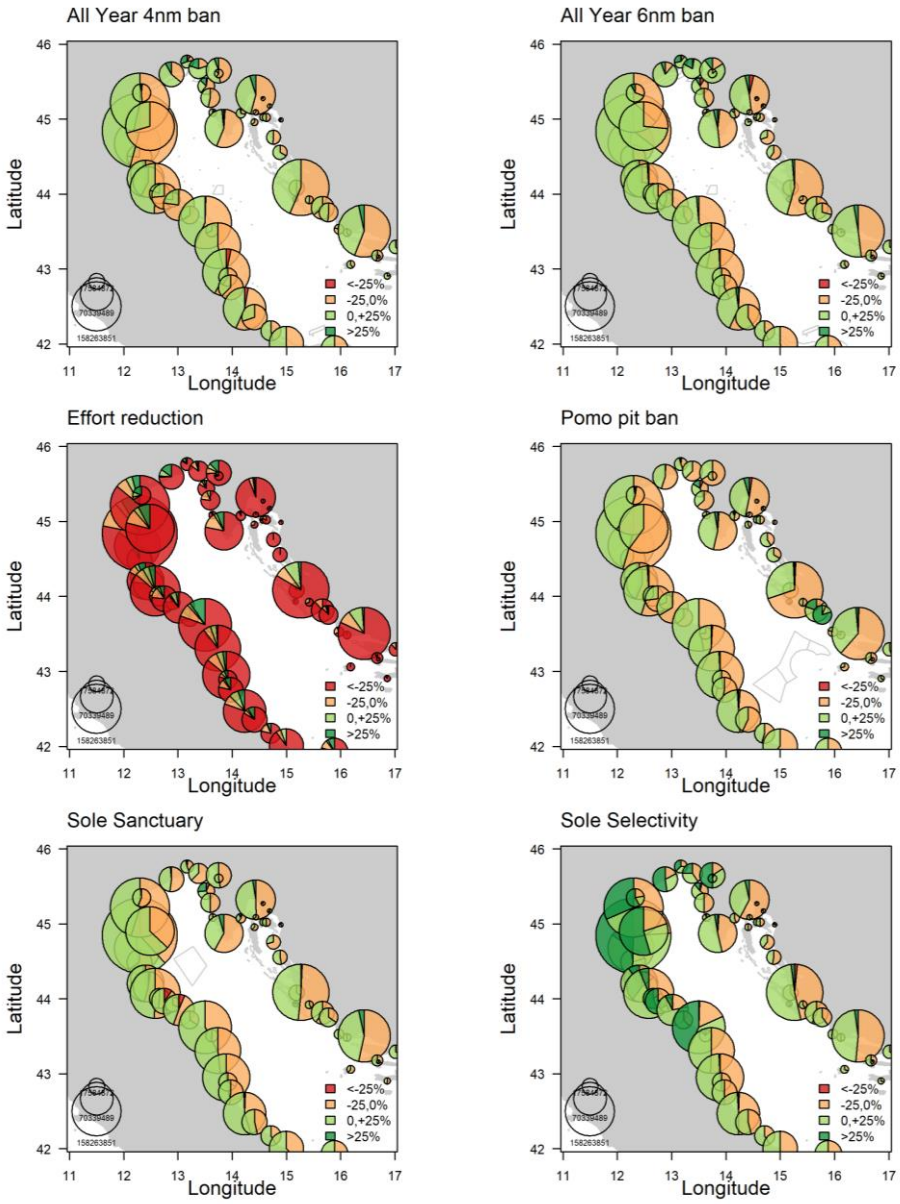


Possible alternative management measures will be evaluated by testing 6 scenarios:

1. Coastal strip 4 mn (ban for trawlers)
2. Coastal strip 6 mn (ban for trawlers)
3. Pomo Pit (A, B and C zones FRA)
4. New Sole sanctuary (ban for trawlers all year round + ban for gillnetters from 1st December to 28th February)
5. Decrease of fishing effort by a 10% (fishing days)
6. Sole selectivity: increase gillnet mesh size to 72mm and increase MLS to 25 cm TL

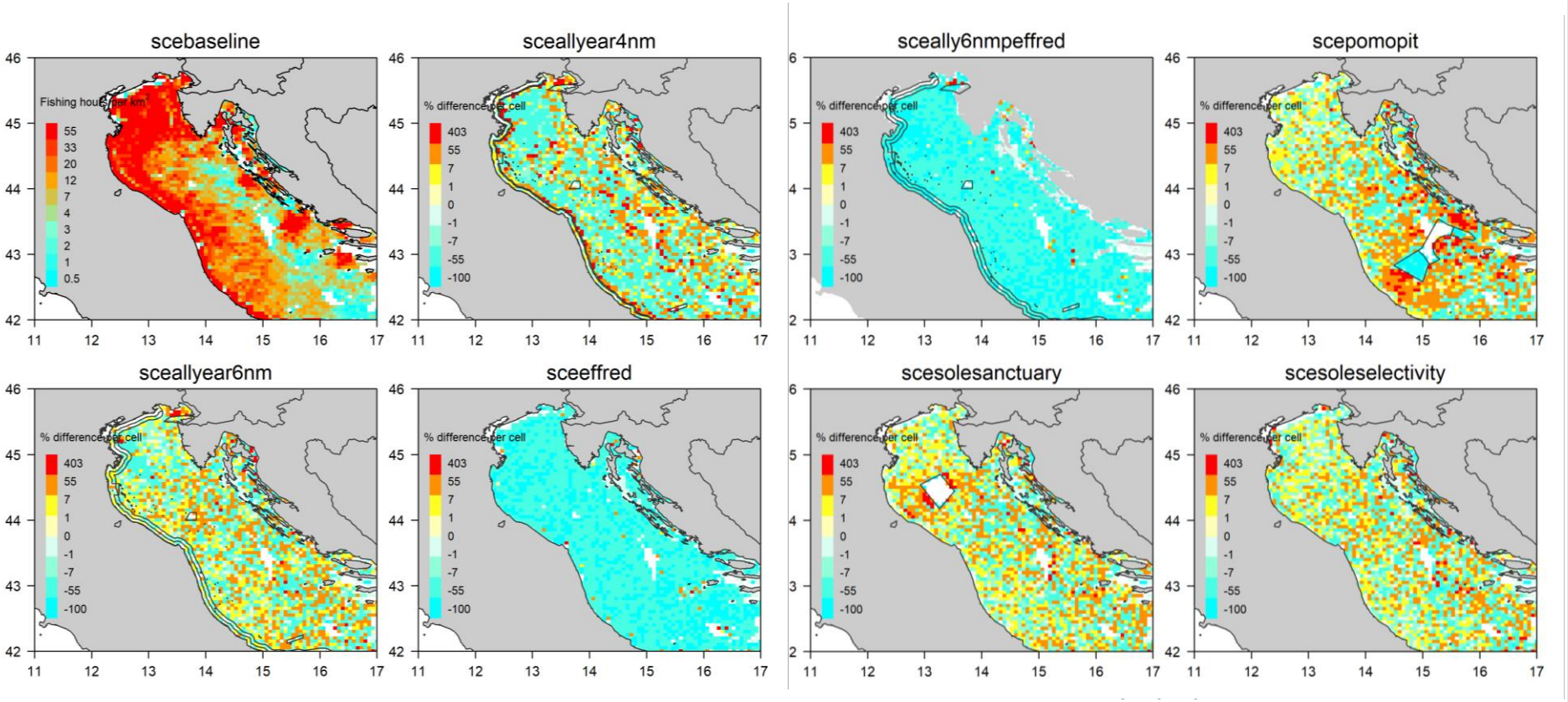
Preliminary results
(after 5-years simulation horizon)

Simulated stress level categories (<-25%, -25 to 0%, 0 to 25%, >25%) at the fishing harbor communities' scale expressed as proportion of vessels with change in incomes from landings resulting from applying the scenarios



Preliminary results

Redistribution of fishing effort in all scenarios (in relative) compared to the baseline scenario (in absolute)



Thank you for your attention …any questions?