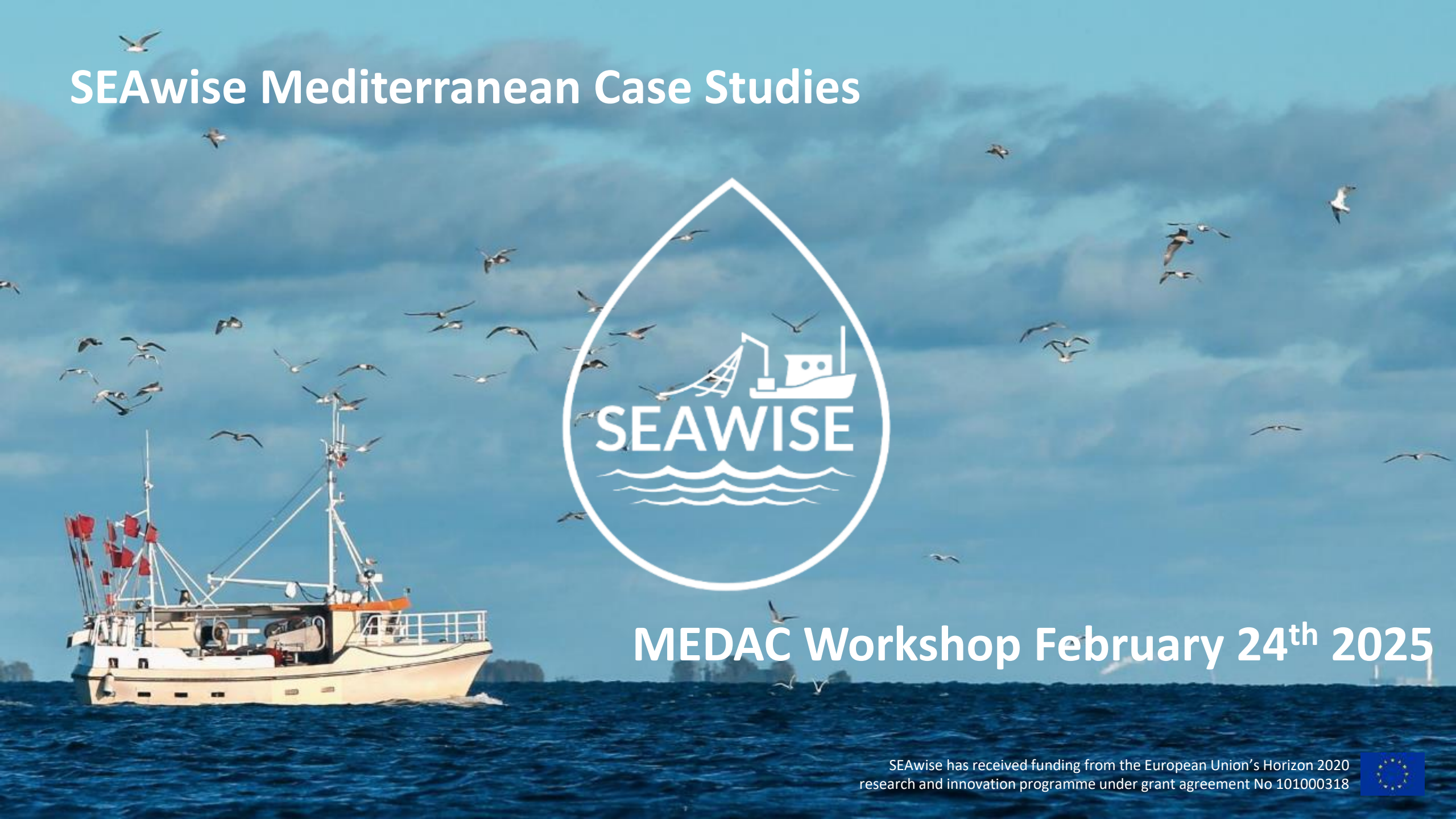
SEAwise Mediterranean Case Studies



MEDAC Workshop February 24th 2025

SEAwise has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 101000318

SEAwise: Operationalising an effective implementation of Ecosystem Based Fisheries Management in Europe

Beginning in October 2021 as part of EU's Horizon 2020 programme, SEAwise works until September 2025 to **address the four key challenges to the effective implementation of EBFM today**:

1. **Lack of end-user driven advice**
2. **Lack of clear and widely accepted priorities**
3. **Gaps in existing knowledge**
4. **Lack of accurate and adaptive methods**

SEAwise and Ecosystem Based Fisheries Management in Europe

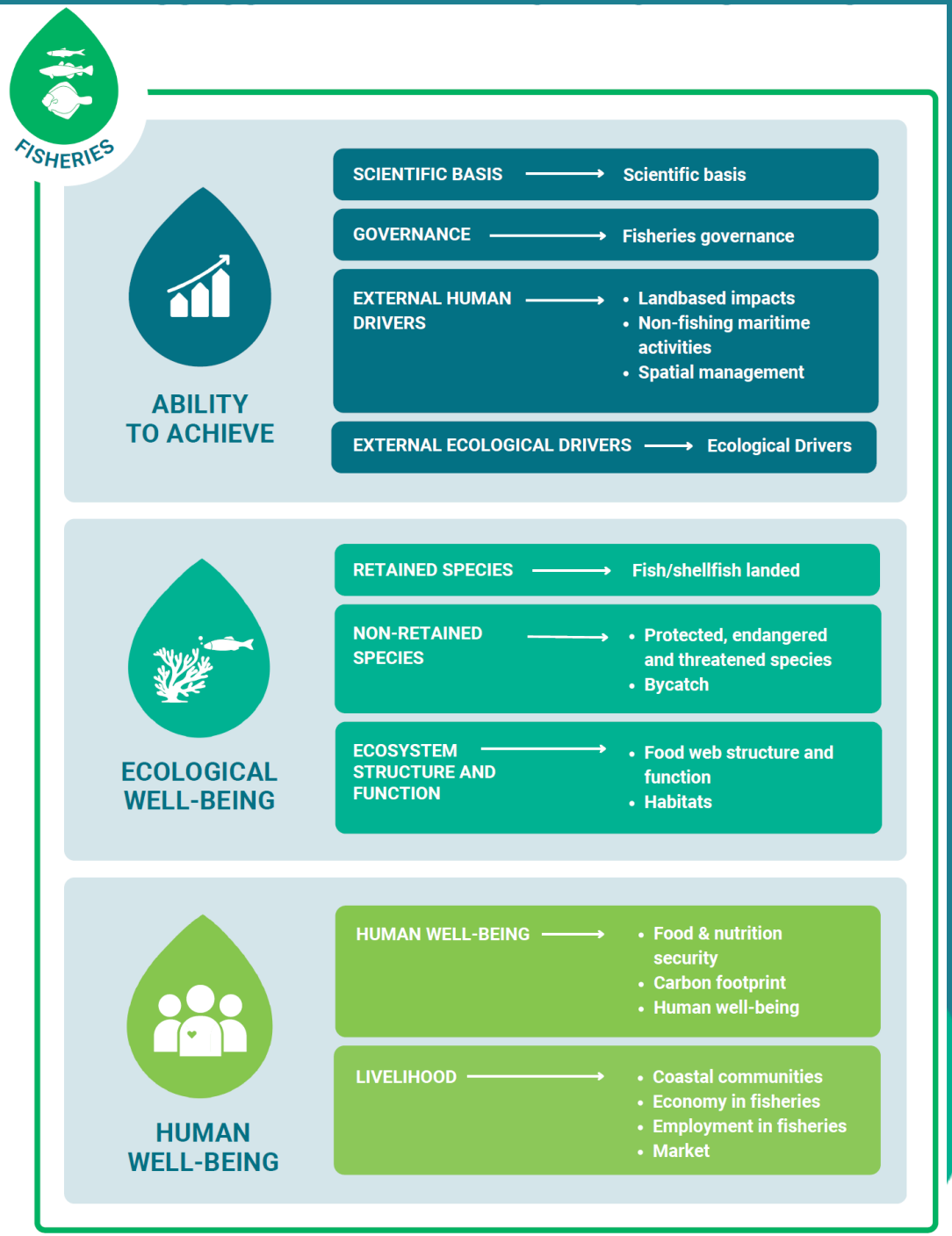
EBFM
Ecosystem Based Fisheries Management

Management	Social & economic elements	Fishing elements	Ecosystem elements	Management framework
EBFM Ecosystem-Based Fisheries Management	All elements	All fisheries in region	Some elements	**CFP*, MSFD**** *Common Fisheries Policy **EU Marine Strategy Framework Directive
EAFM Ecosystem Approach to Fisheries Management	Not considered	All fisheries in region	Some elements	**CFP**
SS Single Species Approach to Fisheries Management	Not considered	Focal fishery only	Target species only	**CFP**

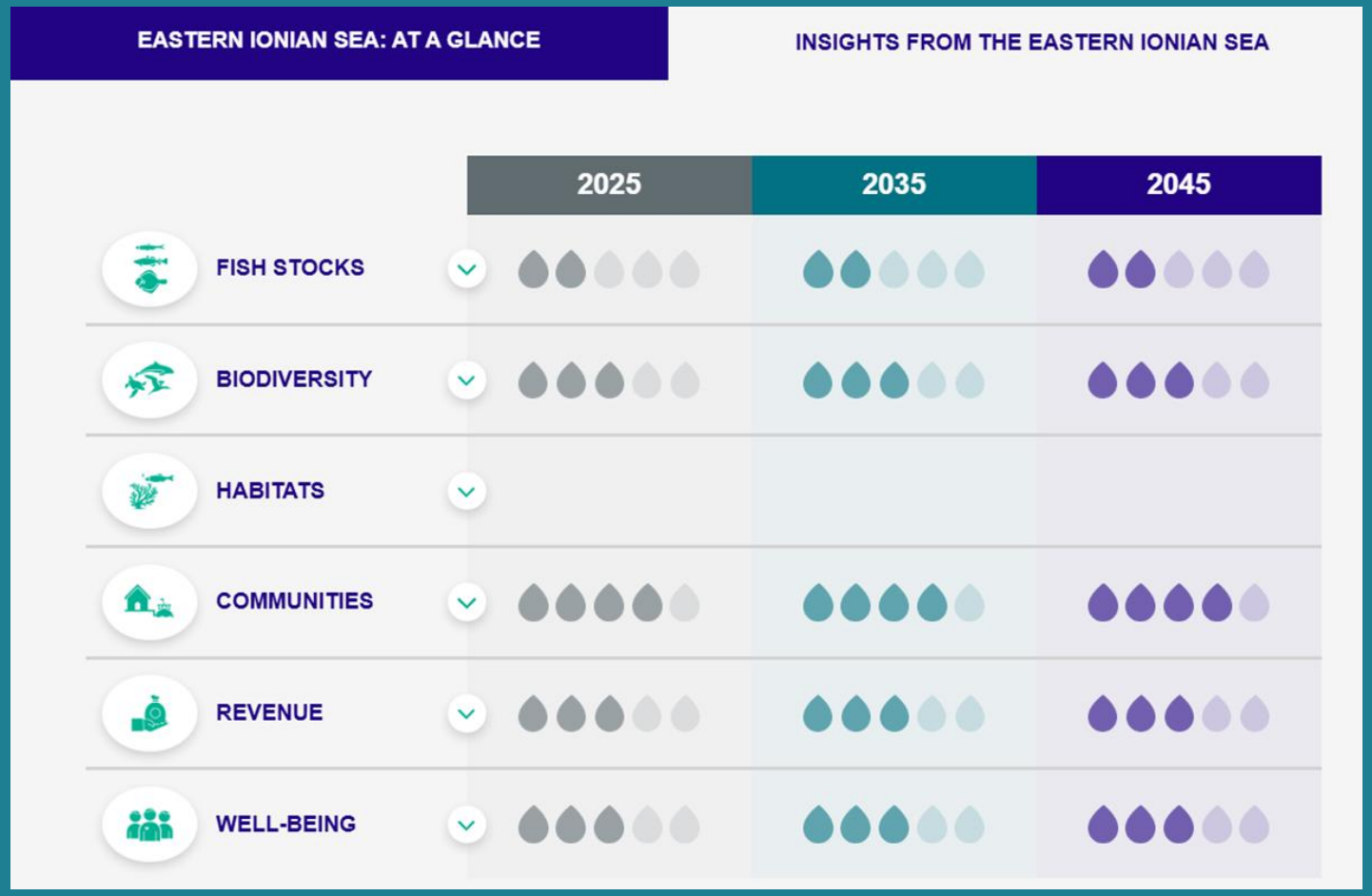
An approach that takes a holistic overview of all ecosystem elements related to fisheries – including impacts on stocks, marine environments and social benefits.

What should we consider in Ecosystem Based Fisheries Management?

- There are numerous drivers acting on the sea and our ability to achieve our goals for it
- In SEAwise, we focus on climate change, fisheries and spatial management
- The ecological system contains the species we land and the species and habitats that we impact
- The social system contains the people, communities and economies that are impacted by fisheries



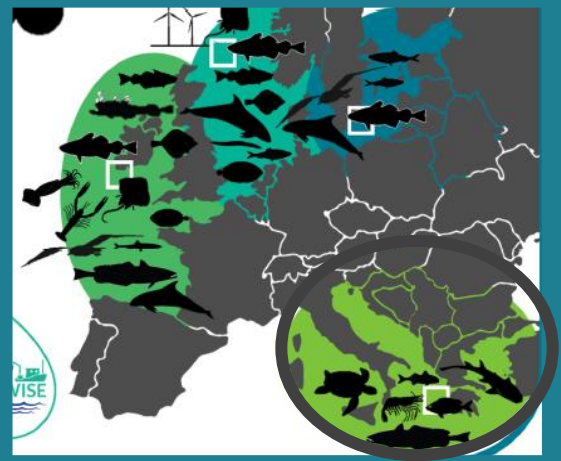
For Ecosystem Based Fisheries Management we need to look at all of this together



- Today, we will first give you a taste of the results in the project
- The we will work with you on using two different tools to interact with these results in a way that allows you to see all impacts of climate and management measures together

SEAWISE

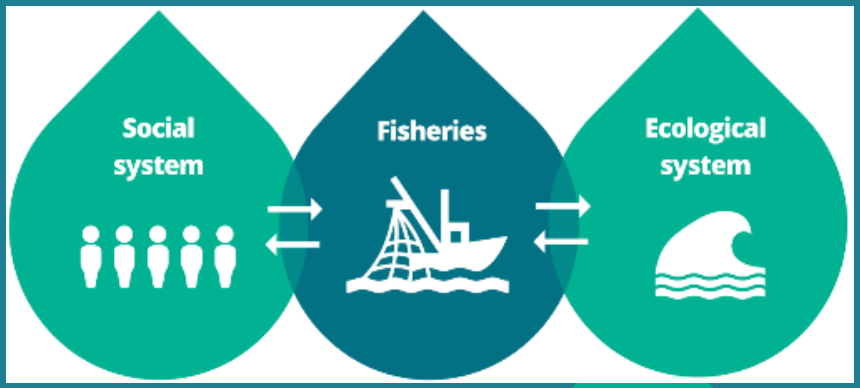
SEAwise results in brief on the Mediterranean Case Study



Co-design an effective and socially acceptable governance for the Adriatic Ionian region (GSAs 17-18-19 and GSA 20), accounting for its peculiar traits:

How?

- Collating all the available information and data, **structured review**;
- **scoping workshops**, interviews with fishers and stakeholders;
- developing/applying **biological, economic and social indicators** for the region;
- developing ecological, spatial, bio-economic, MSE **modelling for predictions in the short and medium terms**….



…accounting for the climate change scenarios

Practical insights Applicable tools Ecosystem based management

Data used

Latest official and validated stock assessment results:

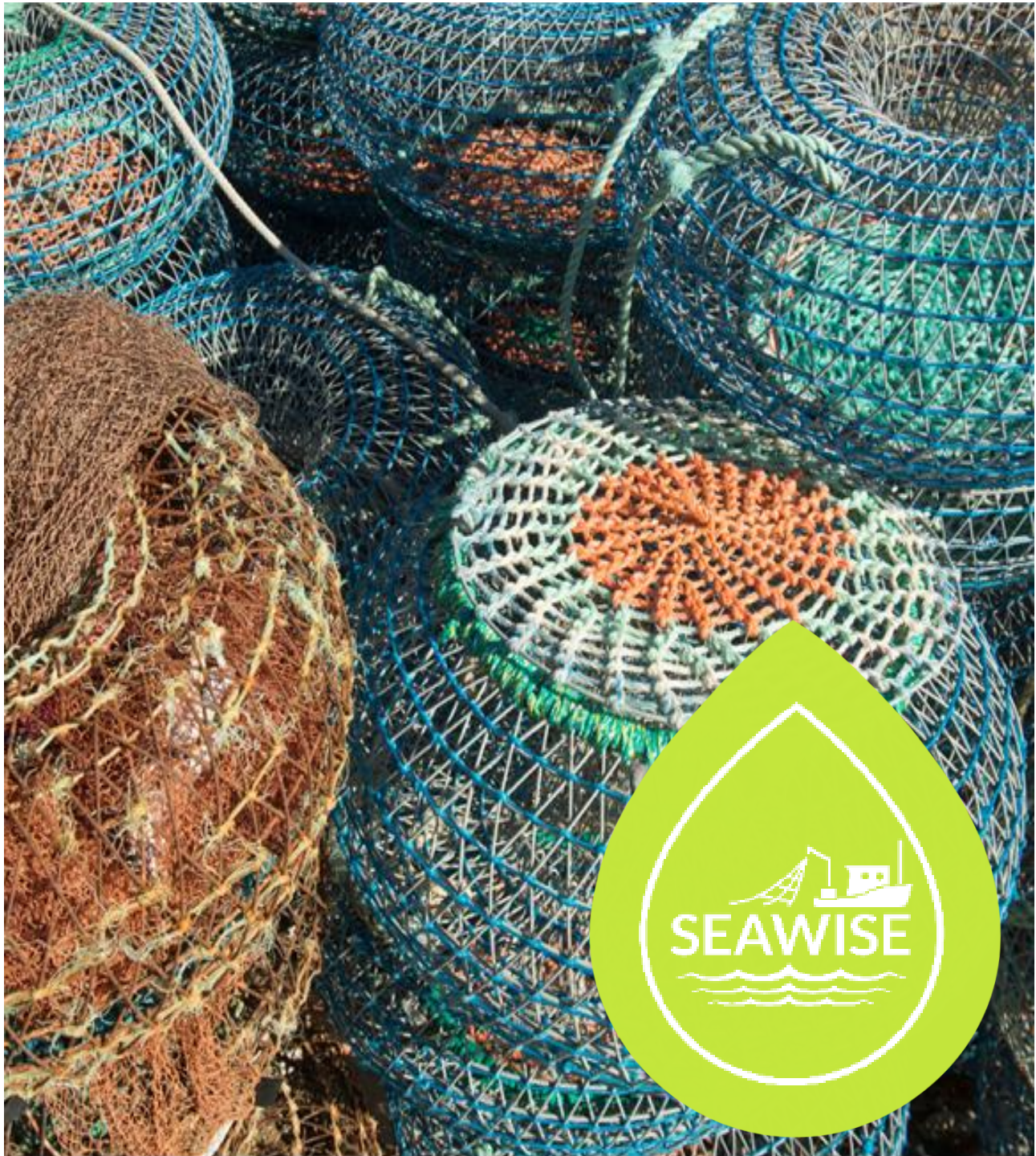
- https://www.fao.org/gfcm/data/safs/fr/ (GFCM)
- https://stecf.ec.europa.eu/reports/mediterranean-black-sea-stock-assessments_en (STECF)

Socio-economic data:

- *Annual Economic Report*: https://stecf.ec.europa.eu/data-dissemination/aer_en
- *Fisheries Dependent Information*: https://stecf.ec.europa.eu/data-dissemination/fdi_en
- *Ad hoc SEAwise data call for data at GSA level*

Scientific survey data:

- *Ad hoc SEAwise data call for MEDITS data*



Reference Points and Management objectives

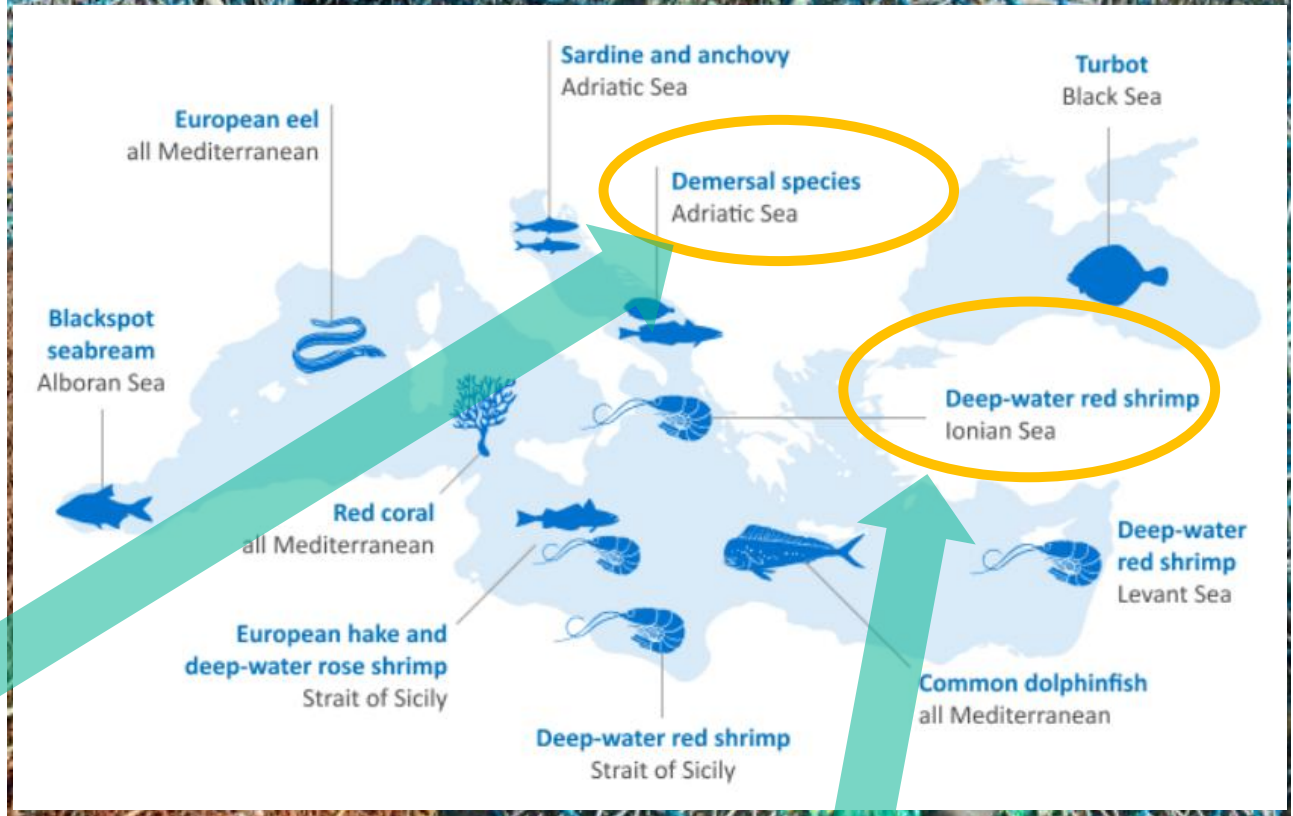
The framework for describing stock status and providing **management advice in relation to reference points** [1]

- Target reference points (e.g. F_{MSY}, $F_{0.1}$);
- Threshold (precautionary) reference points (e.g. B_{pa});
- Limit reference points (e.g. B_{lim}).

Management objectives by the Multi-annual Management Plans:

Demersal fisheries in the Adriatic Sea:

"Reach maximum sustainable yield (MSY) levels of exploitation for five target species (European hake, red mullet, deep-water rose shrimp, Norway lobster, common sole) *in demersal fisheries in the Adriatic Sea by 2026."* (Rec. GFCM/43/2019/5, GFCM/44/2021/1, GFCM/45/2022/8, GFCM/46/2023/5).



Deep water red shrimp fisheries in the eastern-central Mediterranean:

"to maintain fishing mortality for giant red shrimp and blue and red shrimp" (Rec. GFCM/42/2018/4).

1 https://gfcmsitestorage.blob.core.windows.net/website/New%20webpages/Fisheries/Resources/SA 2014-Advice.pdf

The indicators we selected in EBFM

Human well-being:

Social and economic effects of and on fishery

- Number of meals provided;
- Ratio between revenues of SSF and LSF;
- Gross Value Added (GVA)

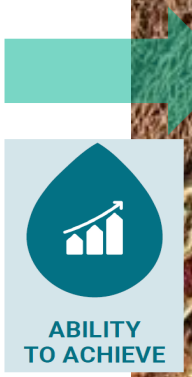
Ecological well-being:

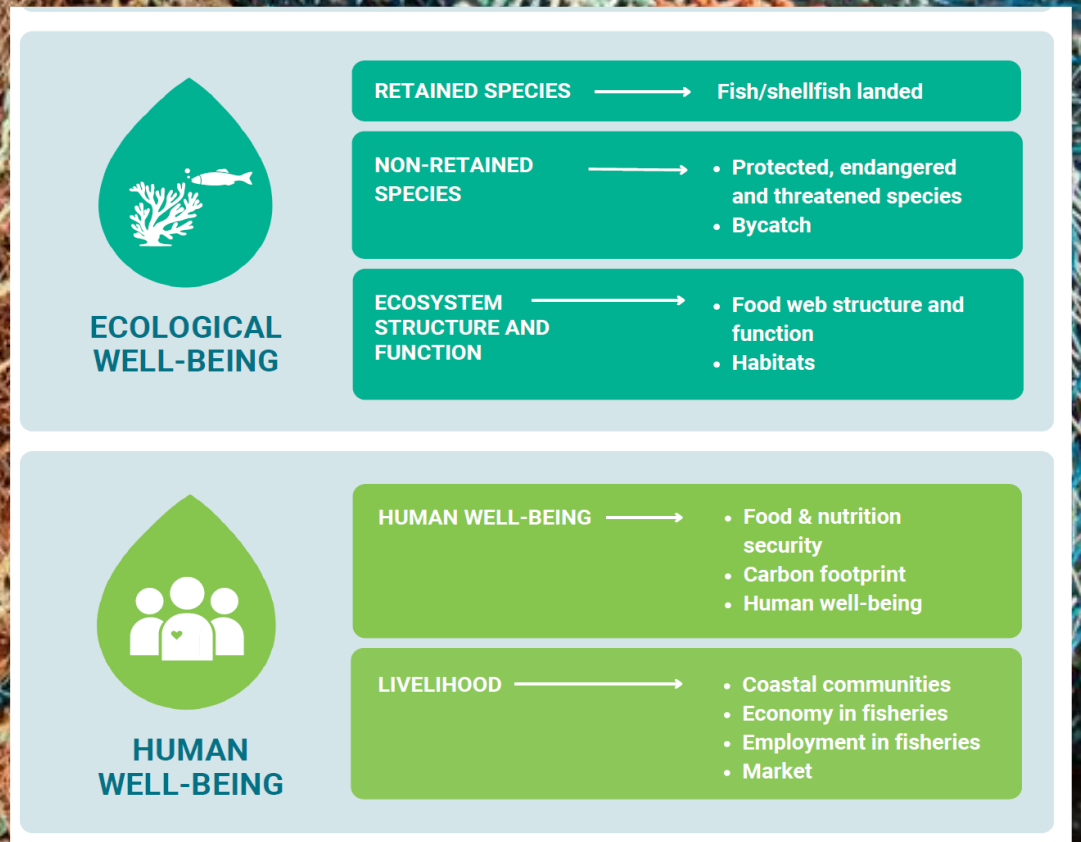
Ecological effect on and of fishing (<u>including management and climate change</u>)

- Status of retained target species F/F_{MSY}, SSB/B_{MSY}, *catch*
- Status of non-retained species *risk of by-catch, PETs,*
- impact on habitats *(Relative benthic state)*
- *and on* food web

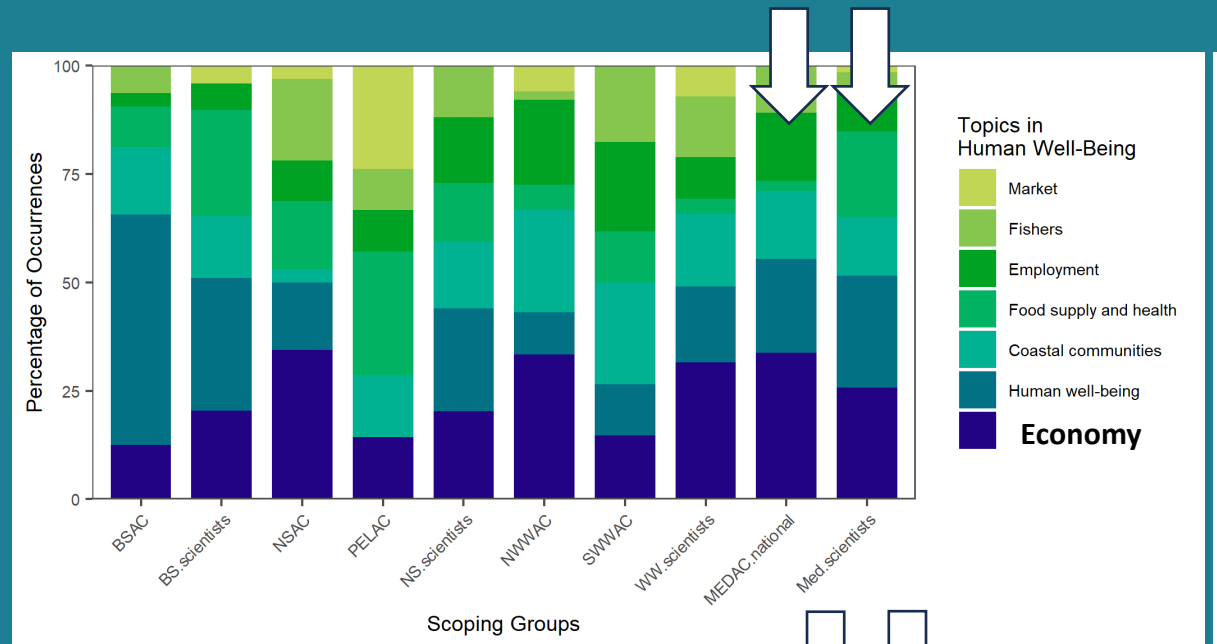
Basis

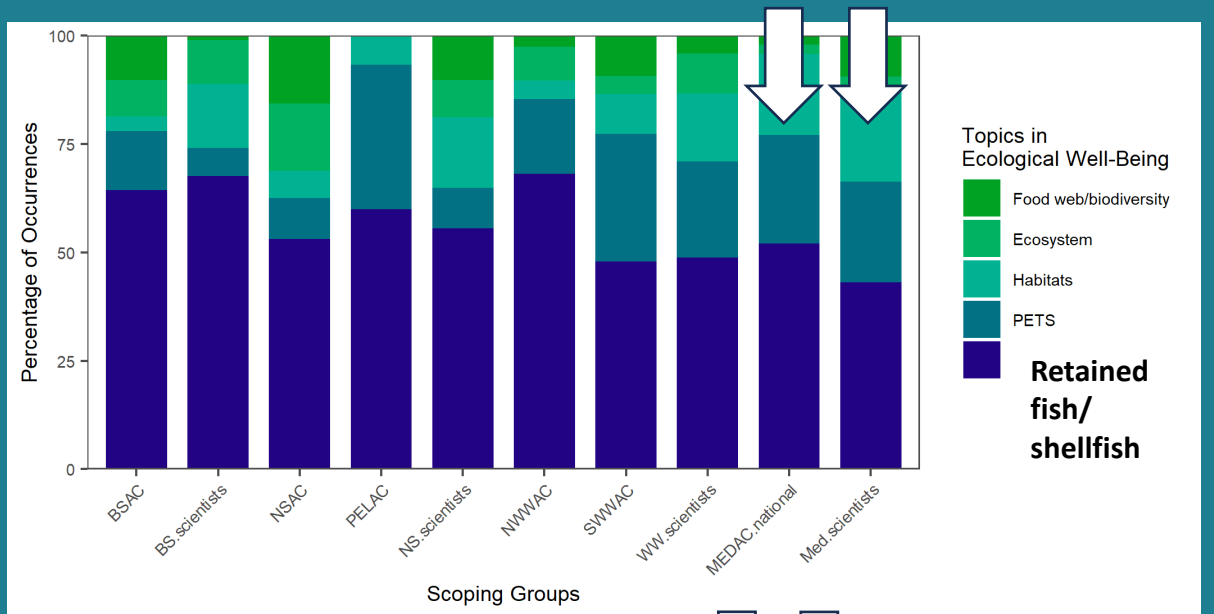
- the Common Fisheries Policy pillars: ecological, social and economic
- the Marine Strategy Framework Directive
- the GFCM Framework and 2030 Strategy
- FAO Ecosystem Approach to Fisheries
- the EU 30x30 Strategy

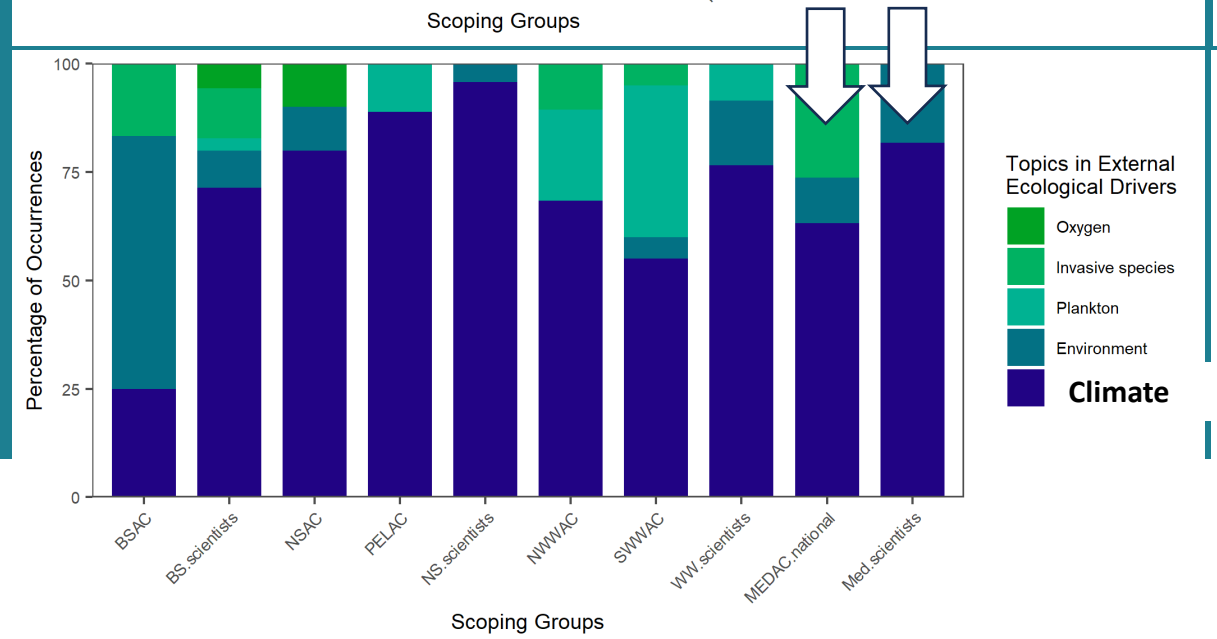


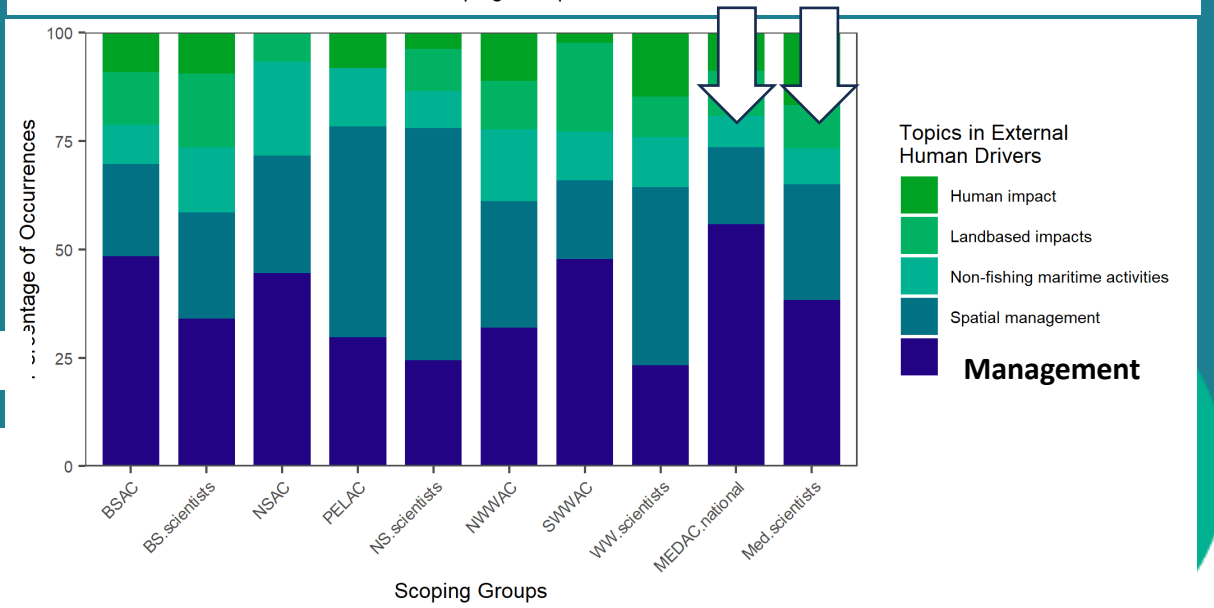


What we learnt from the scoping workshops with stakeholders



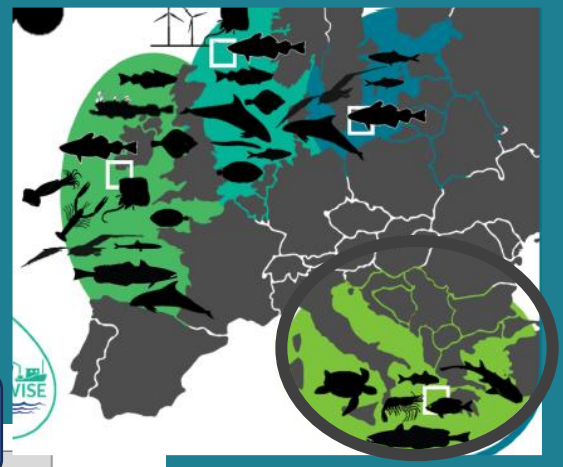




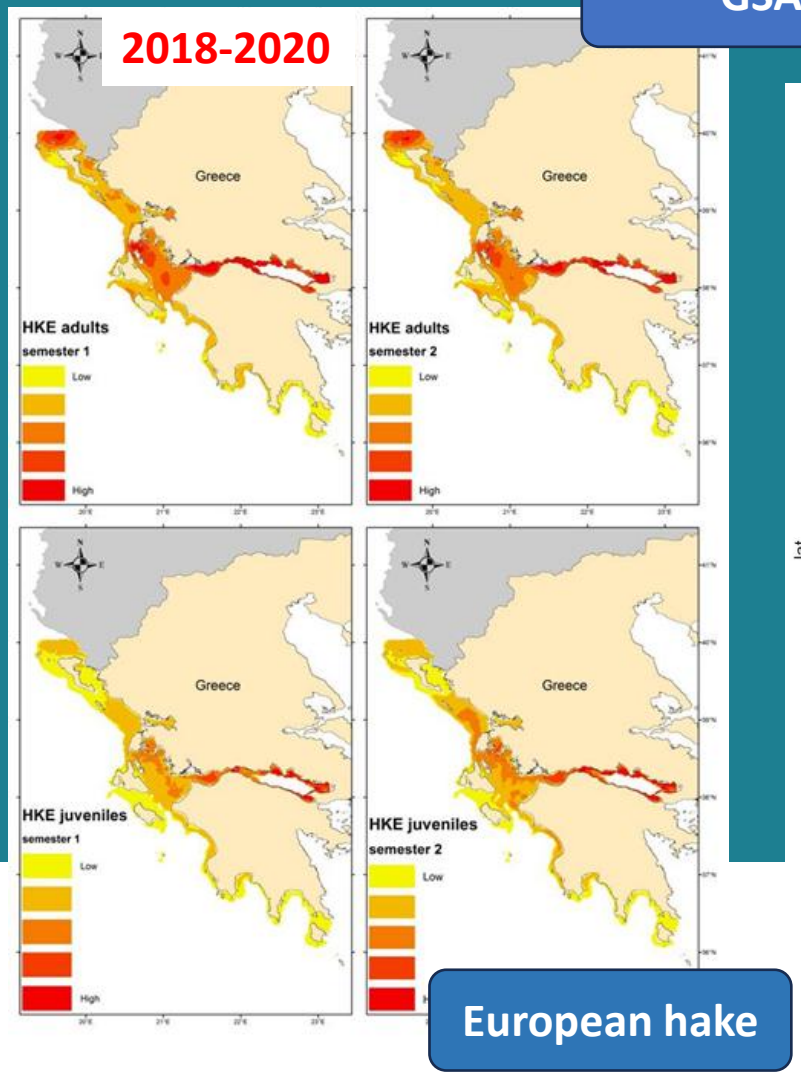


Ecological effects of fisheries

Predicting and mapping abundance changes of key species along the time

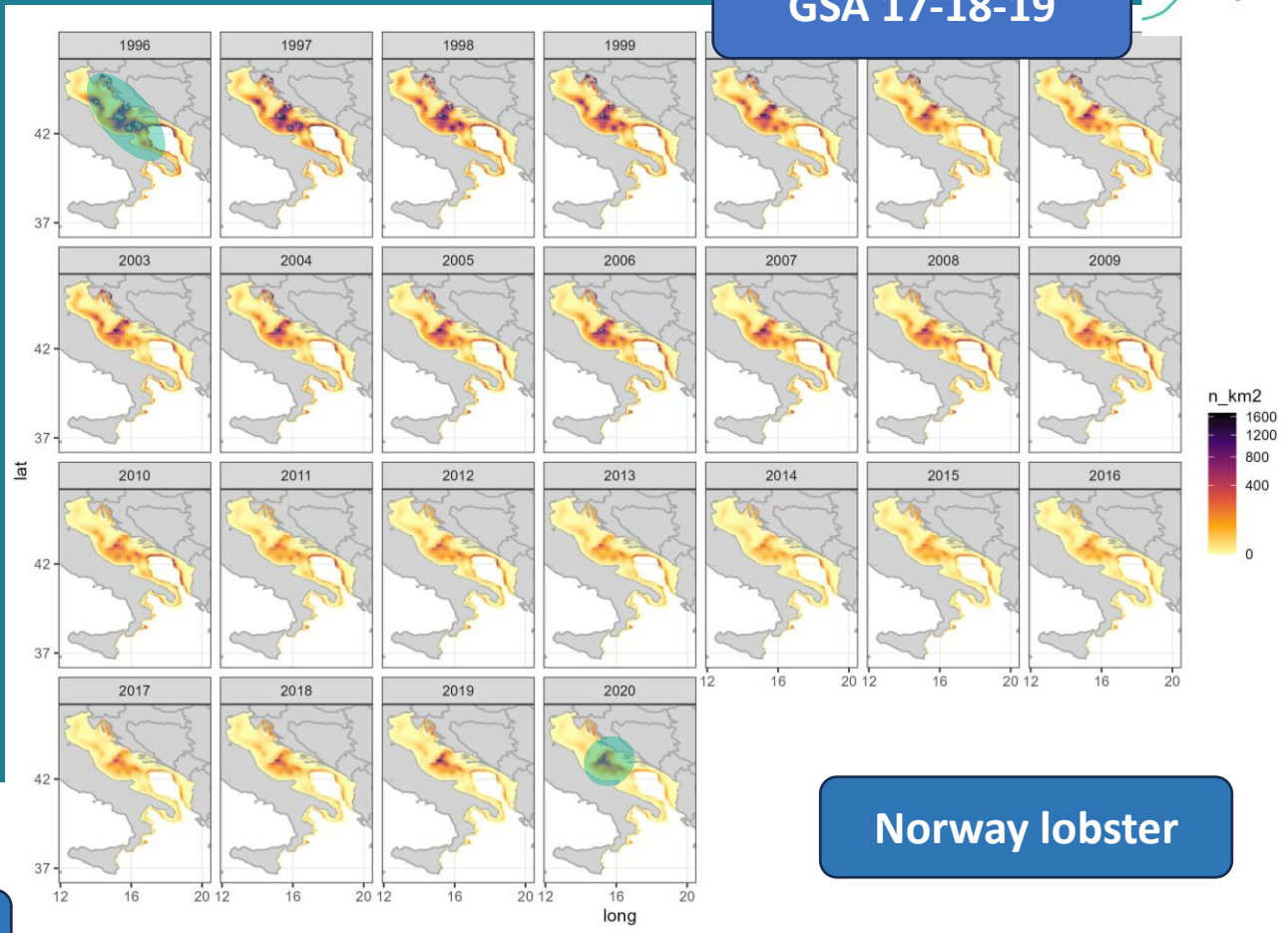


GSA 20



European hake

GSA 17-18-19

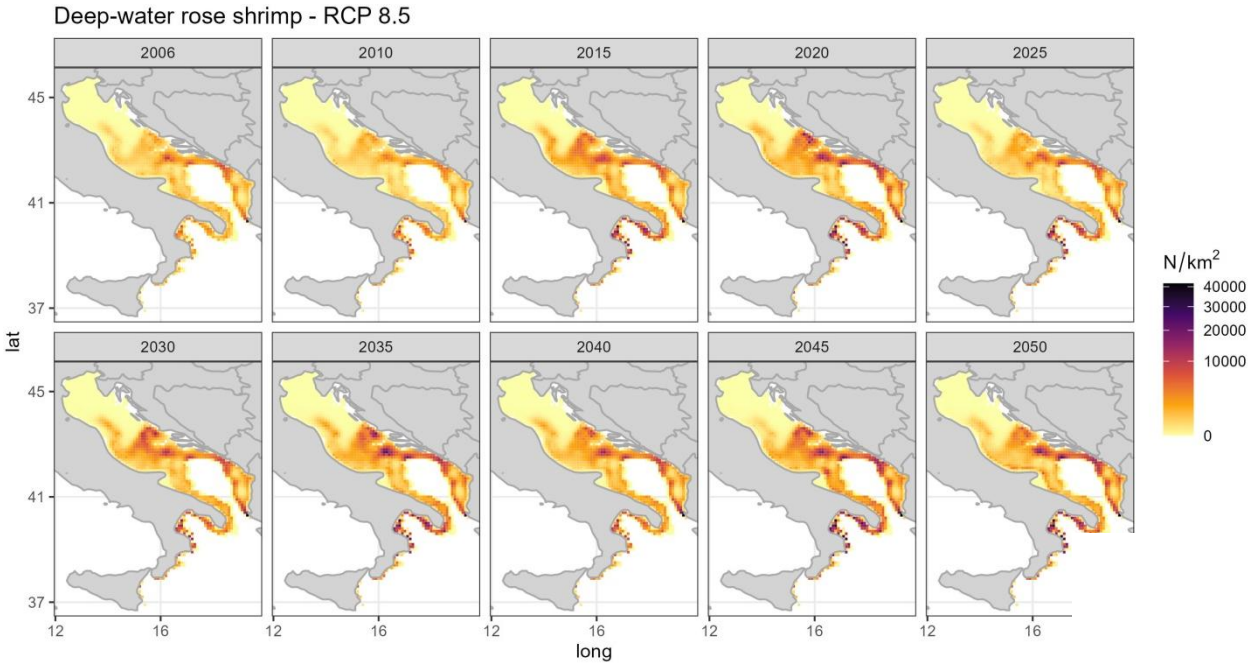


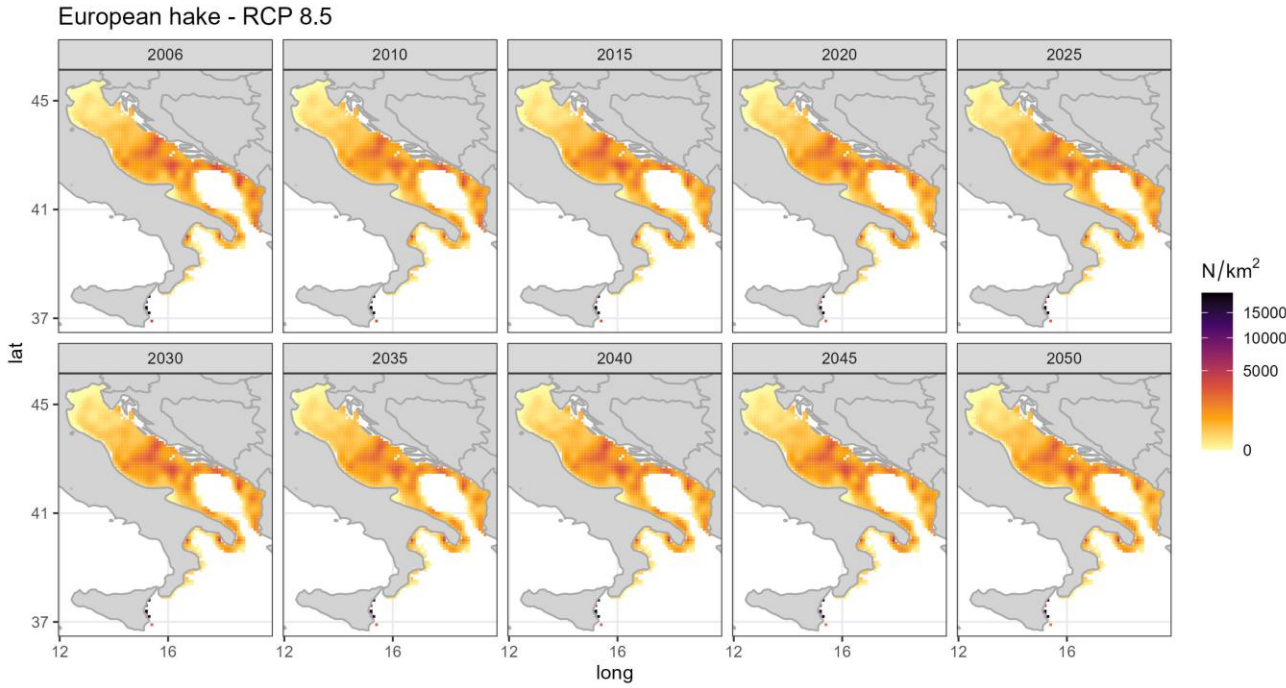
Norway lobster

Ecological effects of fisheries

Predicting abundance in the short-medium terms under climate change scenarios

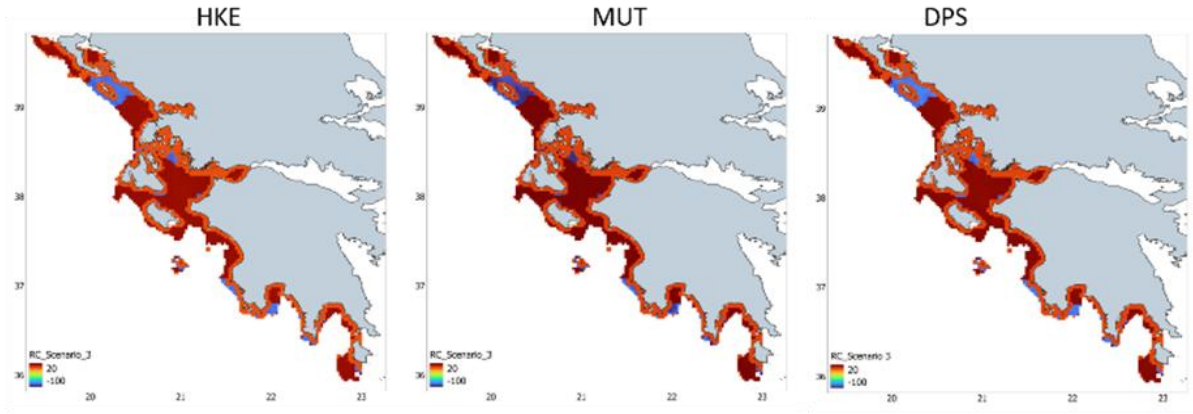
more pronounced for deep-water rose shrimp…



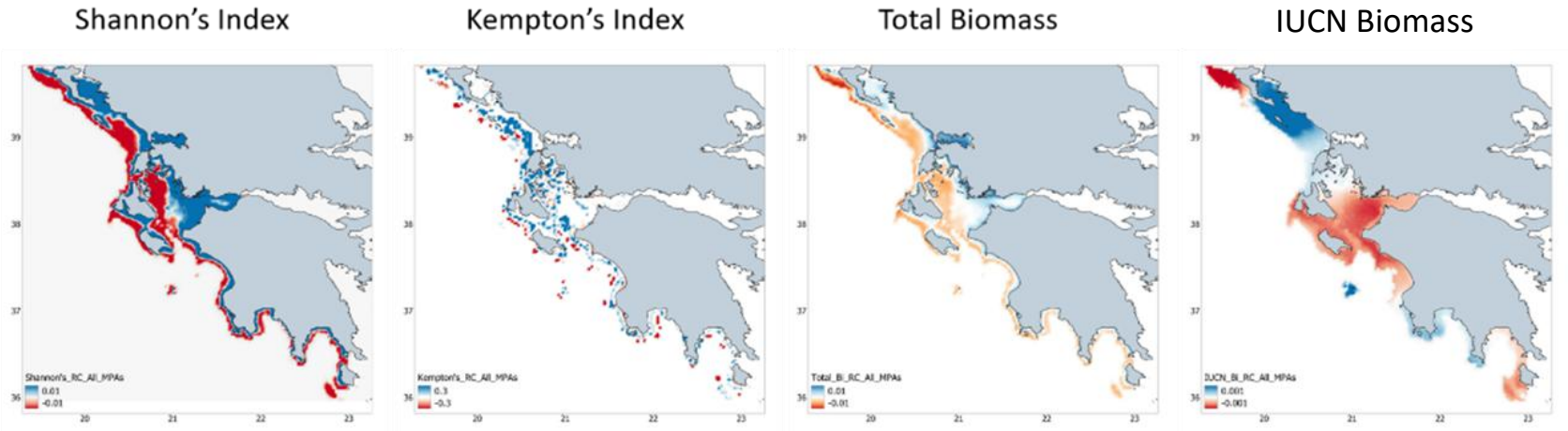


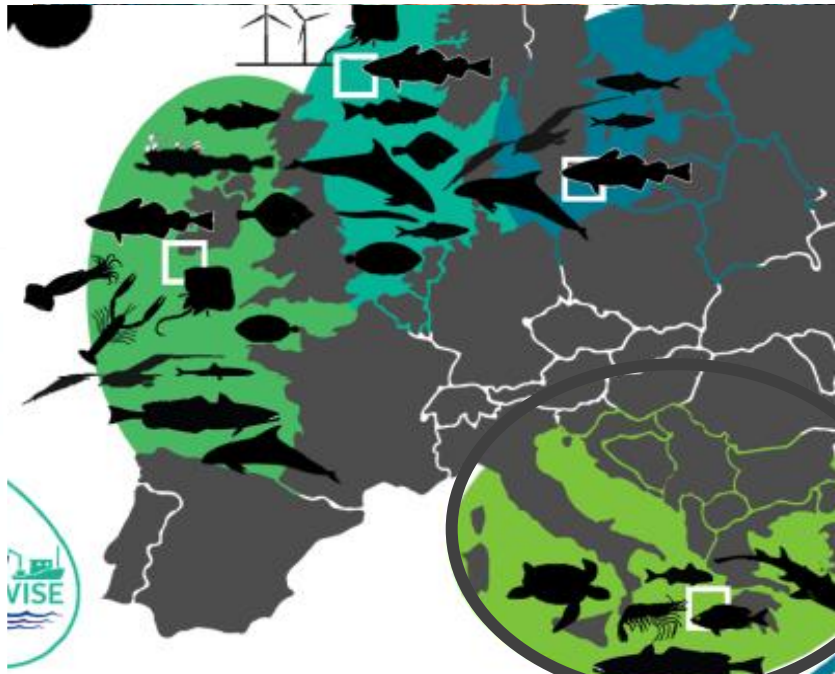
Spatial management in the Eastern Ionian Sea

Scenarios simulating ban of bottom trawl in all MPAs



Relative change (%RC) of catches (top row figures) and biodiversity indicators (bottom row figures) as a result of closing all MPAs (existing and new) in the Eastern Ionian Sea (using Ecopath with Ecosim and ECOSPACE).





The management scenarios

Scenarios are aimed at finding a trade-off between healthy seas and viable fishery.

Building on the management instruments in place in the MAPs (*effort quotas, catch limits, spatio-temporal closures, MCRS*)

- **Baseline (Status quo)**: current effort levels and same exploitation pattern
- **F_{MSY}**: effort quotas reduction and catch limits to achieve the maximum sustainable yield for the key target stocks, acting on SSF ad LSF;
- **Pretty Good Yield (PGY) or F_{comb}:** less severe effort reduction to achieve the 95% of the maximum sustainable yield (or the F_{MSY}) of the key target stocks

…. under a **moderate** (Representative concentration pathways 4.5) and a **worse** (RCP 8.5) climate change hypothesis

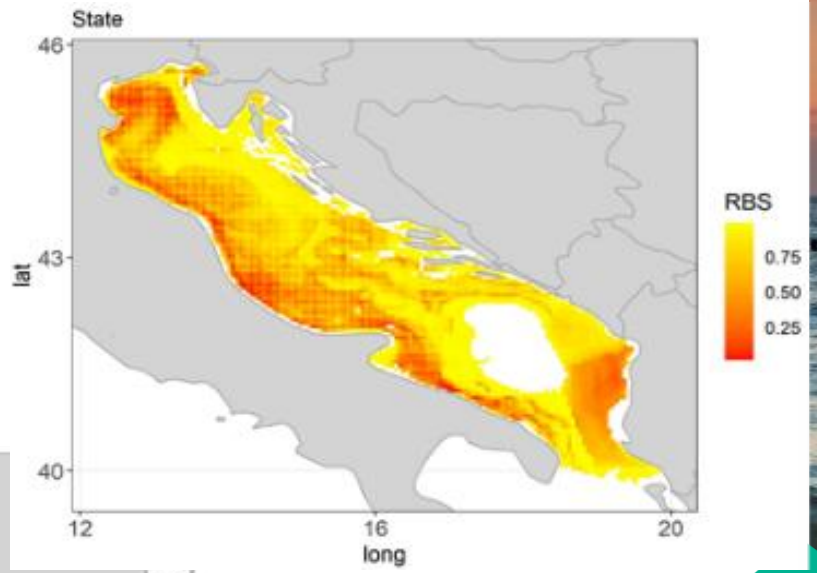
Management and climate impacts

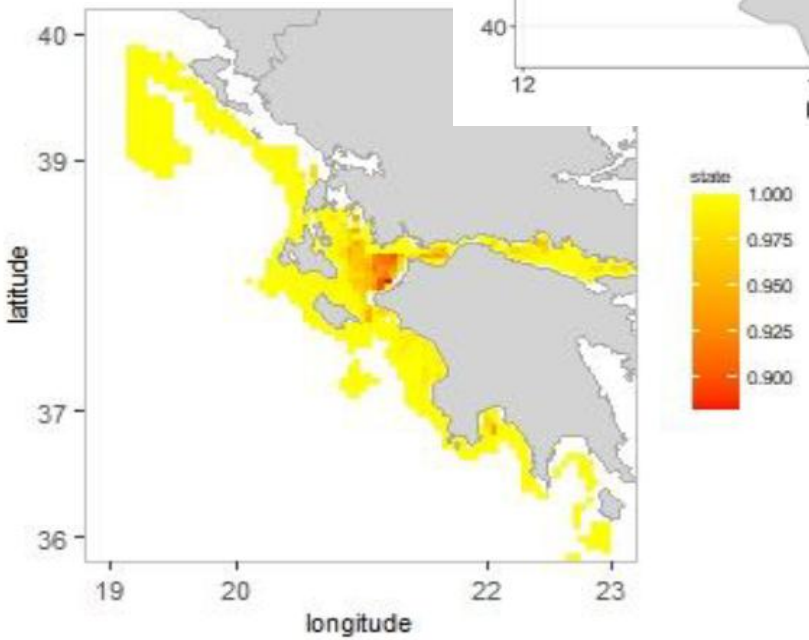
PGY is representing a trade-off scenario to mitigate effort reduction, while contrasting the underutilization of stocks fished below or at F_{MSY} (compatible with a mixed-fishery context)

Ecological effects of fisheries and forecast under management measures

- The benthic impact of trawlers was estimated across the Status quo, F_{MSY} and PGY scenarios (Relative Benthic State, ICES WGFBIT[1])

Relative Benthic State Assessments (RBS)





…the lower the worse

- The F_{MSY} scenario with closure areas results in the lowest percentage of area with RBS <0.8 (*improved status*)
- Both fishing effort levels and closed areas influence RBS, with PGY + closures having a higher RBS <0.8 percentage than F_{MSY} without closures (*improved status with mitigated consequences for fishers*).

Ecosystem Based Management

https://doi.org/10.17895/ices.pub.28351412.v2

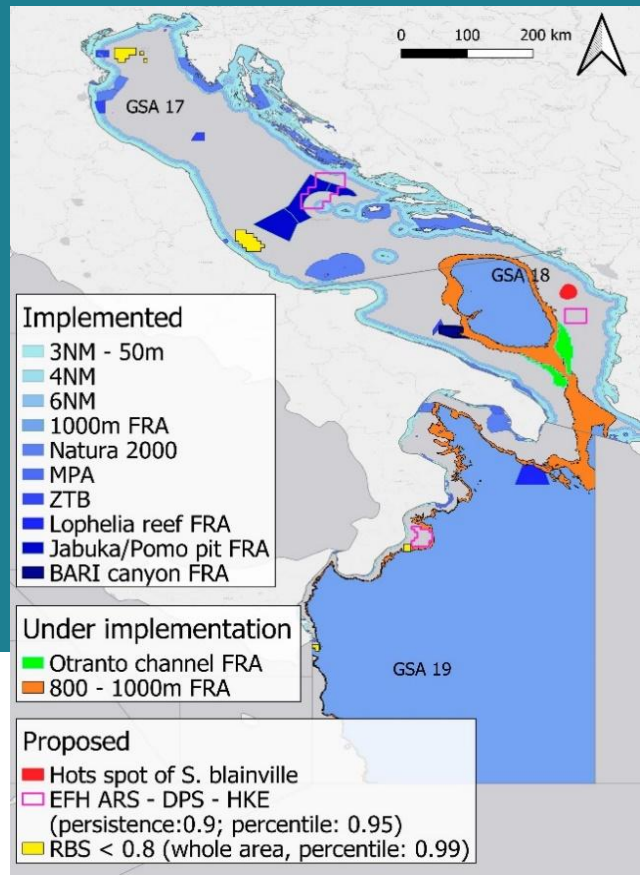
The management scenarios

Insights for durable sustainability:

Improving the exploitation pattern and avoidance of unwanted catch through improved selectivity, gear technology, fleet behaviour.

- **gear selectivity improvement *:*** square mesh size 45 mm (e.g., when targeting fish and shrimps) and sorting grid (e.g., when targeting Norway lobster)
- **Proposal of new spatial closures** to protect juveniles of target stocks

…. the scenarios are explored with BEMTOOL[1] and FLBEIA[2] bio-economic models to evaluate **potential socio-economic consequences** (e.g. changes in catches, catch value, etc..)



(The MEDAC Advice 2024, Ref.: 251/2024; MEDAC Ref: 113/2024 and MEDAC Ref.: 251/2024 provided useful insights for these scenarios)

[1] Rossetto *et al.,* 2015; Russo, Bitetto *et al.*, 2017; STECF EWGs on Western Med MAP; [2] Garcia *et al.*, 2017

HUMAN WELL-BEING

Socio-economic consequences
(GSAs 17-18-19)

....scenarios **differentiated for SSF and LSF**

Hake and red mullet **penalized by the climate change, shrimps benefit** from moderate climate change

In western Ionian Sea, SSF negatively influenced from rising temperatures

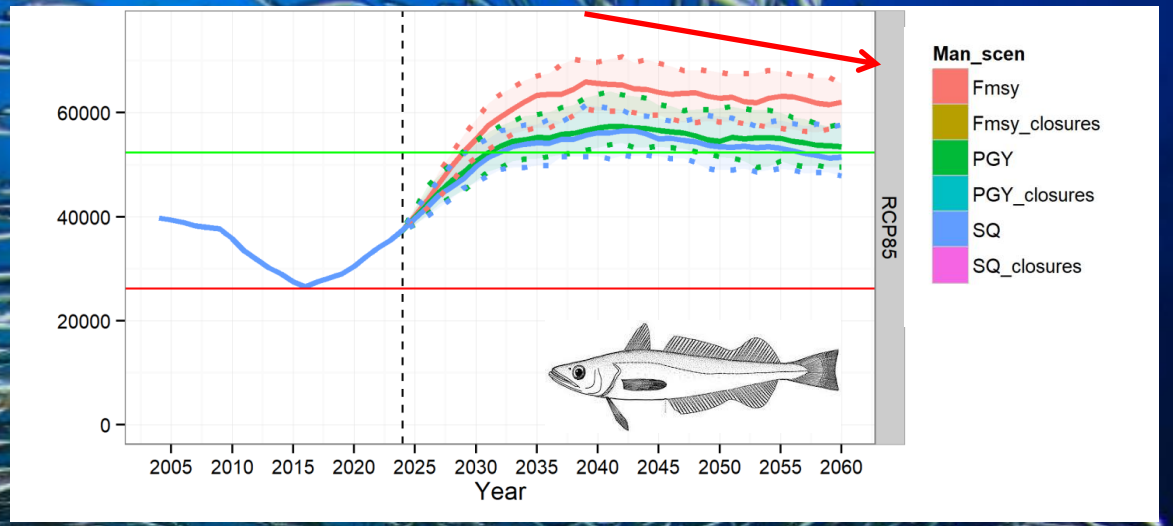
Negative impact on the overall **number of meals** provided

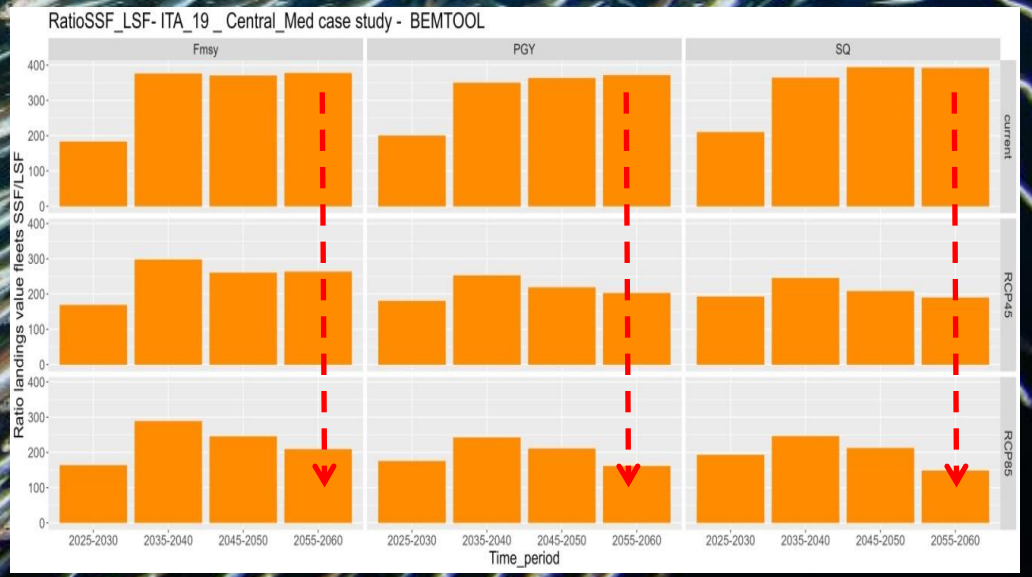
Decreased CO_2 emissions per kg of landed fish

PGY as a **compromise** between sustainable exploitation of main target stocks and socio-economic consequences.

Adriatic and Western Ionian Sea

Spawning Stock Biomass in tons





HUMAN WELL-BEING

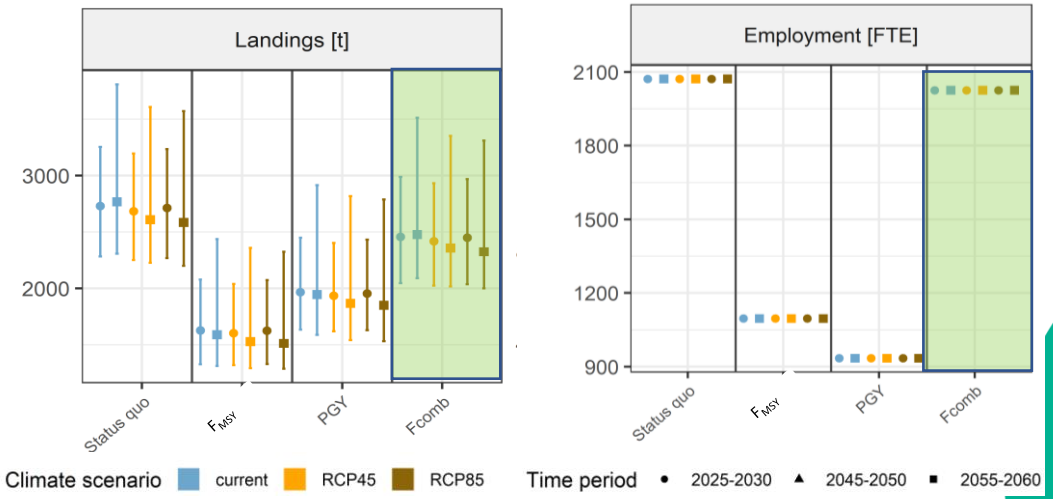
Socio-economic consequences (GSA20)

Overall negative impact on **economic indicators**;

Climate change increase the financial risk of SSF

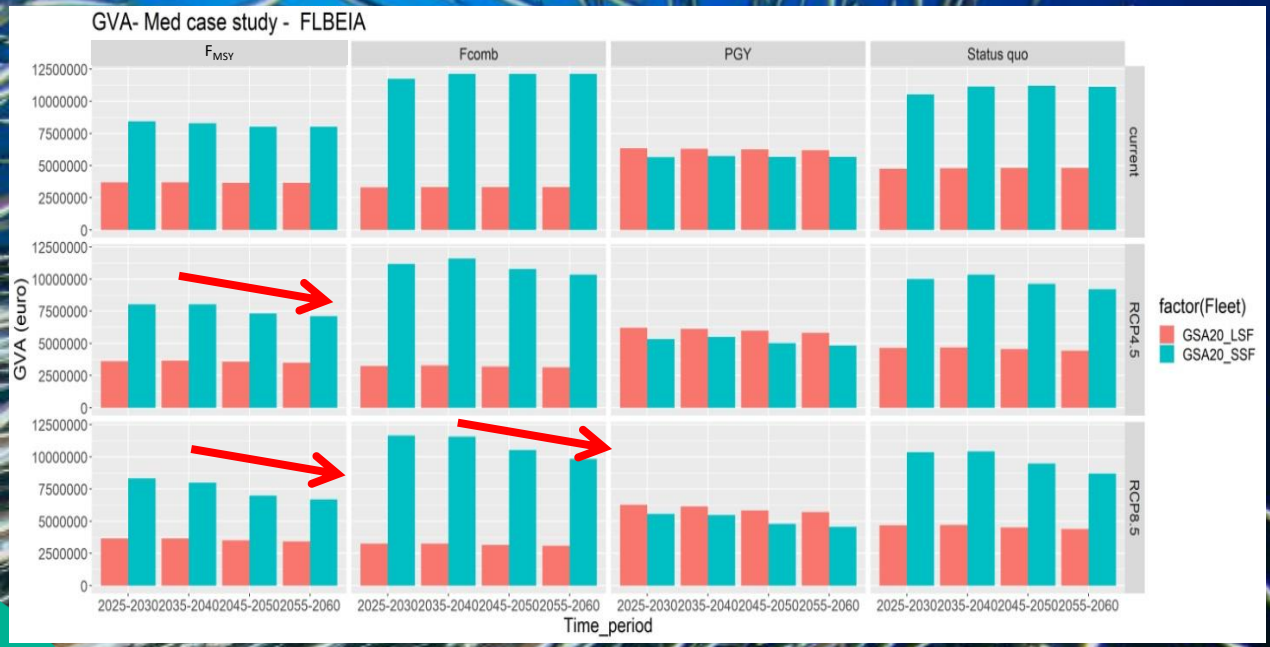
SSF higher total **CO_2 emissions** than LSF, but **LSF emits more CO_2/kg of landed fish**.

F_{comb} as the best for **socio-economic indicators**, **total landings** and **food security**.



F_{MSY} scenario as a better trade-off to protect hake (overexploited).

Sustainability for hake not achievable even if trawlers (LSF) was totally banned.



Eastern Ionian Sea

Ecological well-being

reduced biomass of the main species;

decreased overall biodiversity and the average size of fish, except for some pelagic species.

Non-retained species

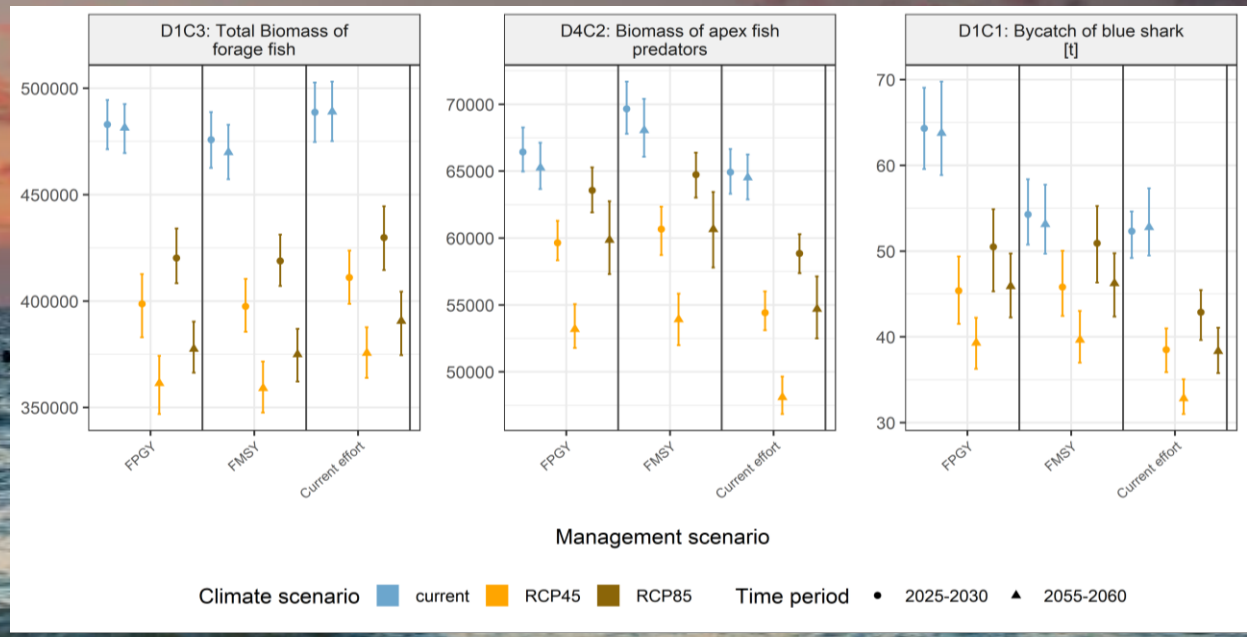
Management measures help marine life recover and reduces accidental catch (e.g. blue shark).

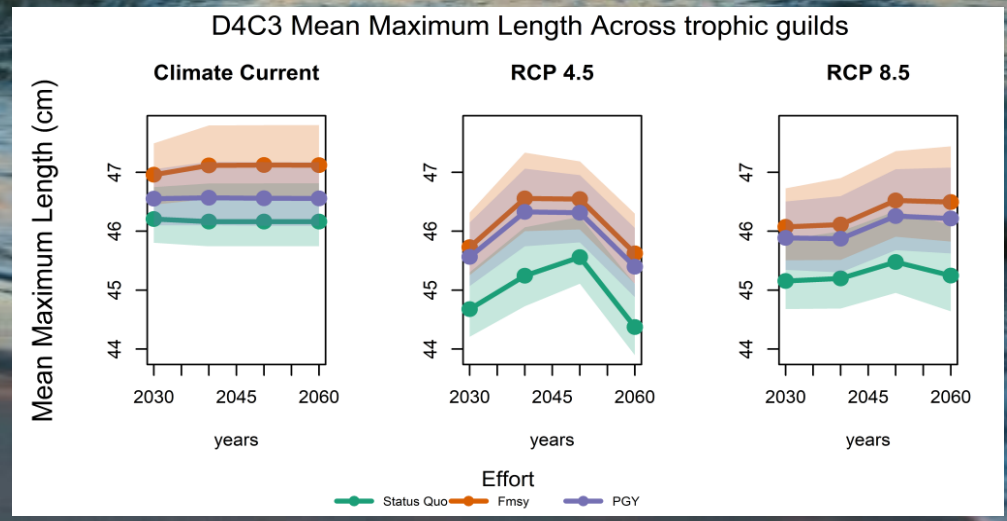
- Ad hoc fishing strategies (F_{MSY} and PGY) can **mitigate climate change effects**;

Adriatic and western Ionian Sea

Ecosystem structure and function

Ecosystem model Ecopath with Ecosim (EwE)





Ecological well-being

Non-retained species

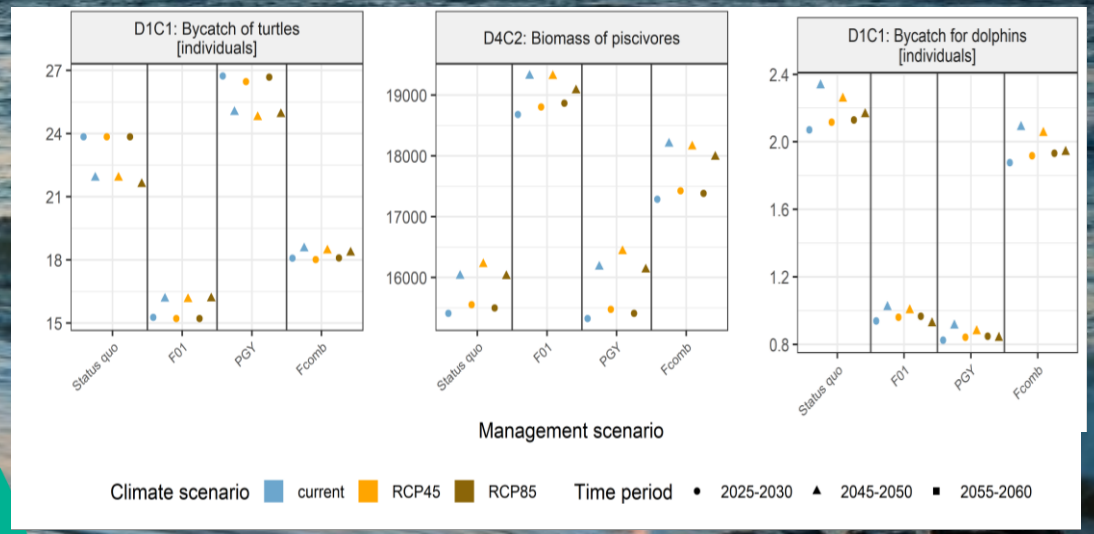
- More **turtles** accidentally caught in the PGY and Status Quo scenarios
- More **dolphins** caught in the Status Quo and F_{comb} scenarios.

Eastern Ionian Sea

Ecosystem structure and function

Ecosystem model Ecopath with Ecosim (EwE)

CHANGE IN FOOD CHAIN



THE SEAWISE EBFM TOOL AND TOOLBOX

Two tools designs to suit the needs and priorities of the SEAwise Stakeholder Network.

Both tools intend to provide accessible, useful information in support of better EBFM in Europe.

Applicable Tools for Ecosystem Based Management

Thank you!

Your opinion matters!

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SEAwise Project

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