SEAwise Northwestern waters

NWWAC Workshop March 11th 2025

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

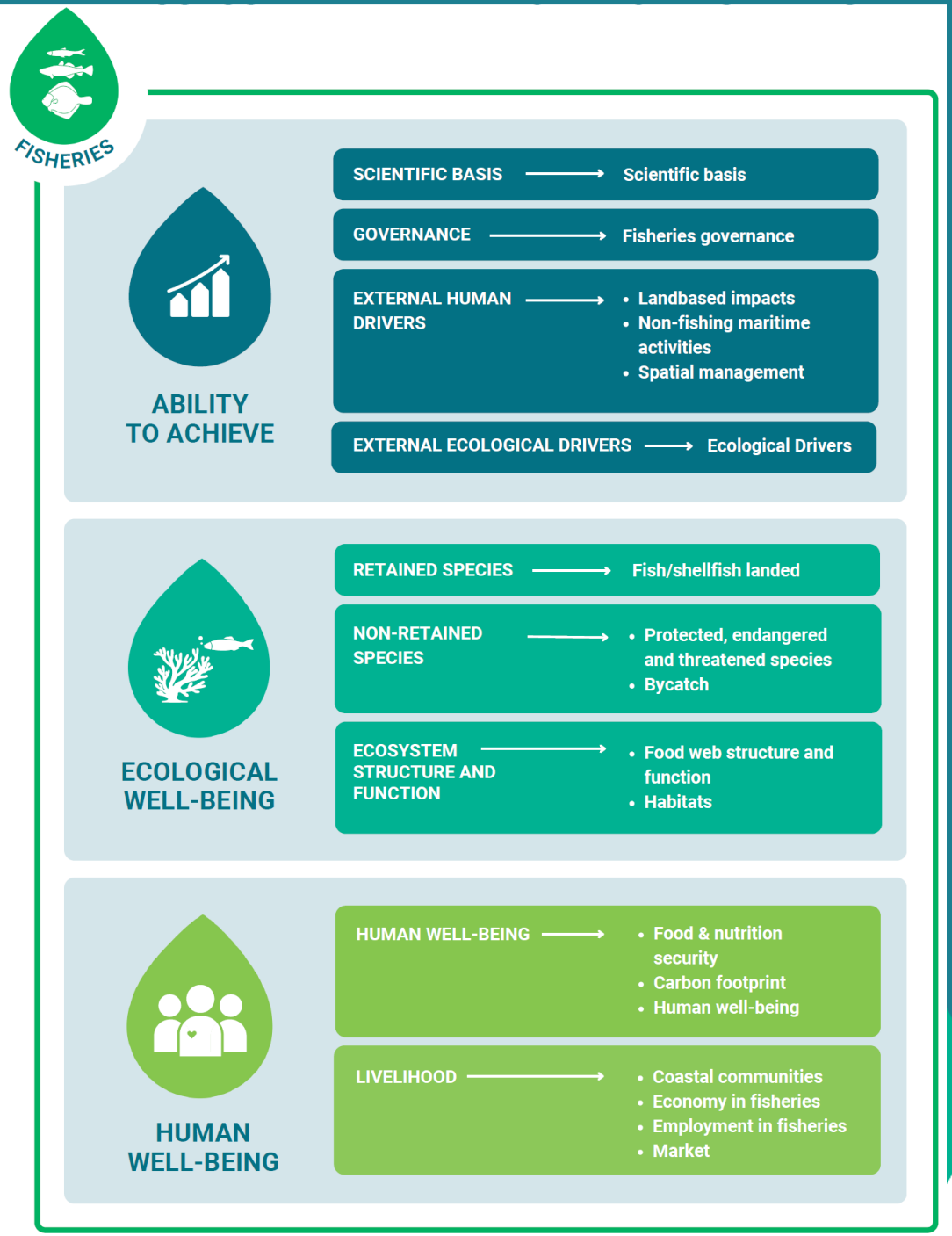
SEAwise works from October 2021 until September 2025 to pave the way for the effective implementation of Ecosystem Based Fisheries Management in Europe

We work with our stakeholder network to establish clear priorities, a common knowledge base and characteristics of ready-for uptake advice addressing our 4 aims

1. Build a network of stakeholders
2. Assemble a new knowledge base
3. Collate, develop and integrate predictive models
4. Provide ready-for-uptake advice

What should we consider in Ecosystem Based Fisheries Management?

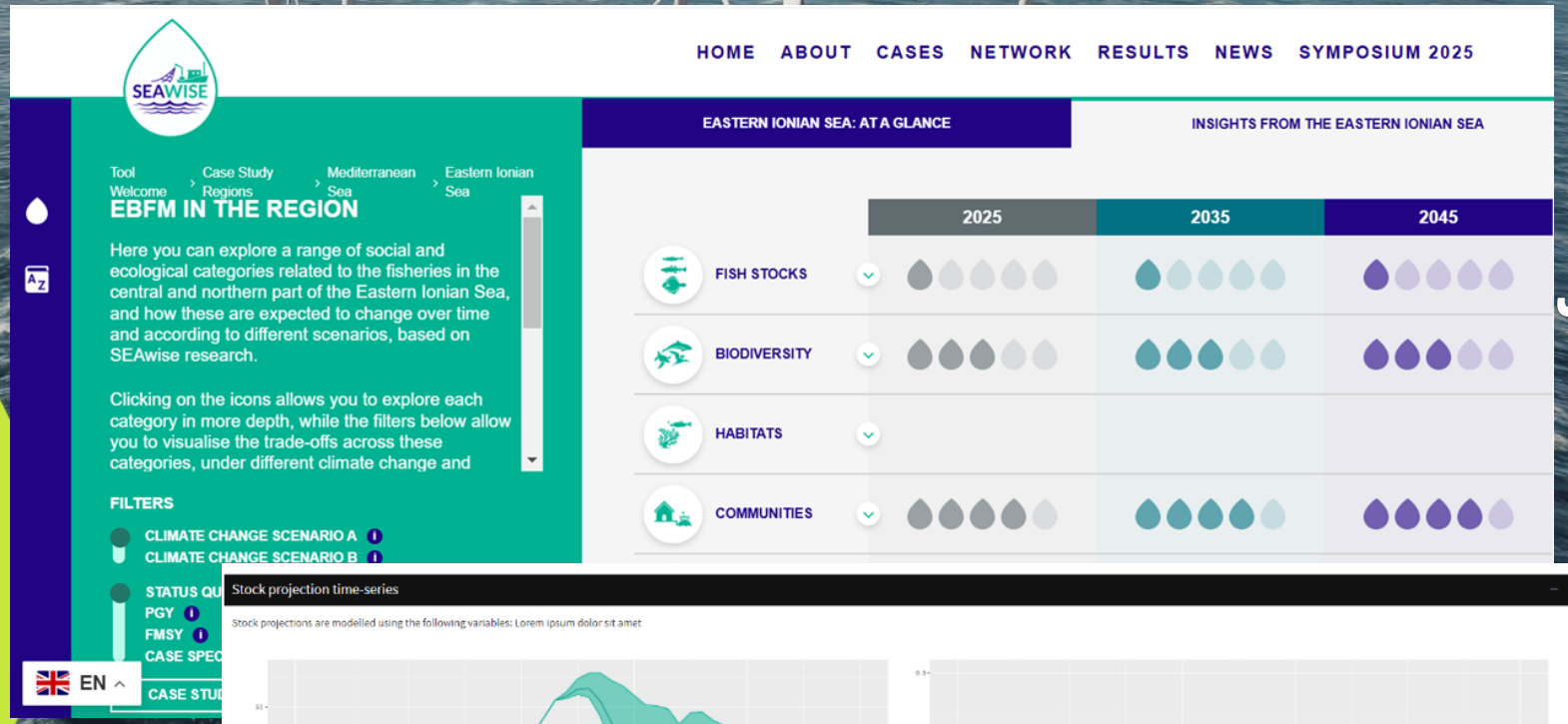
- There are numerous drivers acting on the sea and our ability to achieve our goals for it
- In SEAwise, we focus on climate change, fisheries and spatial management
- The ecological system contains the species we land and the species and habitats that we impact
- The social system contains the people, communities and economies that are impacted by fisheries
- …but this all very quickly gets very complex. So how can we make it simpler?

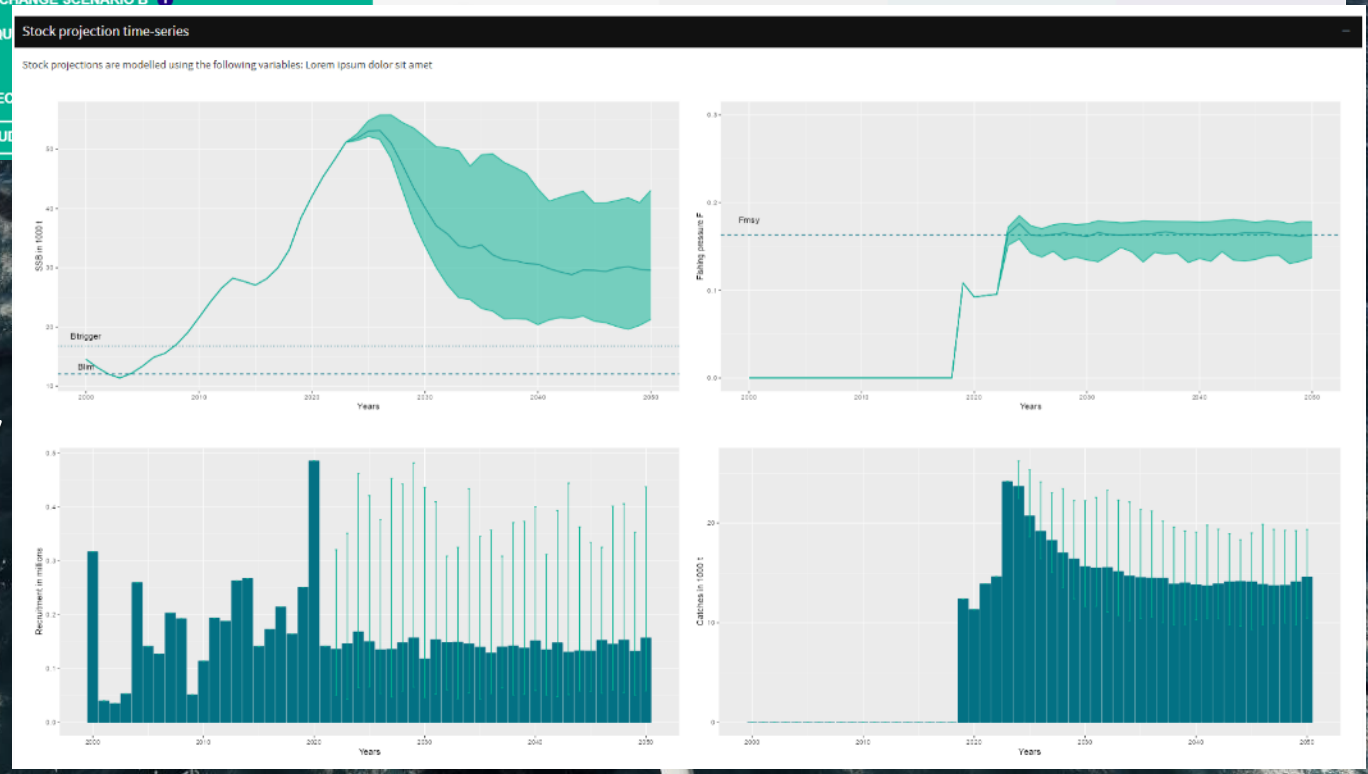


Split issues in two: the EBFM Website Tool and Tool box

Complexity within objectives

Complexity across objectives

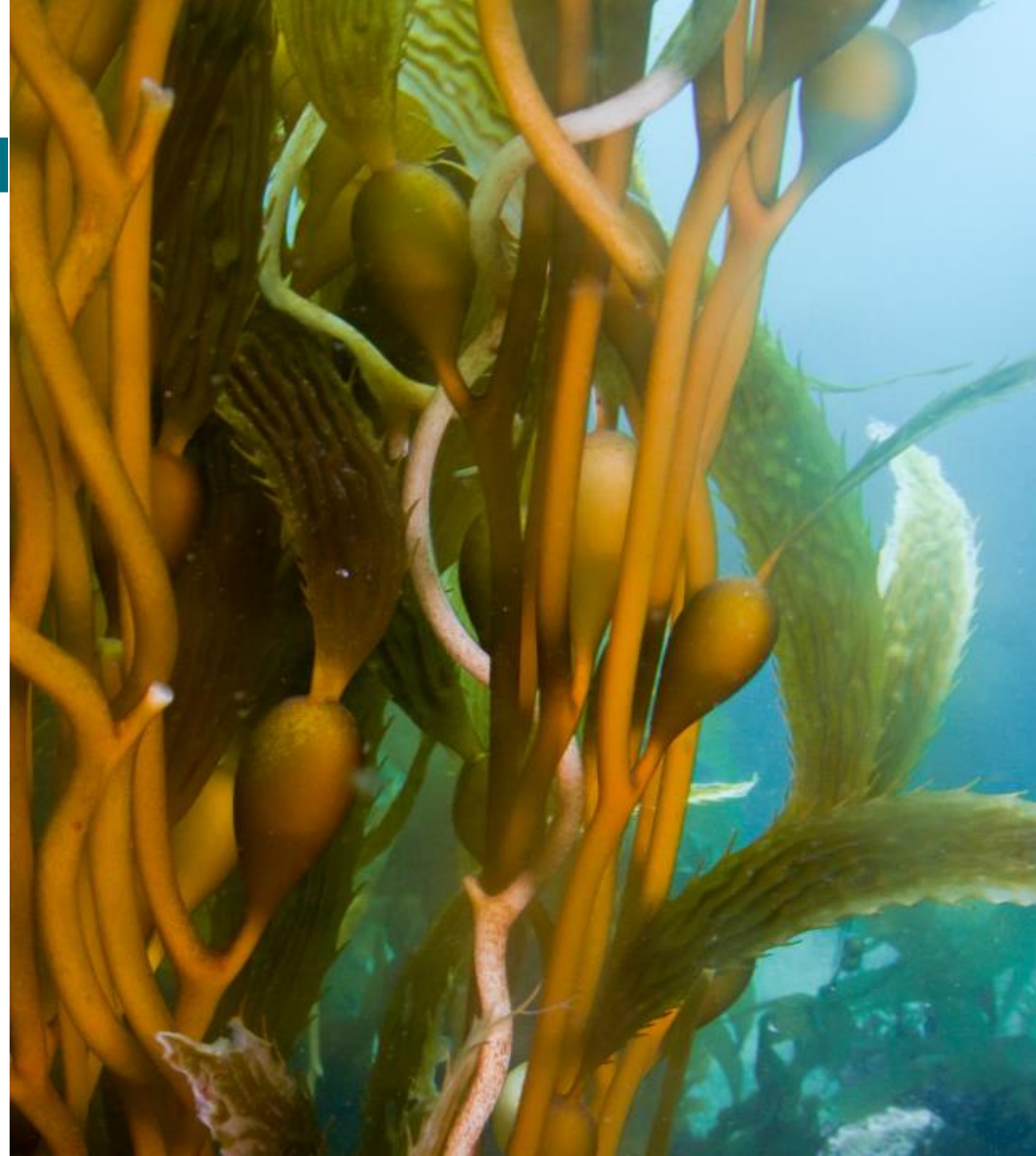




AGENDA

Tuesday 11 March

14:00 - 14:10	**Opening welcome**	Anna Rindorf, DTU
14:10 - 14:30	**SEAwise Case Study**	Session led by Jochen Depestele, ILVO
14:30 - 15:00	**Discussion**	
15:00 - 15:15	**Coffee break**	
15:15 - 15:30	**EBFM Tool Demo**	Session led by Lia ní Aodha, Mindfully Wired
15:30 - 15:50	**Trial of Tool**	
15:50 - 16:10	**Feedback**	
16:10 - 16:25	**EBFM Toolbox Demo**	Session led by Neil Maginnis, ICES
16:25 - 16:45	**Trial of Toolbox**	
16:45 - 17:05	**Feedback**	
17:05 - 17:30	**Gaps, future work and closing comments**	



NWWAC –SEAwise Timeline

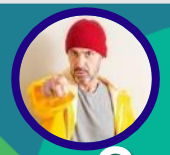
Autumn 2021	27 Jan 2022	14 Mar 2022	15 June 2023

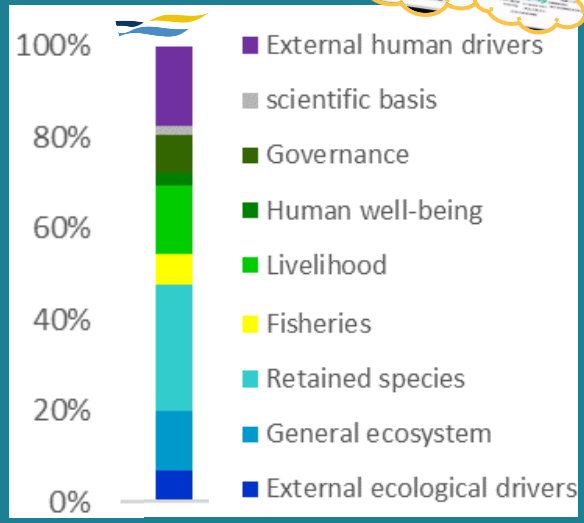
SEAwise introduction

Scoping workshop
Priority setting

Update Knowledge & methods

Co-design workshop
Tool design



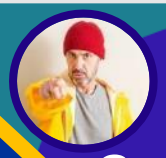


2 July 2024	11 March 2025	Summer 2025

Update Knowledge & methods

Review workshop
Tool testing

Synthesis workshop
Advice demo



REGISTRATION NOW OPEN!

SYMPOSIUM 2025
OPERATIONALISING EUROPEAN ECOSYSTEM BASED FISHERIES MANAGEMENT
June 30 - July 3, Brussels

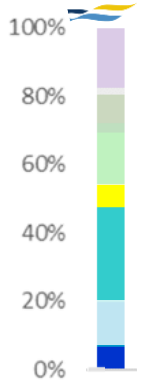
slido

Please download and install the Slido app on all computers you use

How can we make our management simulations more tailored to your needs?

ⓘ Start presenting to display the poll results on this slide.

⇒ Climate-informed management scenarios



2 key models

StrathE2E

FLBEIA by AZTI

MISSION ATLANTIC

ICES CIEM

StrathE2E App:
https://rshiny.science.strath.ac.uk/apps/StrathE2EApp/

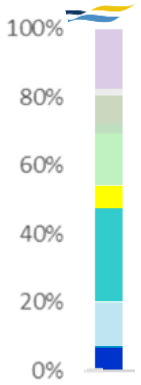
Slido #2167 770

SEAWISE

MODEL ARCHITECTURE

SCENARIOS

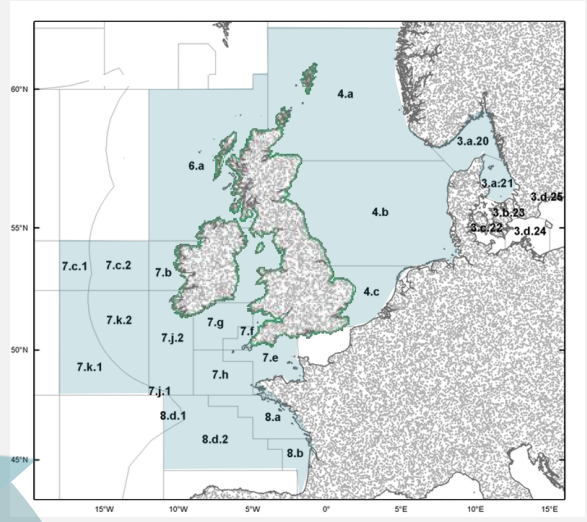
ASSESSMENT

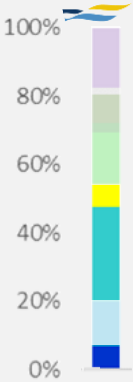


MODEL CHARACTERISTICS

9 (demersal) fish stocks

ank.27.78abd, **cod**.27.7e-k, **had**.27.7b-k, **hke**.27.3a46-8abd, **meg**.27.7b-k8abd, **mon**.27.78abd, **sol**.27.7e, **sol**.27.7fg, **whg**.27.7b-ce-k + ***Nephrops***





⇒ **Celtic Sea mixed fisheries considerations**

- No trophic interactions
- No high-resolution spatial dynamics

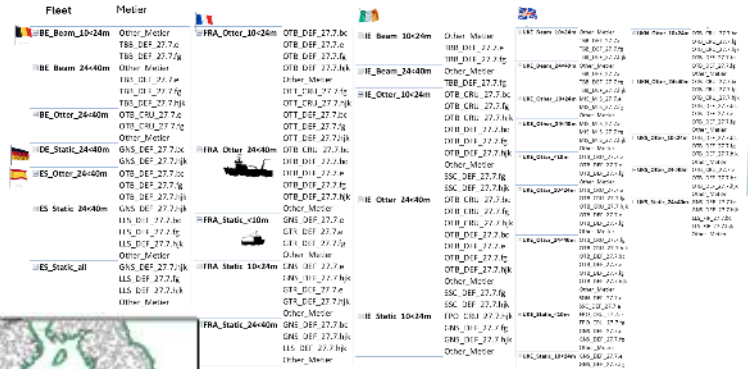
ICES CIEM

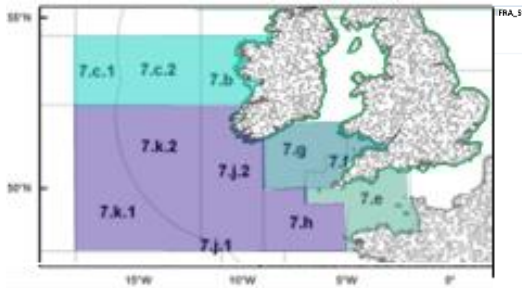
Technical interactions

156 FBLEIA fleet & metiers

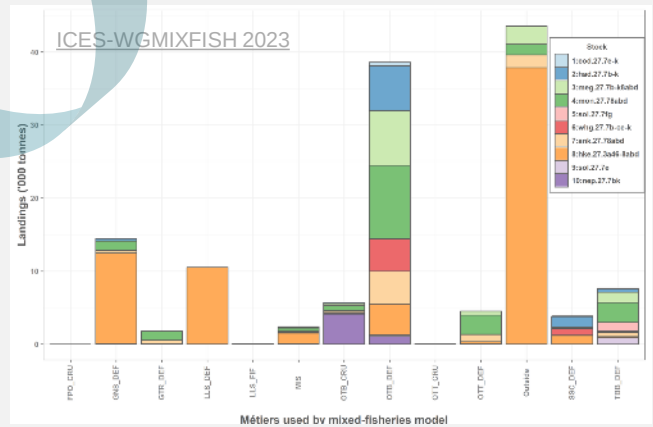
COUNTRY+LOA
e.g. FRA_Otter_10<24m

GEAR+TARGET+AREA
e.g. OTB_DEF_7.e





CATCH PROFILES *q*
(*Catch = q*Eff*Biomass*)



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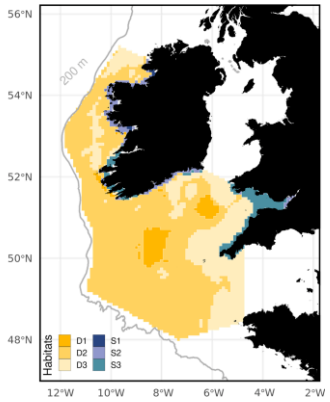
MODEL CHARACTERISTICS

⇒ Explore what-if experiments

- 6 habitats, based on in/offshore and sediment
- Bentho-pelagic coupling



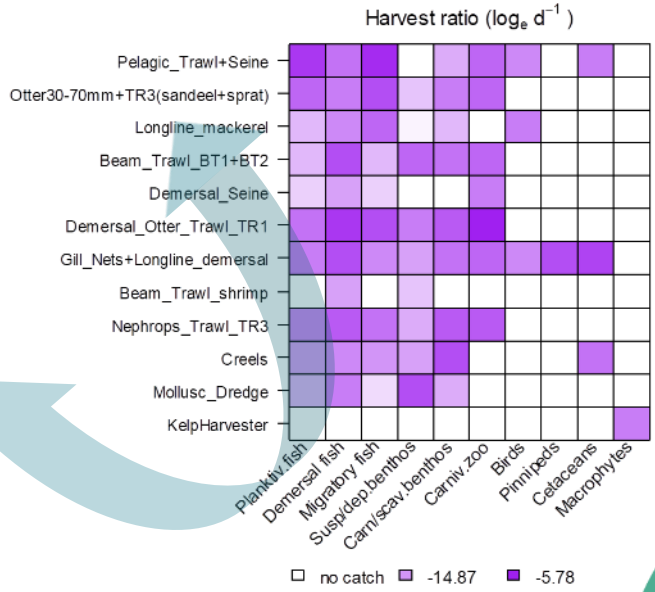
StrathE2E Metiers

Pelagic trawls and seines, Sandeel and sprat trawls (Otter trawls 30-70mm and TR3), Longlines targeting mackerel, Beam trawls (BT1 and BT2), Demersal seines, Demersal otter trawl (TR1), Gillnets and longlines targeting demersal fish, Beam trawls targeting shrimp, Nephrops trawls (TR2), Pots and creels, Mollusc dredges, Kelp harvesting vessels

26 guilds (entire ecosystem)

Nutrients (4), detritus (6), primary producers (2), Zooplankton (6), benthos (2), fish (3: planktivorous, migratory, demersal: benthic-piscivorous, quota-limited and non-quota fractions), mammals (3)

Trophic interactions



https://www.marineresourcemodelling.maths.strath.ac.uk/strathe2e/index.html

SEAWISE

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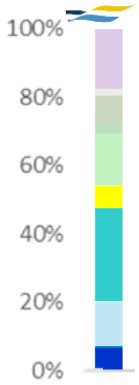

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⇒ 3 scenarios of management-induced effort changes

Status Quo Effort equals the average effort of the three most recent years

Fmsy - min Fishing stops when quota of one spp is exhausted, assuming perfect compliance with LO

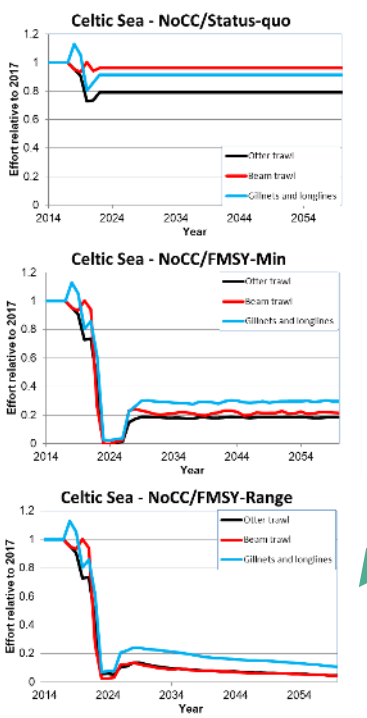
PGY - min same as Fmsy–min with some flexibility for Fmsy, *i.e. 95%* of MSY

Status Quo Effort

Fmsy min

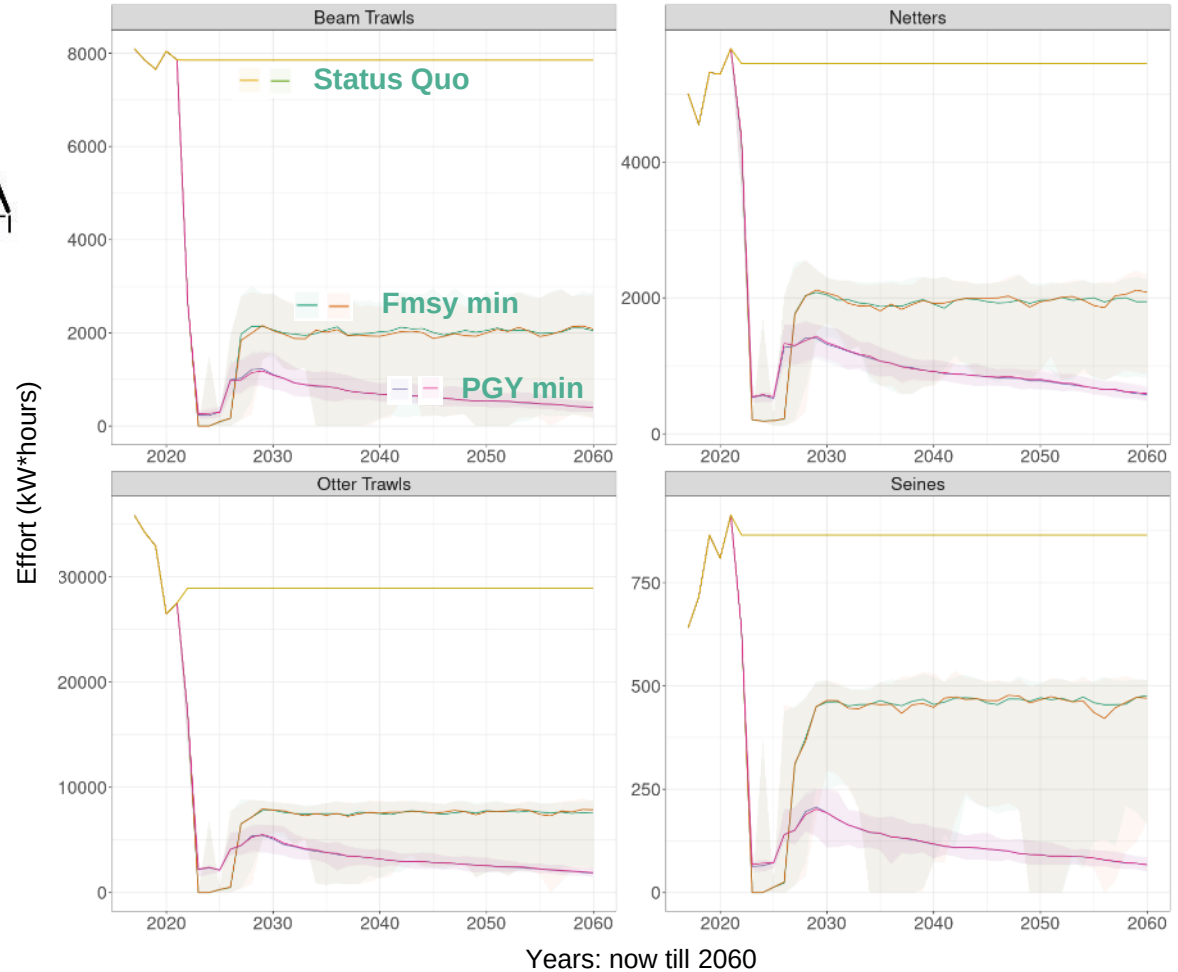
PGY min

Effort of beam, otter, nets + longliners

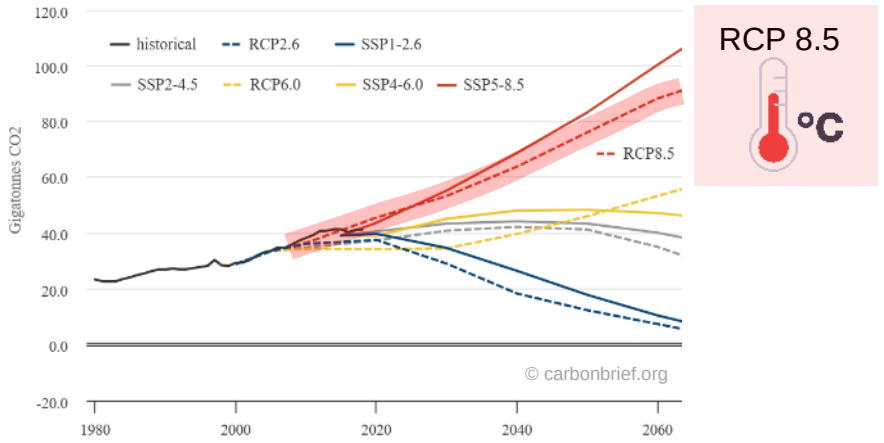


StrathE2E

FLBEIA by AZTI



⇒ 2 scenarios of climate-induced productivity changes



RCP 8.5

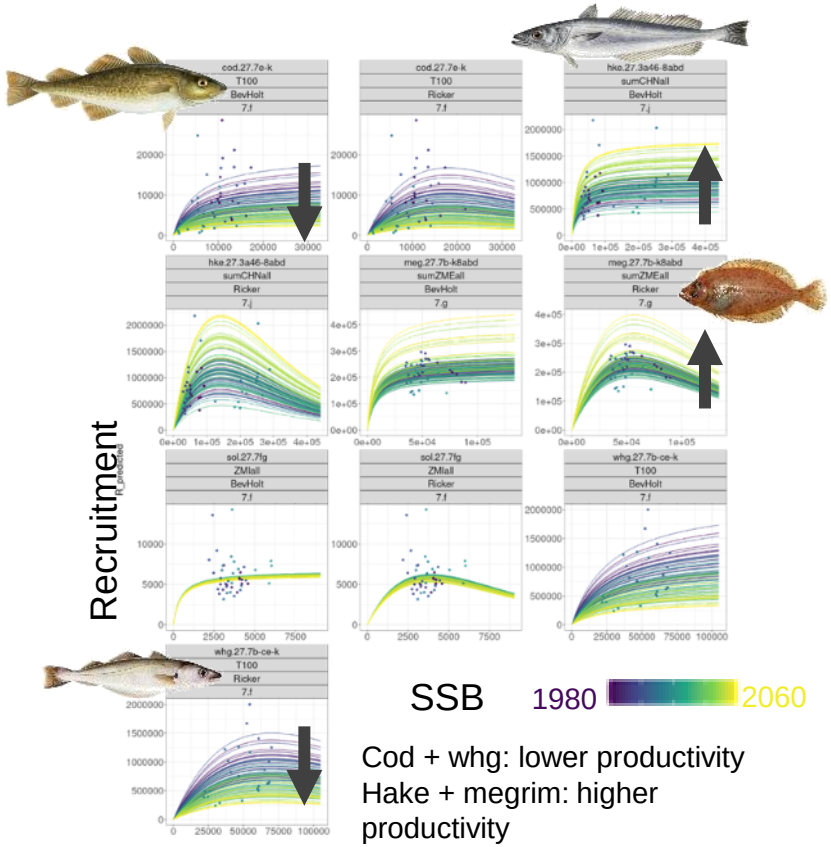
°C

⇒ **Env-driven nutrient fluxes**, incl. temperature, nitrate, ammonia, particulate material, transport rates, based on COUPLED-BIOGEOCHEMICAL model on PRODUCTIVITY !

FLBEIA by AZTI

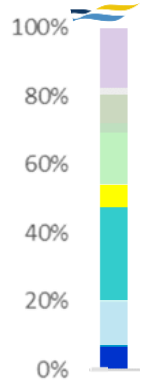
StrathE2E

⇒ **Env-mediated Stock-Recruitment Relationship**
based on STATISTICAL CORRELATION



SSB 1980 2060

Cod + whg: lower productivity
Hake + megrim: higher productivity



T100 Bottom temperature
CHN Chl-a concentration in non-diatom phytoplankton
ZME Meso zooplankton (mmol-N/m3)

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MODEL ARCHITECTURE

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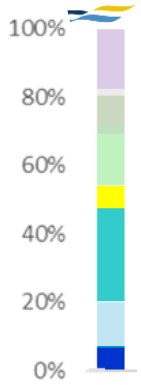

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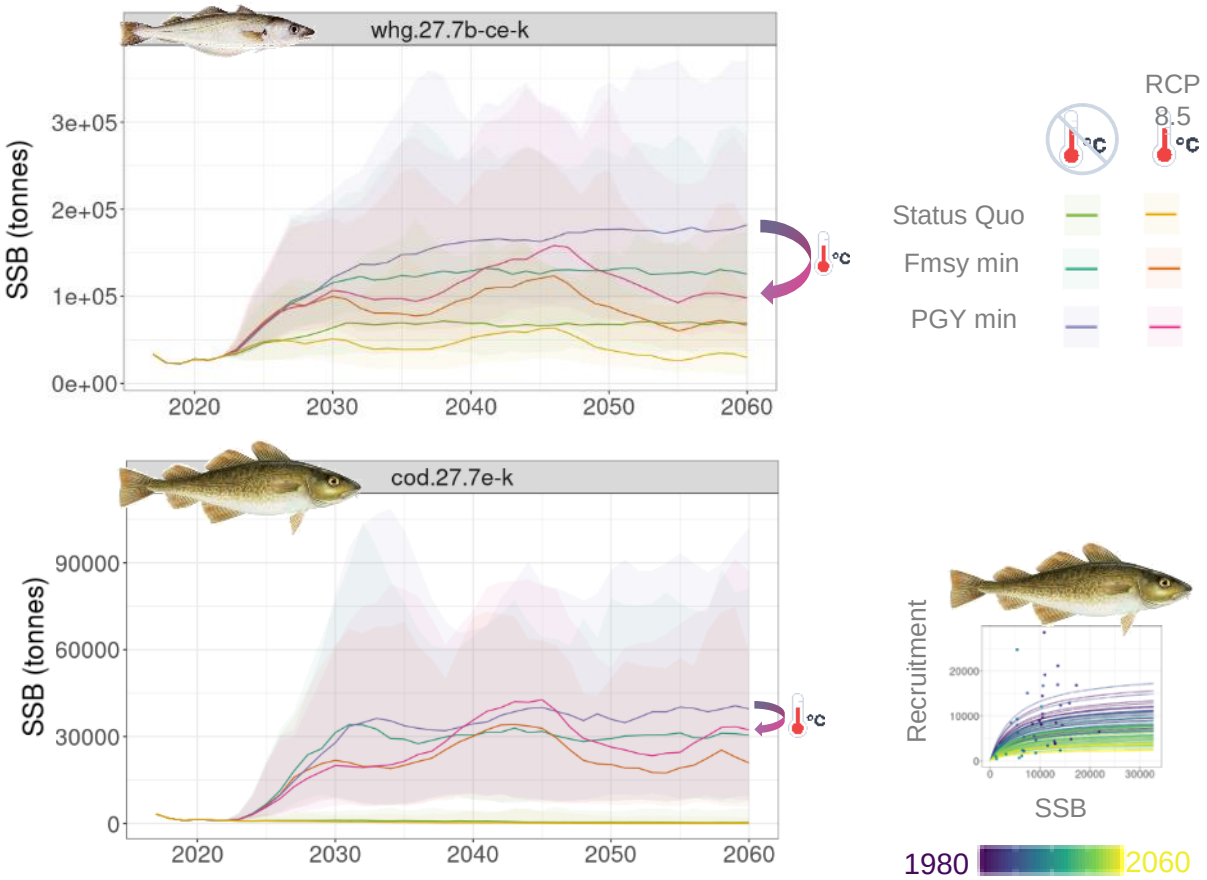
Examples

Stock indicators: SSB

⇒ Recovery of cod and whiting under Fmsy & PGY but to lower productivity levels under RCP8.5

⇒ No cod recovery under Status Quo



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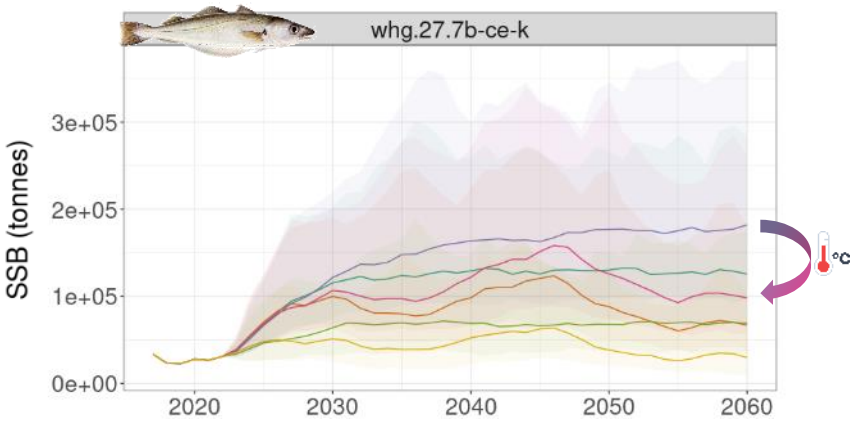
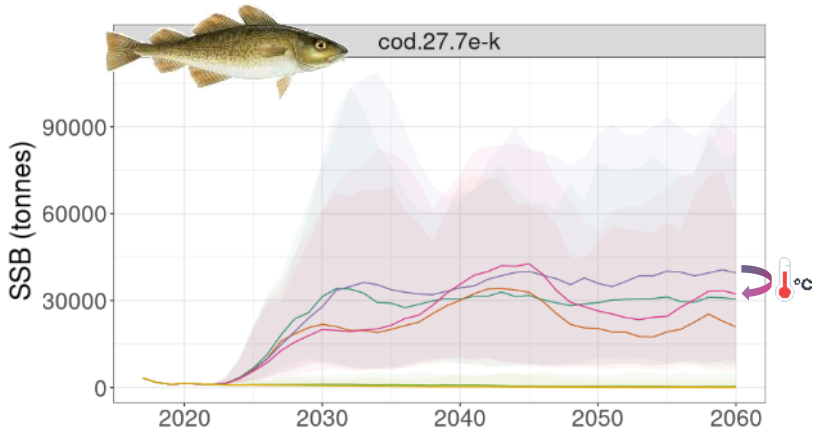
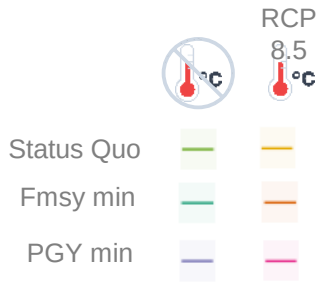
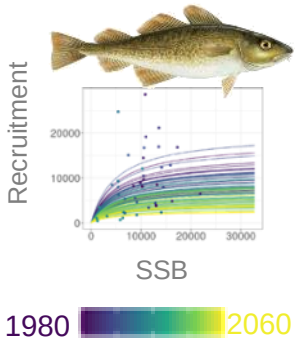
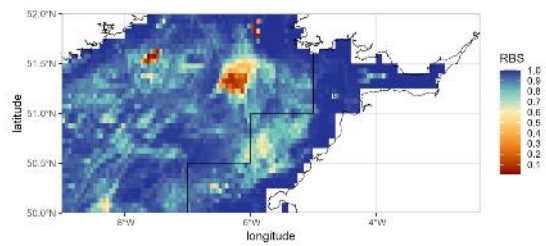


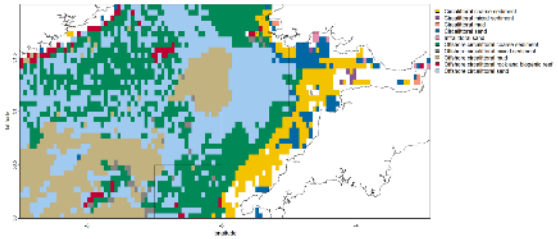


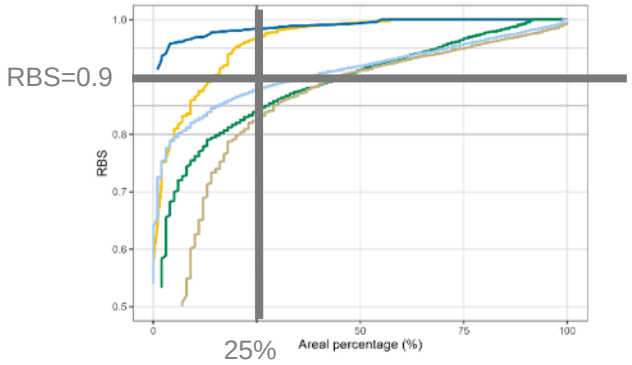




Relative Benthic State

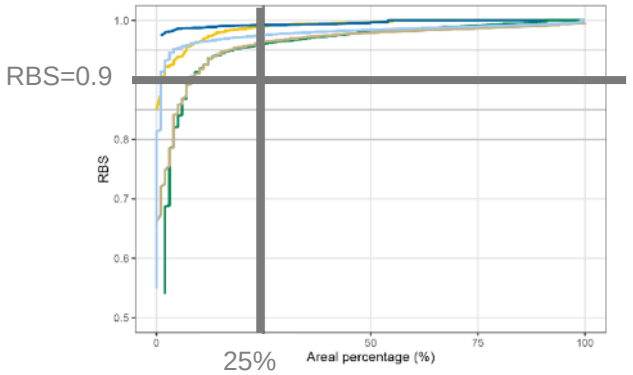






Status Quo

⇒ >25% of offshore circalittoral sand, mud and mixed sediment impaired using RBS = 0.9 as threshold



PGY 2030-2035

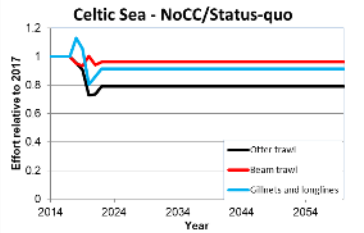
⇒ No sediment impaired using RBS = 0.9 as threshold

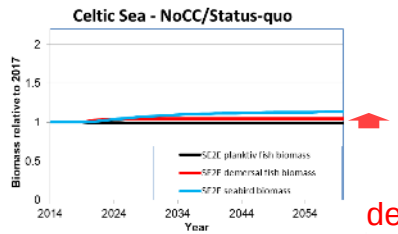
Examples

Effort of beam, otter, nets + longliners

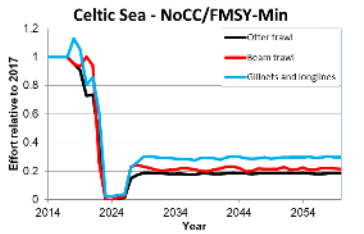
Biomass

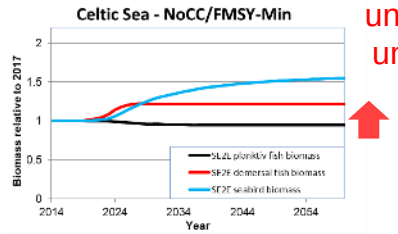
Status Quo



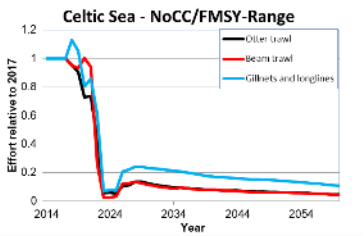


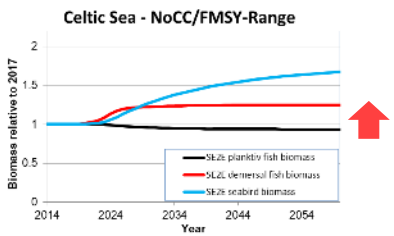
Fmsy min





PGY min





Lower recovery of demersal fish biomass under Status Quo than under Fmsy and PGY

Examples

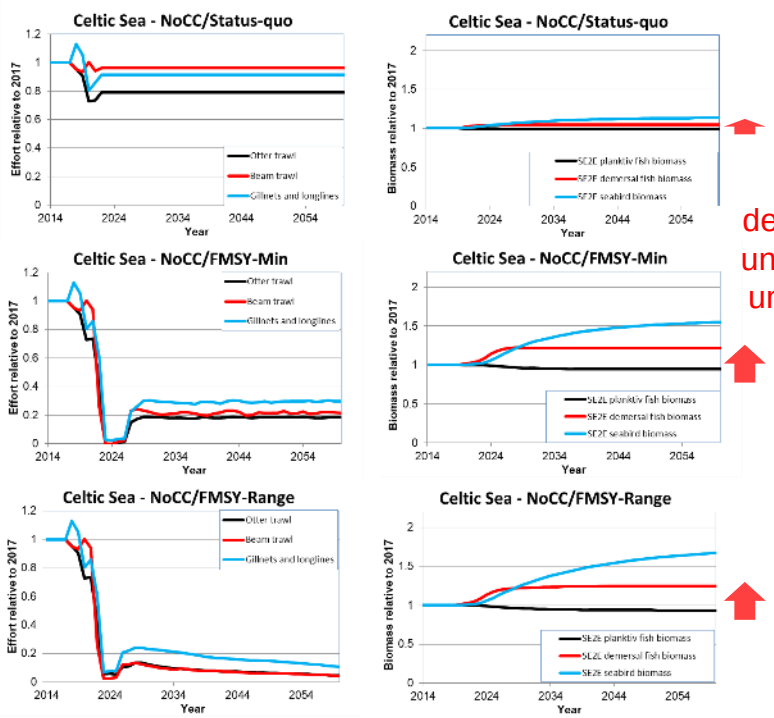
Effort of beam, otter, nets + longliners

Biomass

Status Quo

Fmsy min

PGY min

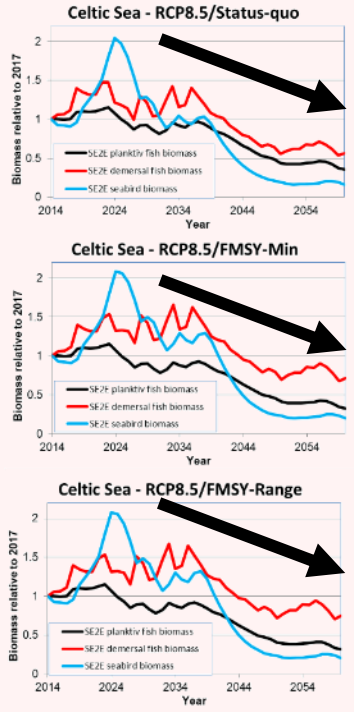


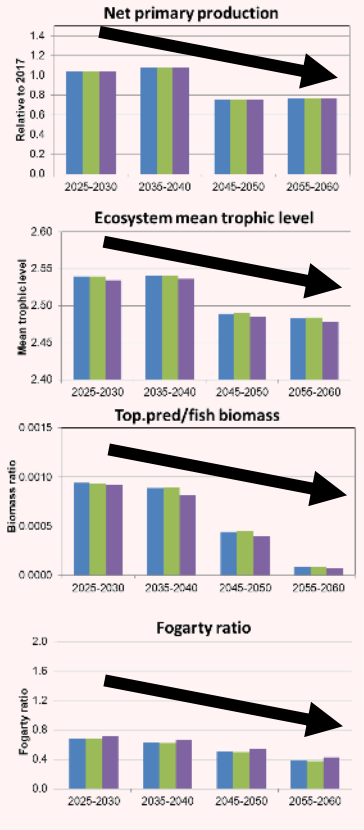
Lower recovery of demersal fish biomass under Status Quo than under Fmsy and PGY

FUTURE = strongly reduced productivity

RCP 8.5

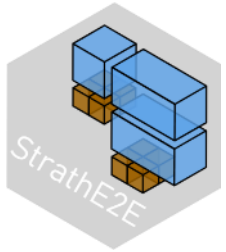
Biomass

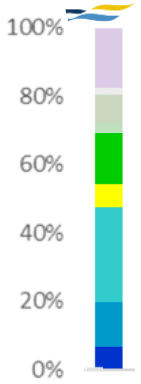




Fmsy-Min PGY-Min Status quo

MANY INDICATORS…





StrathE2E indicators

- **Catches**
- **Ecosystem indicators**
  - Net primary production
  - Biomass ratio of top predators to fish
  - Ecosystem mean trophic level
  - Bycatch of mammals and birds
  - Swept area ratio
  - Fogarty ratio
    - = index of Ecosystem overfishing

$$= \frac{total\ catches}{total\ primary\ productivity} < 1\ ‰\ (threshold)$$

Link & Watson (2019)

FLBEIA indicators

- **Stock indicators**: SSB, recruitment, F
- Effort-related indicators:
  - **Economic indicators**:
    - Total revenues, gross value added, profit margin, employment using variable costs, fuel consumption

  - **Global and ecosystem indicators**:
    - CO_2-emissions,
    - bycatch risk of PETs,
    - Relative Benthic State.

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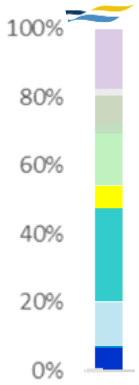
MODEL ARCHITECTURE

SCENARIOS

ASSESSMENT



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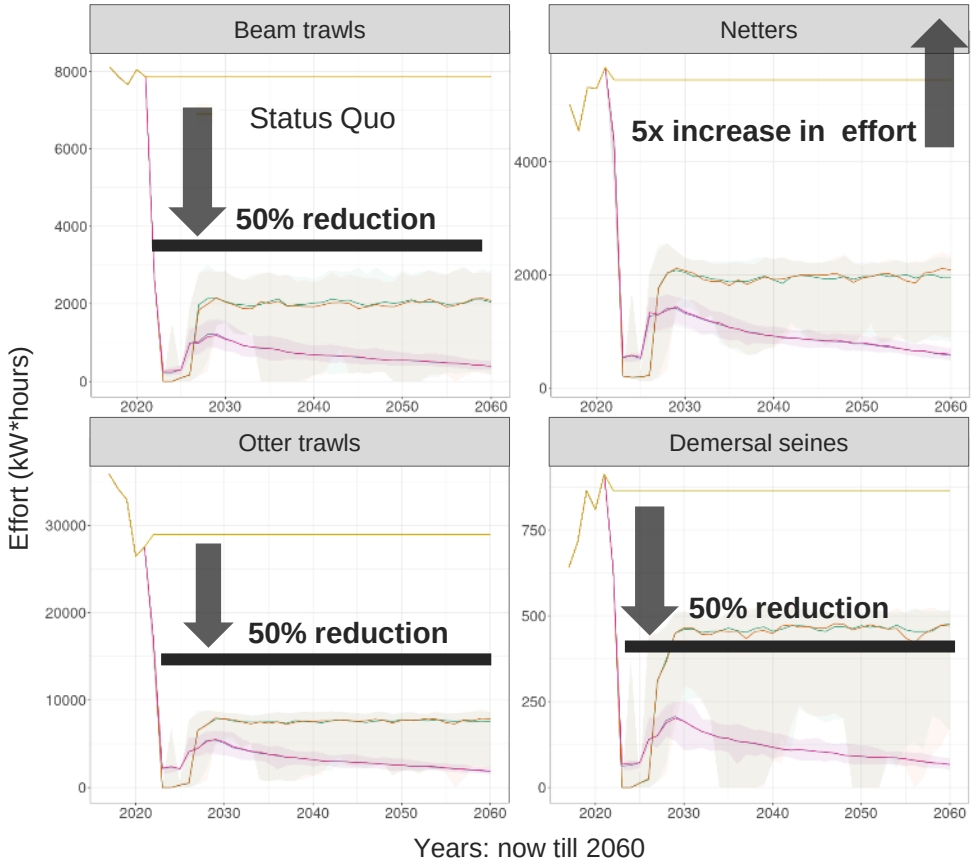
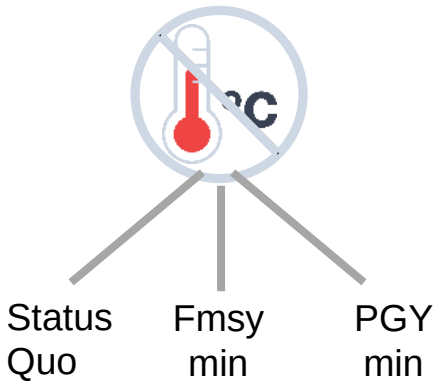
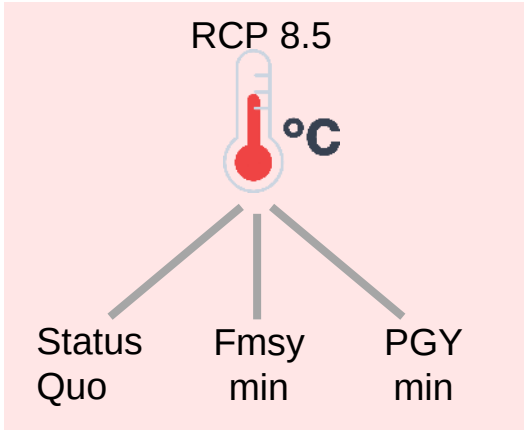
1 additional scenario

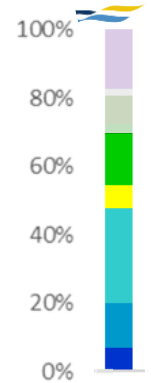
⇒ What can we learn from a scenario that simulates a reduction in trawling effort and an increase in passive gears?



6 scenarios







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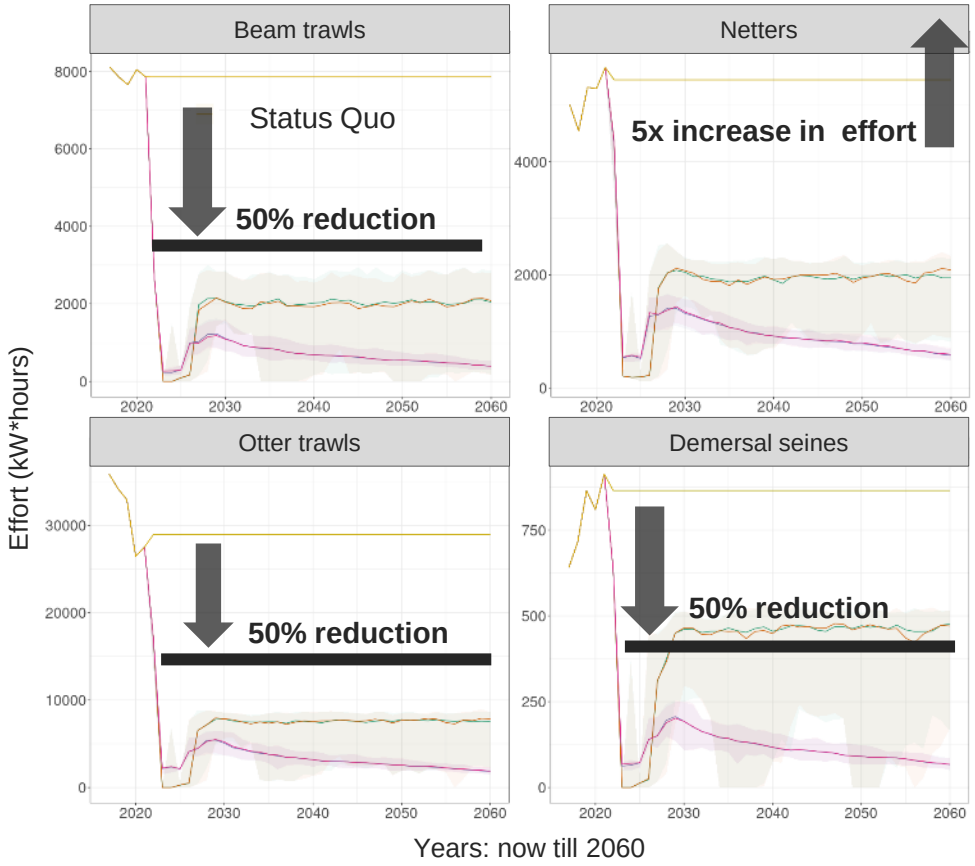


1 proposed scenario

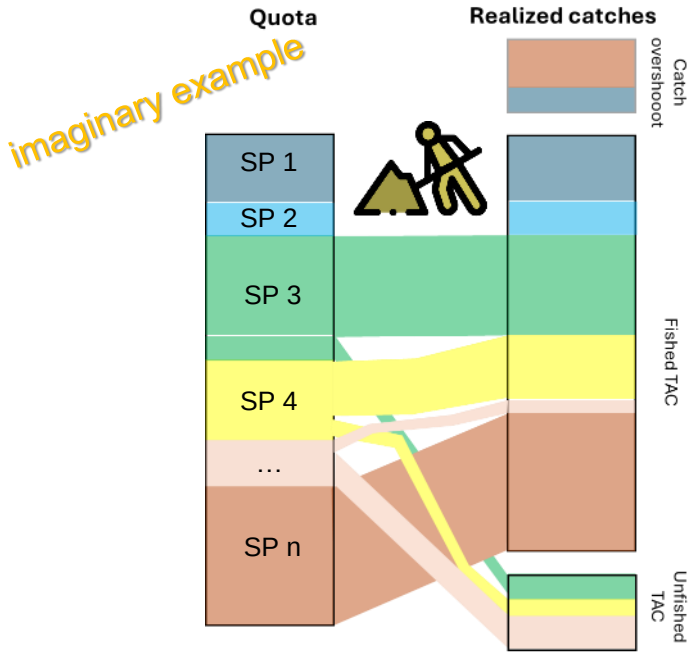
Find the best re-allocation of effort across fleets and metiers to

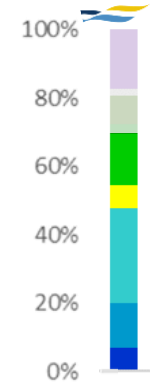
⇒ Better match catch and quota

⇒ Reduce benthic impacts

⇒ **Useful? What constraints are needed?**

e.g. relative metier-effort cannot change >10% by country
e.g. time span of implementation . . .





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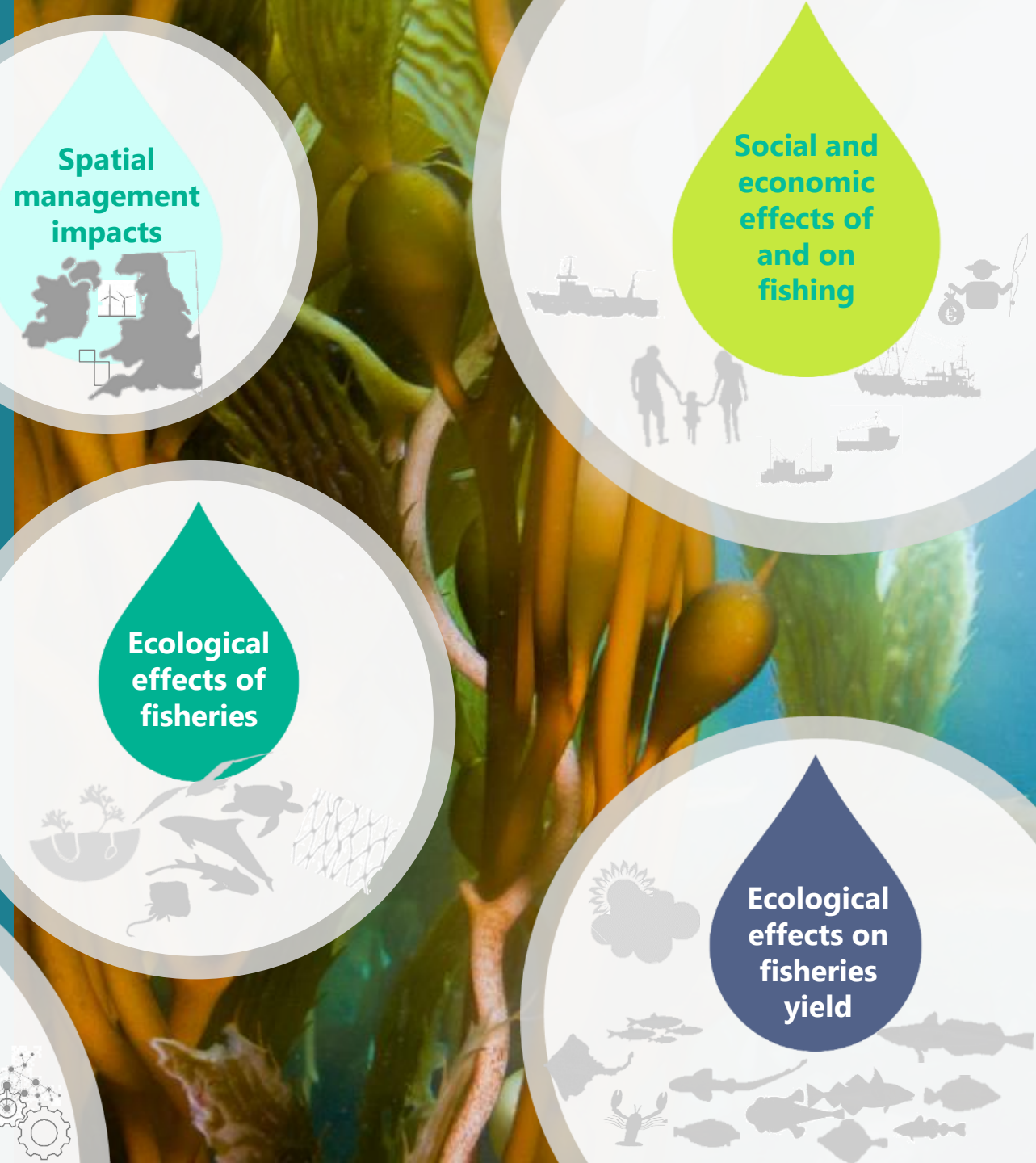

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