

Evaluation of fishing effort regime in the Western Mediterranean – part VI

STECF EWG 21-13 (27th of September – 1st of October 2021)

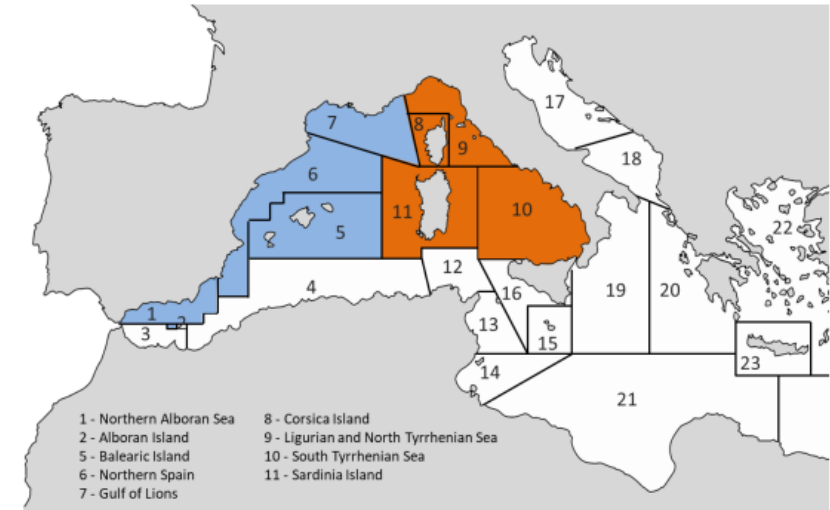
Cecilia Pinto

17th of December 2021

MEDAC extraordinary online meeting

Overview of the Western Mediterranean Management Plan (2019/1022)

- The Commission adopted the MAP proposal on March 8th 2018
- The European Parliament and Council reached an agreement on February 4th, 2019
- Annual effort quotas are set by the Council, since 01.01.2020
- The main characteristics of the regime are as follows:
 - Effort regime applicable to all trawl vessels targeting demersal stocks.
 - Two effort groups: mixed demersal fisheries (Hake, Red mullet, Deep-water rose shrimp, Norway lobster); deep-shrimp fisheries (Giant red shrimp, Blue and red shrimp).
 - Four sub-groups of vessels: < 12m; 12-18m; 18-24m; and >24m.
 - Effort quotas in terms of fishing days.
 - Fishing day is limited to 15 hours (from port to port).
 - Baseline: average fishing days between 01.01.2015 and 31.12.2017
 - Implementation of closure areas to obtain a 15-25% reduction of captures of juveniles and spawners.



MAP region. Blue= EMU1. Red: EMU2

Overview of the Plan from 01.01.2020 up to 31.12.2021

	EMU 2	EMU 1	
	Italy	France	Spain
Effort reduction 2020	-10%	-10%	-10%
Effort reduction 2021	-10%	-10%	-10%
Spatial closures 2020	Permanent	Temporal	Permanent and Temporal
Spatial closures 2021	NONE	NONE	Permanent and Temporal

Overview of the STECF EWGs focused on the Plan implementation

- STECF 18-09: issues managing fisheries with fishing effort regimes.
 - relationship between fishing effort and fishing mortality is not constant – efficiency can increase while fishing effort is getting reduced.
 - STECF 18-14: relationship between fishing effort and fishing mortality for the MAP stocks was shown to be never linear.
 - first review of existing bioeconomic mixed fisheries models in the Western Med – 2 years roadmap to implement the models for the MAP.
 - STECF 19-01: updating and improving mixed-fisheries models.
 - first review of existing bioeconomic mixed fisheries models in the Western Med – 2 years roadmap to implement the models for the MAP.
 - develop a single combined model for EMU1 including data from both Spain and France together.
 - STECF 19-14: combined IAM model for EMU1, including both Spanish and French fleets but including only hake data. Two models were run in parallel for EMU 2 (BEMTOOL and SMART).
 - how to simulate closed areas in the bioeconomic models to evaluate their potential impact in the medium-term.
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- STECF 20-13: update of the 19-14 models and scenarios. (based on stock assessments up to 2019)
 - In 2020, the West Med MAP has been implemented since January 1st, through Regulation (EU) 2019/1022, with fishing opportunities in terms of maximum allowable fishing effort in fishing days fixed for 2020 in Council Regulation (EU) 2019/2236.
 - STECF 21-01: evaluation of conversion factors between fleet segments, of 2021 closure areas and effect of recreational fisheries on F of MAP species.
 - STECF 21-13: update of the 20-13 models and scenarios. (based on stock assessments up to 2020)

STECF EWG 21-13 Terms of Reference

TOR 1. Update the F-E analyses for Effort Management Units 1 and 2 with the most recent socio-economic and biological data and the most recent stock assessments' results. If possible, estimate the impact of the COVID-19 outbreak with the most updated available data and knowledge.

TOR 2. Based on the work of the FDI EWG in September 2021, compile and provide complete sets of annual data on fishing effort starting in 2015 to and including 2020. This should be described in terms of fishing days, days at sea, GT*days, fishing hours and nominal effort by Member State, GSA and, where possible, by fishing gear.

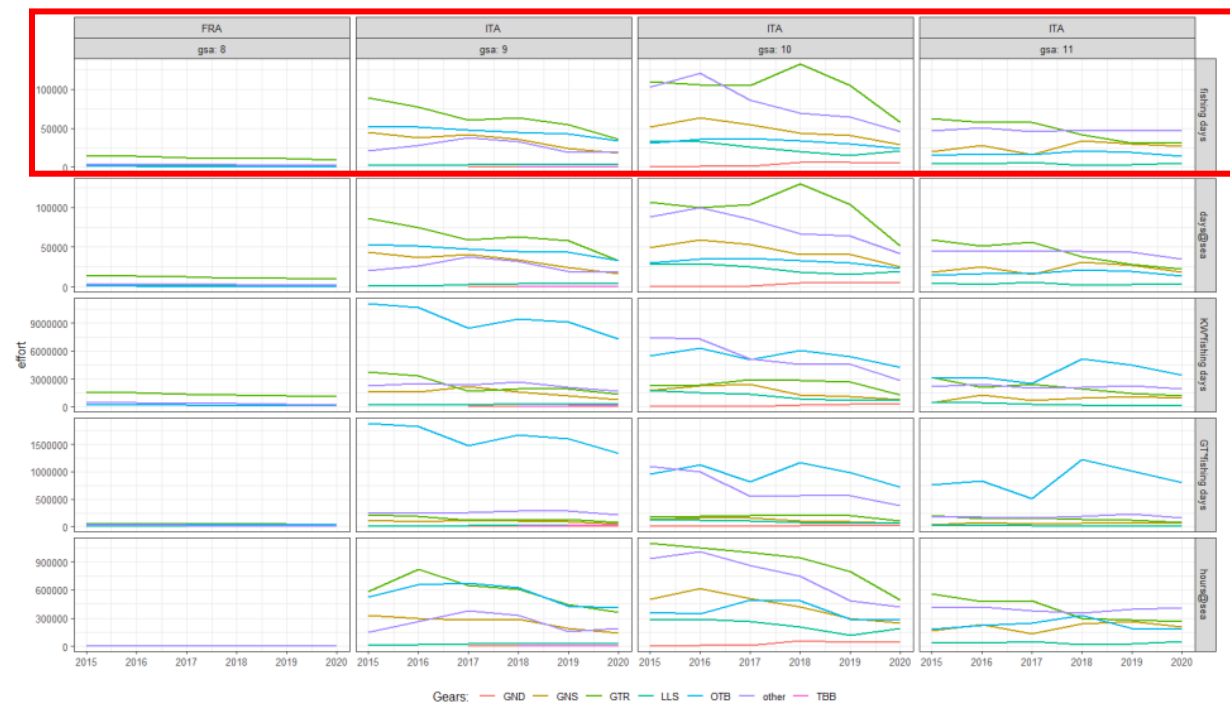
TOR 3. Develop mixed-fisheries effort scenarios for all demersal fishing gear (e.g. bottom trawls, gillnets, longlines) in EMU1 and EMU2. In grey, the priority scenarios, in case time constraints do not allow to fully address the proposed scenarios. The percentages of reduction of effort given in the scenarios are calculated in reference to the reference period 2015-2017 and should account for the 10% reduction of effort applied in 2020.

TOR 4. Using the advice structure developed in 2020 (EWG 20-13) and the Annex 1 of 2020 and 2021 Fishing Opportunities (in supp. Material), provide a synoptic overview of: (i) the source of data and methods and; (ii) the management advice, including technical and conservation measures combined to a range of fishing effort reduction that secure the achievement of MSY by 2025 accounting for the socio-economic impact.


TOR 5. Discuss future steps in preparation of EWG 22-01 (March 2022) that would investigate the impact of additional management measures in order to achieve MSY by 2025 at the latest, for the six main demersal species in the western Mediterranean Sea.

TOR 6. To the extent possible, evaluate the impact of transfers of fishing days between deep and coastal bottom trawl fisheries of the same geographical area at metier level and where possible at stock level, following the procedure developed during STECF EWG 21-01.


ToR: 1-2 Fishing effort trends by GSA




ToR: 1-2 Comparison between EU regulation and declared data

 Stock group	Fleet segment	FDI baseline: average of 2015-2017 fishing effort E ₂₀₁₅₋₂₀₁₇	FDI Fishing effort in 2020	2020 Regulation	82.5% of the FDI baseline 0.825* E ₂₀₁₅₋₂₀₁₇	2021 regulation	% of change between the 2020 regulation and 2020 FDI effort	% of change between the 2021 regulation and 82.5% of the FDI baseline
Red mullet in GSAs 1, 5, 6, 7; Hake in GSAs 1, 5, 6, 7; Deep-water rose shrimp in GSAs 1, 5, 6; Norway lobster in GSAs 5 and 6.	< 12 m	2663	1376	2260	2197	2072	+39.11%	-6.04%
	≥ 12 m and < 18 m	21685	21244	24284	17890	22260	+12.52%	+19.63%
	≥ 18 m and < 24 m	50588	45587	45563	41735	41766	-0.05%	+0.07%
	≥ 24 m	25166	16826	16047	20762	14710	-4.86%	-41.14%
Blue and red shrimps in GSA 1,5,6,7	< 12 m	2	0	0	2	0	-	-
	≥ 12 m and < 18 m	409	630	1139	338	1044	+44.71%	+67.65%
	≥ 18 m and < 24 m	3908	6169	11535	3224	10574	+46.52%	+69.51%
	≥ 24 m	5588	5713	9260	4610	8488	+38.30	+45.68
TOTAL FISHING EFFORT OF SPANISH TRAWLS		110009	97544	110088	90758	100914	+11.39%	+10.06%

ToR: 1-2 Comparison between EU regulation and declared data

 Stock group	Fleet segment	FDI baseline: average of 2015-2017 fishing effort E ₂₀₁₅₋₂₀₁₇	FDI Fishing effort in 2020	2020 Regulation	82.5% of the FDI baseline 0.825* E ₂₀₁₅₋₂₀₁₇	2021 Regulation	% of change between the 2020 regulation and 2020 FDI effort	% of change between the 2021 regulation and 82.5% of the FDI baseline
Red mullet in GSAs 1, 5, 6 and 7; Hake in GSAs 1-5-6-7; Deep-water rose shrimp in GSAs 1, 5 and 6; Norway lobster in GSAs 5 and 6	≥ 18 m and < 24 m	4 666	4 450	5 144	3 849	4 715	+13,49%	+18.36%
	≥ 24 m	6 115	5 382	6 258	5 045	5 737	+14%	+12.06%
TOTAL FISHING EFFORT OF FRENCH TRAWLS		10 781	9 832	11 402	8 894	10 452	+13,77%	+14.9%

ToR: 1-2 Comparison between EU regulation and declared data

 Stock group	Length of vessels	FDI baseline: average of 2015-2017 fishing effort $E_{2015-2017}$	FDI Fishing effort in 2020	2020 Regulation	80% of the FDI baseline $0.80 * E_{2015-2017}$	2021 Regulation	% of change between the 2020 regulation and 2020 FDI effort	% of change between the 2021 regulation and 80% of the FDI baseline
Red mullet in GSAs 9, 10 and 11; Hake in GSAs 9-10-11; Deep-water rose shrimp in GSAs 9-10-11; Norway lobster in GSAs 9 and 10.	< 12 m	3374	4157	3081	2699	2824	-34.92%	+4.419%
	≥ 12 m and < 18 m	52679	30910	46350	42143	42487	+33.31%	+0.809%
	≥ 18 m and < 24 m	35031	23435	31170	28025	28572	+24.82%	+1.915%
	≥ 24 m	4680	4267	4160	3744	3813	-2.57%	+1.810%
Giant red shrimp in GSAs 9, 10 and 11.	< 12 m	567	129	510	454	467	+74.71%	+2.869%
	≥ 12 m and < 18 m	3345	3977	3760	2676	3447	-5.77%	+22.367%
	≥ 18 m and < 24 m	2838	3648	3028	2270	2776	-20.48%	+18.213%
	≥ 24 m	450	1459	405	360	371	-260.25%	+2.965%
TOTAL FISHING EFFORT OF ITALIAN TRAWLS		102964	71982	92464	82371	84757	+22.15%	+2.81%

ToR: 1-2 Effects of Covid-19 lock down on fishing effort levels

Estimate of the impact of the Covid-19 outbreak on fishing days in EMU 1 and 2

EMU	gsa	2018	2019	2020	baseline (mean 2015-2017)	2020-2019	% 2020-2019	% 2020-baseline	E(2020) = MIN(0.9*baseline;2019)	2020-E(2020)	% 2020-E(2020)
1	1	20397	22003	18718	16702	-3285	-15%	12%	15032	3686	17%
1	5	8709	8202	7306	11009	-896	-11%	-34%	8202	-896	-11%
1	6	76412	75803	69201	77889	-6602	-9%	-11%	70100	-899	-1%
1	7	12553	12185	12482	15429	297	2%	-19%	12185	297	2%
2	8	589	464	477	820	13	3%	-42%	464	13	3%
2	9	44445	42746	34082	50565	-8664	-20%	-33%	42746	-8664	-20%
2	10	33487	29534	23695	34223	-5839	-20%	-31%	29534	-5839	-20%
2	11	21240	18880	13677	16163	-5203	-28%	-15%	14547	-870	-5%
1	all 1-7	118071	118192	107707	121029	-10485	-9%	-11%	108926	-1219	-1%
2	all 8-11	99760	91624	71930	101771	-19693	-21%	-29%	91594	-19663	-21%

Source: FDI Table G, Fishing gear: OTB, Effort variable: totfishdays

The difference between real 2020 values and the expected no-Covid 2020 values would indicate a different impact of the Covid-19 on the fishing days in EMU 1 and EMU 2.

In **EMU 1**, the Covid-19 outbreak would have determined a **reduction by just 1%**, equivalent to 1.2 thousand days; while in **EMU 2** the whole reduction registered from 2019 to 2020 (almost 20 thousand days), equal to **21%**, would be due to the effects of Covid-19.

ToR: 3-4 Mixed-fisheries models

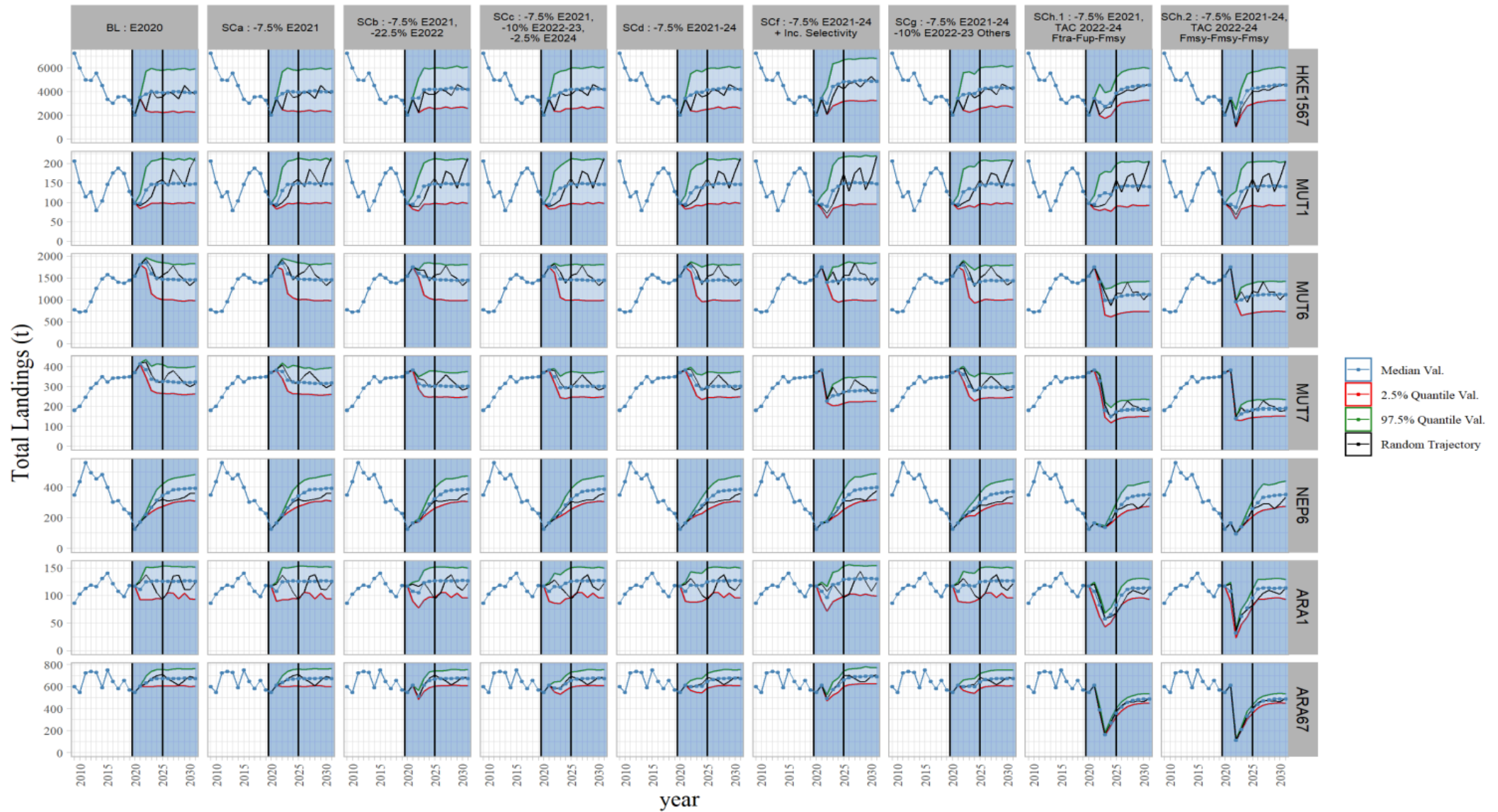
	EMU 2		EMU 1	
	SMART	BEMTOOL	IAM	(ISIS-FISH)*
Multiple gears	NO	YES	YES	(YES)*
Spatially explicit	YES	NO	NO	(YES)*

* MODEL WILL BE AVAILABLE FOR SIMULATIONS IN 2022

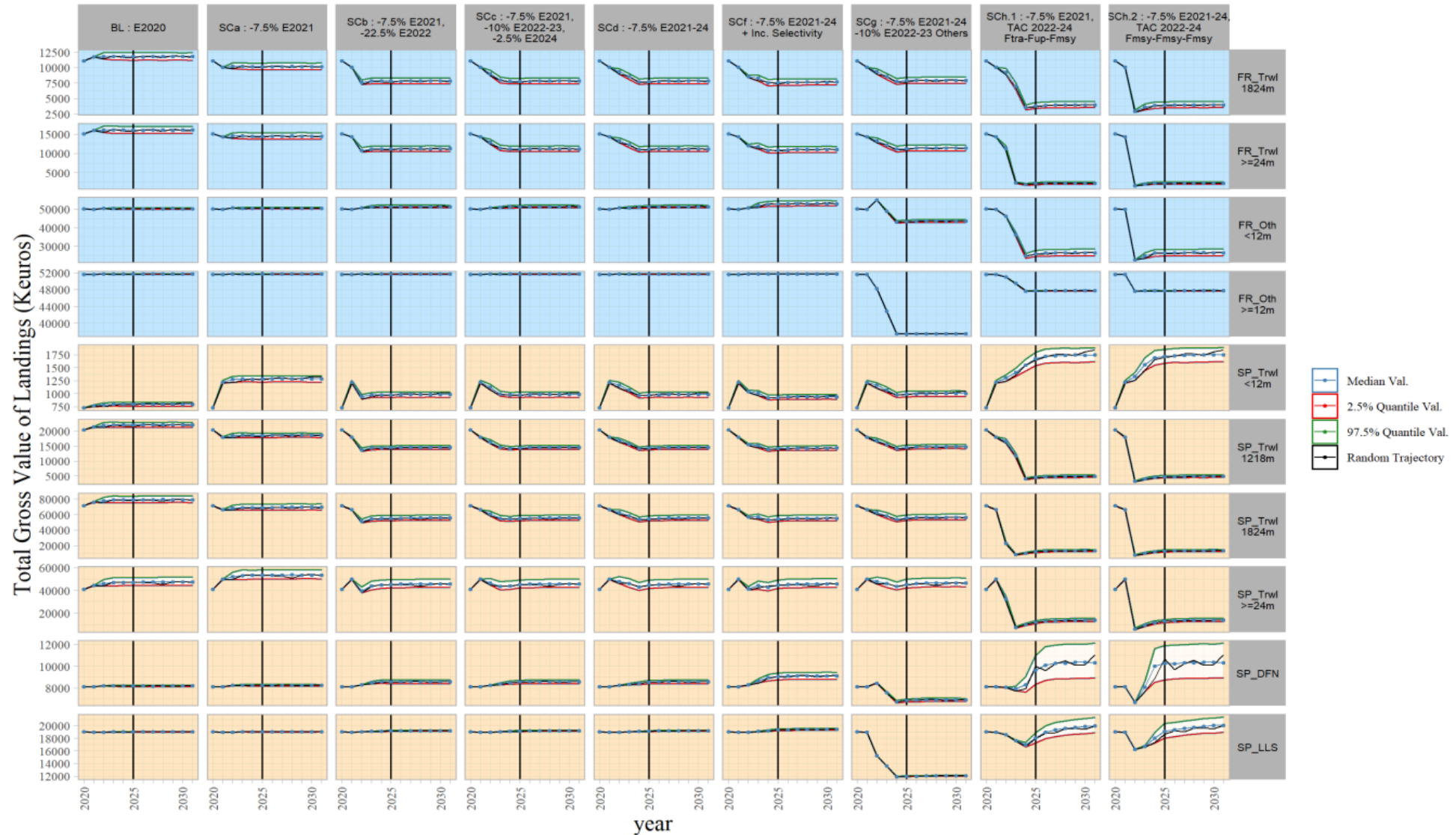
EMU 1 - SCENARIOS

	Seasonal closures																											
	Permanent closures (areas closed across whole year (no seasonality))																											
	Effort reduction compared to the baseline (kepts constant in 2022/23/24)																											
		EMU1																										
	Effort reduction					Spatial closures					Selectivity measures					Reduction other gears (LLS, GTR, GNS)						TAC						
Scenario	2020	2021	2022	2023	2024	2020	2021	2022	2023	2024	2020	2021	2022	2023	2024	2020	2021	2022	2023	2024	2020	2021	2022	2023	2024	IAM		
a		-7.5%				✓	✓	✓	✓	✓																	x	
b		-7.5%	-23%			✓	✓	✓	✓	✓																	x	
c		-7.5%	-10%	-10%	-2.5%	✓	✓	✓	✓	✓																	x	
d		-7.5%	-7.50%	-7.50%	-7.5%	✓	✓	✓	✓	✓																	x	
e		-7.5%	-7.50%	-7.50%	-7.5%	✓	✓	✓	✓	✓																		
f		-7.5%	-7.50%	-7.50%	-7.5%	✓	✓	✓	✓	✓	50mm square mesh on deepwater																	x
g		-7.5%	-7.50%	-7.50%	-7.5%	✓	✓	✓	✓	✓								-10%	-10%	-10%							x	
h		-7.5%				✓	✓	✓	✓	✓													✓	✓	✓		x	
i		-7.5%				✓	✓	✓	✓	✓								-10%	-10%	-10%			✓	✓	✓			

ToR: 3-4 Total Landings predictions for EMU 1



ToR: 3-4 Total Gross Value predictions for EMU 1



ToR: 3-4 Mixed-fisheries models

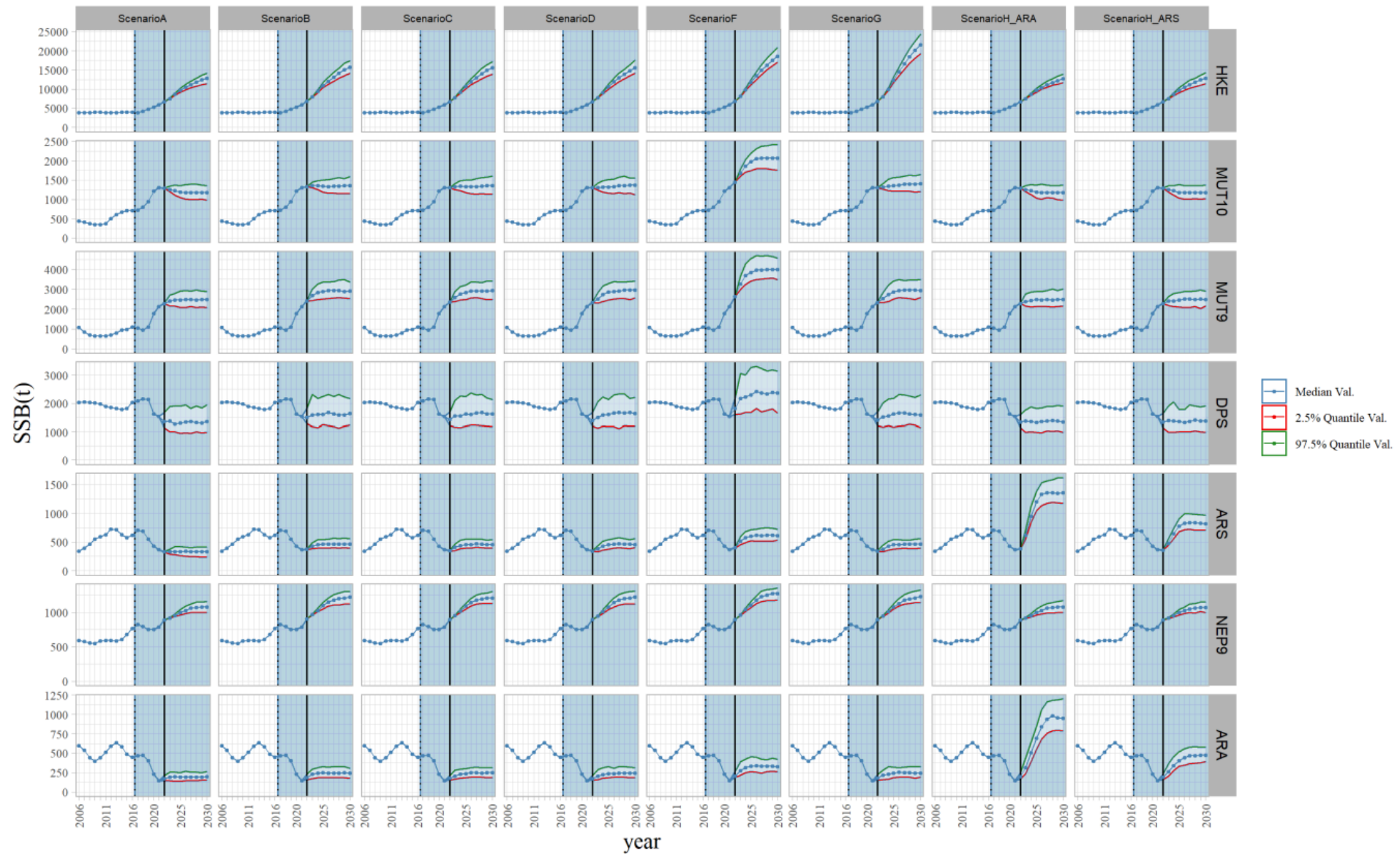
	EMU 2		EMU 1	
	SMART	BEMTOOL	IAM	(ISIS-FISH)*
Multiple gears	NO	YES	YES	(YES)*
Spatially explicit	YES	NO	NO	(YES)*

* MODEL WILL BE AVAILABLE FOR IN MARCH 2022

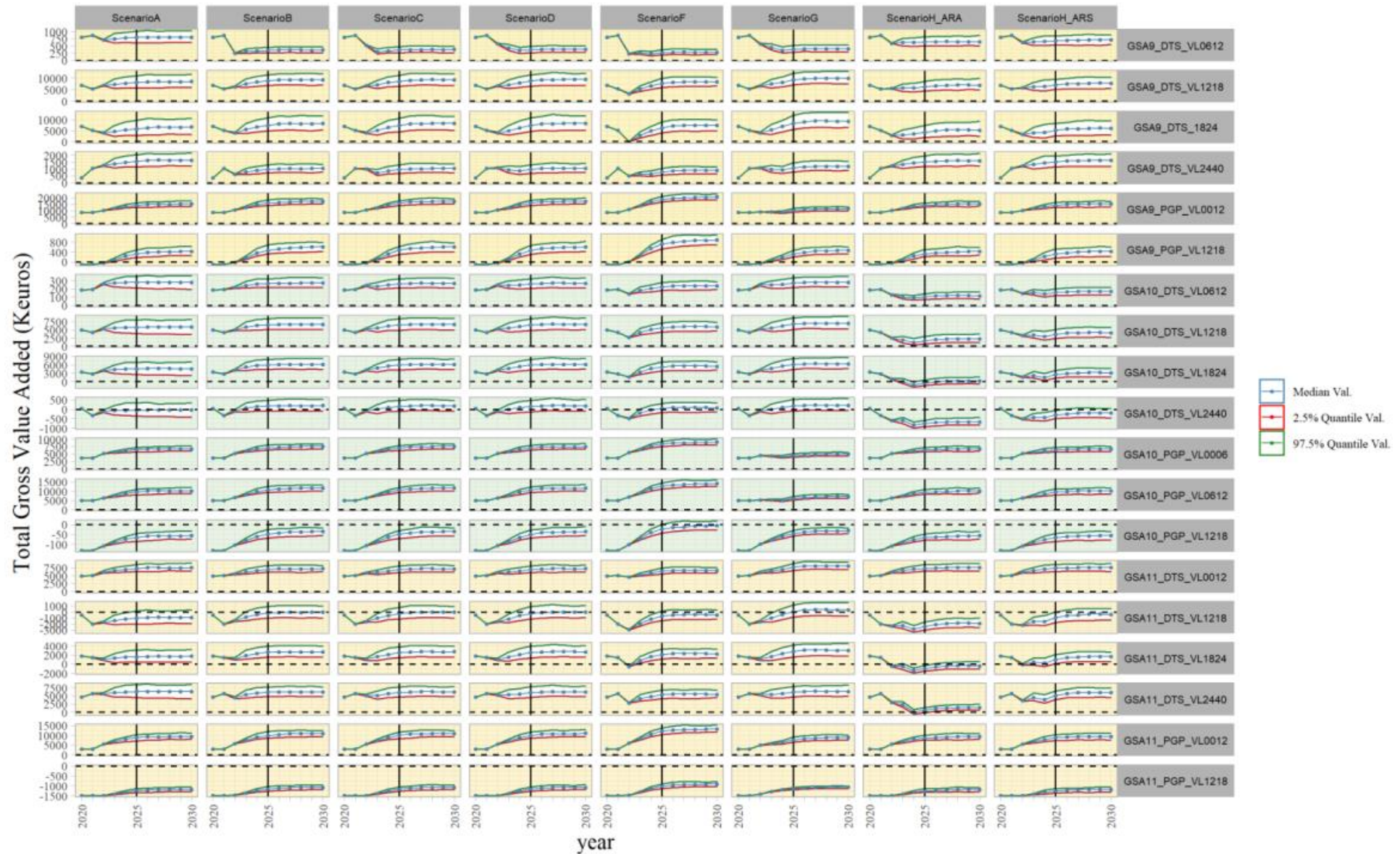
EMU 2 - SCENARIOS

		EMU2																											
		Effort reduction					Spatial closures						Selectivity measures					Reduction other gears (LLS, GTR, GNS)						TAC					
Scenario	2020	2021	2022	2023	2024	2020	2021	2022	2023	2024	2020	2021	2022	2023	2024	2020	2021	2022	2023	2024	2020	2021	2022	2023	2024	BEMTOOL			
a		-10%				✓	✓	✓	✓	✓																	x		
b		-10%	-20%			✓	✓	✓	✓	✓																	x		
c		-10%	-10%	-10%		✓	✓	✓	✓	✓																	x		
d		-10%	-7.50%	-7.50%	-5%	✓	✓	✓	✓	✓																	x		
e		-10%	-7.50%	-7.50%	-5%	✓	✓	✓	✓	✓																			
f		-10%	-7.50%	-7.50%	-5%	✓	✓	✓	✓	✓		50 square mesh																x	
g		-10%	-7.50%	-7.50%	-5%	✓	✓	✓	✓	✓								-10%	-10%	-10%							x		
h1		-10%				✓	✓	✓	✓	✓														✓	✓	✓	x		
h2		-10%				✓	✓	✓	✓	✓														✓	✓	✓	x		
i		-10%				✓	✓	✓	✓	✓								-10%	-10%	-10%				✓	✓	✓			

ToR: 3-4 Total Landings predictions for EMU 2



ToR: 3-4 Total Gross Value predictions for EMU 2



ToR: 3-4 Mixed-fisheries models

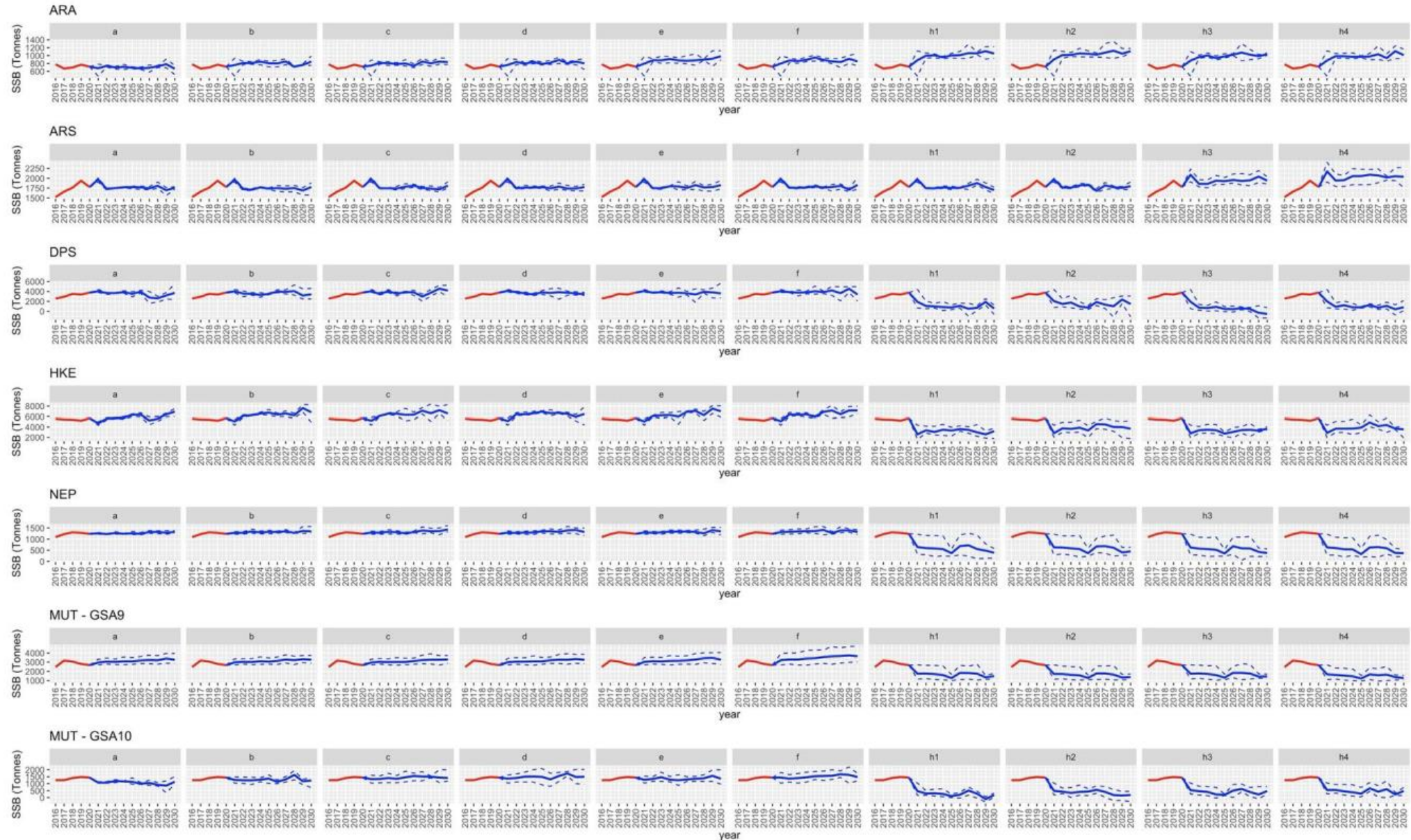
	EMU 2		EMU 1	
	SMART	BEMTOOL	IAM	(ISIS-FISH)*
Multiple gears	NO	YES	YES	(YES)*
Spatially explicit	YES	NO	NO	(YES)*

* MODEL WILL BE AVAILABLE FOR IN MARCH 2022

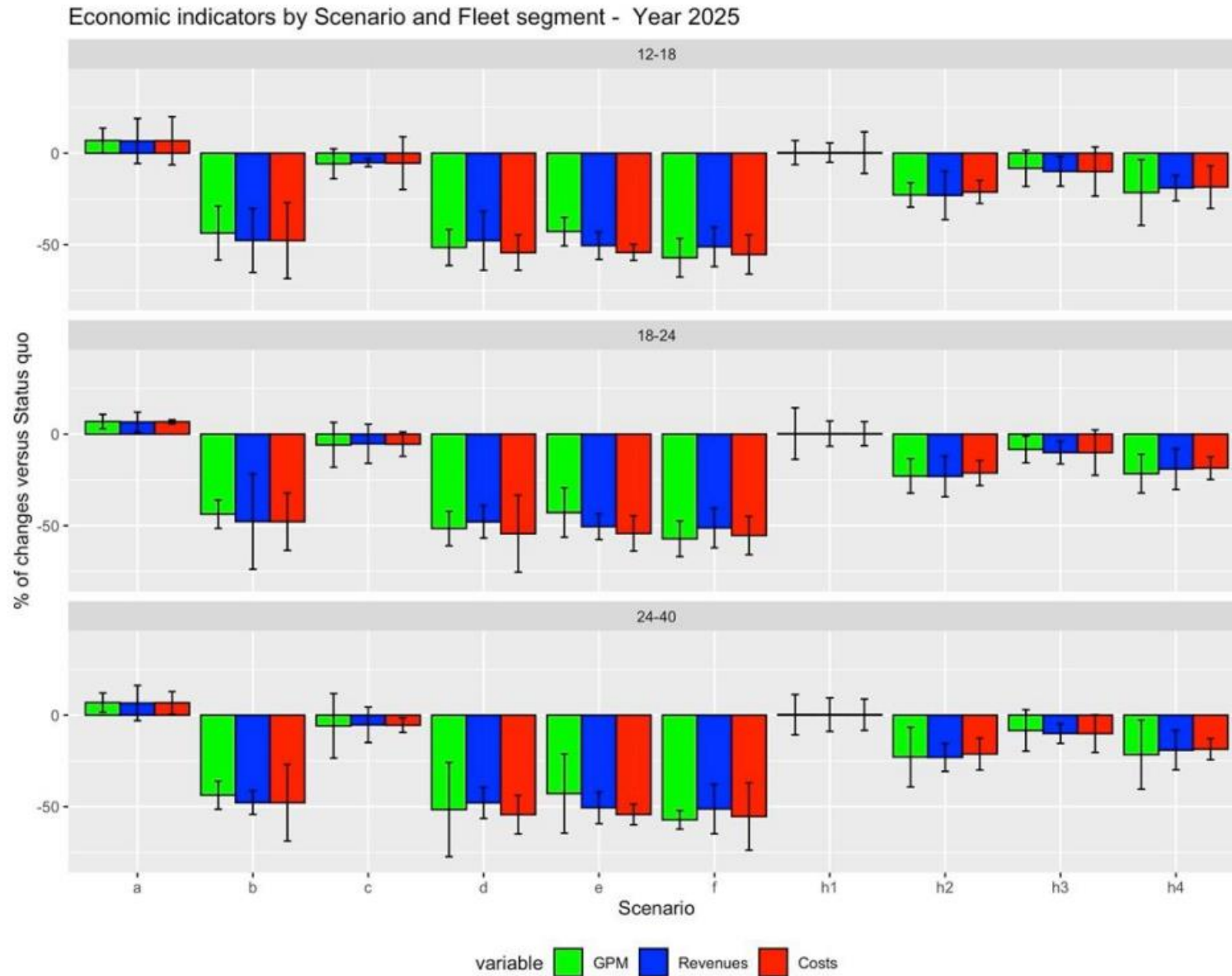
EMU 2 - SCENARIOS

	Seasonal closures																												
	Permanent closures (areas closed across whole year (no seasonality))																												
	Effort reduction compared to the baseline (kepts constant in 2022/23/24)																												
		EMU2																											
		Effort reduction						Spatial closures						Selectivity measures					Reduction other gears (LLS, GTR, GNS)						TAC				
Scenario	2020	2021	2022	2023	2024	2020	2021	2022	2023	2024	2020	2021	2022	2023	2024	2020	2021	2022	2023	2024	2020	2021	2022	2023	2024				
a		-10%				✓	✓	✓	✓	✓																			
b		-10%	-20%			✓	✓	✓	✓	✓																			
c		-10%	-10%	-10%		✓	✓	✓	✓	✓																			
d		-10%	-7.50%	-7.50%	-5%	✓	✓	✓	✓	✓																			
e		-10%	-7.50%	-7.50%	-5%	✓	✓	✓	✓	✓																			
f		-10%	-7.50%	-7.50%	-5%	✓	✓	✓	✓	✓	50mm square mesh																		
g		-10%	-7.50%	-7.50%	-5%	✓	✓	✓	✓	✓									-10%	-10%	-10%								
h		-10%				✓	✓	✓	✓	✓													Species	✓	✓	✓	✓		
h1		-10%				✓	✓	✓	✓	✓													ARA (progressive TAC)	✓	✓	✓	✓		
h2		-10%				✓	✓	✓	✓	✓													ARA (full TAC)	✓	✓	✓	✓		
h3		-10%				✓	✓	✓	✓	✓													ARS (progressive TAC)	✓	✓	✓	✓		
h4		-10%				✓	✓	✓	✓	✓													ARS (full TAC)	✓	✓	✓	✓		
i		-10%				✓	✓	✓	✓	✓									-10%	-10%	-10%								

ToR: 3-4 Spawning stock biomass predictions for EMU 2



ToR: 3-4 Total Value predictions for EMU 2



ToR: 3-4 Conclusions

- None of the models account for hyperstability: a linear relationship between effort and fishing mortality is assumed.
- Difficult to discriminate on the efficacy of spatial management within the results: no scenario accounting only for closure areas.
 - Permanent closures did not show any improvement compared to temporal ones (EMU 2).
- When effort reduction is gradual, losses in revenues and gross profits are minimal.
- 50mm square mesh both on coastal and deep-water métiers, with effort reduction and spatial closures shows an increase in biomass and a reduction of fishing mortality even for the most overexploited stocks.
 - Increased selectivity could determine a loss of catches for the stocks which are already close to F_{msy} in 2020 (e.g. Red mullet).
- Reduction of effort on other gears (e.g. set nets and longlines) generates improvements on HKE in EMU 2 (but not in EMU 1), and this is probably due to a decrease of fishing effort on hake spawners.
- Scenarios accounting for a TAC implementation since 2022 should be considered as very preliminary results from all models:
 - potential choke effect was not explored in depth and should be accounted for in the future.
 - IAM and BEMTOOL could not consider the two métiers (coastal and deep water) separately.
- SMART was the only model accounting for two métiers (coastal and deep water) behaviour when the TAC was reached and it highlighted how effort redistribution could negatively affect the coastal stocks.
- All models showed that a gradual TAC towards reaching F_{msy} would have a weaker economic impact.
- BEMTOOL results suggest also that an “inverse TAC” (which increases through time) should be tested, as it would be more efficient in reaching F_{msy} .

ToR: 6 Transfer* of fishing days at métier level

$$LPUE = \frac{\sum_{j,z}^{2020} \text{landingsweight}}{\sum_{j,z}^{2020} \text{fishingdays}}$$

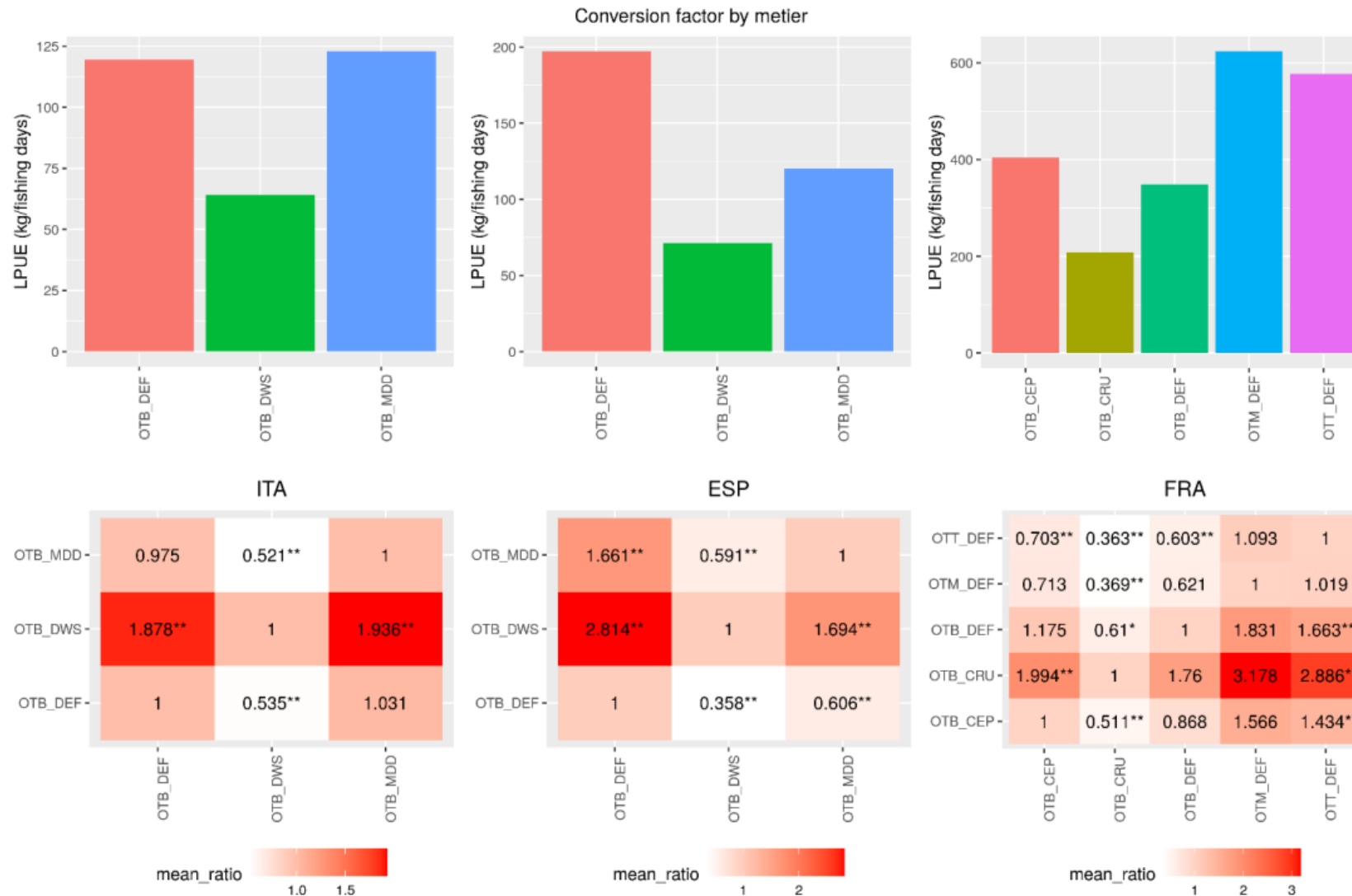
j is the métier and z the country

$$\text{ConversionFactor} = \frac{LPUE^{(ITA_{DES})}}{LPUE^{(ITA_{DWS})}}$$

LPUE  Total landed weight of the species representing the 75% of the OTB landings for 2020 was considered.

*To estimate the conversion factors between métier by country it was applied the approach suggested by STECF 20-21 (STECF, 2021) based on Wilderbuer et al. (1998) and adapted for the purpose of the analysis.

ToR: 6 Transfer of fishing days at métier level



ToR: 6 Transfer of fishing days at métier level

The EWG highlighted the following limitations when estimating conversion factors at métier level:

- Analysis based on métier are quite uneven as it depends on the abundance of the resources, therefore vessels can move between métiers;
- In the EU regulations, the assignment of the fishing opportunities does not use métier as reference strata;
- swapping fishing days between métier could have higher effect on the population dynamic compared to the vessel length approach (e.g., hake in slope are larger than in shelf);
- definition of métier is not the same in all countries.



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