

Recent developments in assessment, science and advice for mackerel.



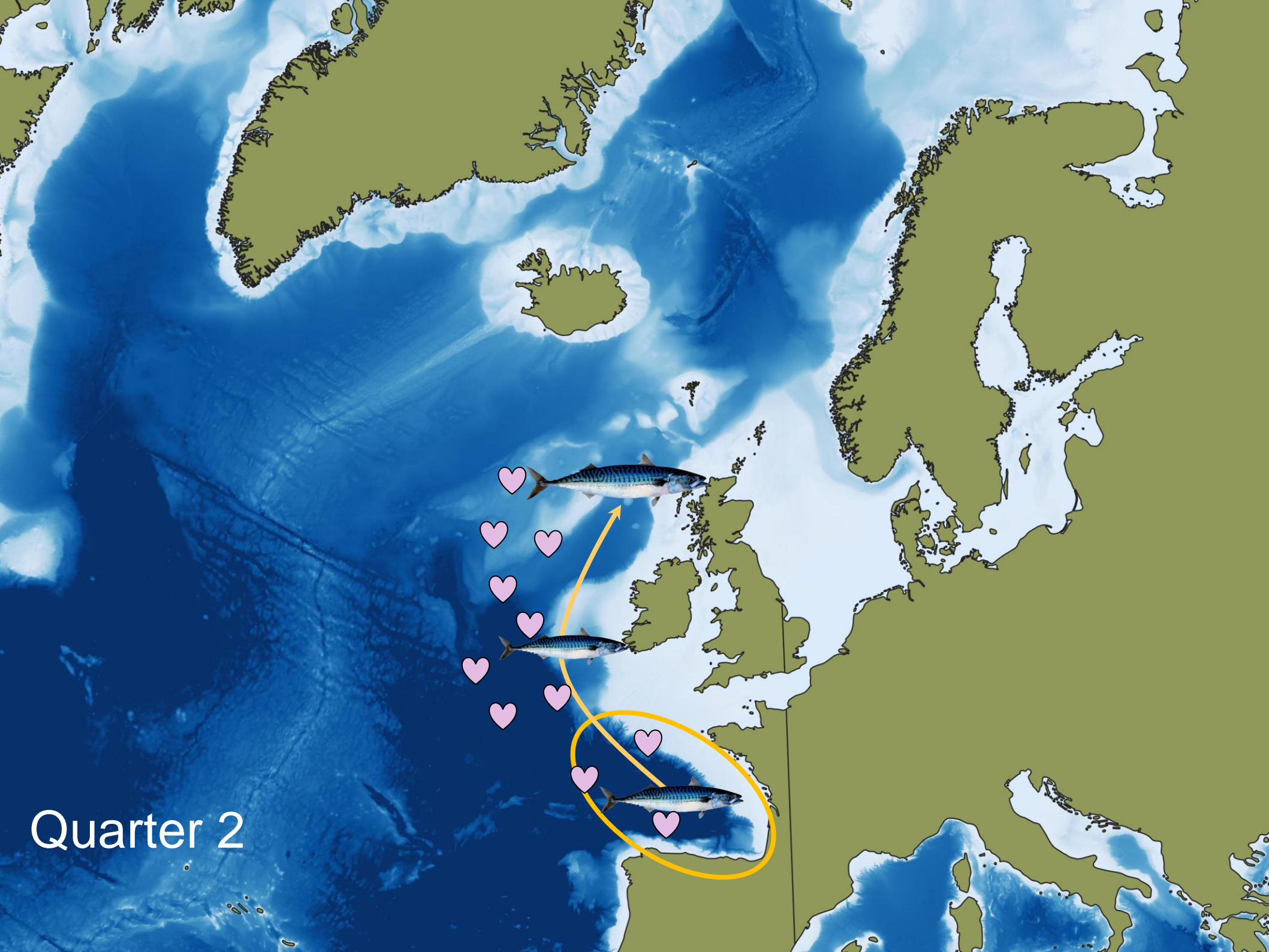
Scottish Government
Riaghaltas na h-Alba
gov.scot

An aerial photograph of a large white research vessel, likely the Scottish Marine Science Ship (SMSS), sailing on the ocean. The ship has multiple decks, a prominent bridge, and various scientific equipment visible on its deck. The water is dark blue with white foam from the ship's wake. A thick green diagonal line cuts across the upper right portion of the image.

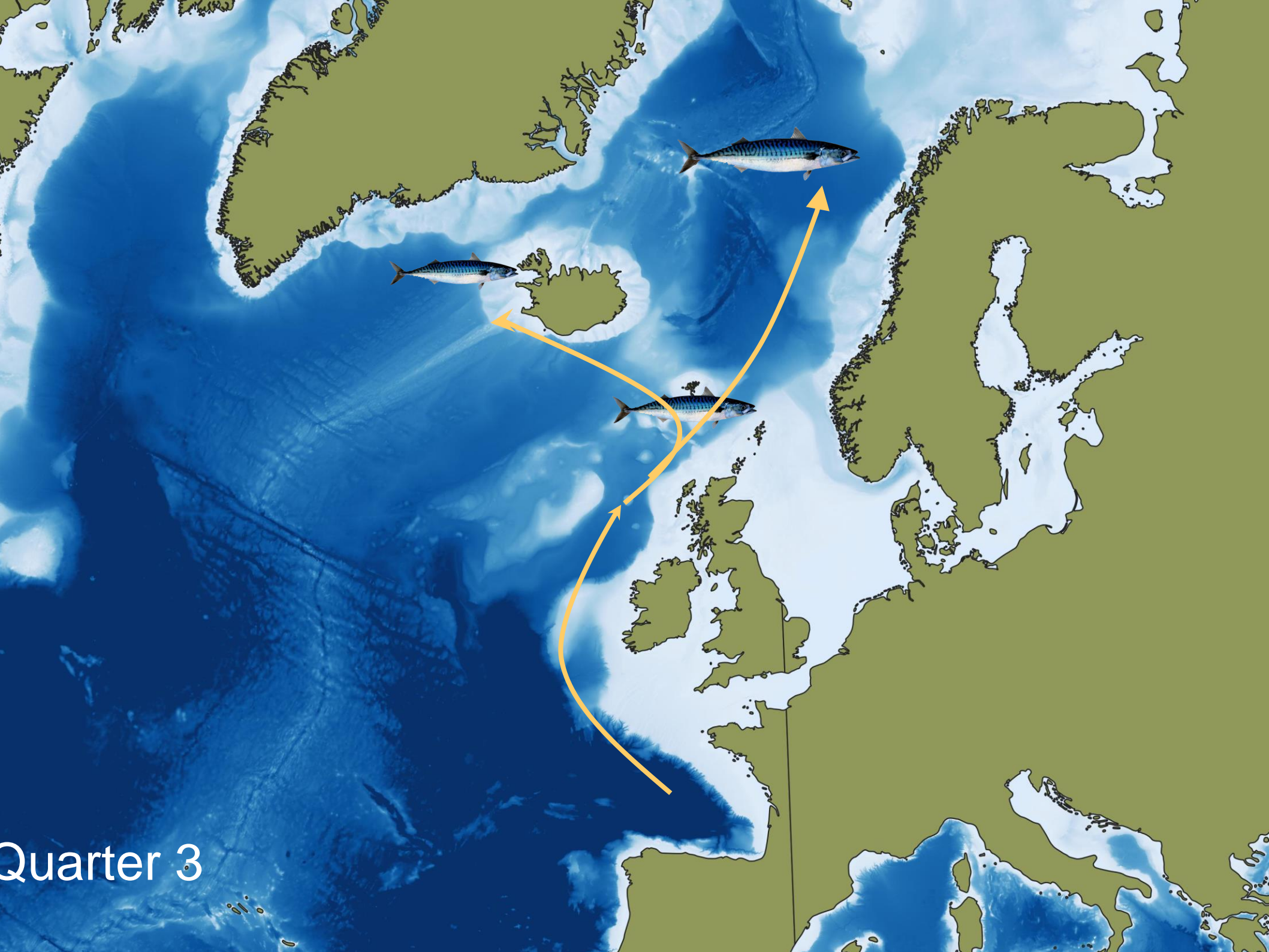
Dr Neil Campbell

Deputy Chief Advisor (Pelagics), Marine Scotland
NESFDP Meeting, 1.11.2019

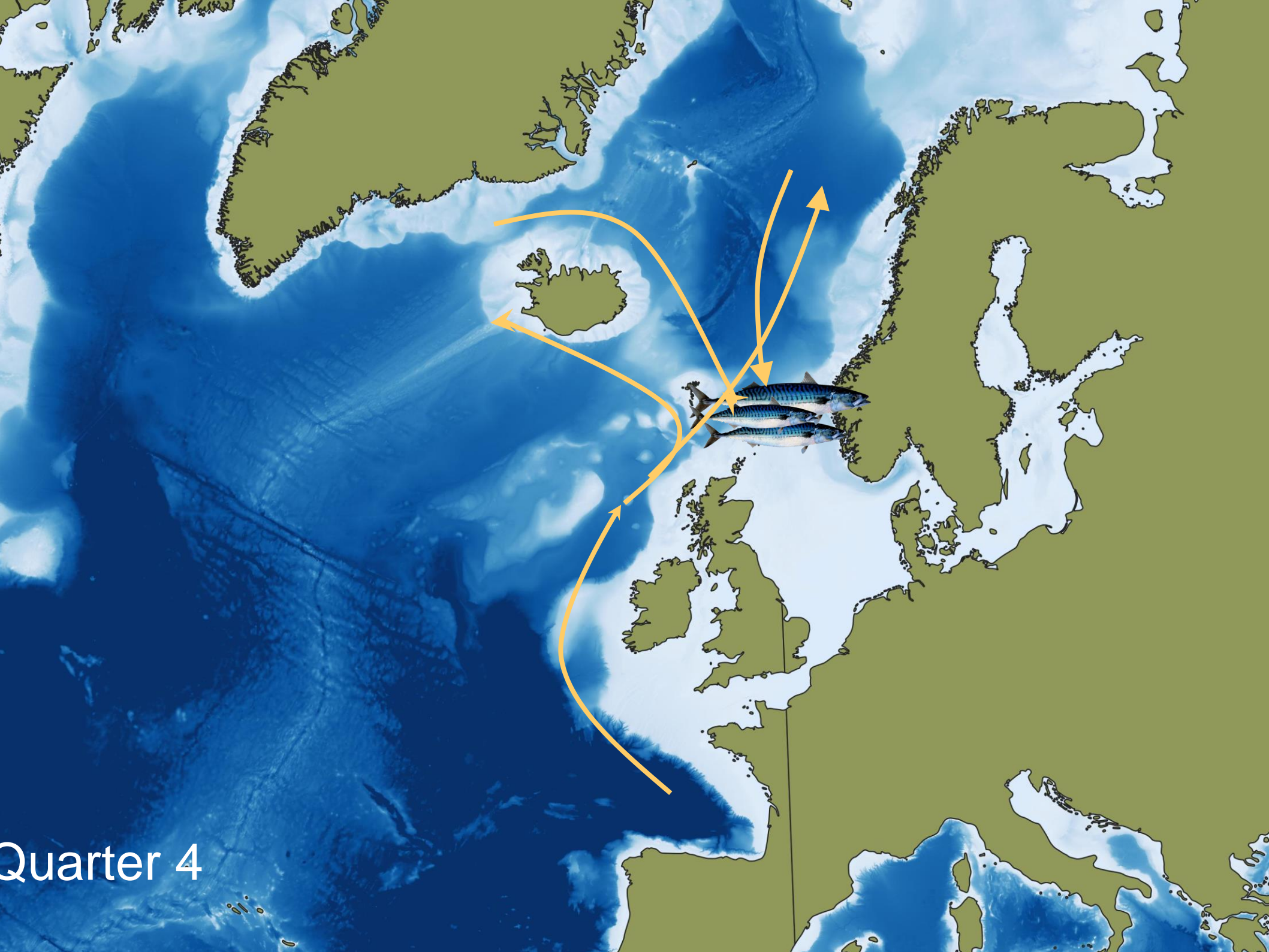
marine scotland
science



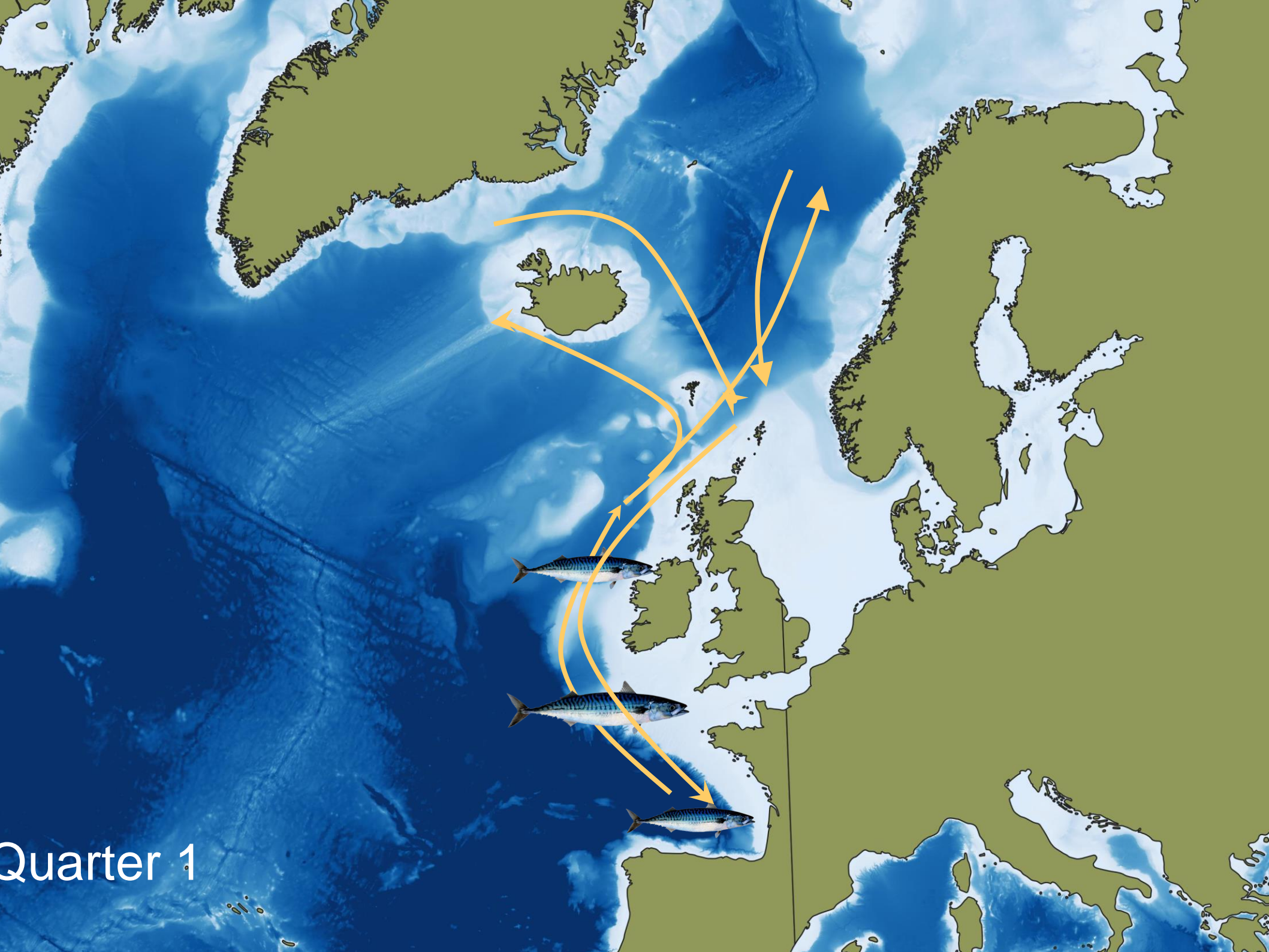
Quarter 2



Quarter 3



Quarter 4



Quarter 1

Challenges

- Widely distributed stock
- Variable distribution
- North Sea component?
- Historical misreporting



Mackerel Stock Assessment

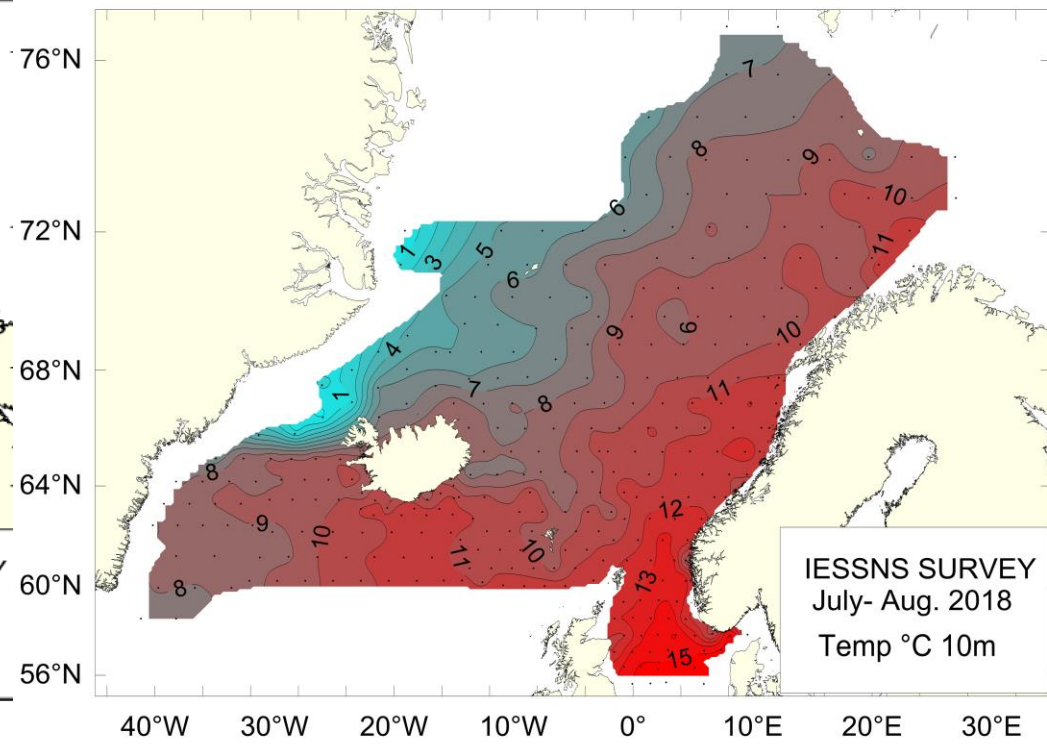
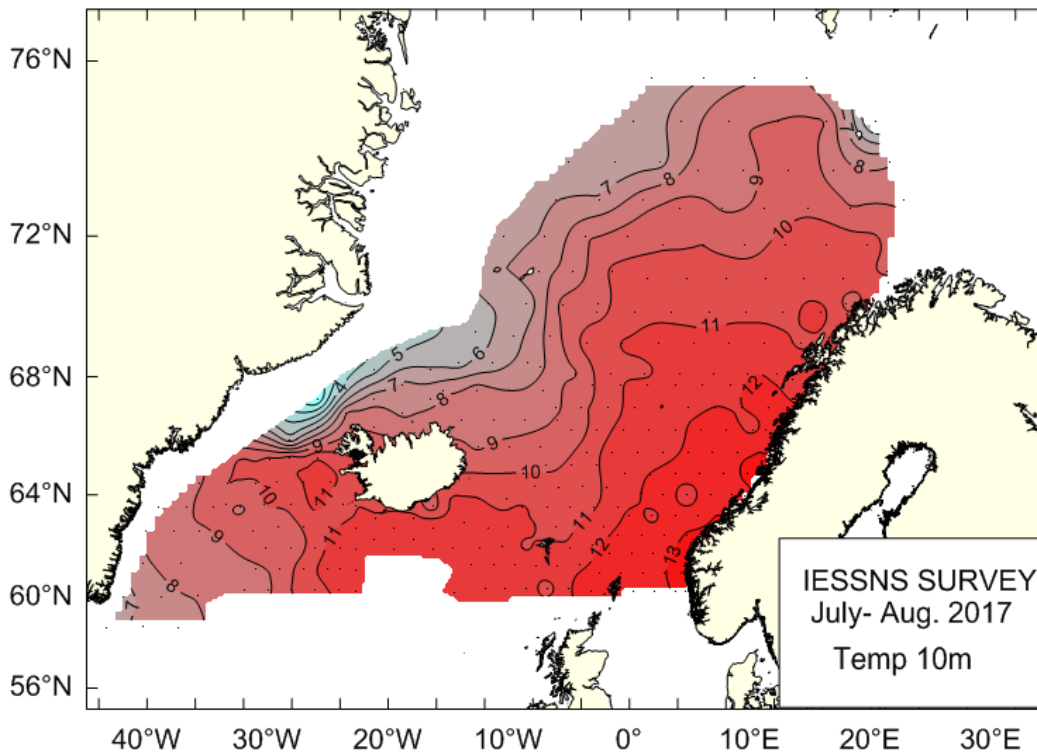
- **Input Data**
 - Catches (=Landings)
- **Surveys**
 - Recruitment Index
 - Mackerel Egg Survey
 - “Swept Area Survey”
 - Tag-return Data
- **Assessment Method**
 - “State-space Assessment Method” (SAM)

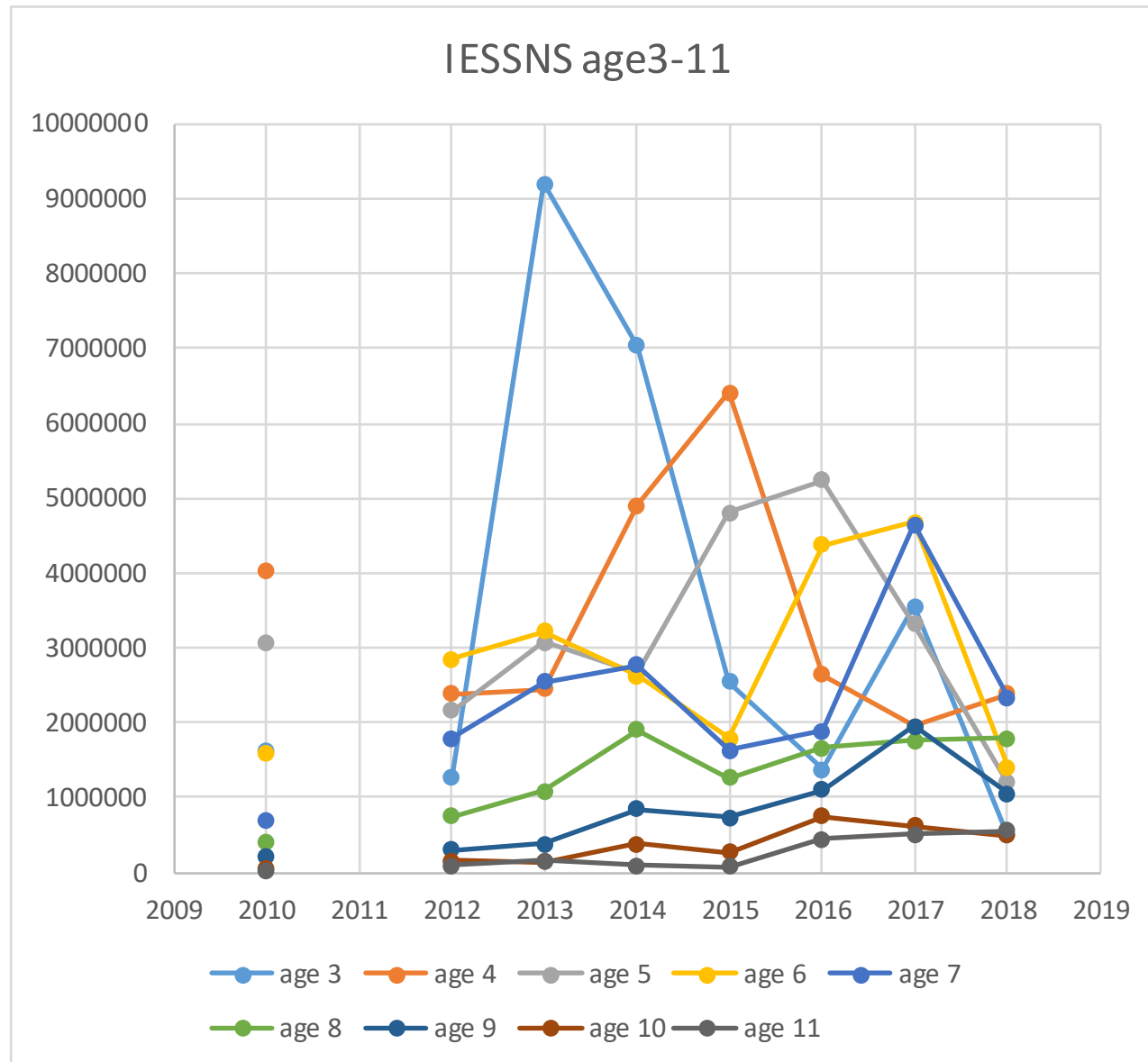
Mackerel Stock Assessment - 2018

- **Input Data**
 - Catches (=Landings)
- **Surveys**
 - Recruitment Index
 - Mackerel Egg Survey
 - “Swept Area Survey”
 - Tag-return Data
- **Assessment Method**
 - “State-space Assessment Method” (SAM)

2018 Swept Area Survey

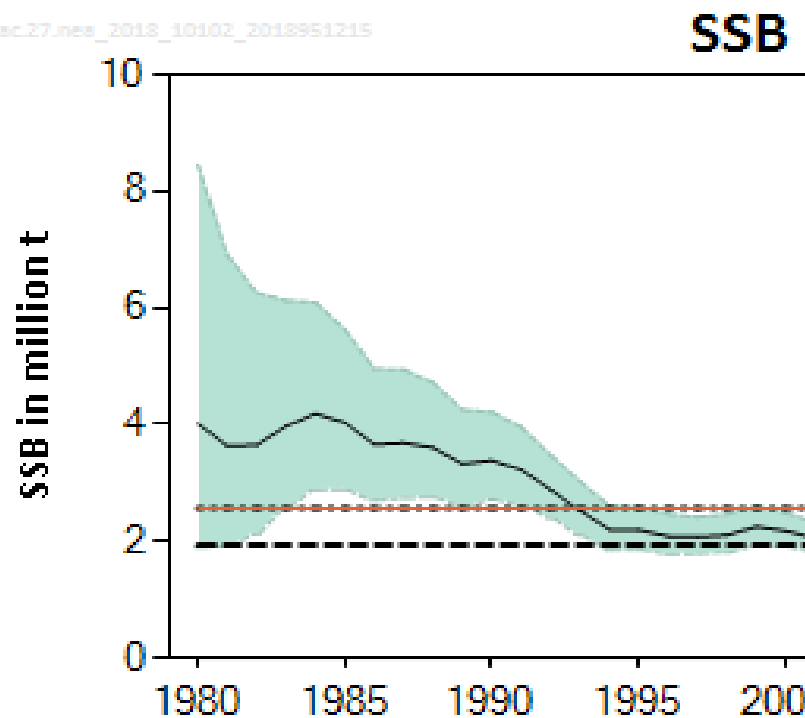
- Mackerel distribution constrained by 8°C isotherm



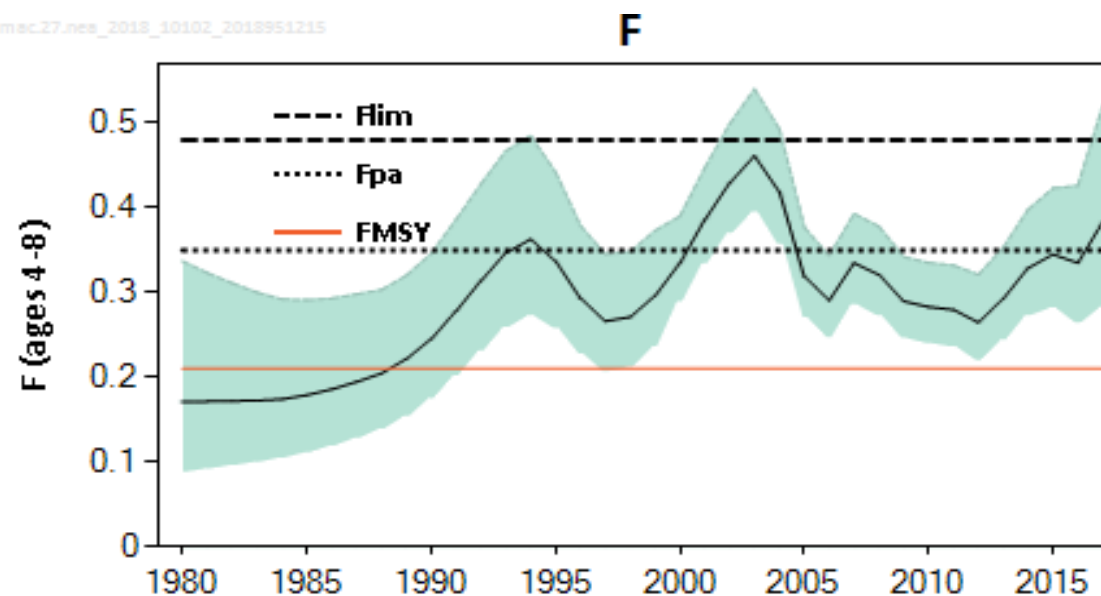


2018 Advice

mac27.nes_2018_10102_2018951215



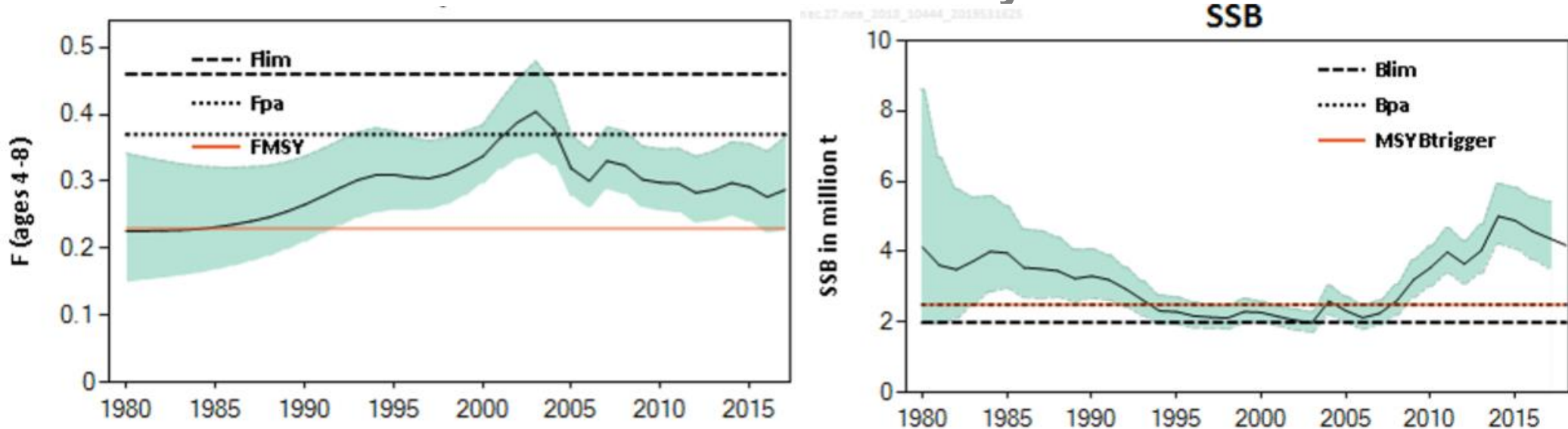
mac27.nes_2018_10102_2018951215



Basis	Total catch (2019)	F_{4-8} (2019 and 2020)	SSB spawning time (2019)	SSB spawning time (2020)	% SSB change *	% Catch change **	% Advice change ***
ICES advice basis							
MSY approach: $F_{MSY} \times SSB(2019) / MSY B_{trigger}$	318403	0.173	2117257	2333959	10.2%	-68.2%	-42.2%

2019 – Mackerel Interbenchmark

- Update to the recruitment time series
- Thorough examination of tag data
- Changes to model configuration
- Assessment model was measurably “better” fitted



Basis	Total catch (2019)	F4-8(2019 and 2020)	SSB spawning time (2019)	SSB spawning time (2020)	% SSB change *	% Catch change **	% Advice change ^
ICES advice basis							
MSY approach: $F = F_{MSY}$	770358	0.23	4297228	4236240	-1.4%	-23.0%	39.8%

2019 WKRRMAC

- Identify issues
- Knowledge deficits
- Prioritise research recommendations
- Consider other data & knowledge
- Develop a roadmap



WKRRMAC Outcomes



WKRRMAC Outcomes

WKRRMAC - findings



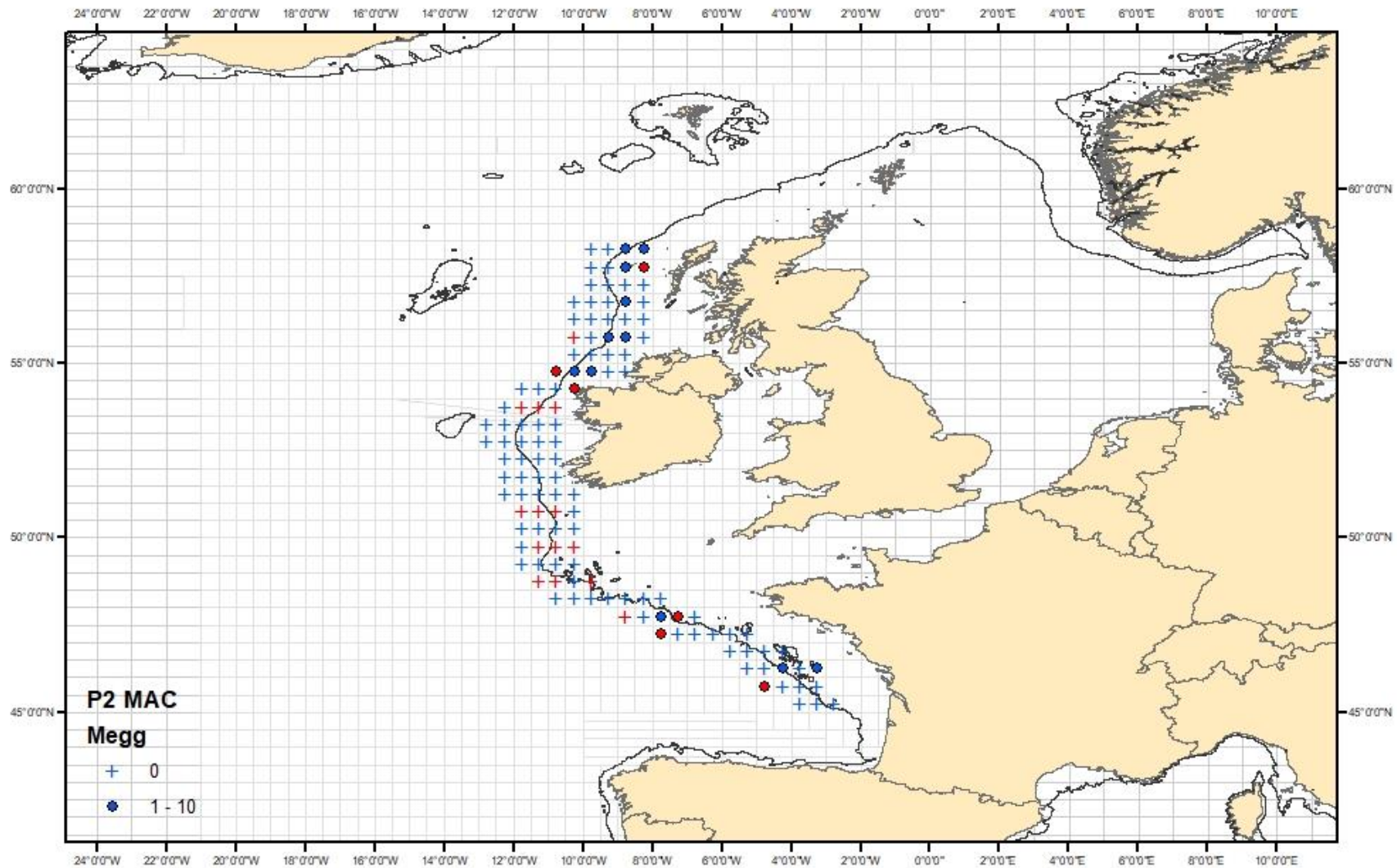
WKRRMAC Outcomes

- Explore new funding mechanisms for research
- Invest and better coordinate building fisheries science expertise
- Evaluate processes that will result in more robust quality assured advice on optimised yield
- Explore which surveys contribute the strongest signal into the stock assessment, and reconcile survey information
- Explore expanding existing surveys
- Further extend the winter acoustic survey time series
- Build mechanisms to incorporate industry sampling of biological information into stock assessment process

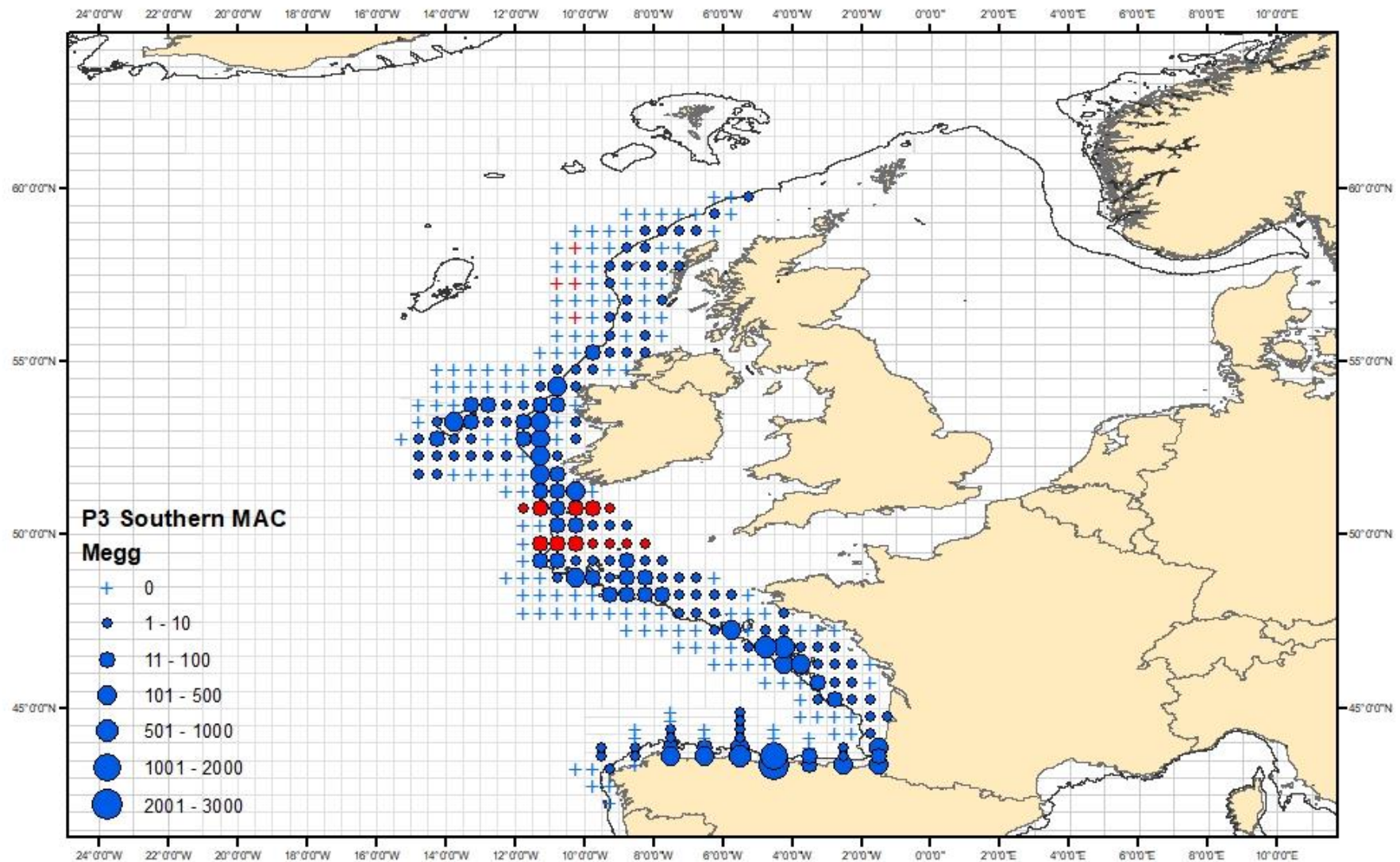
2019 Advice

- Mackerel Egg Survey

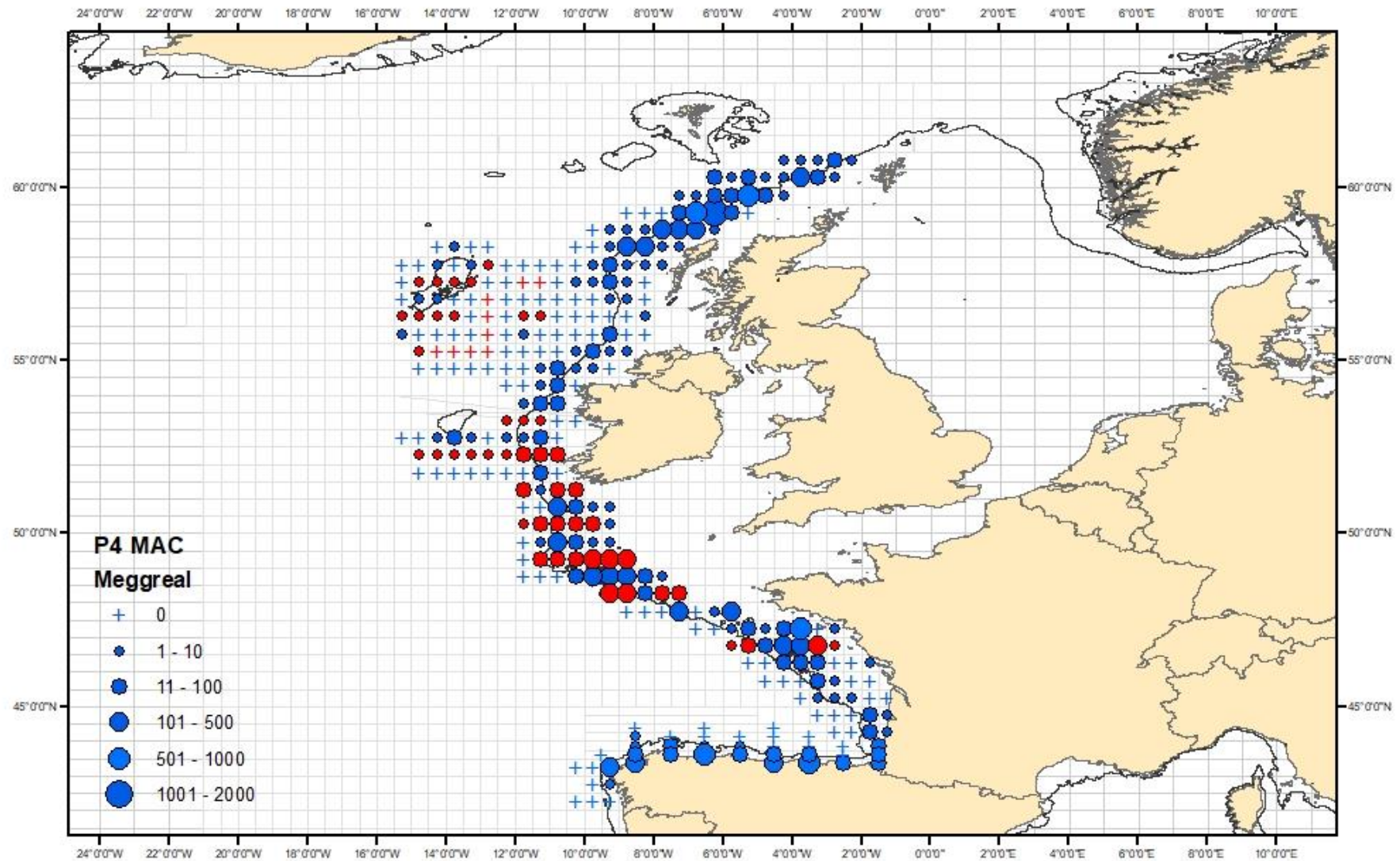
Period 2 (5 Feb – 3 Mar)



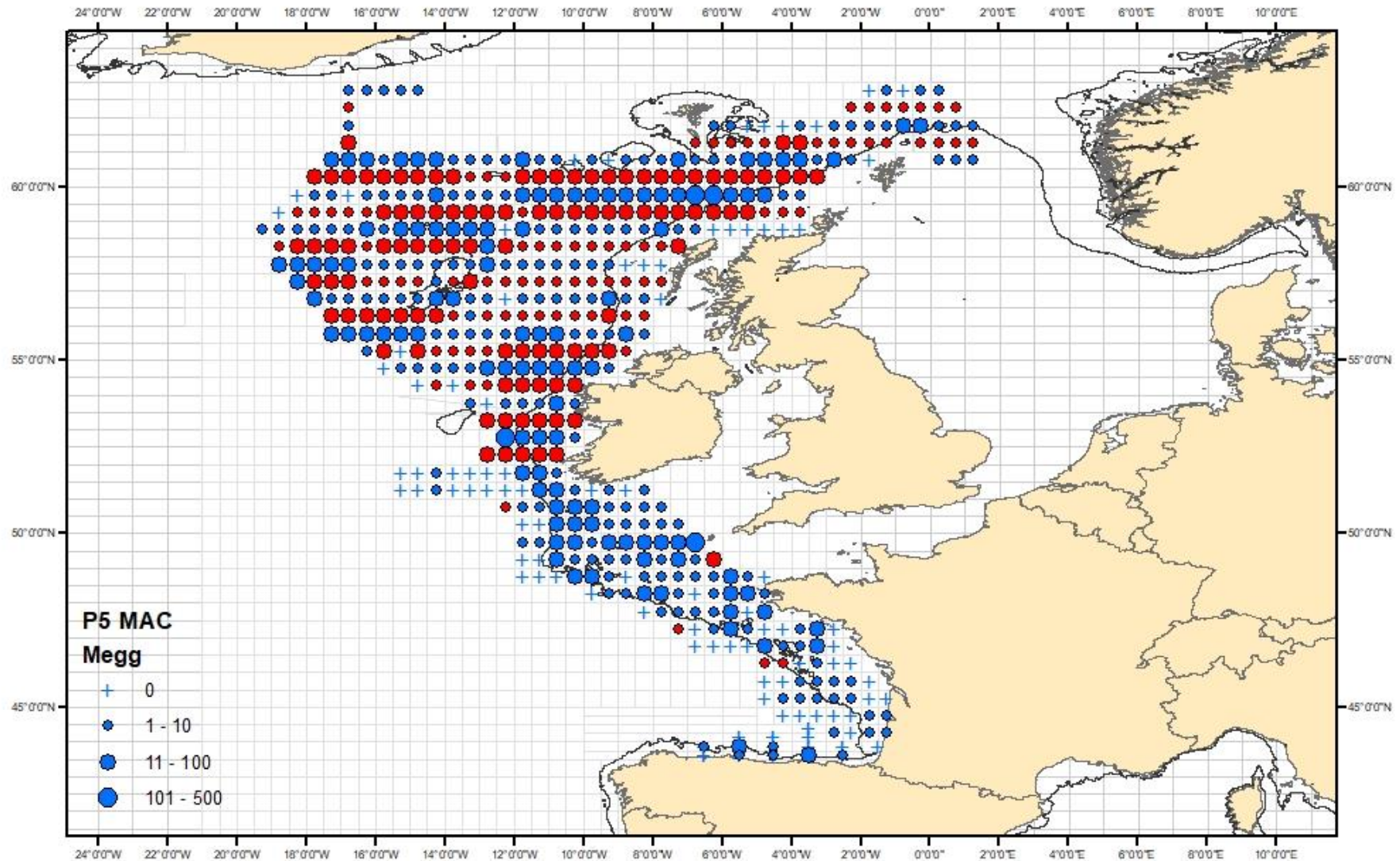
Period 3 (4th Mar – 12th Apr)



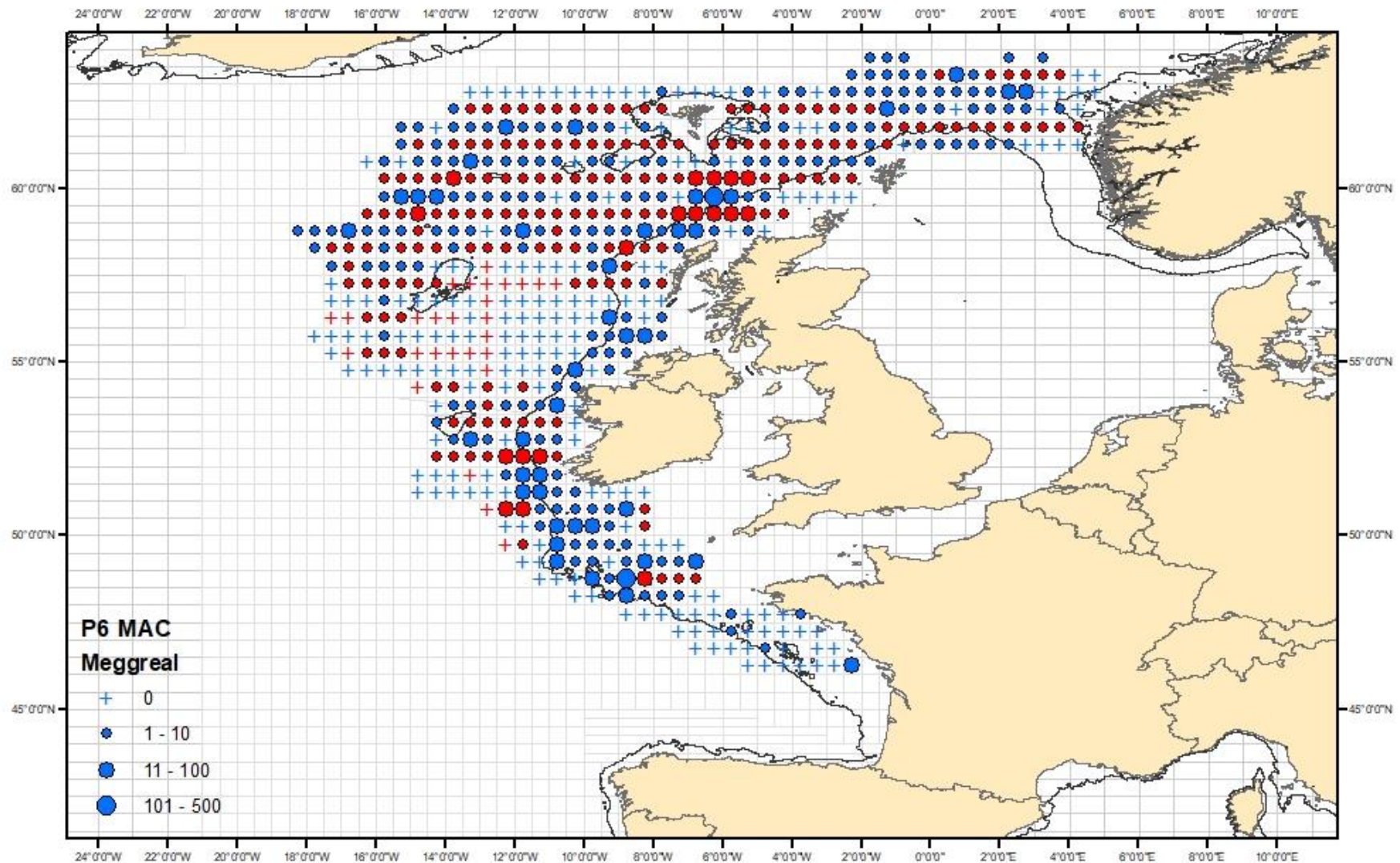
Period 4 (13th Apr – 3rd May)



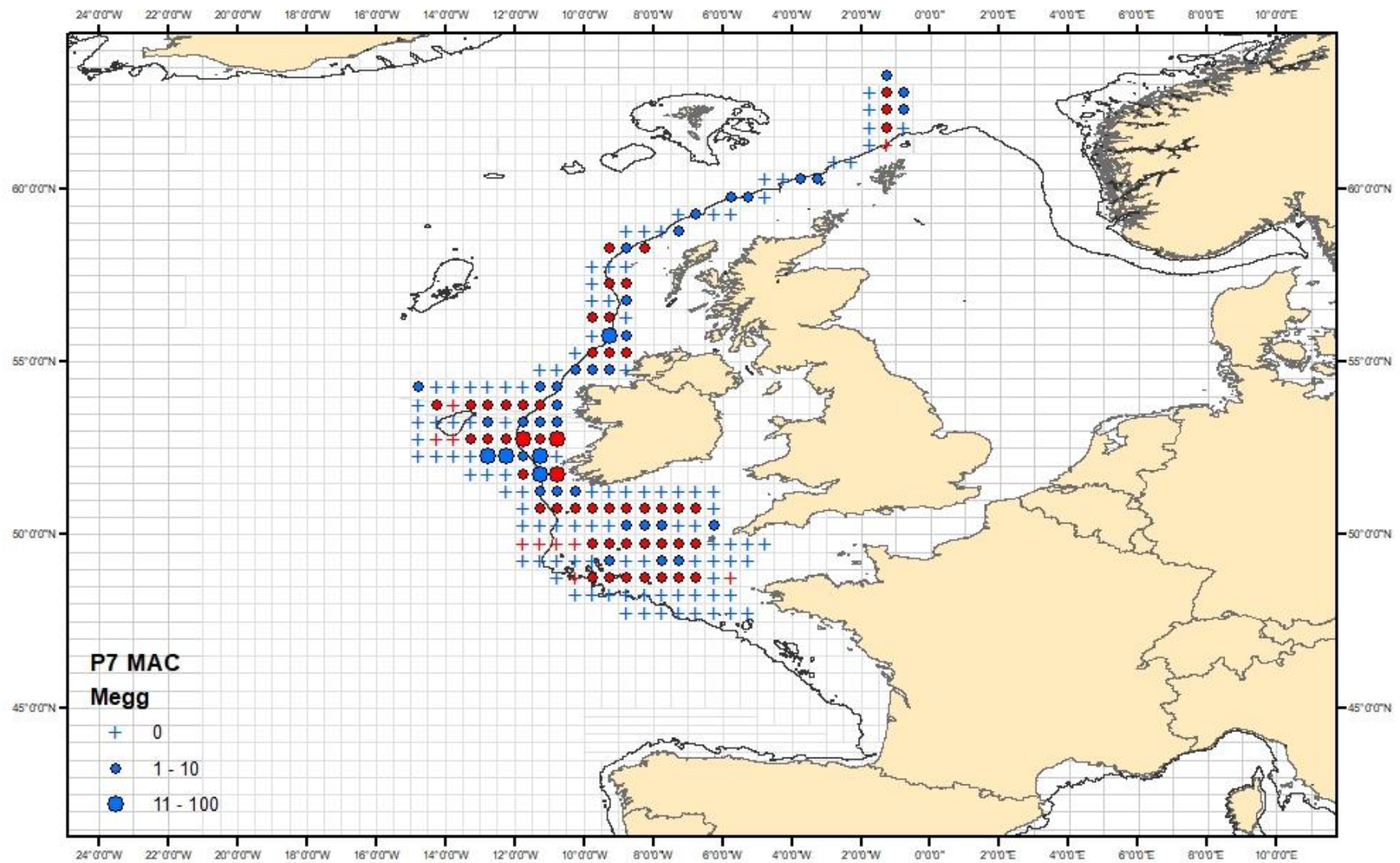
Period 5 (4th May – 5th June)



Period 6 (6th – 30th June)

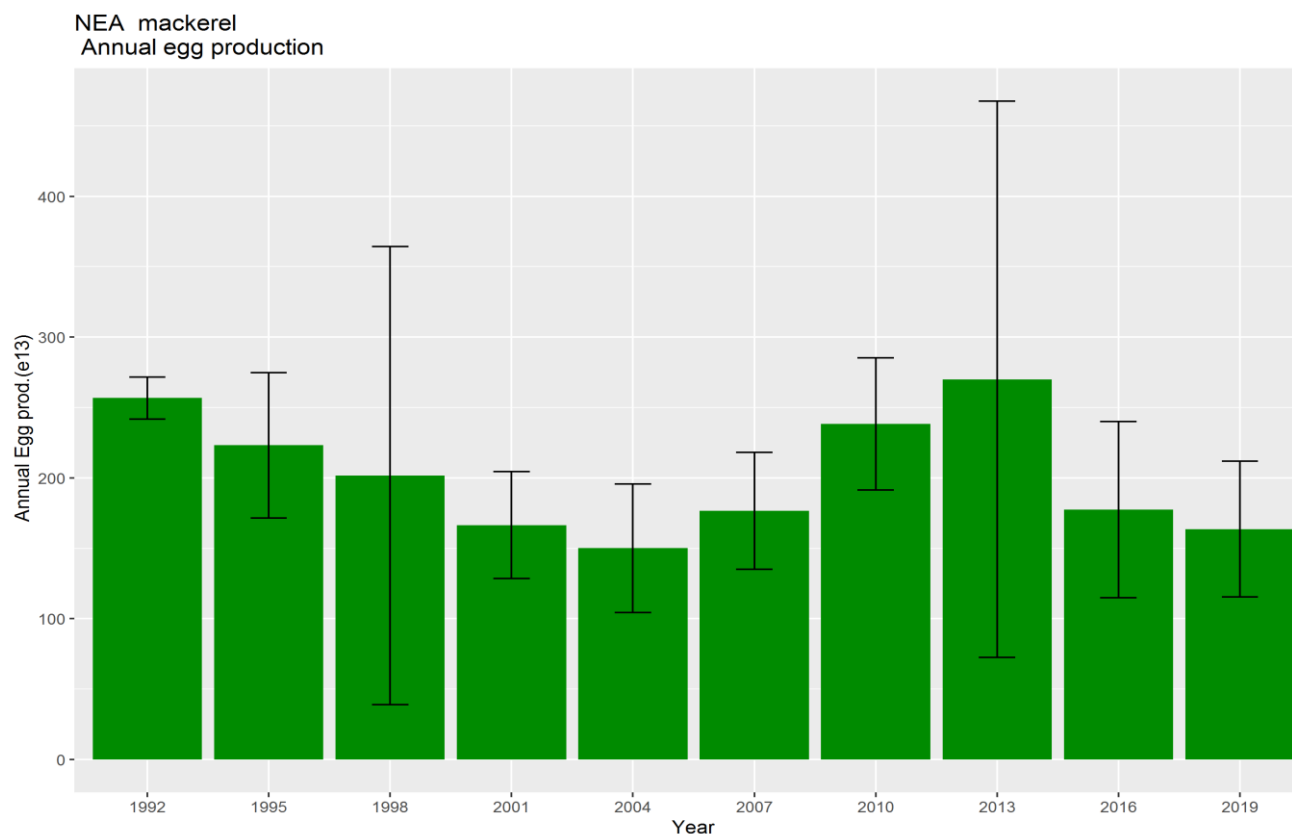


Period 7 (1st – 31st July)



MEGS 2019 – Combined Results

Mackerel Egg Production



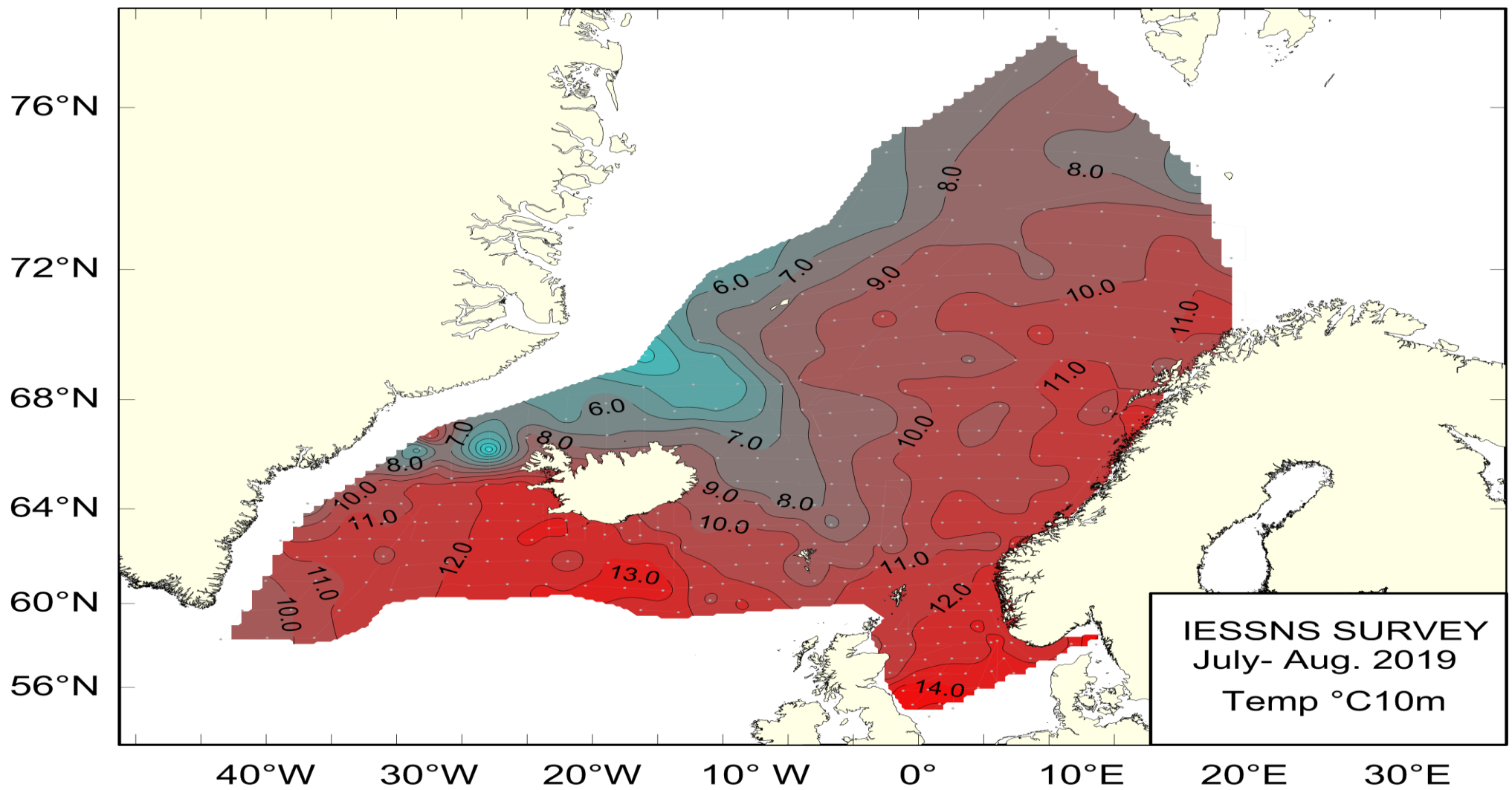
Combined mackerel TAEP estimates ($\times 10^{15}$) - 1992 – 2019



9% decrease from 2016

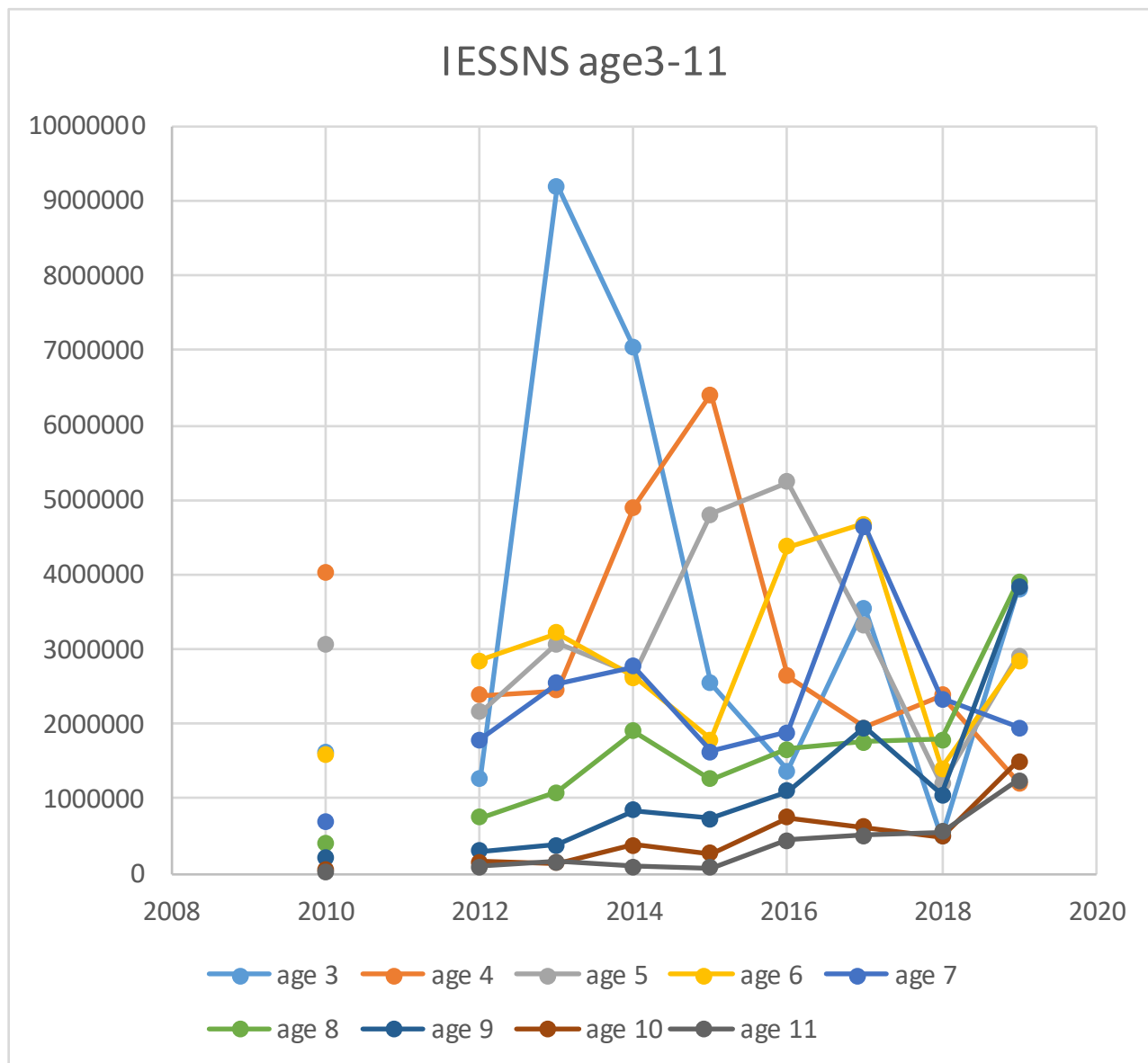
2019 Advice

- Mackerel Egg Survey
- Swept Area Survey



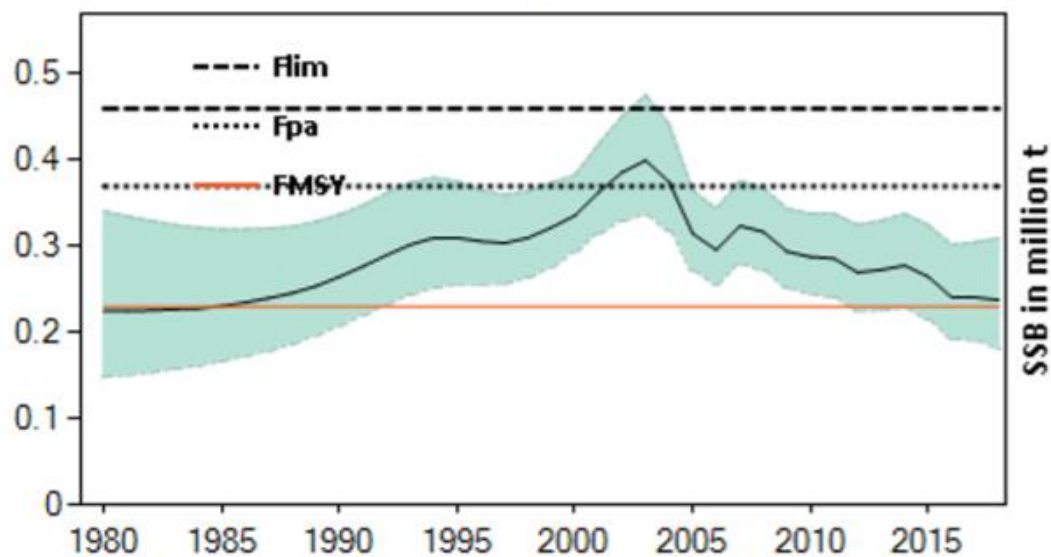
2019 Advice

- Strong upward signal at all ages!
- ☹️

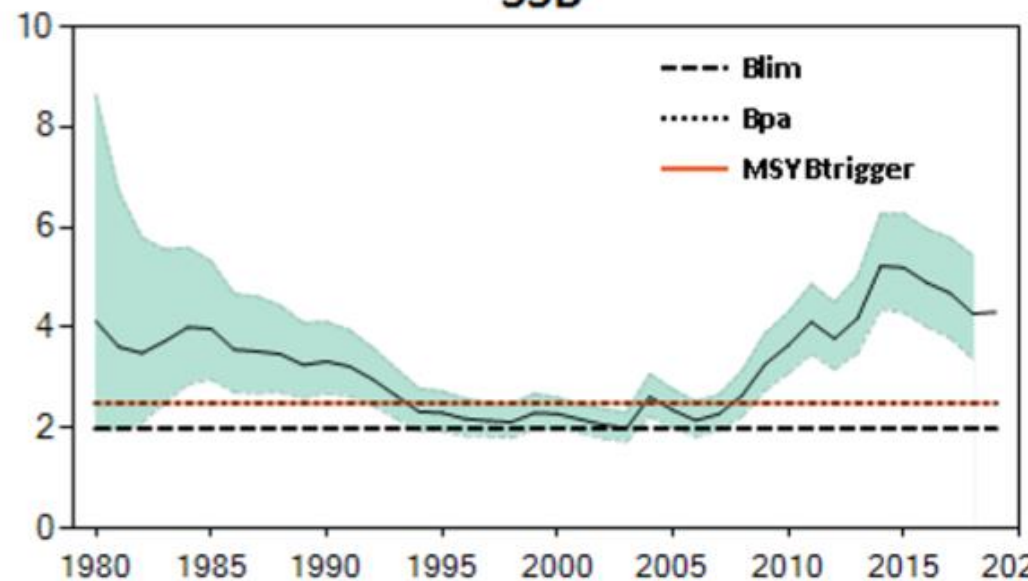


2019 Advice

F



SSB



Basis	Total catch	$F_{ages\ 4-8}$	SSB at spawning time		% change		
	2020	2020 and 2021	2020	2021	SSB *	Catch **	Advice ***
ICES advice basis							
MSY approach: $F = F_{MSY}$	922064	0.23	4526617	4390097	-3.0	10.4	19.7

Where next...?

- **WKRRMAC, phase II**
- **Survey development?**
 - Q4 Acoustic Survey
 - Extend swept area to west of Scotland
 - Additional tagging