

# Experience of ICES on the impacts of bottom fisheries on vulnerable marine ecosystems (VME) & long-term sustainability of deep-sea fish stocks

*United Nations, New York,*

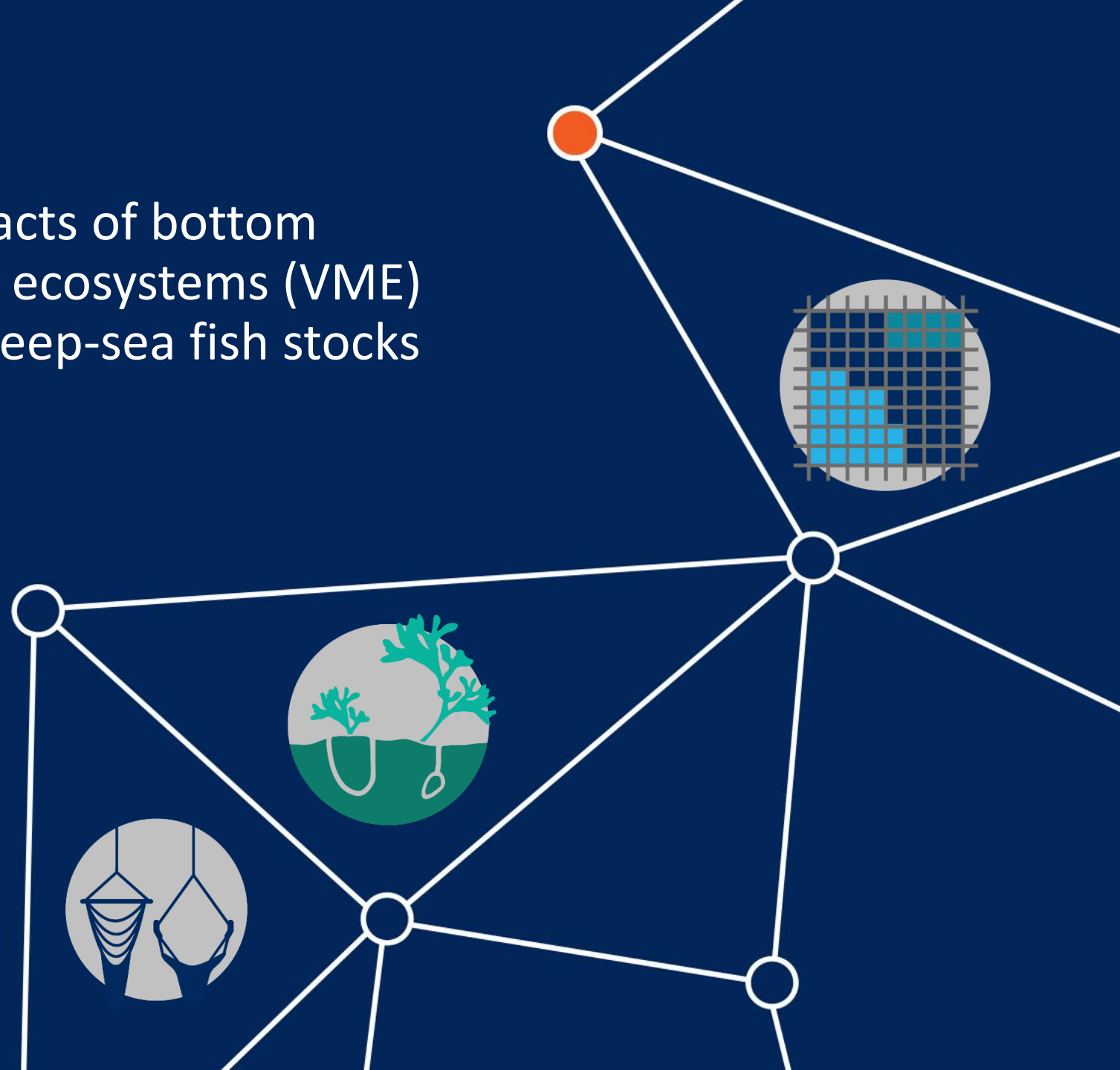
*2 to 3 August 2022.*

*Eugene Nixon*

*ACOM Vice-Chair*



Science for sustainable seas



# Annual VME advice from ICES



For both North East Atlantic Fisheries Commission (NEAFC) & European Union (EU)

Consistent with the [2009 FAO Guidelines \(UN Res.61/105\)](#)

- identify where VMEs are known or likely to occur
- using best information available
- to prevent significant adverse impacts on VMEs
- take account of areas where deep-sea fisheries are well established & areas where deep-sea fisheries have not taken place or only occur occasionally
- implication is VMEs that intensely fished may already be damaged & further fishing would not cause further significant adverse impacts

## WORKSHOP ON EU REGULATORY AREA OPTIONS FOR VME PROTECTION (WKEUVME)

VOLL

ICES SCI

RAPPOR  
SCIENTIF

ICES Special Request Advice  
EU ecoregions  
Published 5 January 2021



EU Request to advise on the list of areas where VMEs are known to occur or are likely to occur and on the existing deep-sea fishing areas (ref. (EU)2016/2336)

### Advice summary

There are two parts to ICES advice:

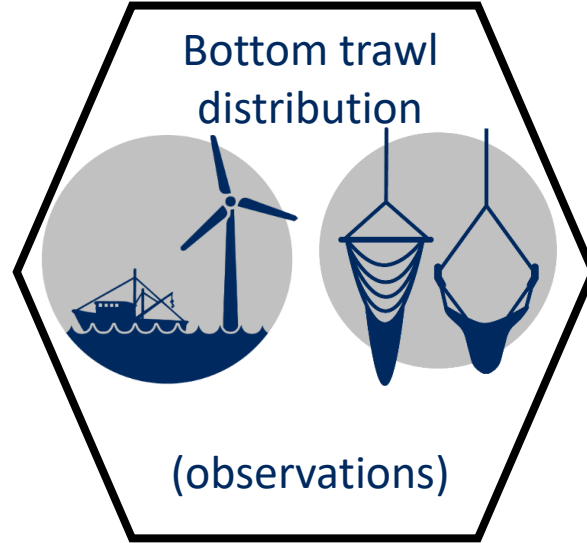
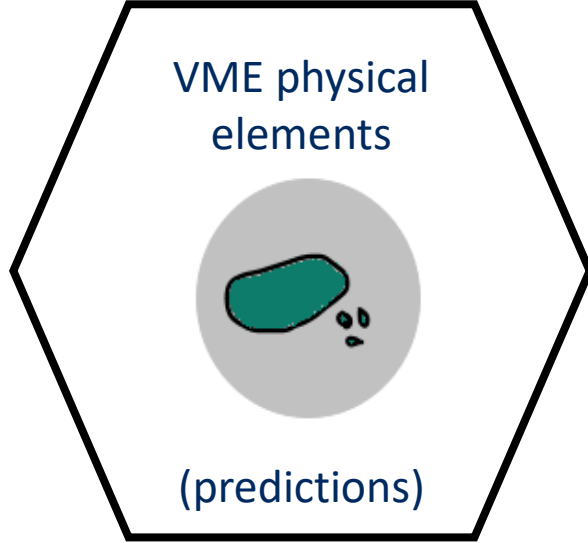
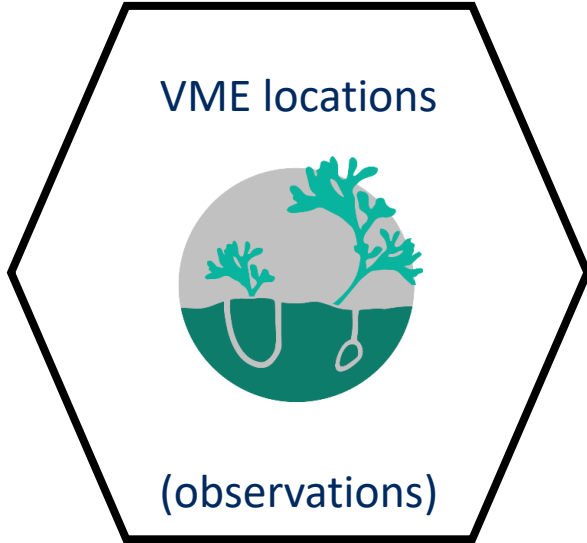
1. ICES advises that the "Existing Deep-Sea Fishing Areas" for the reference years 2009–2011 are based on the VMS and logbook data submitted to ICES in 2019 and shown in the accompanying Interactive Maps and PDF maps. The coordinates are provided in CSV files. "Existing Deep-Sea Fishing Areas" for the reference years are limited to the 400–800 metre depth range and are separated into three fishing footprints based on the gear type used. These are the combined static and mobile bottom-contacting gear (MBCG) footprint, the static gear only footprint, and the MBCG only footprint.
2. ICES advises that the list of areas where VMEs are known to occur or likely to occur is based on the VME data submitted to ICES in 2020. These areas are shown in the accompanying interactive maps. The coordinates are provided in CSV files. The list of habitat types, indicators, and physical elements used to define these VME areas is provided, along with the criteria used to translate the quantity and quality of data into the likelihood of VME occurrence, known as a VME Index.

This data-driven advice was developed through an iterative three-year process and is modeled on the approach taken by "NEAFC Recommendation 19- 2014: Protection of VMEs in NEAFC Regulatory Areas". It involves combining two data streams, VMS/logbook data to quantify the fishing footprint and data on where VMEs are known to or are likely to occur. To demonstrate how these two data layers can be used in practice to protect VMEs from fishing impacts, ICES developed and describes two scenarios, each with two options; ICES considers these to be consistent with the relevant United Nations General Assembly (UNGA) Sustainable Fisheries Resolutions and the Food and Agriculture Organization of the United Nations (FAO) International Guidelines for the Management of Deep-sea Fisheries in the High Seas with regard to the protection of VMEs. The two scenarios place different emphasis on the dual aspects of the UNGA policy and EU Regulation 2016/2336, that is, protection of VMEs with and without consideration of bottom-contacting fishing activity.

### Request

The European Commission requests ICES to advise on the list of areas where VMEs are known to occur or are likely to occur and on the existing deep-sea fishing areas (ref. (EU)2016/2336). This advice should deliver the following in

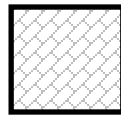
# Annual updates



VME habitats

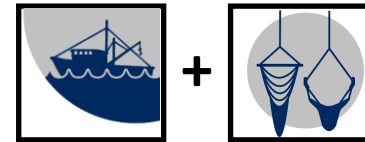


VME elements

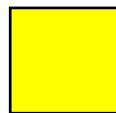


fishing activity logbooks

VMS



VME indicators

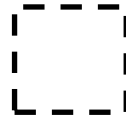


Certainty: High

Medium

Low

Potential: predictive habitat mapping



VMS = vessel monitoring system (satellites)

# ICES VME portal



Legend of the weighting algorithm

**WGDEC VME Weighting Algorithm Layer Legend**

- Low
- Medium
- High
- VME Habitat

**VME DATA LAYER**

**VME Indicator**

**VME Habitat Type**

Check all Habitat Type / Uncheck all Habitat Type

- Anemone aggregations
- Bryozoan patches
- Cold seeps
- Cold-water coral reef
- Coral Garden
- Deep-sea Sponge Aggregations
- Hydrothermal vents/fields
- Mud and sand emergent fauna
- Seapen fields

**Years**

**Data access**

Update VME layer

**OTHER LAYERS**

**WGDEC VME Weighting Algorithm:**

- Weighting VME Algorithm
- Confidence Low
- Confidence Medium
- Confidence High
- Confidence layer


**NEAFC Closed Areas in:**

**ICES Advice in:**

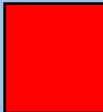

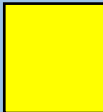
**WGDEC Recommendation in:**

**Other Layers**

Give us some feedback



**VME habitats unequivocal evidence - ROV**

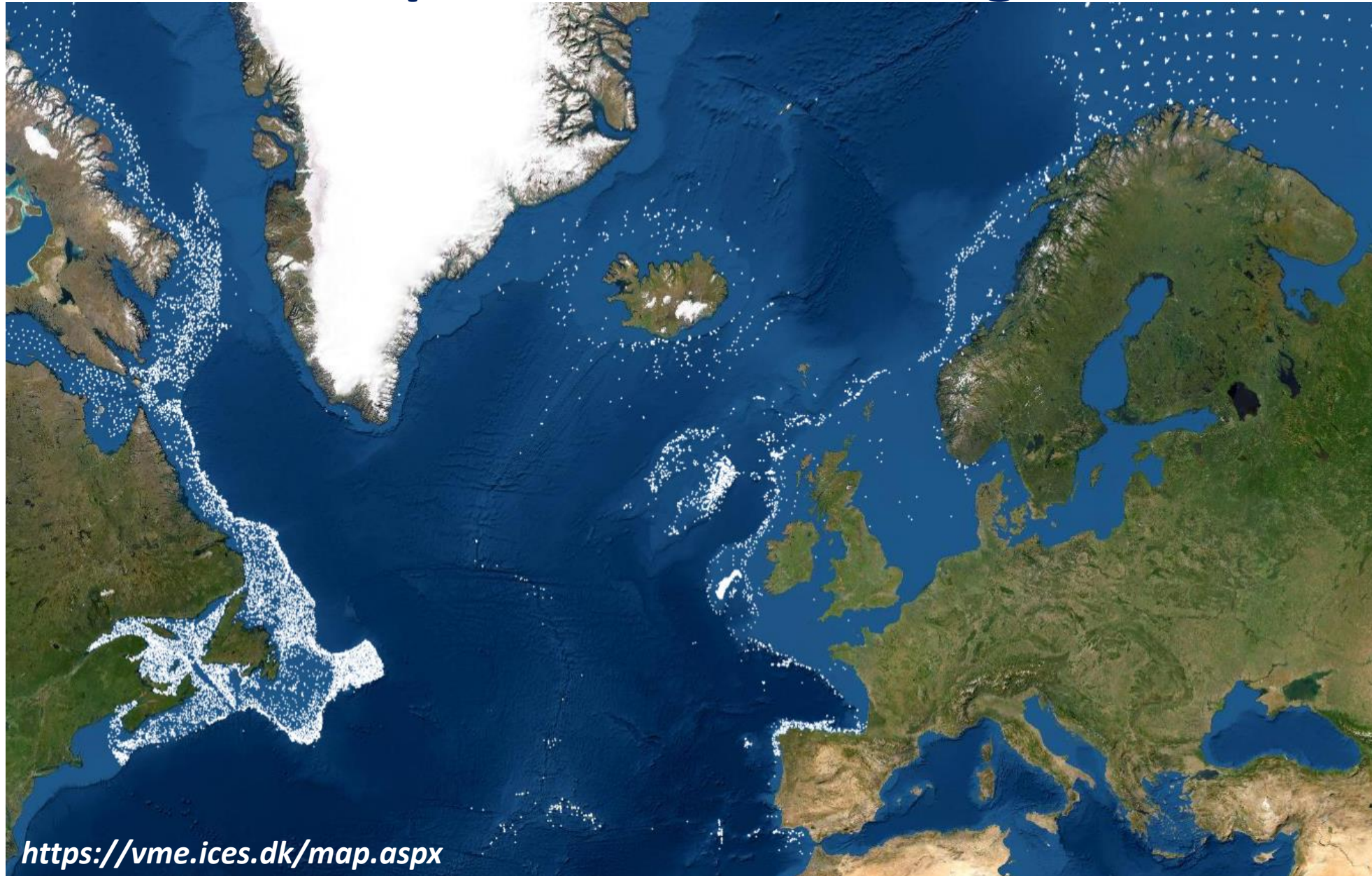
  

High Medium Low

**VME indicators suggest presence**



# ICES VME portal – full coverage



<https://vme.ices.dk/map.aspx>

## VME DATA LAYER

### VME Indicator

Check all VME Indicators / Uncheck all VME Indicators

- Anemones
- Black coral
- Chemosynthetic species
- Cup coral
- Gorgonian
- Sea-pen
- Soft coral
- Sponge
- Stony coral

### VME Habitat Type

### Years

### Data access

Update VME layer

## OTHER LAYERS

### WGDEC VME Weighting Algorithm:

- Weighting VME Algorithm
- Confidence Low
- Confidence Medium
- Confidence High
- Confidence layer

### NEAFC Closed Areas in:

### ICES Advice in:

### WGDEC Recommendation in:

### Other Layers

Give us some feedback

# Vessel Monitoring System (VMS) used for fishing activity & intensity



- bottom trawl gear currently only gear type which ICES has spatial information on intensity of fishing
- generally, trawling has far greater impact on VMEs compared to static gear
- proportional impact of low trawling effort is largest – first trawling event
- ICES advises that any bottom-contact fishing on VME habitats using static or trawl will damage VMEs



# Assessment of Significant Adverse Impacts

## Threshold for of significant adverse impacts occurring from future trawling:

- Swept Area Ratio (SAR) is greater than 0.43 (= 43% or 0.5 h/km<sup>2</sup>). Evidence based see [NAFO 2021](#)
- Applied at a resolution of 0.05 x 0.05 degrees (C-sq) – confidentiality & pragmatism

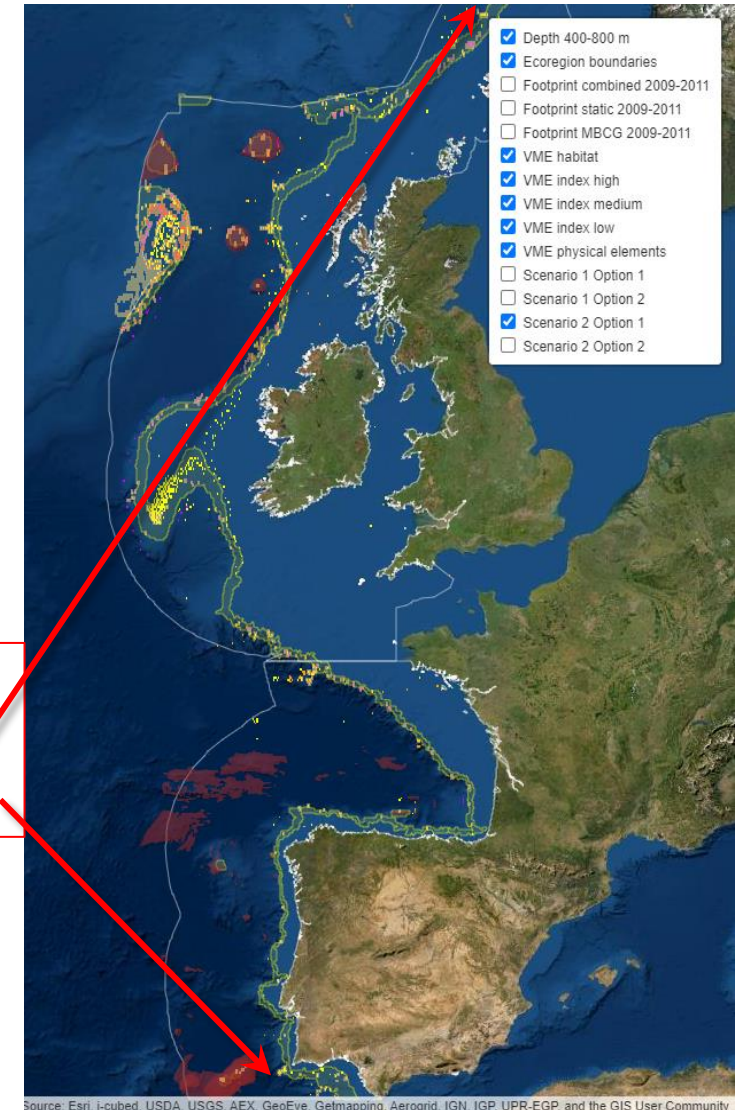
Can be used at any scale – at a broad scale latitude effects C-sq sizes

### Size of 0.05° C-sqs:

Northern area = 14km<sup>2</sup> => threshold ~ 7 hours/C-sq/year)

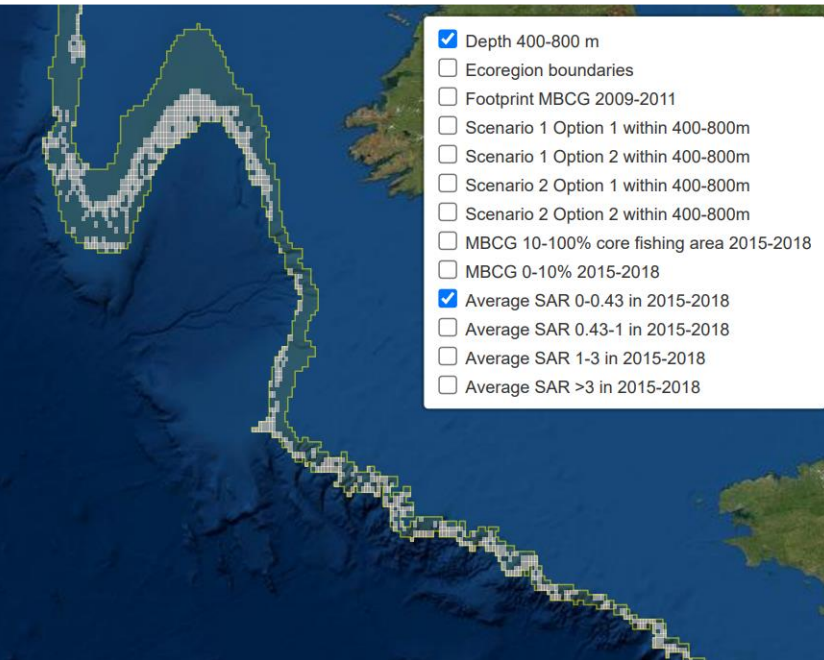
Southern area = 25km<sup>2</sup> => threshold ~ 13 hours/C-sq/year)

**FOA Guidelines:** *Significant adverse impacts* are those that compromise ecosystem integrity (i.e. ecosystem structure or function) in a manner that: (i) impairs the ability of affected populations to replace themselves; (ii) degrades the long-term natural productivity of habitats; or (iii) causes, on more than a temporary basis, significant loss of species richness, habitat or community types.

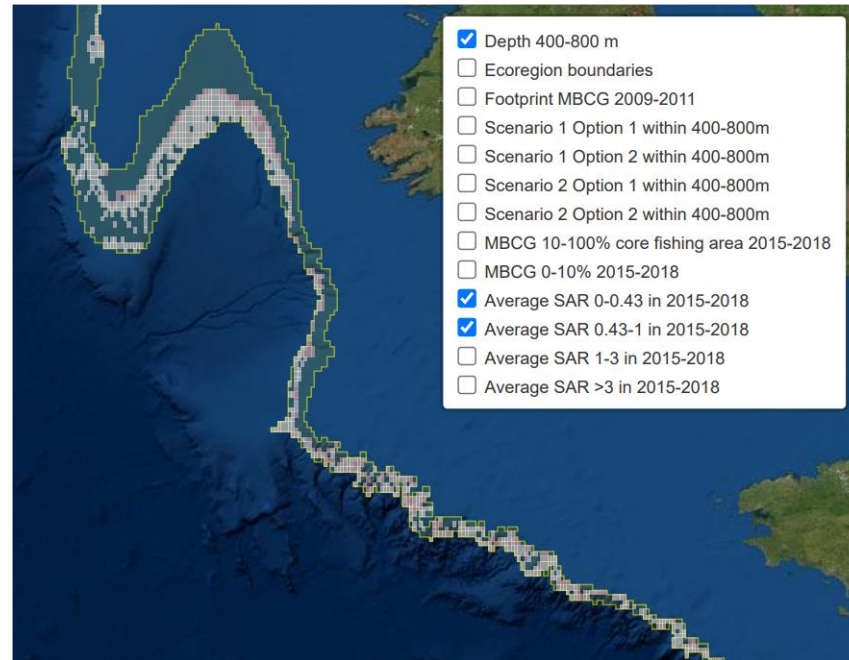


# Threshold - Significant Adverse Impacts

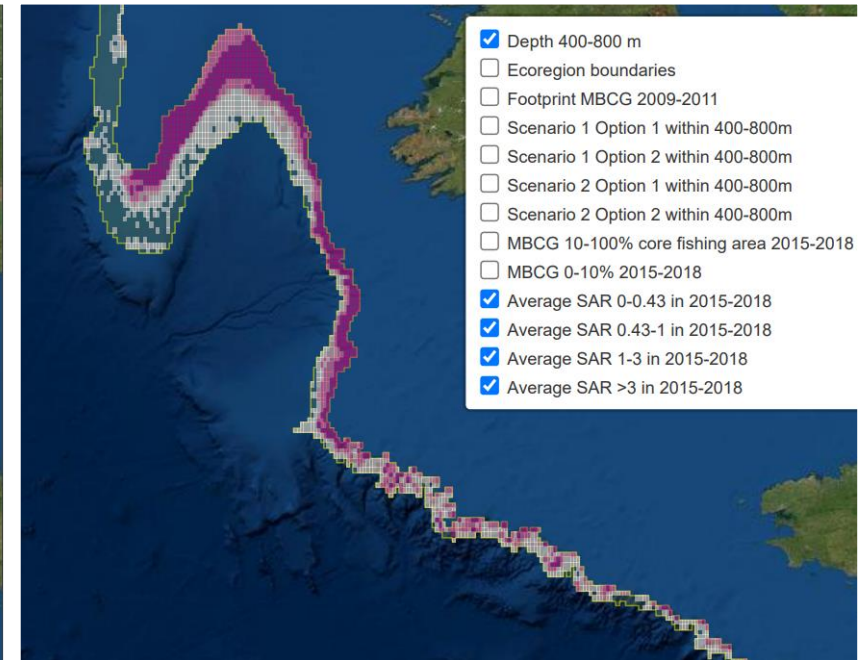
Trawling intensity relative to Significant Adverse Impacts threshold:



- SAR = 0.43, 43% of C-sq
- 0.5 h/km<sup>2</sup> fished
- 7 to 13 hrs / 0.05<sup>o</sup> C-sq. per year



- SAR = 1, 100% of C-sq
- 1.2 h/km<sup>2</sup> fished
- 16 to 30 hrs / 0.05<sup>o</sup> C-sq. per year



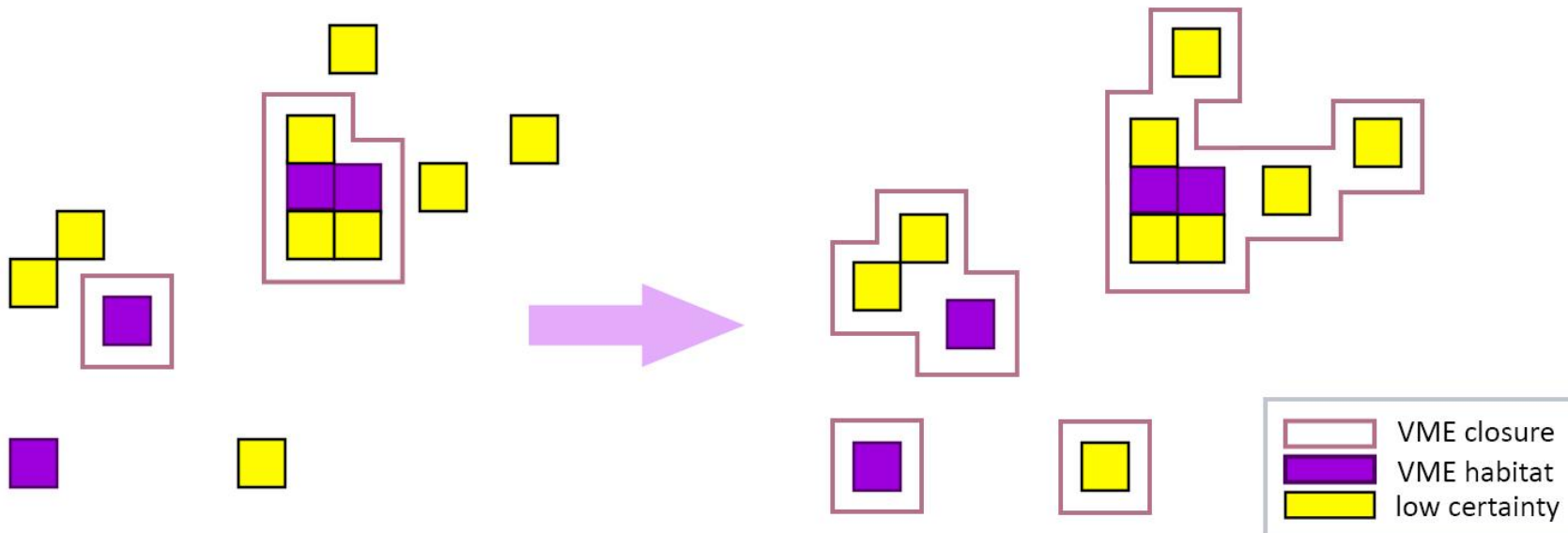
- SAR = greater than 3, >300% of C-sq
- > 3.5 h/km<sup>2</sup> fished
- > 21 to 91 hrs / 0.05<sup>o</sup> C-sq. per year

SAR = swept are ratio of fishing gear in each square



# Rules for constructing trawling closure polygons:

- Establish  $\frac{1}{2}$  C-sq buffers to account for uncertainty around fishing activity & sediment resuspension
- Fill in holes (<3 C-sqs) likely to containing VMEs & are too small for bottom trawling at depths >400m
- Include VME elements likely to contain VMEs



## Note:

- VME Elements - topographic features associated with VME (e.g. bank, coral mound, mud volcano, seamount, cold seeps & hydrothermal vents) from new data sources or updated delineations of existing features
- *Lophelia* reefs known to extend to approximately 280km<sup>2</sup> or >13 C-sqs
- Sponge grounds known to extend for more than 185km or 37 C-sqs

# Possible management approaches – scenarios presented and mapped



To come: VME predictive habitat mapping

**S1**

..if adjacent to M or H

**S2**

..if adjacent to M or H

**S3**

..if SAR < 0.43

**S4**

..if SAR < 0.43

**Significant Adverse Impact Threshold SAR = 0.43 (0.5h/km<sup>2</sup>/year)**



## Key messages:

- Operational implementation of FAO Guidelines, using best available information
- Can be adapted to different information sources, spatial resolutions, gear types & depths
- Integrates evidence of activity of mobile bottom contacting gear with observations/likelihood of VME presence
- Uses evidence based SAI threshold – expressed as area and hours fished (economic value could be included - see ICES Trade-off advice 2021)
- Risk & precaution can vary through choices of VME likelihood, thresholds & closure polygon rules
- Designed to incorporate new types of information (e.g. VME predictive habitat mapping)

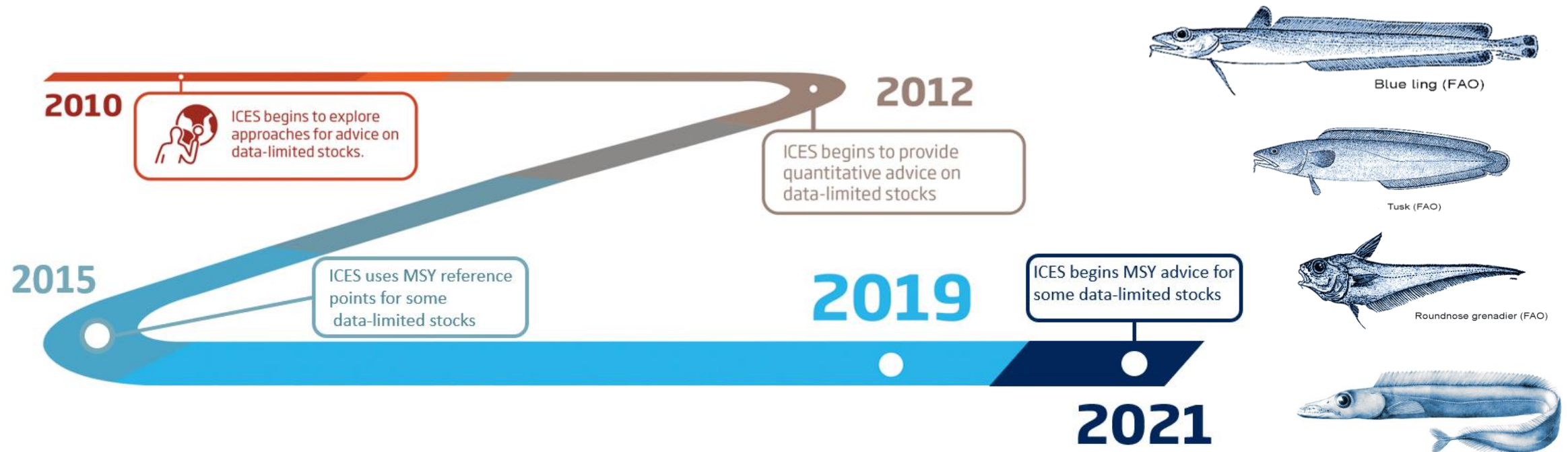


# ICES advice on 55 deep-sea fish stocks

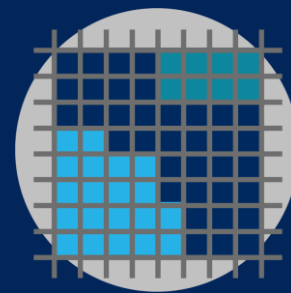


## Mixture of analytical methods

- Traditional stock assessments
- New data limited methods (production models, tested harvest control rules)
- Recording catch time series for vulnerable species



# Thank you.



Science for sustainable seas

## References:

- International Guidelines for the Management of Deep-sea Fisheries in the High Seas  
<https://www.fao.org/documents/card/en/c/b02fc35e-a0c4-545a-86fb-4fc340e13b52>
- EU Request to advise on the list of areas where VMEs are known to occur or are likely to occur and on the existing deep-sea fishing areas (ref. (EU)2016/2336)  
<https://doi.org/10.17895/ices.advice.7507> accompanying Maps and Data <https://doi.org/10.17895/ices.data.7506>
- ICES. 2020. Workshop on EU regulatory area options for VME protection (WKEUVME). ICES Scientific Reports. 2:114. 237 pp.  
<https://doi.org/10.17895/ices.pub.7618>
- Benchmark Workshop on the occurrence and protection of VMEs (vulnerable marine ecosystems) (WKVMEBM)  
<http://doi.org/10.17895/ices.pub.20101637>
- NAFO. 2021. Report of the Scientific Council, 27 May -11 June 2021. NAFO SCS Doc. 21/14REV  
<https://www.nafo.int/Portals/0/PDFs/sc/2021/scs21-14REV.pdf>
- EU request on how management scenarios to reduce mobile bottom fishing disturbance on seafloor habitats affect fisheries landing and value.  
<https://doi.org/10.17895/ices.advice.8191> accompanying Maps and Data [https://ices-library.figshare.com/articles/dataset/ICES\\_data\\_outputs\\_of\\_EU\\_request\\_on\\_how\\_management\\_scenarios\\_to\\_reduce\\_mobile\\_bottom\\_fishing\\_disturbance\\_on\\_seafloor\\_habitats\\_affect\\_fisheries\\_landing\\_and\\_value/18600380](https://ices-library.figshare.com/articles/dataset/ICES_data_outputs_of_EU_request_on_how_management_scenarios_to_reduce_mobile_bottom_fishing_disturbance_on_seafloor_habitats_affect_fisheries_landing_and_value/18600380)