Northwest Atlantic Fisheries Organization

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NEREIDA

NAFO POTENTIAL VULNERABLE MARINE ECOSYSTEMS. IMPACTS OF DEEP-SEA FISHERIES

Applying the Ecosystem Approach to Fisheries Management in ABNJ

11-13 March, 2025
FAO Headquarters - Rome, Italy

Northwest Atlantic Fisheries Organization

ICES CIEM

Food and Agriculture Organization of the United Nations

Analysis of VMS and Logbook data to study the bottom fishing footprint in the NAFO Regulatory Area

Sacau, M.[1], Garrido, I.[1], Baldó, F.[2], González-Troncoso, D.[1], González-Costas, F.[1], Durán-Muñoz, P.[1]

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[2]Centro Oceanográfico de Cádiz (COCAD-IEO), CSIC. Puerto Pesquero, Muelle de Levante, s/n, 11006 Cádiz. Spain

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Image Credit: NOAA Ocean Exploration

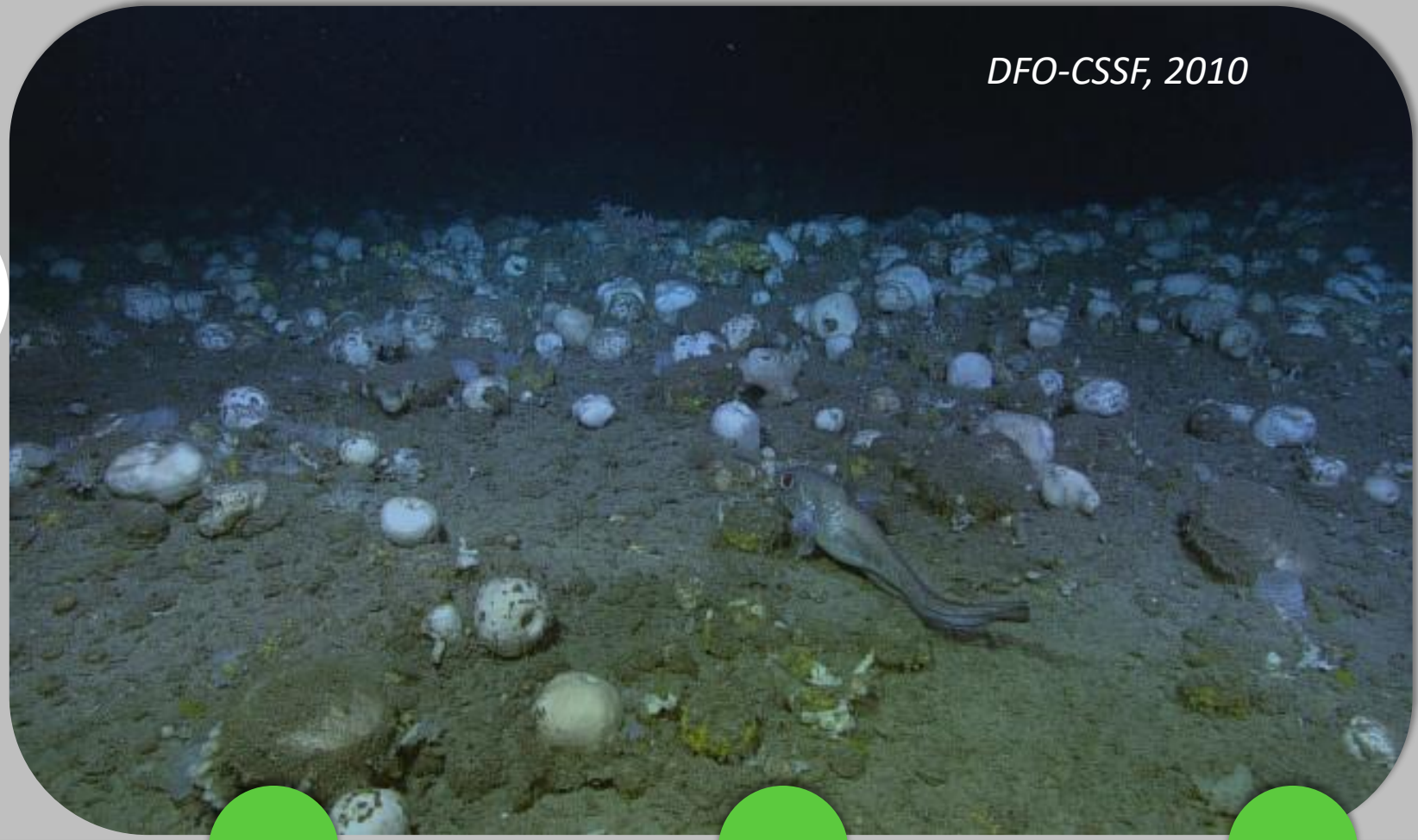
The UNGA urges the **protection** of vulnerable marine ecosystems on the high seas

Resolution 61/105

Vulnerable Marine Ecosystems (VMEs)

DFO-CSSF, 2010

Uniqueness or rarity



DFO-CSSF, 2010

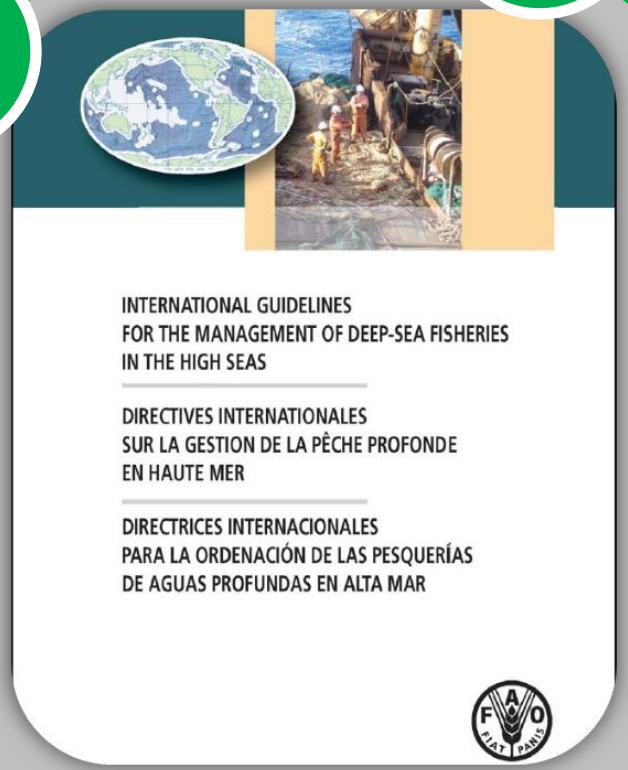
Functional significance of the habitat

Fragility

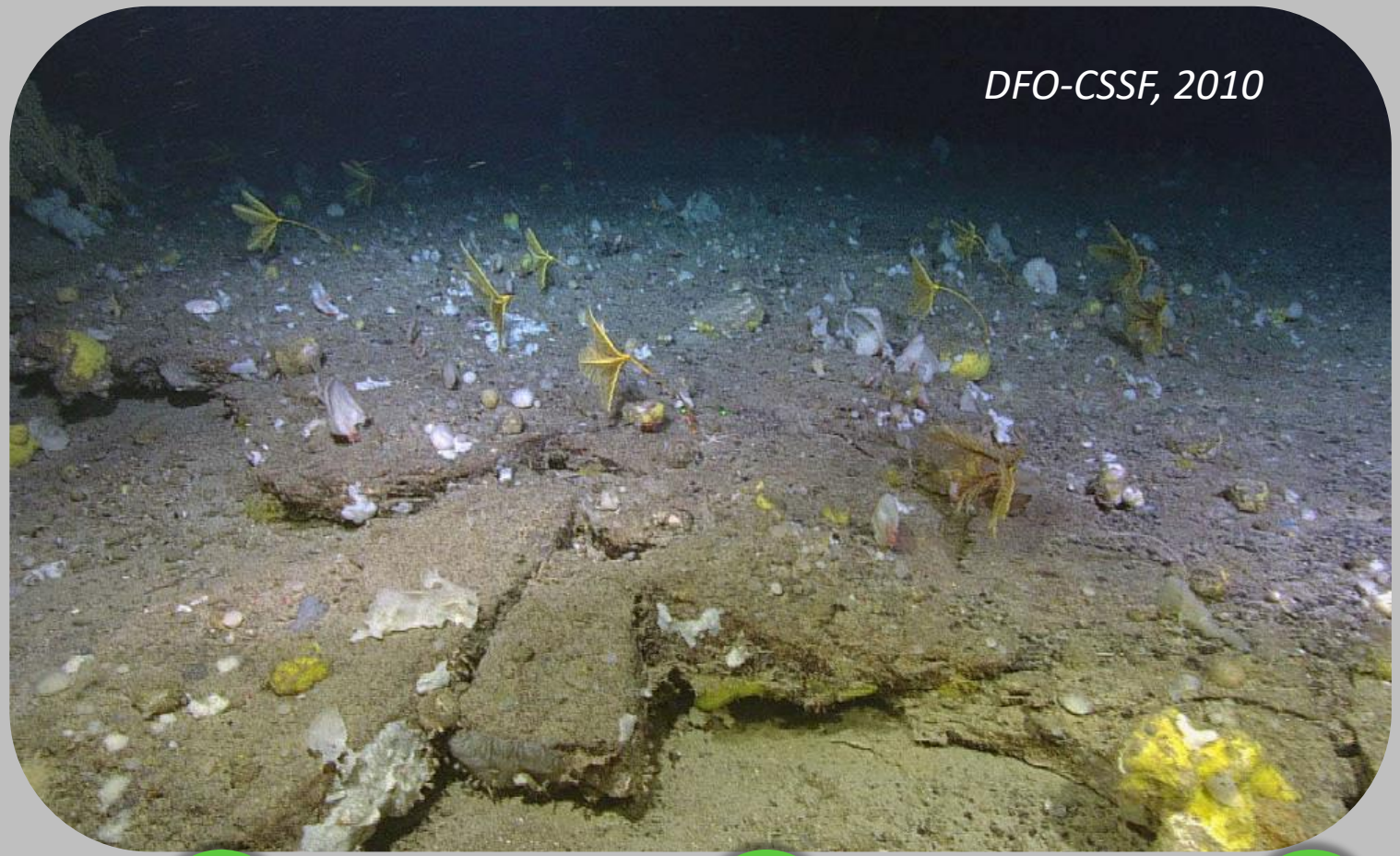

INTERNATIONAL GUIDELINES
FOR THE MANAGEMENT OF DEEP-SEA FISHERIES
IN THE HIGH SEAS
DIRECTIVES INTERNATIONALES
SUR LA GESTION DE LA PÊCHE PROFONDE
EN HAUTE MER
DIRECTRICES INTERNACIONALES
PARA LA ORDENACIÓN DE LAS PESQUERÍAS
DE AGUAS PROFUNDAS EN ALTA MAR

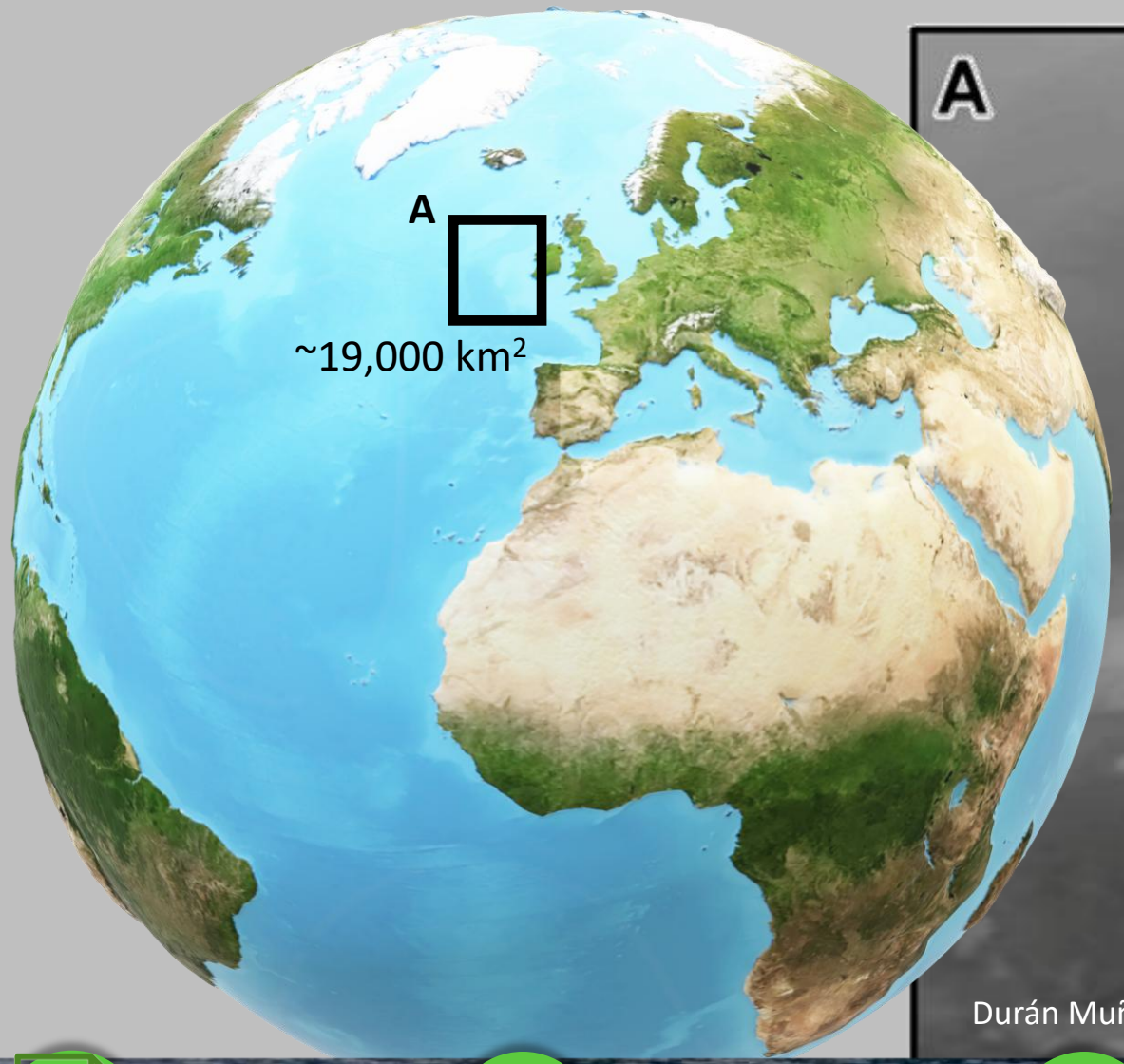

DFO-CSSF, 2010

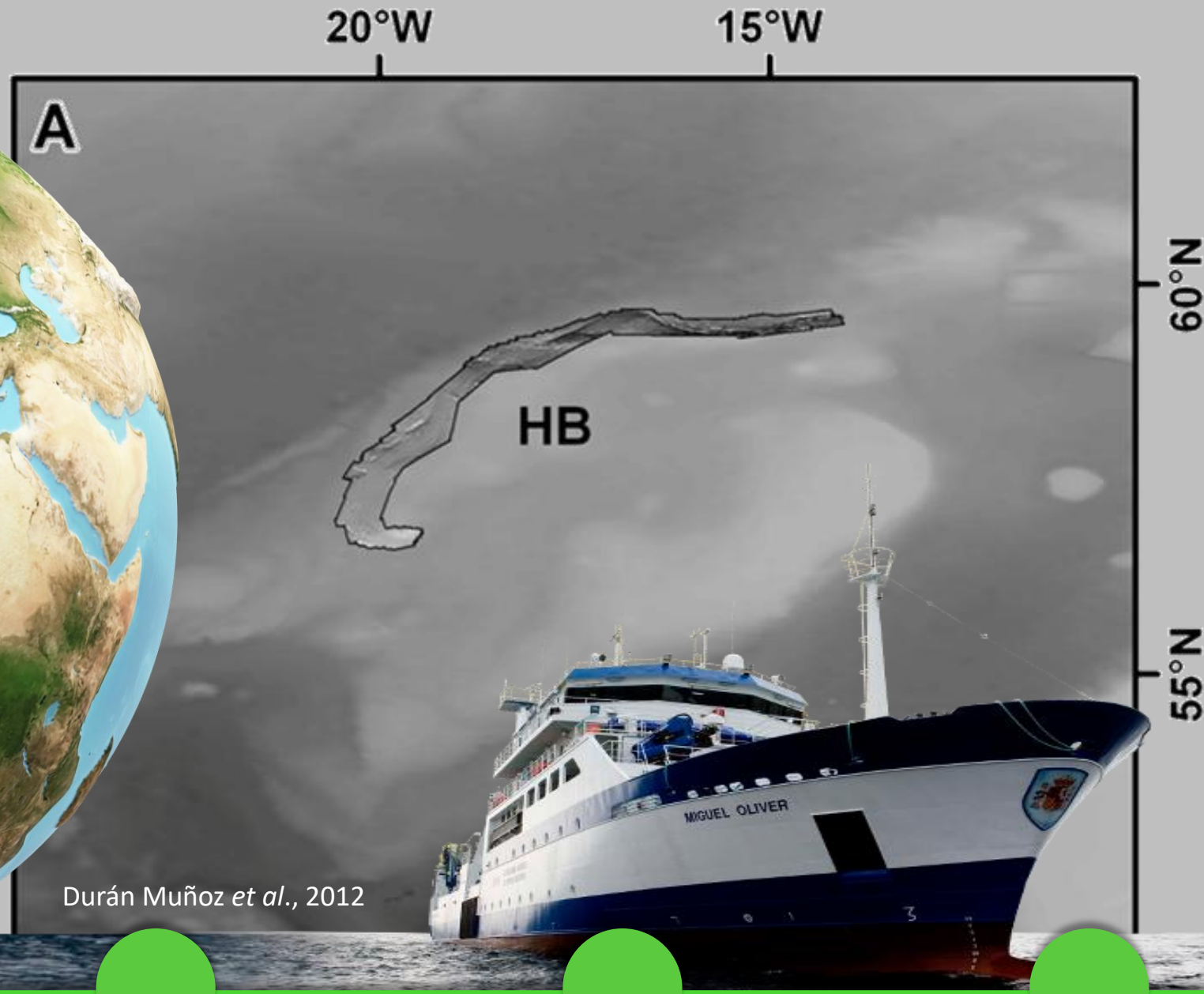
Life-history traits of component species that may recovery difficult

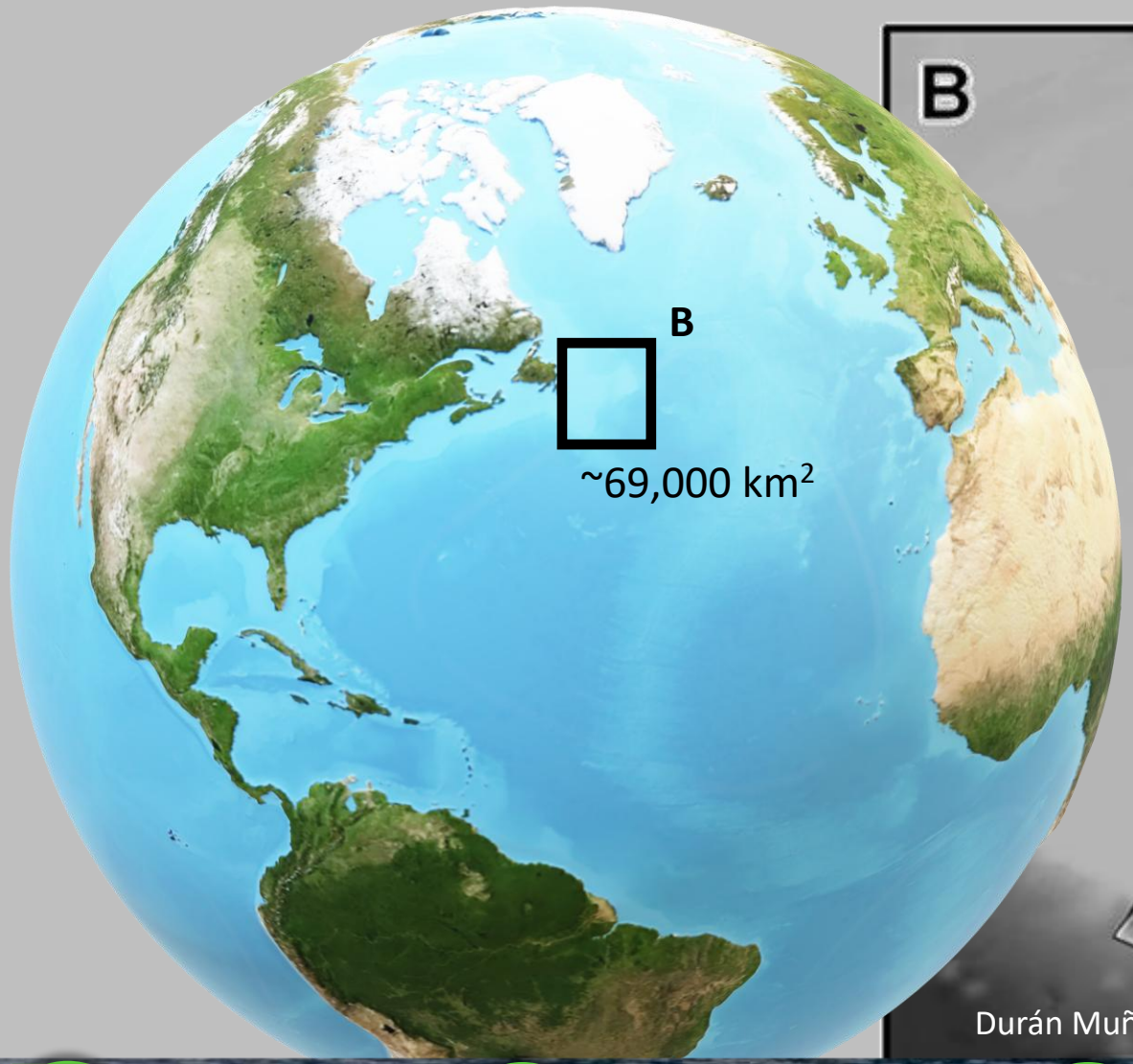


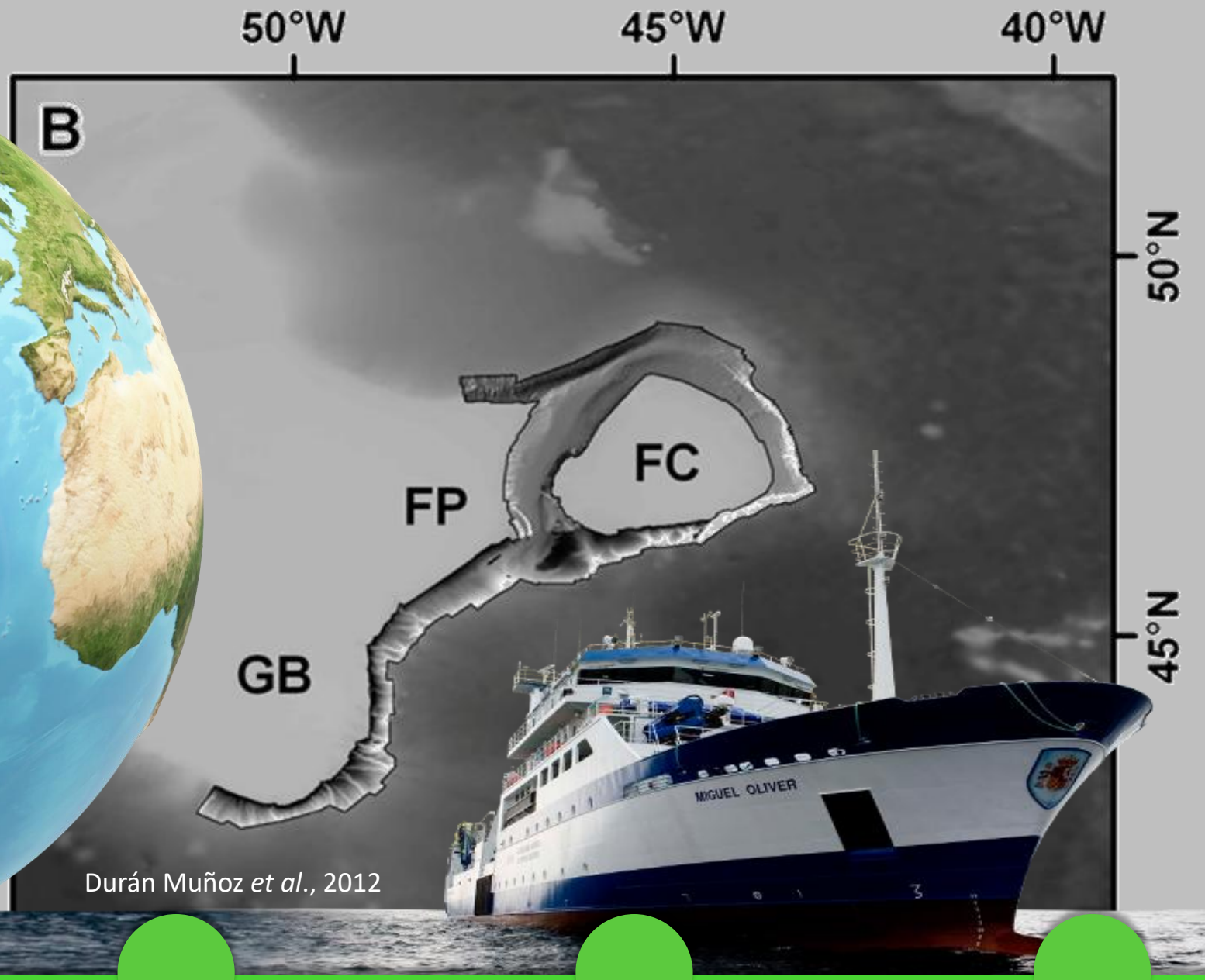
Structural complexity

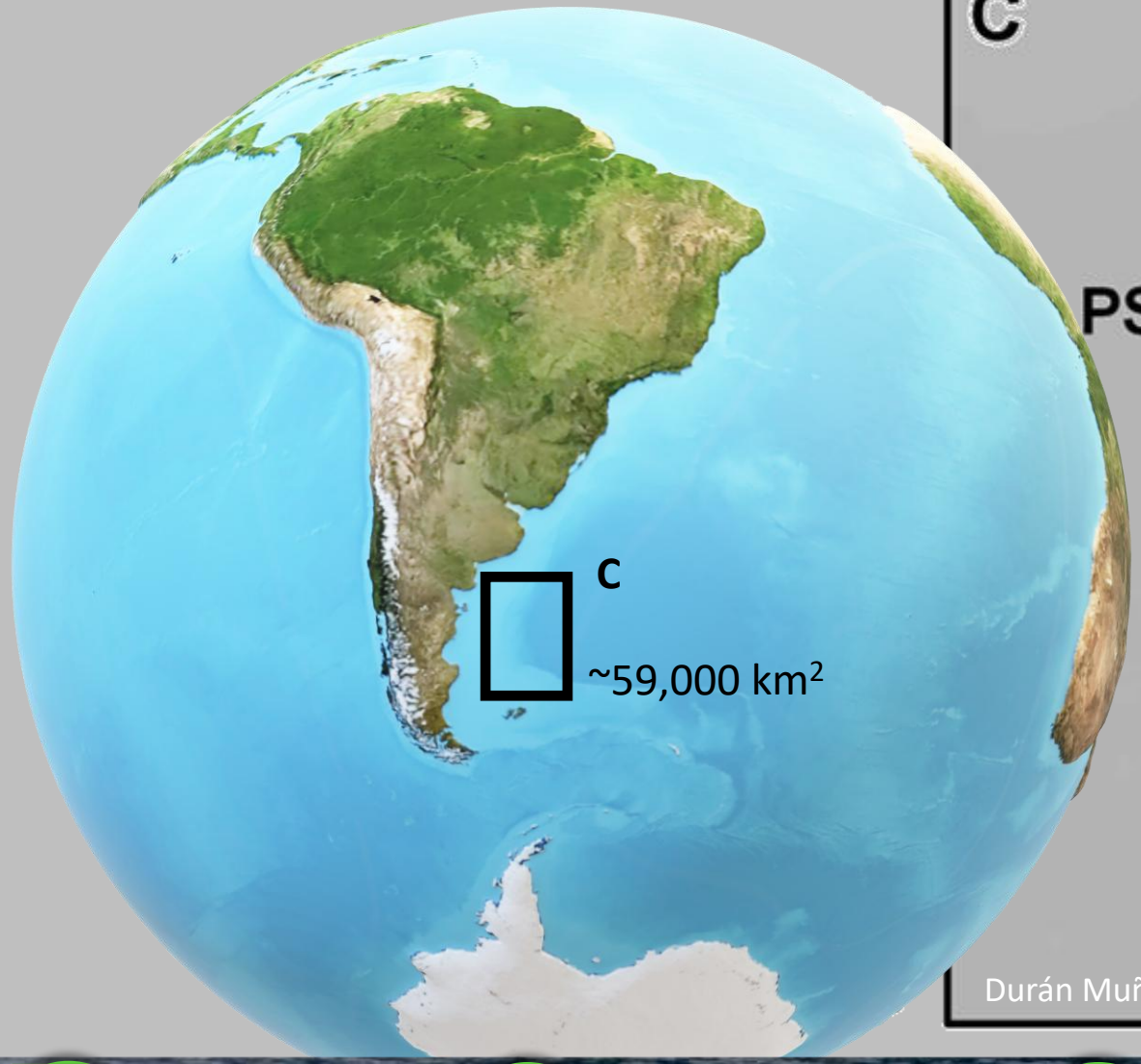



A
~19,000 km²

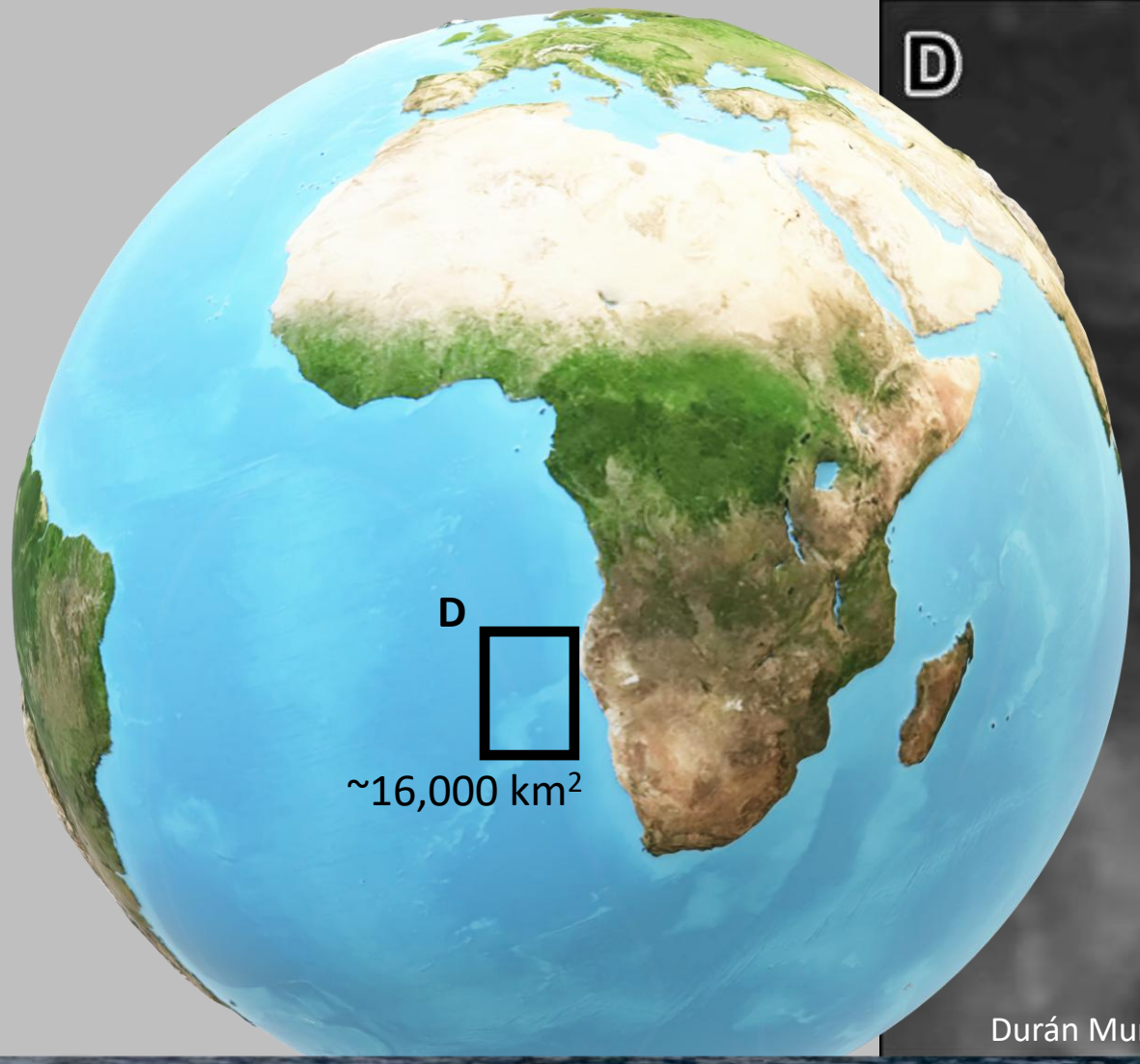

20°W
15°W
A
HB
60°N
55°N
MIGUEL OLIVER
Durán Muñoz *et al.*, 2012

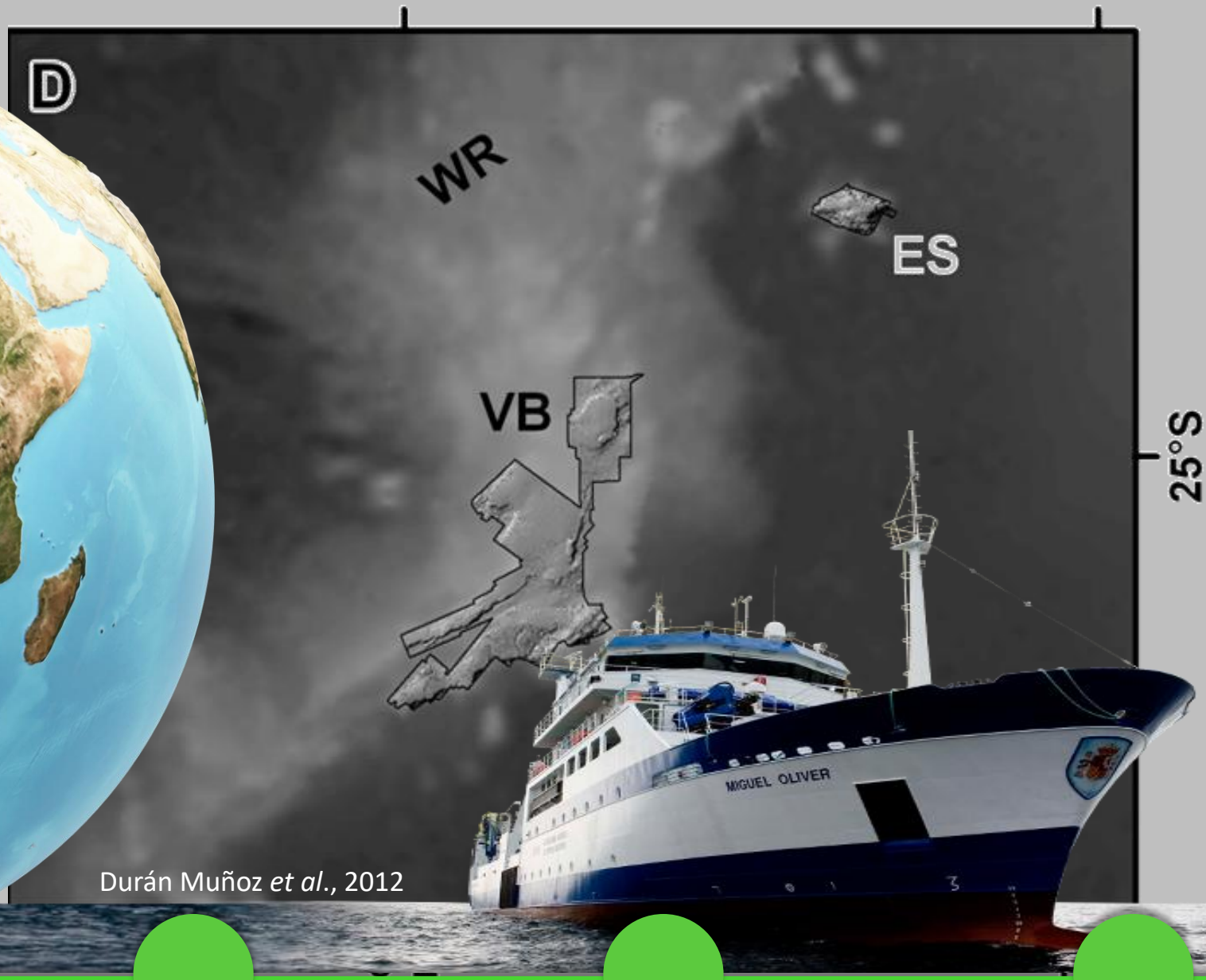

B
~69,000 km²


50°W
45°W
40°W
B
50°N
45°N
FC
FP
GB
MIGUEL OLIVER
Durán Muñoz *et al*., 2012



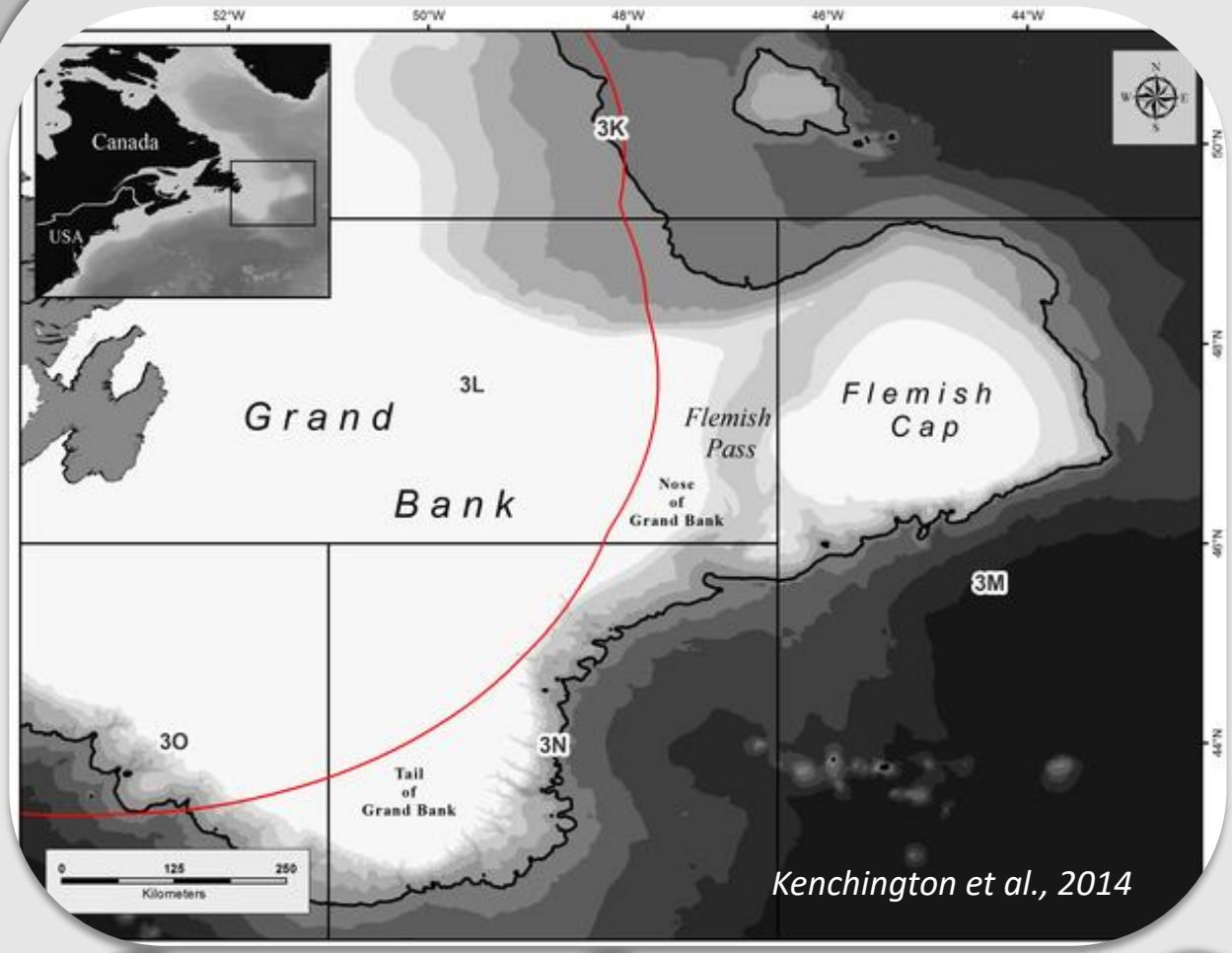
Durán Muñoz *et al*., 2012





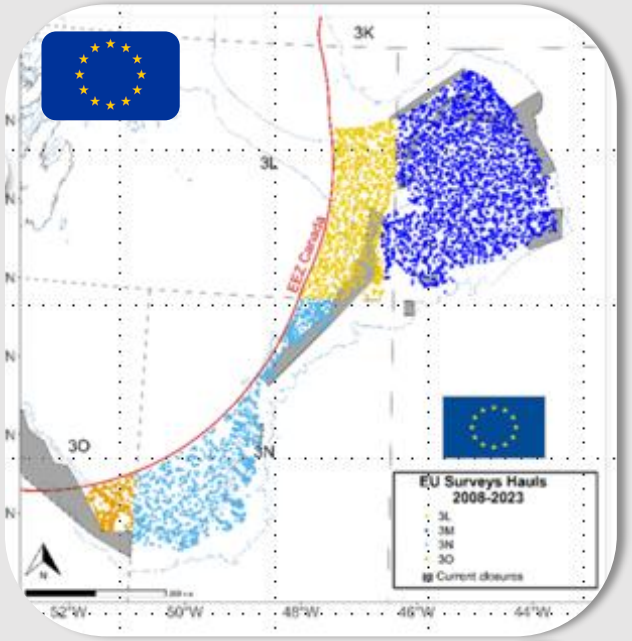
Durán Muñoz *et al.*, 2012

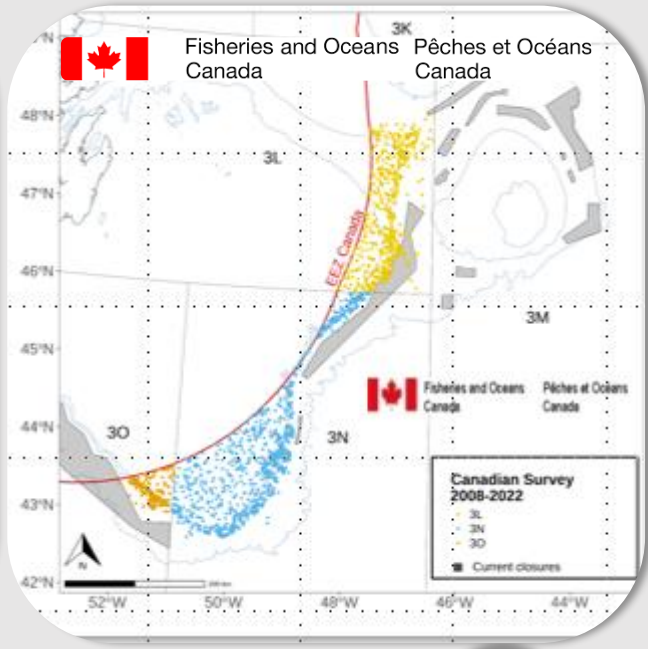
Vulnerable Marine Ecosystems (VMEs)



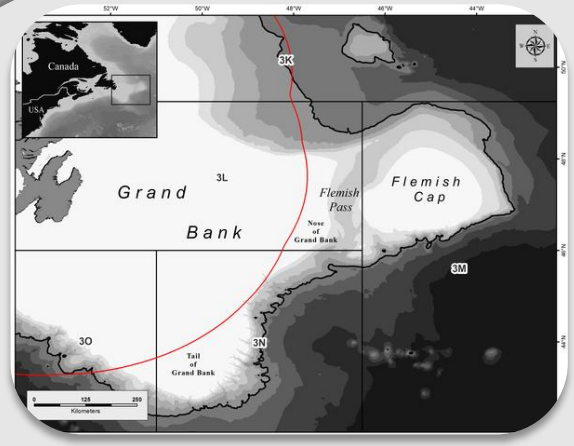
R/V groundfish surveys

VME Indicator species catches





Vulnerable Marine Ecosystems (VMEs)



1 **Kernel Density Analysis**

Identification of significant concentrations of VME indicator species from survey data

2 **Species Distribution modeling**

Predict species distribution using environmental variables.

NAFO identified the following VME indicator taxa

Northwest Atlantic Fisheries Organization

- Black Corals
- Small Gorgonians
- Large Gorgonians
- Large Sponges
- Sea Pens
- Sea Squirts
- Bryozoans





OPEN ACCESS Freely available online — PLOS ONE

Kernel Density Surface Modelling as a Means to Identify Significant Concentrations of Vulnerable Marine Ecosystem Indicators

Ellen Kenchington[1]*, Francisco Javier Murillo[1,2], Camille Lirette[1], Mar Sacau[3], Mariano Koen-Alonso[4], Andrew Kenny[5], Neil Ollerhead[4], Vonda Wareham[4], Lindsay Beazley[1]

1 Bedford Institute of Oceanography, Department of Fisheries and Oceans, Dartmouth, Nova Scotia, Canada, 2 Departamento de Zooloxía e Antropoloxía Física, de Bioloxía, Universidade de Santiago de Compostela, Santiago de Compostela, Spain, 3 Instituto Español de Oceanografía, Centro Oceanográfico de Vigo, Pesquerías Lejanas, Vigo, Spain, 4 Northwest Atlantic Fisheries Centre, Department of Fisheries and Oceans, St. John's, Newfoundland and Labrador, Canada, Environment, Fisheries and Aquaculture Science, Lowestoft, Suffolk, United Kingdom

Kenchington et al., 2014

Kenchington et al., 2019

Serial No. N7030 — NAFO SCR Doc. 19/058

SCIENTIFIC COUNCIL MEETING – NOVEMBER 2019

Vulnerable Marine Ecosystems in the NAFO Regulatory Area: Updated Kernel Density Analyses of Vulnerable Marine Ecosystem Indicators

by

E. Kenchington[1], C. Lirette[1], F.J. Murillo[1], L. Beazley[1], A.-L. Downie[2]

[1]Department of Fisheries and Oceans, Dartmouth, Nova Scotia, Canada.

[2]CEFAS, Lowestoft, Suffolk, United Kingdom.

Vulnerable Marine Ecosystems (VMEs)

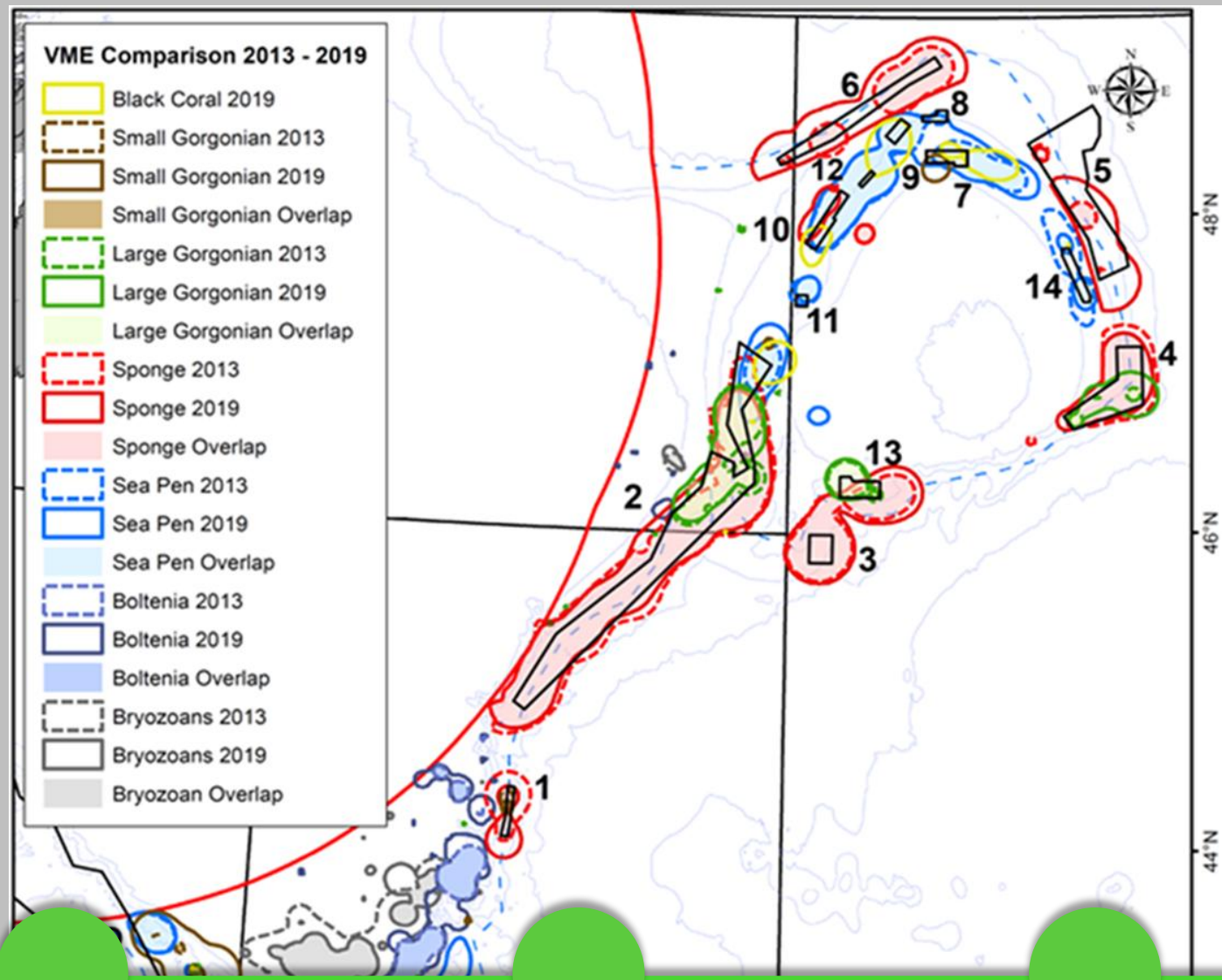
Kernel Density Analysis
Identification of significant concentrations of VME indicator species from survey data

Species Distribution modeling
Predict species distribution using environmental variables.

1st VME Review — 2013

2nd VME Review — 2019

Next VME Reassessment — 2027



Analysis of VMS and Logbook data to study the bottom fishing footprint in the NAFO Regulatory Area

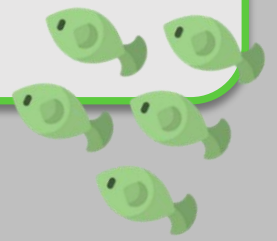
NEREIDA

NAFO POTENTIAL VULNERABLE MARINE ECOSYSTEMS.
IMPACTS OF DEEP-SEA FISHERIES

INTRODUCTION

NEREIDA
NAFO POTENTIAL VULNERABLE MARINE ECOSYSTEMS. IMPACTS OF DEEP-SEA FISHERIES

Characterization of distribution and intensity of fishing effort from 2016 to 2022.
Analysis was estimated based on two data sources:
Vessel Monitoring System (VMS) and Logbook information data



Better understanding on the extent of fishing activities within NRA

Improve the methodology to describe NAFO fisheries footprint and their overlap with VME polygons

Improve the assessment of Significant Adverse Impacts (SAI)

OBJECTIVES

The NAFO Vessel Monitoring System (VMS) is a satellite-based monitoring system that provides data every hour to the fisheries authorities on the location, course and speed of fishing vessels.

1 hour

VMS pings

TOTAL: 874 446 pings

Logbook data provides details for each vessel on catch and discard characteristics, date, type of gear used and geographic position collected during vessel fishing activities.

TOTAL:
62 757 logbook hauls

Coupling VMS and Logbook data

VMS Data

Logbook Data

Raw data cleaning

VMS

Logbook

Data matching

Merged dataset

Analyses

Results

For the same Date and Vessel…

Start Fishing Time: 11:35

Fishing time interval

End Fishing Time: 13:25

"Non-Fishing" VMS pings

"Fishing" VMS pings

"Non-Fishing" VMS pings

10:00 11:00 12:00 13:00 14:00 15:00

Match in time window

“Fishing” VMS pings are assigned to a fishery based on the species with the highest retained catch weight in the Logbook.

Start Fishing Time: 11:35

End Fishing Time: 13:25

Fishing time interval

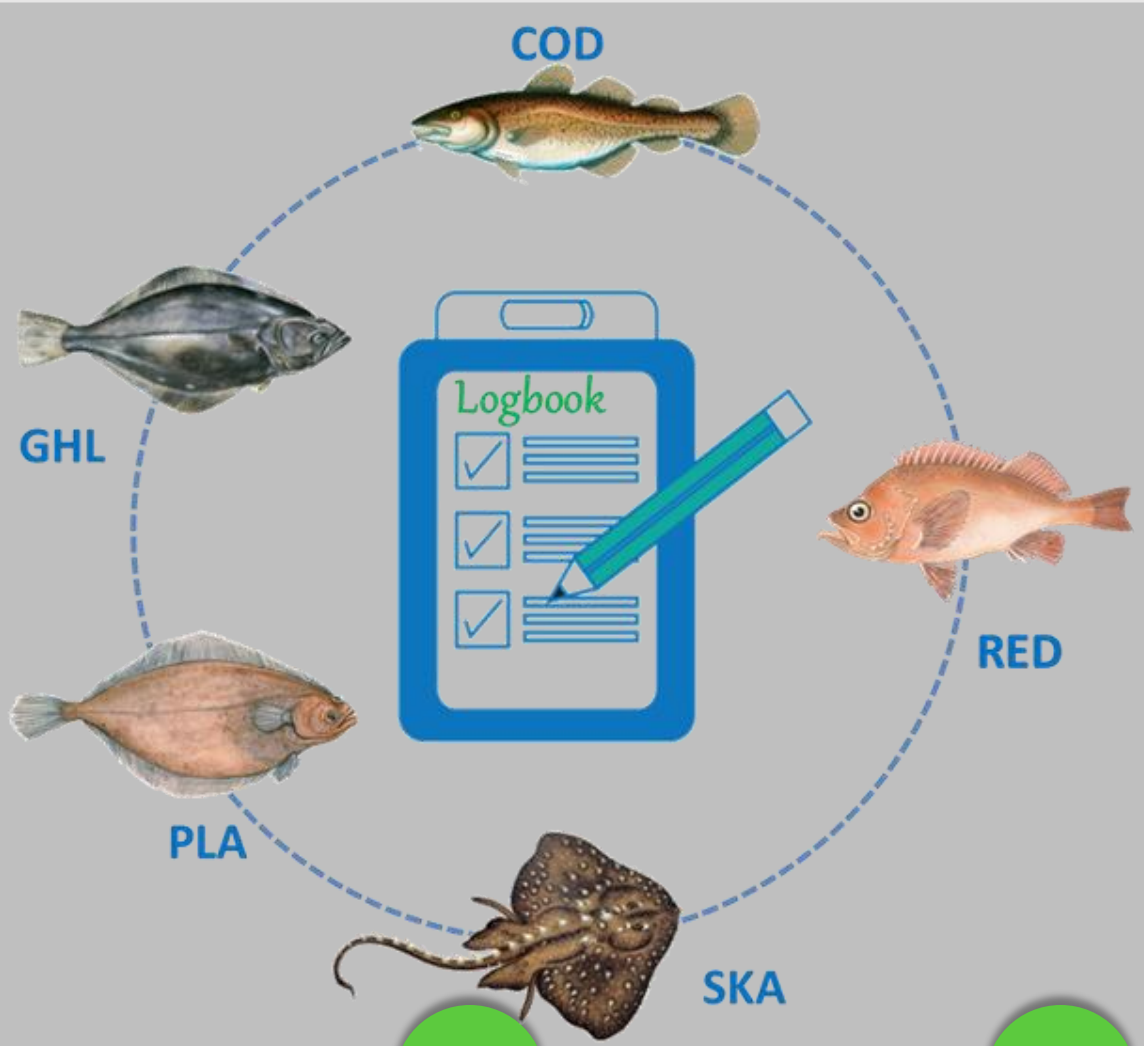
“Non-Fishing” VMS pings

“Fishing” VMS pings

“Non-Fishing” VMS pings

10:00 11:00 12:00 13:00 14:00 15:00

Match in time window



Mapping of fishery footprint

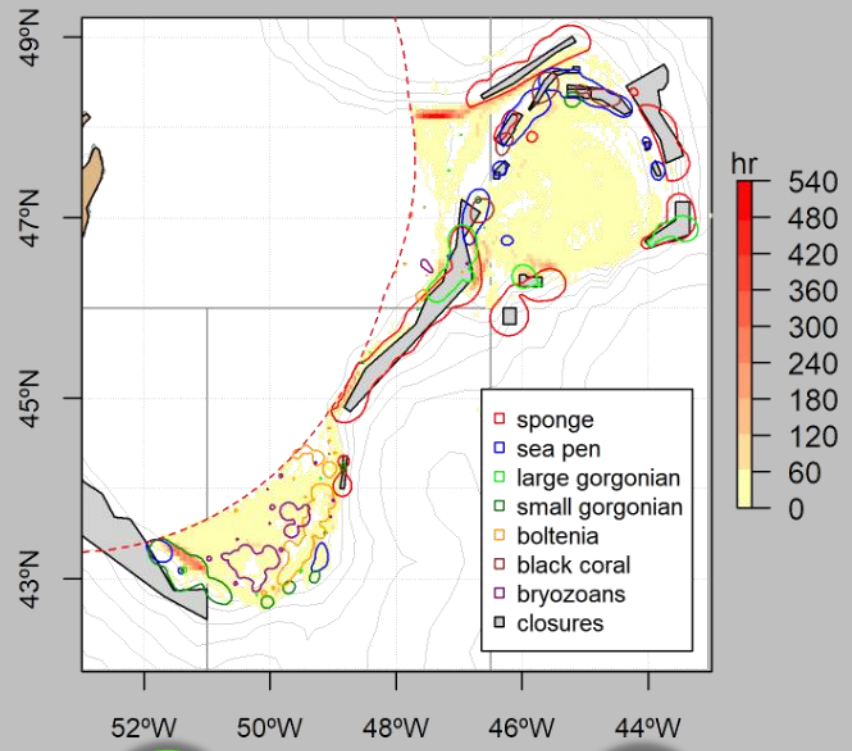
Cumulative fishing effort

Fisheries-specific fishing effort

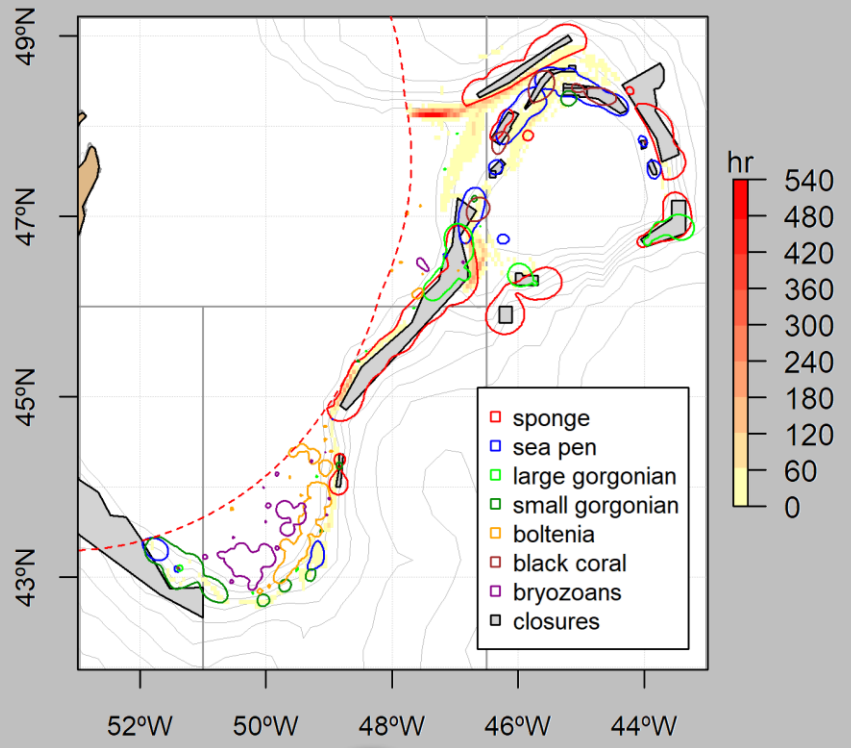
RESULTS

Mapping of fishery footprint (cumulative and fisheries-specific)

Cumulative fishing effort



Greenland halibut



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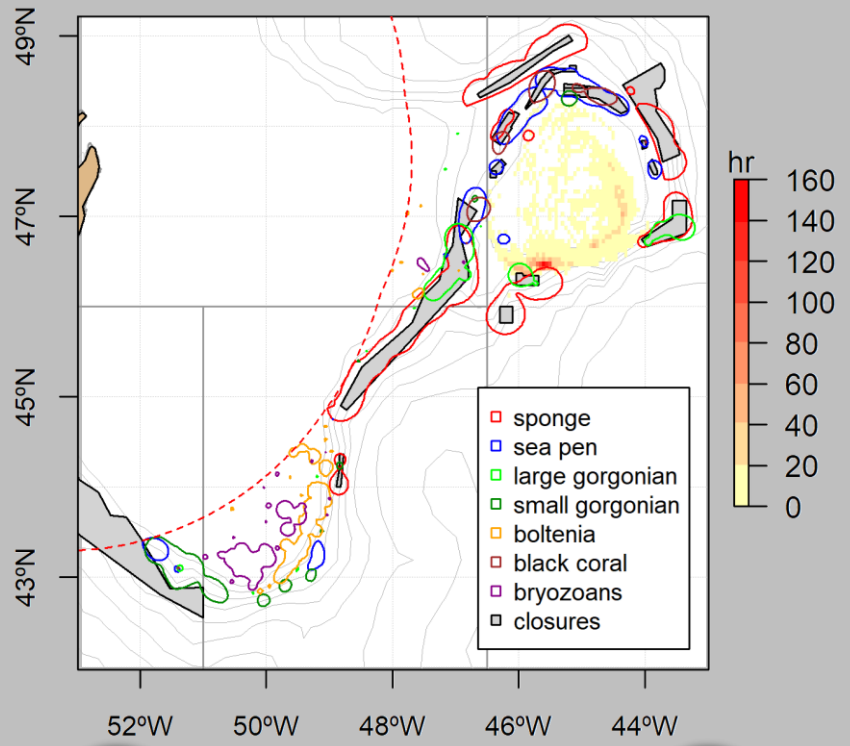
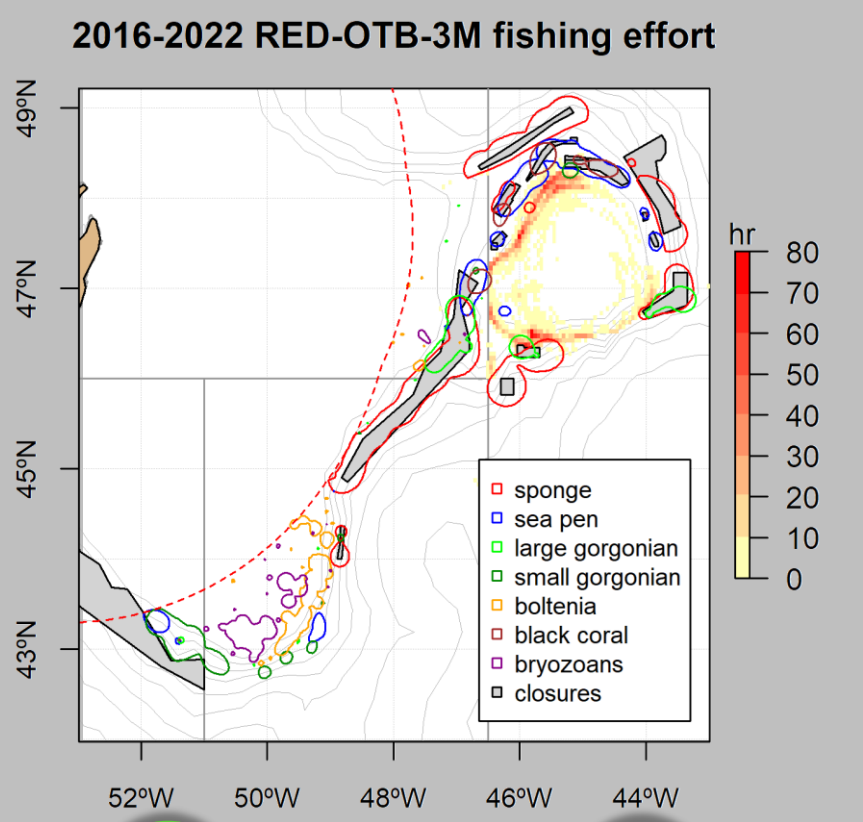


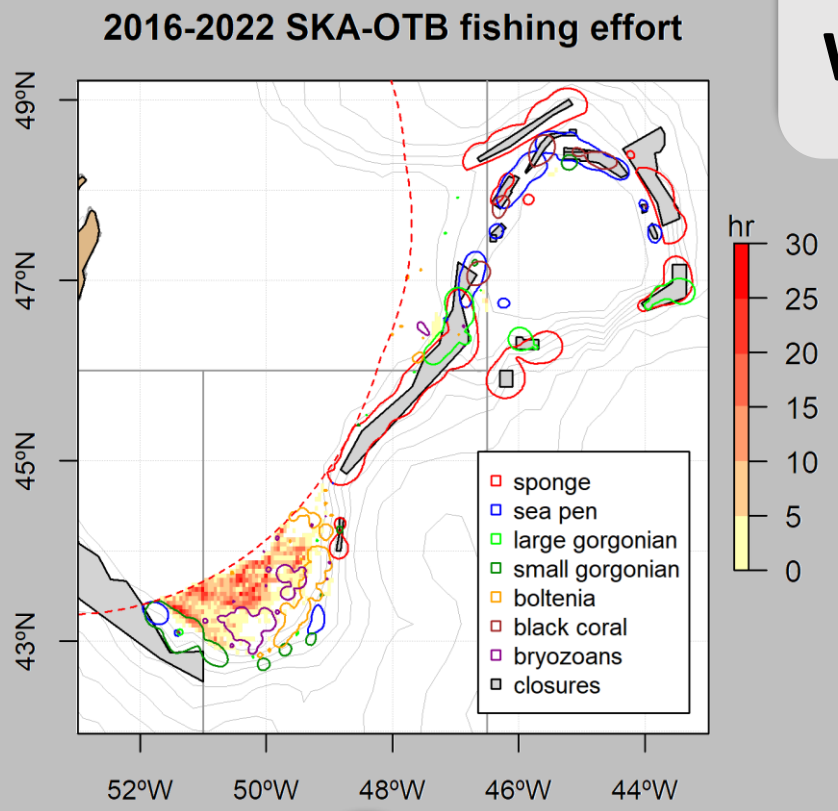
RESULTS

Mapping of fishery footprint (cumulative and fisheries-specific)

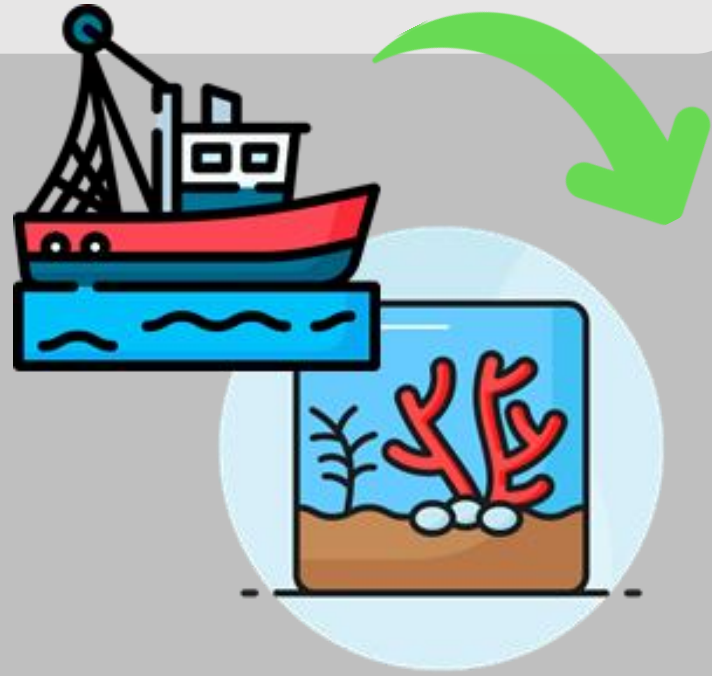
Redfish

Skates



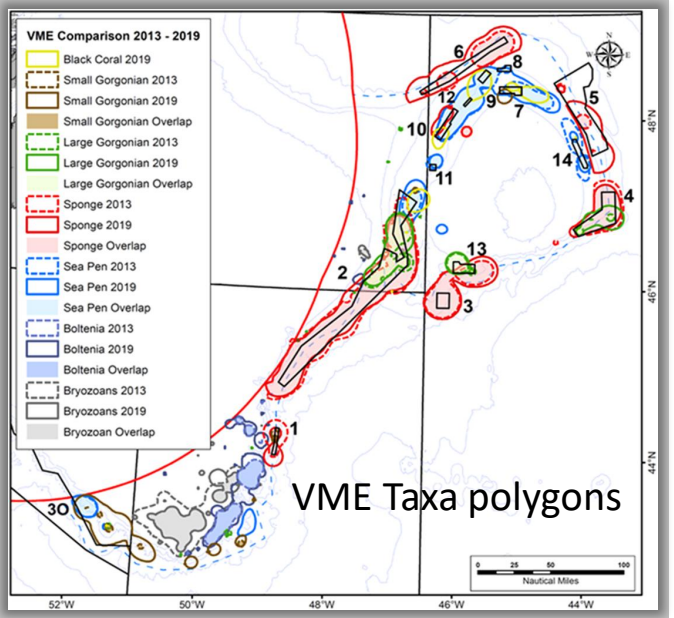


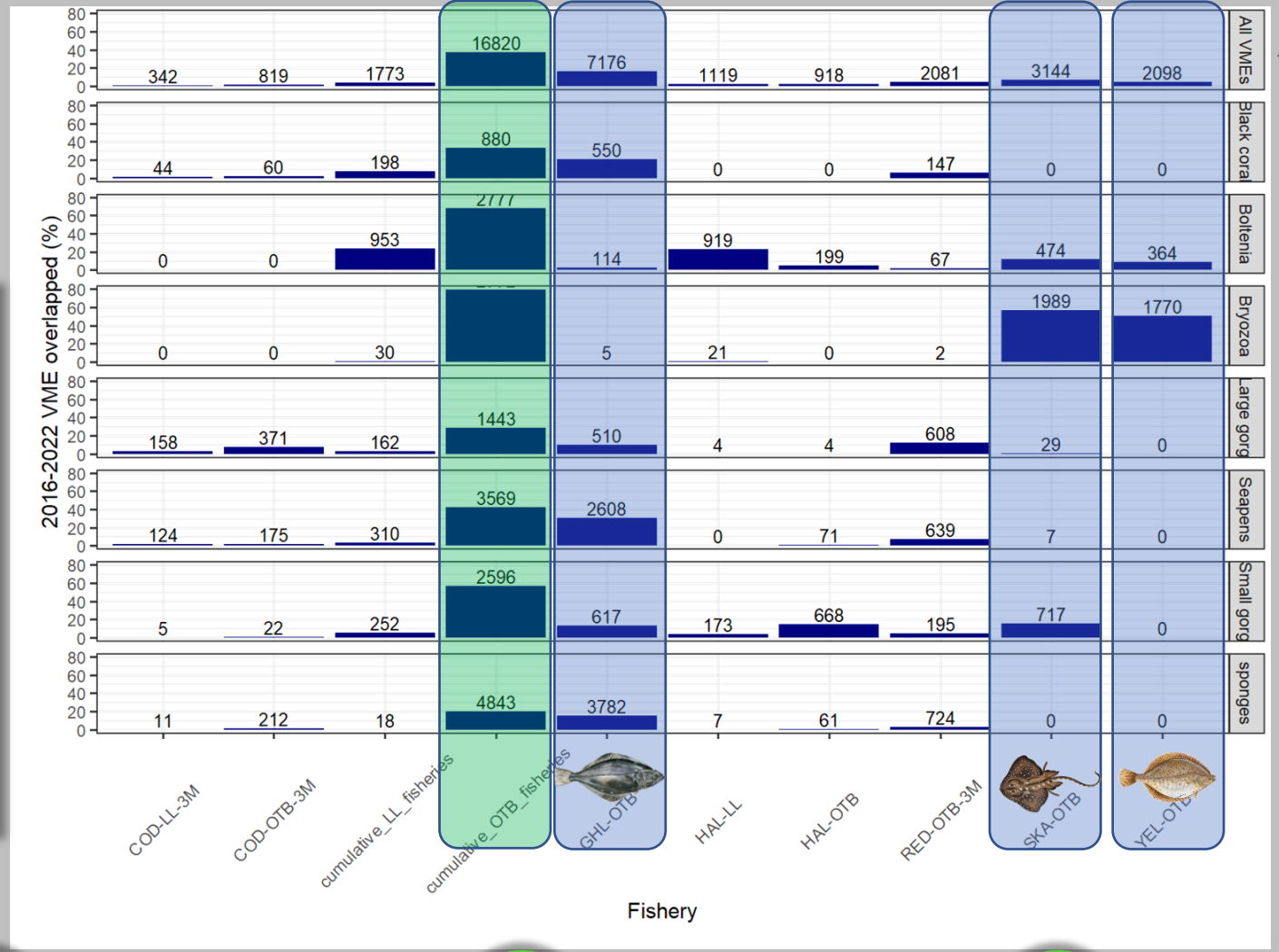
FOOTPRINT OVERLAP WITH VME taxa polygons



RESULTS

Footprint overlap with VME taxa polygons





All VMEs

Black corals

Boltenia

Bryozoa

Large gorgonians

Sea pens

Small gorgonians

Sponges

RESULTS

Some Concluding Remarks

-This analysis significantly **improves the spatial definition** of fishing areas within the NAFO Regulatory Area.

-This method is considered to be an improvement over past effort maps derived from a 1-5 knot speed filter as it **removes spurious effort points**

- **Issues in VMS data transmission**, and in **logbook data** can significantly impact any analysis that relies on this information to estimate the fishing effort exerted by the fleet

- This approach will be used for the **reassessment** of the impact of NAFO bottom fisheries in **2027**

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Thank you !

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