Challenges and opportunities in applying ecosystem-based approaches in deepwater fisheries

Rui Vieira

Symposium on applying the Ecosystem Approach to Fisheries Management in ABNJ

FAO Headquarters - Rome, Italy

11–13 March 2025




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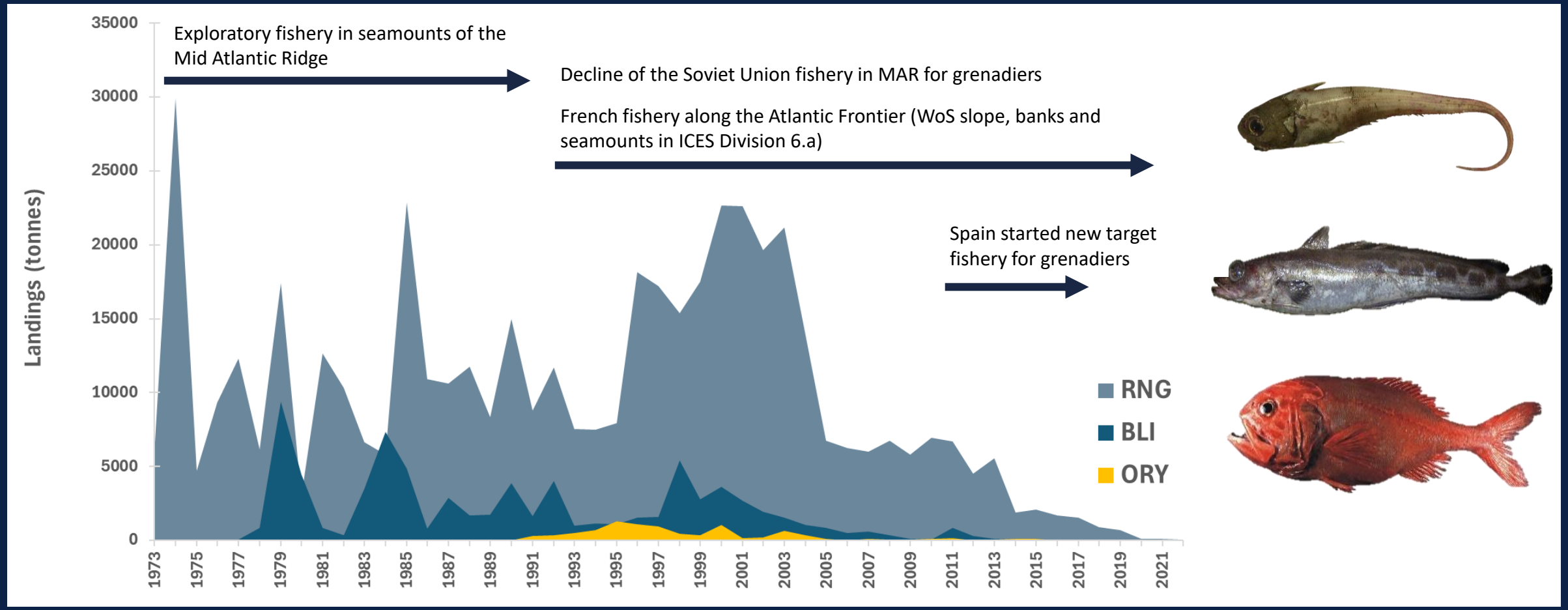
Biodiversity hotspots (VMEs)

- Very stable environments
- Long lived & habitat forming taxa
- Enhanced secondary production
- Benthic/pelagic coupling
- Essential fish habitat
- Regulation of carbon sequestration
- Novel chemicals - pharmacological benefits

Slow growth, long lives and highly sensitive to change

Deepwater fishing effort (fisheries deeper than 400 m) expanded dramatically since the 1960s



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ICES. 2024. Working group on the biology and assessment of deep-sea fisheries resources (WGDEEP). ICES Scientific Reports. 6:56. 1156 pp. https://doi.org/10.17895/ices.pub.25964749

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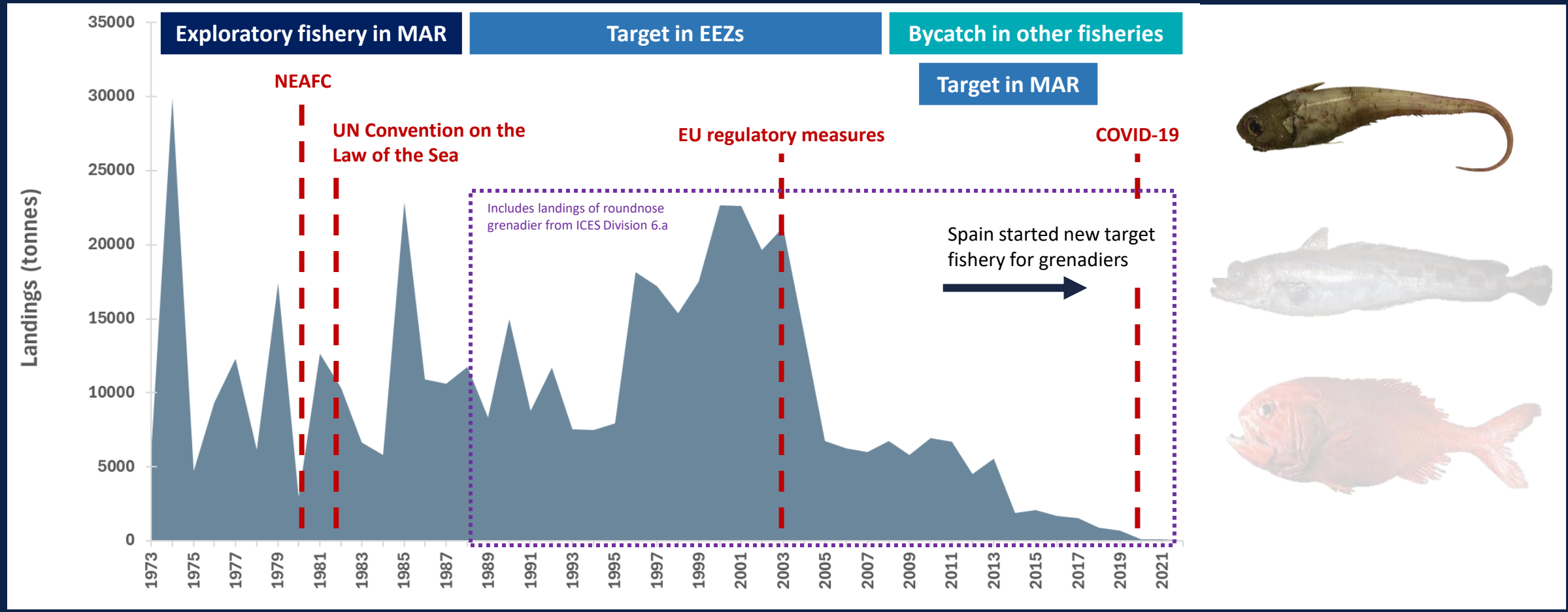

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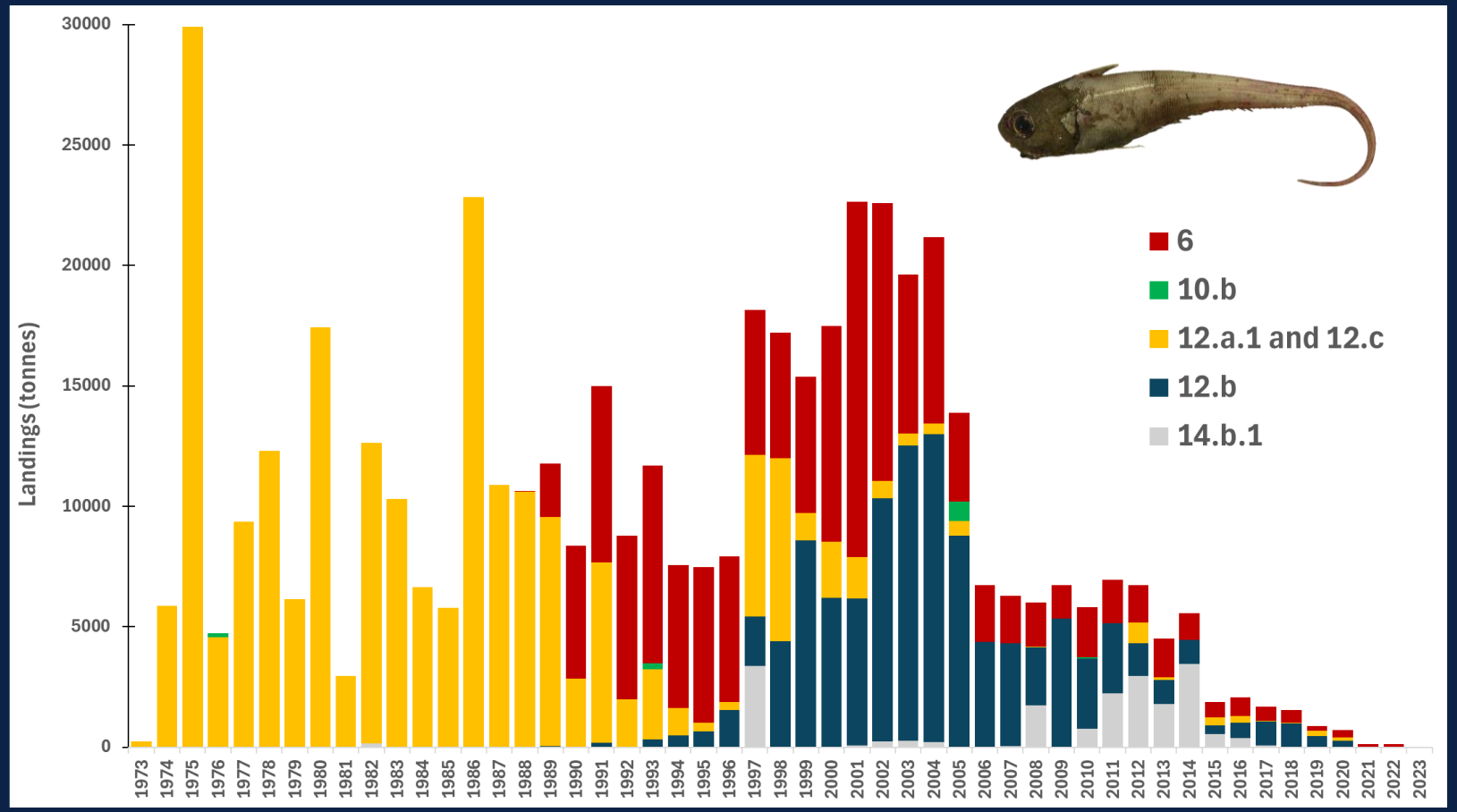
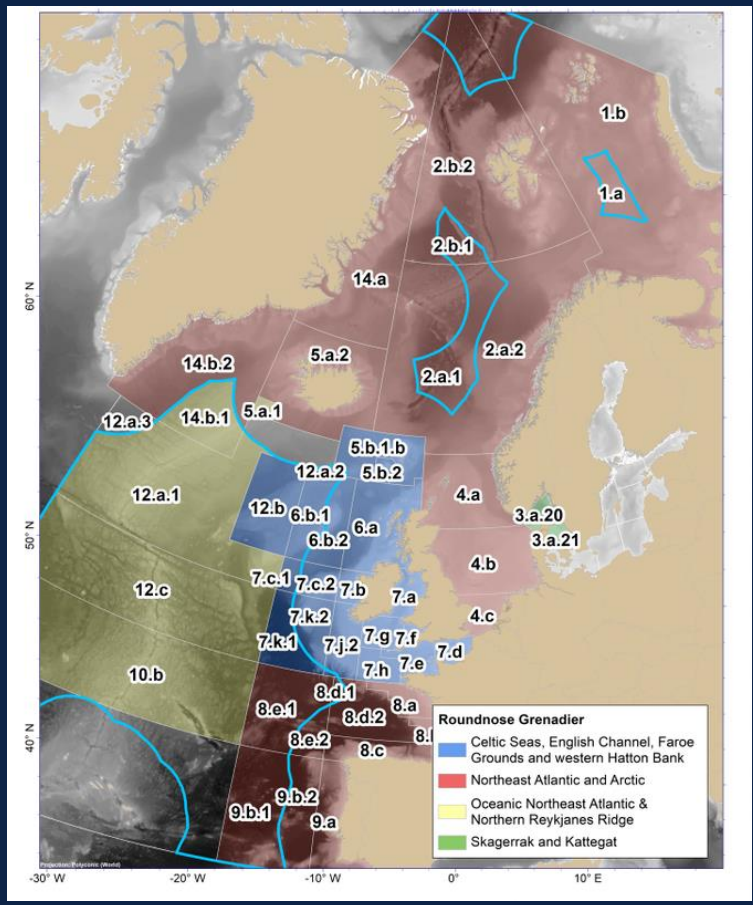
Reported landings of Roundnose grenadier in the Oceanic Northeast Atlantic





Discard rates of roundnose grenadier in other fisheries have declined and this can be attributed to the decline of the deep-water fishery overall

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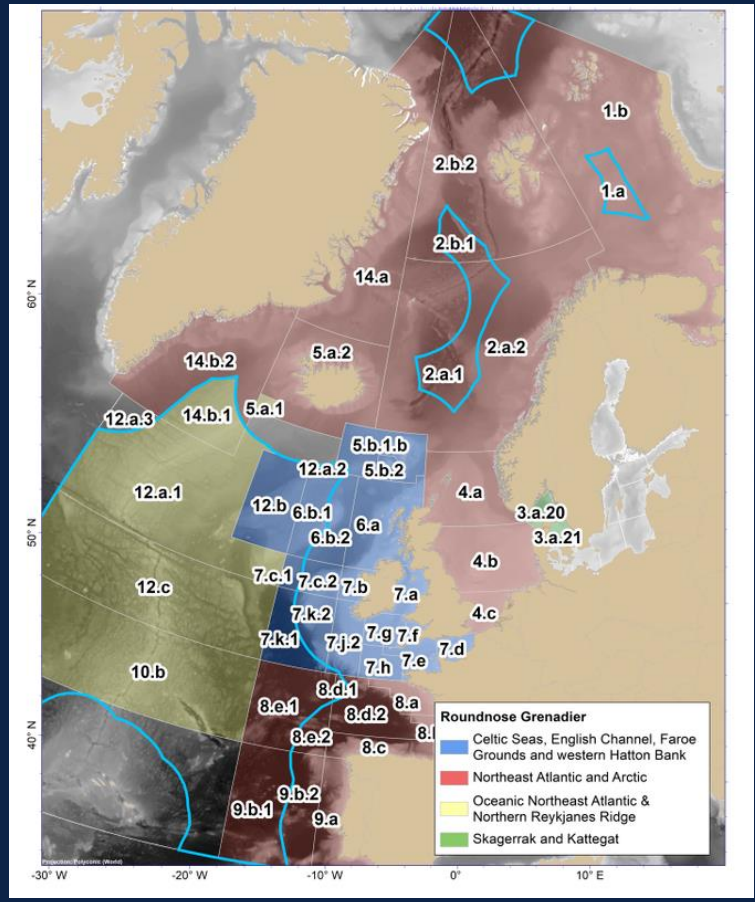
Status of the Roundnose grenadier stocks

- ICES reviewed existing information for roundnose grenadier in 2023, noting that “genetic population structure of roundnose grenadier has been subject to a few studies but remains uncertain”.

- There is currently no stock assessment for areas of the Oceanic Northeast Atlantic, and consequently, ICES cannot assess the stock and exploitation status of roundnose grenadier in this area.

- The limited fisheries-independent data is not considered appropriate to assess the status of roundnose grenadier stocks across the Northeast Atlantic, which limits the ability to understand the species resilience to disturbance and recoverability.



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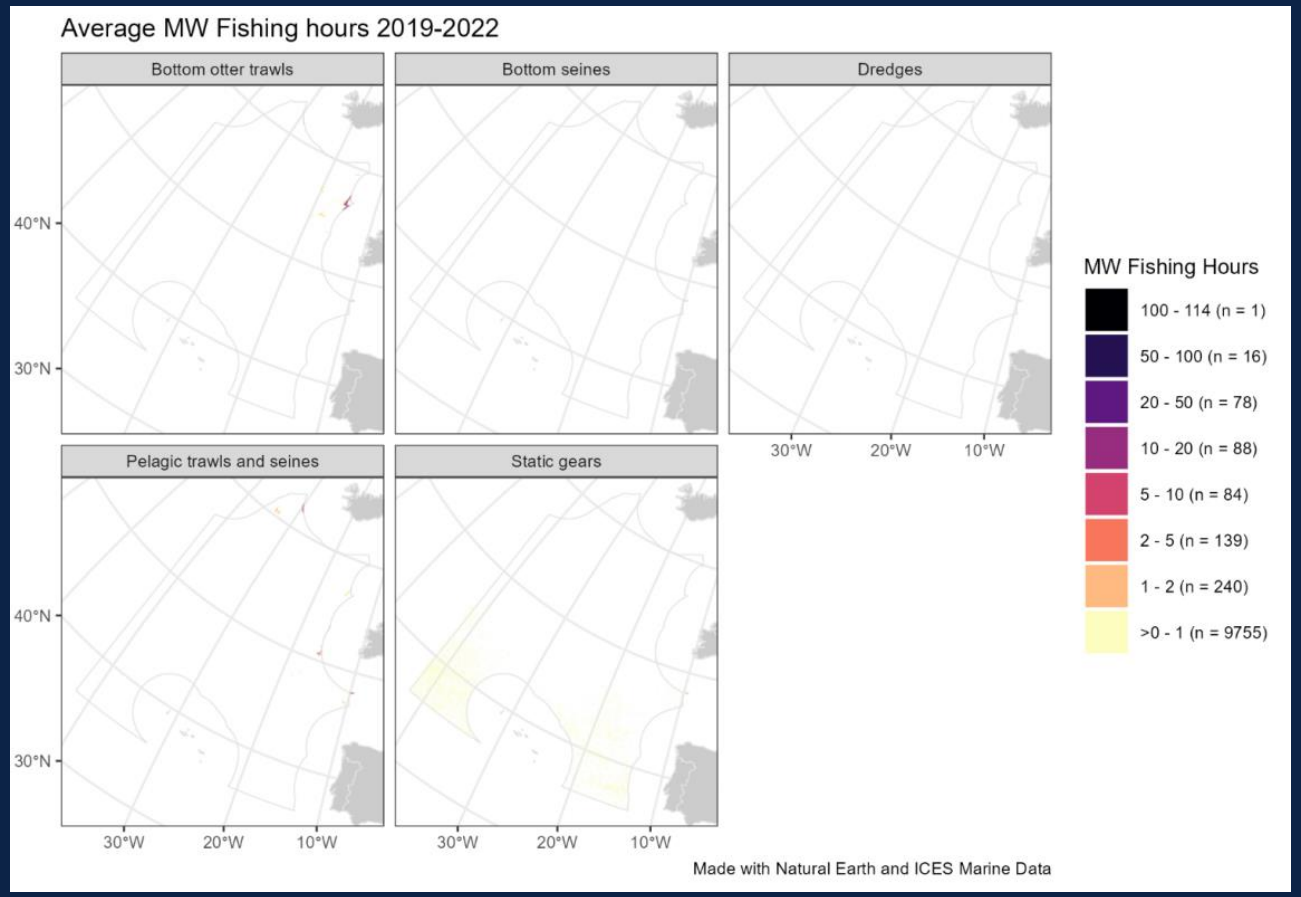
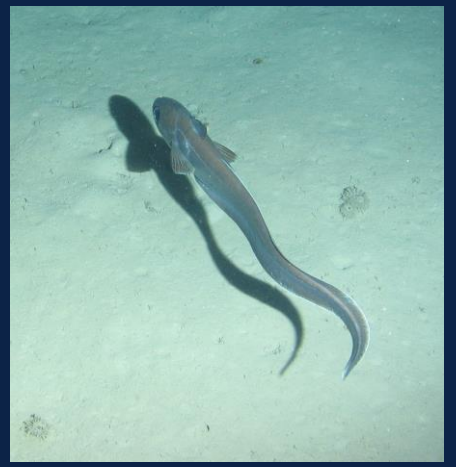
ICES. 2023. EU/UK request to ICES on roundnose grenadier apportion In Report of the ICES Advisory Committee, 2023. ICES Advice 2023, sr.2023.08. https://doi.org/10.17895/ices.advice.23500812
ICES. 2024. Working group on the biology and assessment of deep-sea fisheries resources (WGDEEP). ICES Scientific Reports. 6:56. 1156 pp. https://doi.org/10.17895/ices.pub.25964749

Much of the deep-sea fisheries in the North Atlantic occur(ed) at the same water depths as known Vulnerable Marine Ecosystems.





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(credit: NERC CLASS)

ICES. 2024. Oceanic Northeast Atlantic ecoregion – fisheries overview. In Report of the ICES Advisory Committee, 2024. ICES Advice 2024, section 13.2, https://doi.org/10.17895/ices.advice.27880092
Vieira and others. 2019. Deep-water fisheries along the British Isles continental slopes: status, ecosystem effects and future perspectives. Journal of Fish Biology, 94(6), pp.981-992

Ecosystem-based approaches in ABNJ: research needs & opportunities

Assessment of Significant Adverse Impacts

i. Identification and mapping of biodiversity and VMEs;

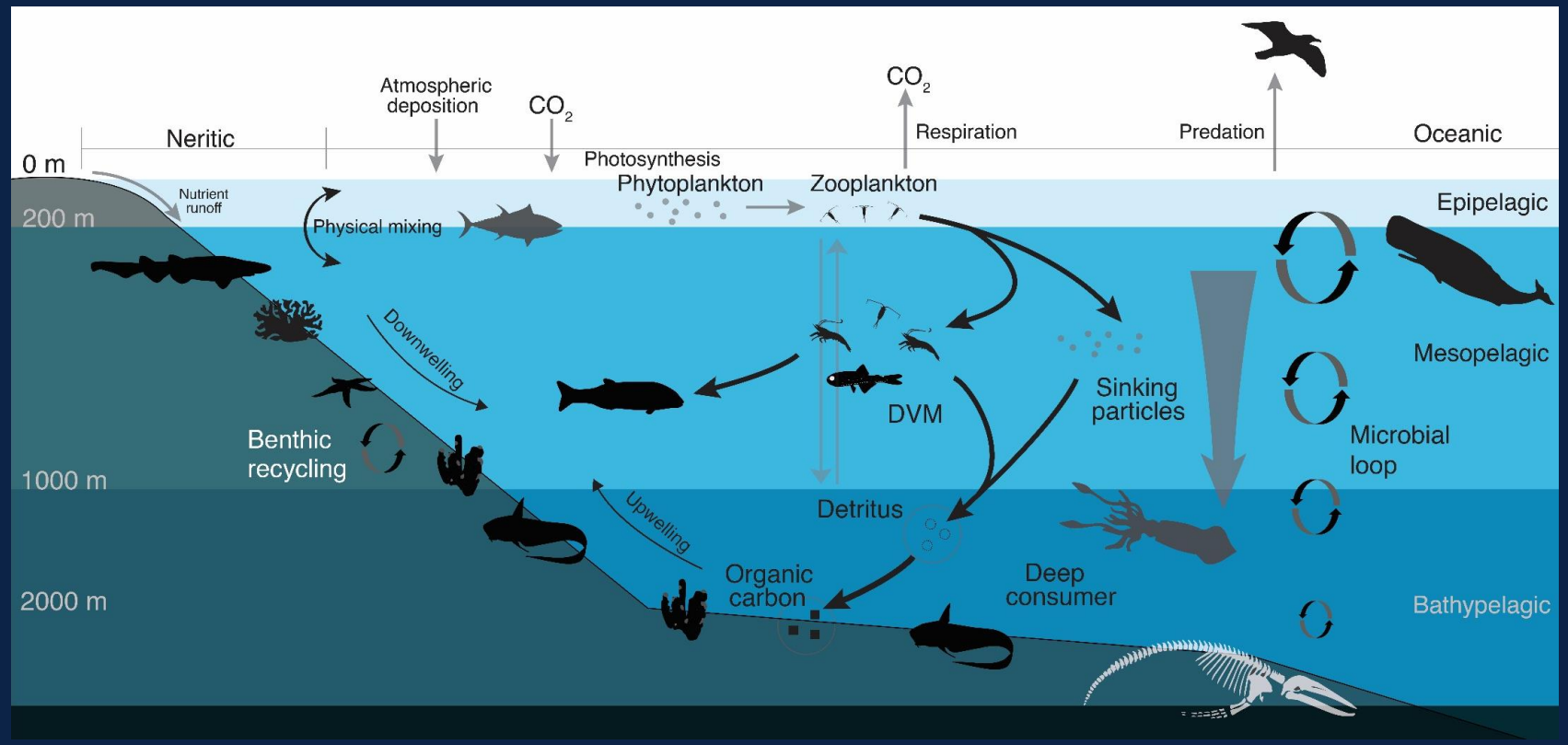
ii. The spatial extent of the impact relative to the availability of the habitat type affected (trade-offs);

iii. The ability of an ecosystem to recover from harm, and the rate of such recovery (connectivity);

iv. The extent to which ecosystem functions may be altered by the impact.

FAO guidelines 2009

Threats to biodiversity in deep sea



- Bottom trawling
- Deep-sea mining
- Oil and gas
- Bioprospecting
- Climate change

Understanding the extent of effects of human-induced disturbances on deep-sea ecosystems is limited by knowledge gaps and a lack of long-term datasets

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Work towards an ecosystem approach to fisheries management

The FAO ecosystem approach to fisheries recognises that fish and fisheries are part of, and dependent upon the entire marine ecosystem.

- Managing fishing activity is **one aspect** of the Ecosystem approach
- Opportunities to support the evidence needs in developing data-limited methods, mixed and multispecies fisheries

(some of the) evidence required:

- Multispecies interactions
- Bycatch (inc. utilising Remote Electronic Monitoring)
- Biodiversity and food webs
- Climate variability and climate change-related effects and predictions

Key scientific questions mapped to the UN Decade of Ocean Science for Sustainable Development

SUSTAINABLE DEVELOPMENT GOALS

THE ROYAL SOCIETY

Nov 2018 - Beyond Challenger: a new age of deep-sea science and exploration

i. What is the diversity of life in the deep ocean?

ii. How are populations & habitats connected?

iii. What is the role of living organisms in ecosystem function & service provision?

iv. How do species, communities, and ecosystems respond to disturbance?

nature ecology & evolution

A decade to study deep-sea life

The United Nations Decade of Ocean Science for Sustainable Development presents an exceptional opportunity to effect positive change in ocean use. We outline what is required of the deep-sea research community to achieve these ambitious objectives.

Kerry L. Howell, Ana Hilário, A. Louise Allcock, David Bailey, Maria Baker, Malcolm R. Clark, Ana Colaço, Jon Copley, Erik E. Cordes, Roberto Danovaro, Awantha Dissanayake, Elva Escobar, Patricia Esquete, Austin J. Gallagher, Andrew R. Gates, Sylvie M. Gaudron, Christopher R. German, Kristina M. Gjerde, Nicholas D. Higgs, Nadine Le Bris, Lisa A. Levin, Elisabetta Manea, Craig McClain, Lenaick Menot, Nelia C. Mestre, Anna Metaxas, Rosanna Milligan, Agnes W. N. Muthumbi, Bhavani E. Narayanaswamy, Sofia P. Ramalho, Eva Ramirez-Llodra, Laura M. Robson, Alex D. Rogers, Javier Sellanes, Julia D. Sigwart, Kerry Sink, Paul V. R. Snelgrove, Paris V. Stefanoudis, Paulo Y. Sumida, Michelle L. Taylor, Andrew R. Thurber, Rui Vieira, Hiromi K. Watanabe, Lucy C. Woodall and Joana R. Xavier

frontiers in Marine Science

A Blueprint for an Inclusive, Global Deep-Sea Ocean Decade Field Program

Kerry L. Howell[1], Ana Hilário[2], A. Louise Allcock[3], David M. Bailey[4], Maria Baker[5], Malcolm R. Clark[6], Ana Colaço[7], Jon Copley[5], Erik E. Cordes[8], Roberto Danovaro[9], Awantha Dissanayake[10], Elva Escobar[11], Patricia Esquete[2], Austin J. Gallagher[12], Andrew R. Gates[13], Sylvie M. Gaudron[14,15], Christopher R. German[16], Kristina M. Gjerde[17], Nicholas D. Higgs[18], Nadine Le Bris[19], Lisa A. Levin[20], Elisabetta Manea[21], Craig McClain[22], Lenaick Menot[23], Nelia C. Mestre[24], Anna Metaxas[25], Rosanna J. Milligan[26], Agnes W. N. Muthumbi[27], Bhavani E. Narayanaswamy[28], Sofia P. Ramalho[2], Eva Ramirez-Llodra[29,30], Laura M. Robson[31], Alex D. Rogers[30], Javier Sellanes[32], Julia D. Sigwart[33], Kerry Sink[34,35], Paul V. R. Snelgrove[36], Paris V. Stefanoudis[37,38], Paulo Y. Sumida[39], Michelle L. Taylor[40], Andrew R. Thurber[41], Rui P. Vieira[42], Hiromi K. Watanabe[43], Lucy C. Woodall[37,38] and Joana R. Xavier[44,45]

Key questions for the achievement of the SDGs and contribute to the conservation and sustainable use of (deep) marine resources

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Thank you for listening

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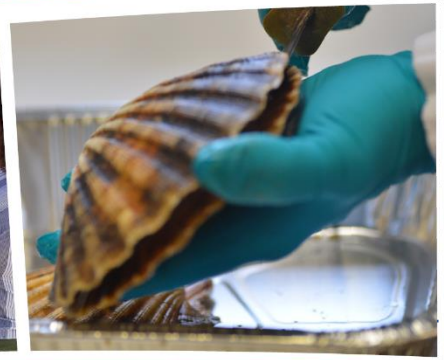
SCAN ME



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