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Aiming to reverse biodiversity decline by strengthening the conservation of coastal and marine areas, balancing human and ecosystem needs, and upscaling ecosystem-based management

A research plan for using Simple Ecological Systems approach to analysing management options in international pelagic fisheries

Catherine Chambers 1, Bjarki Þ. Elvarsson 2, Unn Laksá 3, Magni Laksáfoss 3, Sandra Rybicki 2, Anna H. Ólafsdóttir 2, **Pamela J. Woods 2**

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Funded by the European Union

WWF

Háskólasetur Vestfjarða University Centre of the Westfjords

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Outline

1. MarineSABRES
2. The study system (Iceland focus)
3. The proposed approach
4. Questions, feedback, discussion

The Challenge

- **Ecosystem Based Management (EBM)** is championed at the international level and enshrined in the MSFD and the Maritime Spatial Planning Directive (MSPD)

BUT

- Marine **Social-Ecological-Systems (SES)** are inherently complex to manage, distracting from our capacity to effectively deal with the most important combination of activities and pressures.

Aims

To conserve and protect biodiversity by integrating sustainable ecosystems and a resilient blue economy“

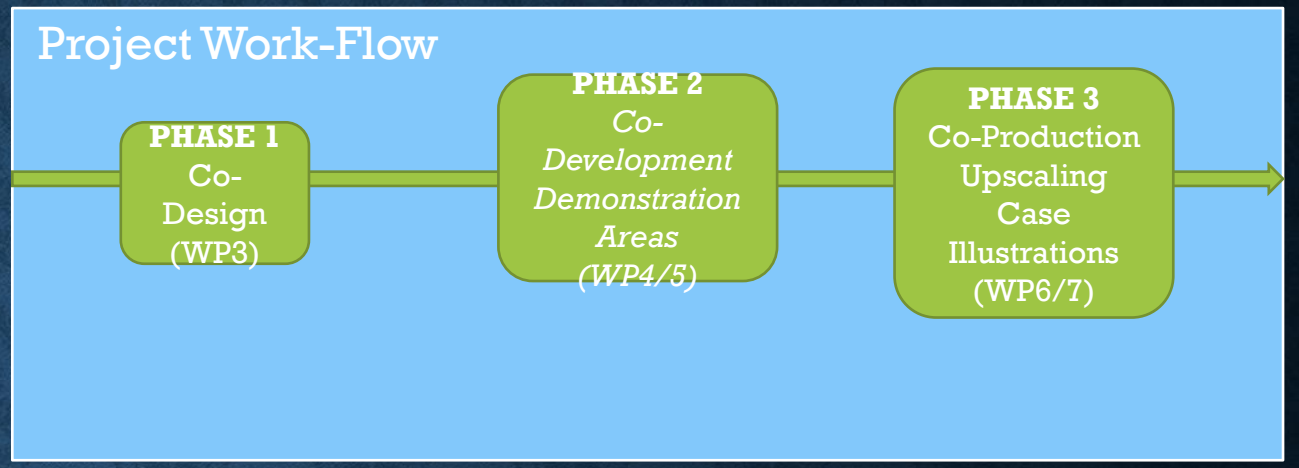
“….Bringing stakeholders together from government, policy, business and coastal management, with marine scientists to co-design a simple social-ecological system (ses). This simple SES is designed to improve uptake of ecosystem-based management (EBM) and strengthen interventions and measures for the protection and conservation of coastal and marine areas, their biodiversity and ecosystem services (ES)…..”

LINK TO EBM

PHASE 1: Specification and development of a Simple SES

PHASE 2: Application, testing and demonstration of the Simple SES

PHASE 3: Refinement of the Simple SES



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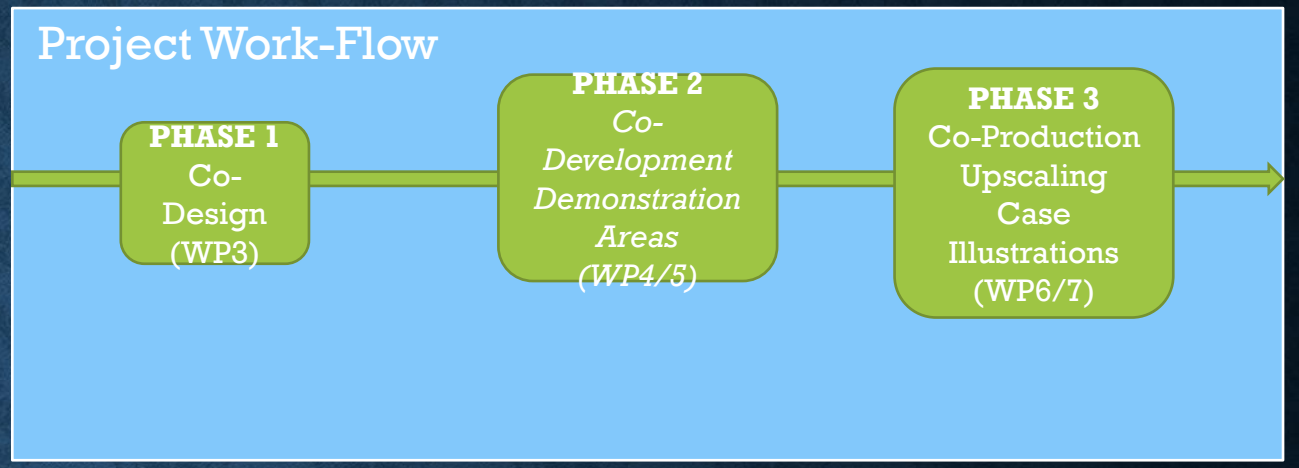
LINK TO EBM

PHASE 1: Specification and development of a Simple SES
Mapping the SES sub-systems with stakeholders

PHASE 2: Application, testing and demonstration of the Simple SES

PHASE 3: Refinement of the Simple SES



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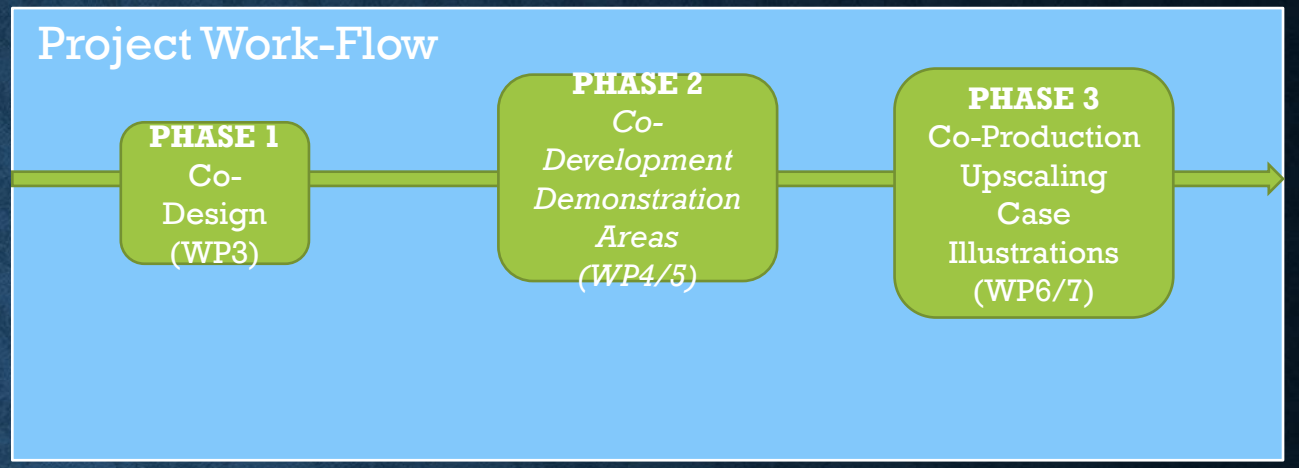

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LINK TO EBM

PHASE 1: Specification and development of a Simple SES
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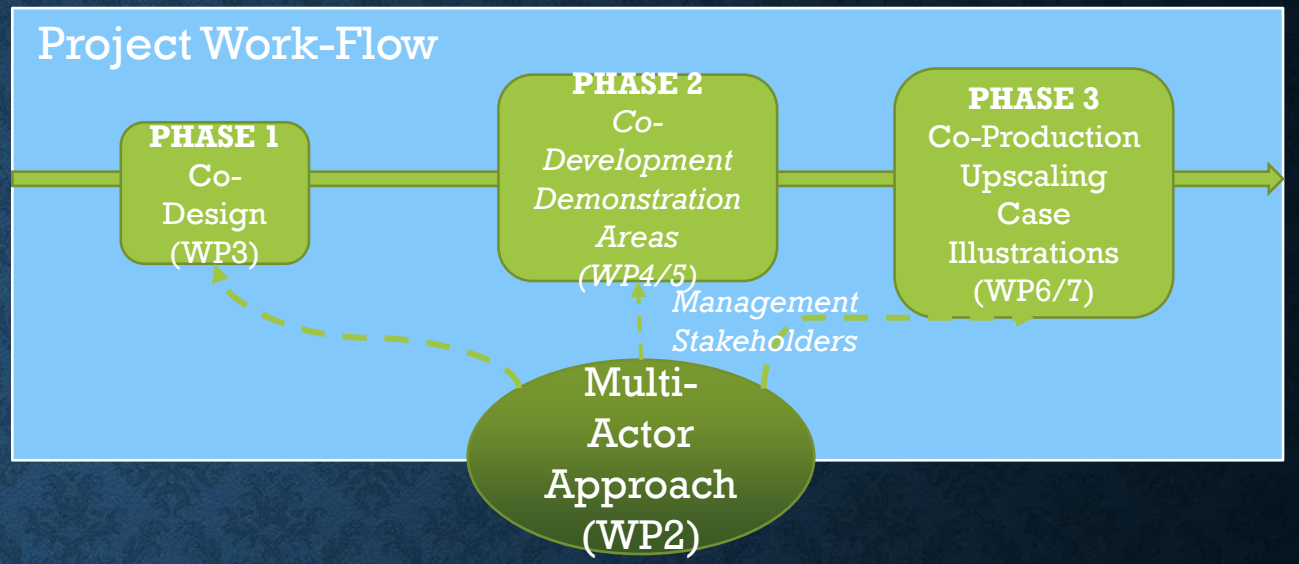

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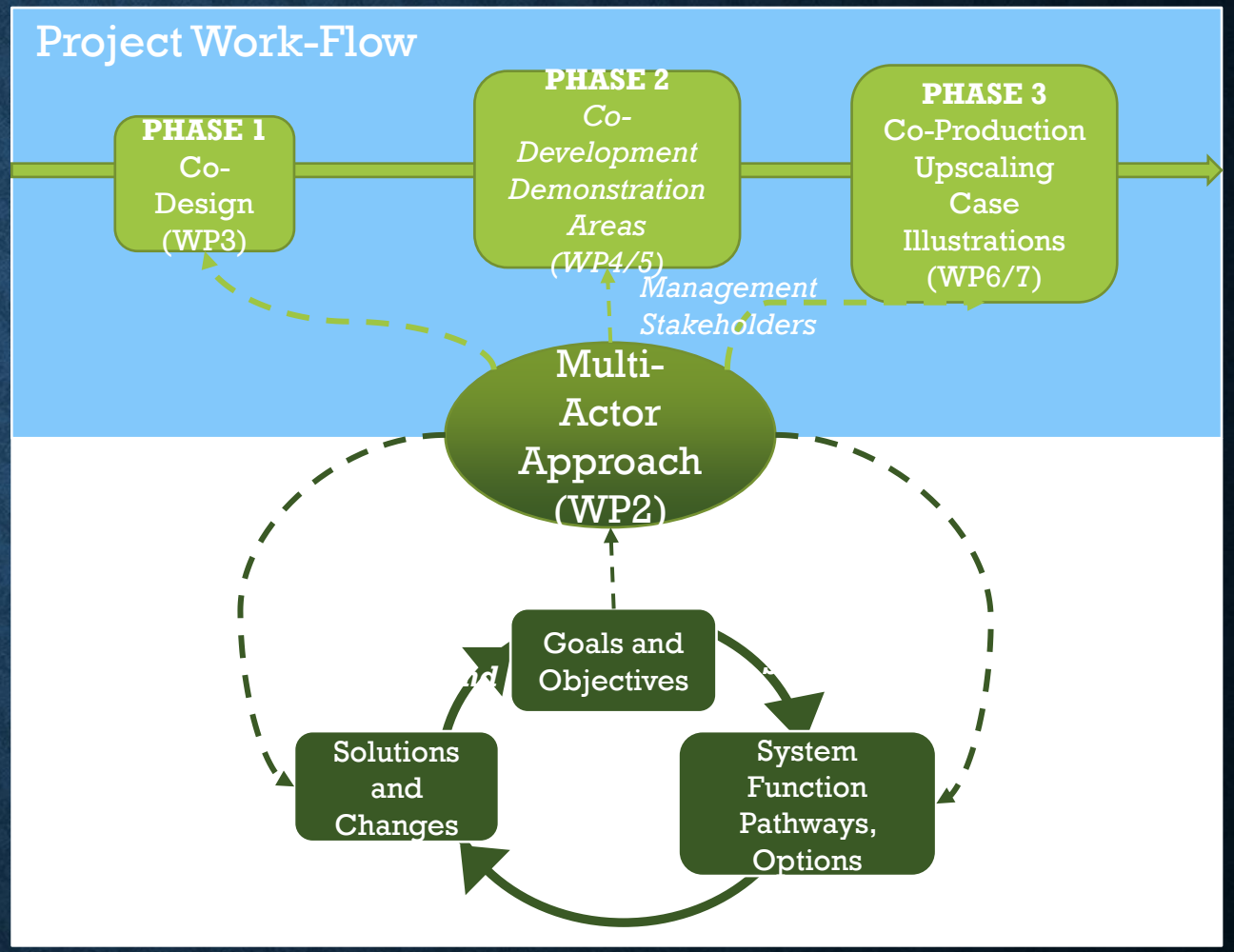
LINK TO EBM

PHASE 1: Specification and development of a Simple SES
Mapping the SES sub-systems with stakeholders

PHASE 2: Application, testing and demonstration of the Simple SES
Identification and costing of scenarios for development in the DAs

PHASE 3: Refinement of the Simple SES
Packaging of the tools and guidance to populate the Simple SES into an open access Decision Support System (DSS)



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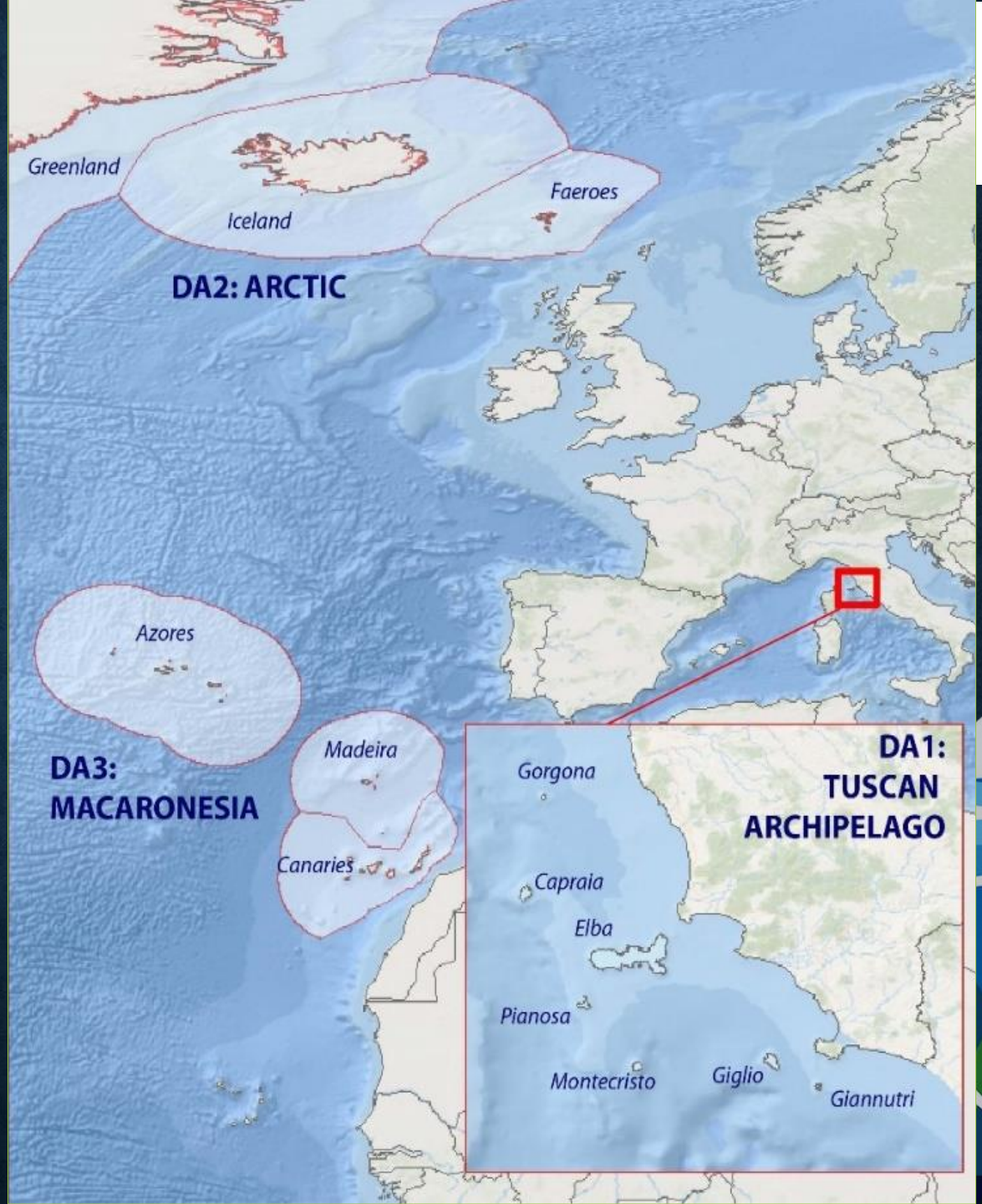
Demonstration Areas



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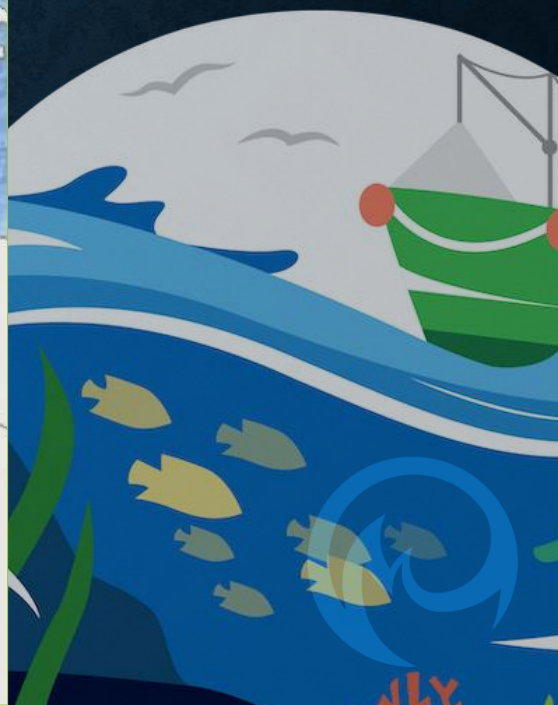
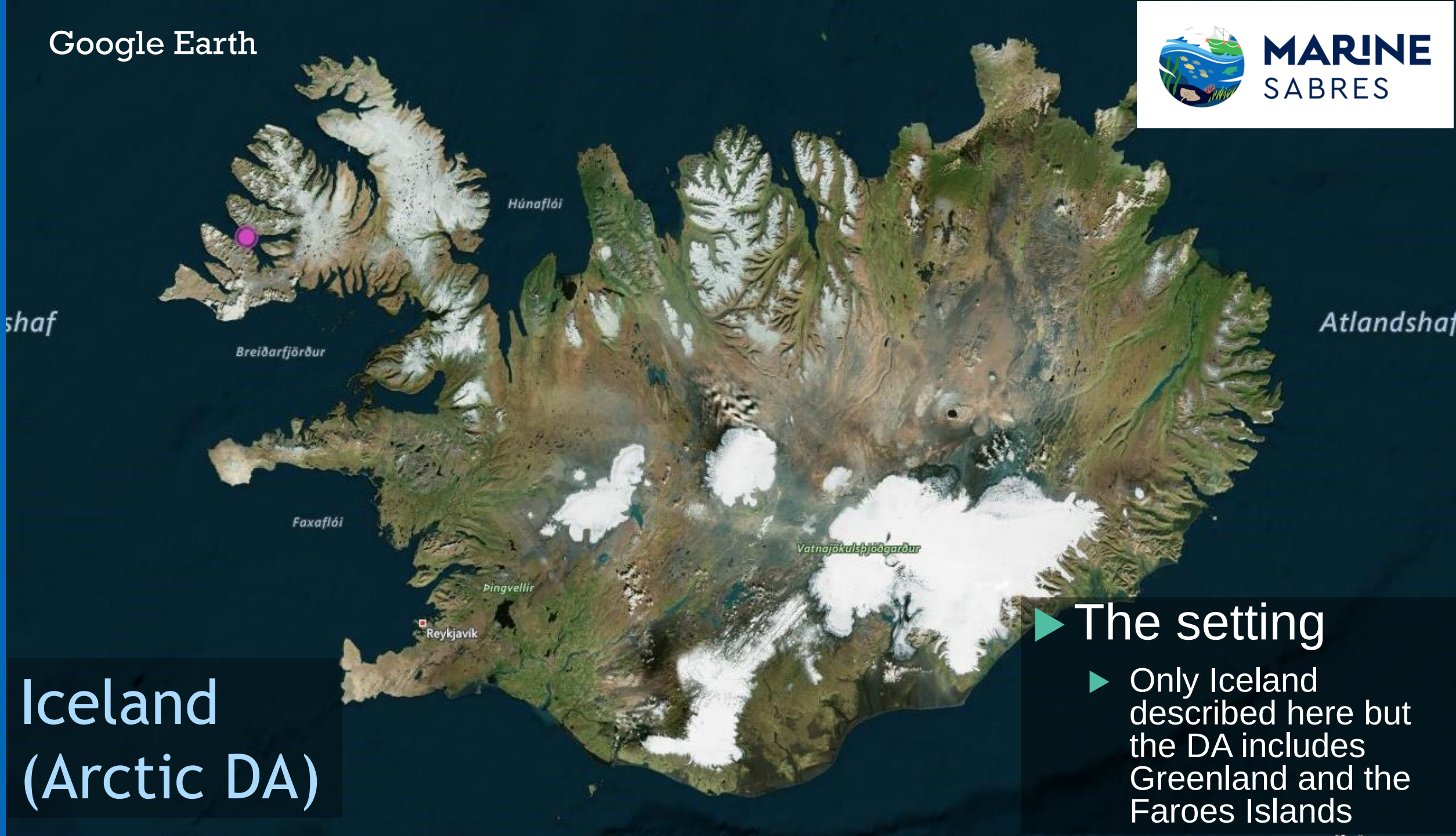
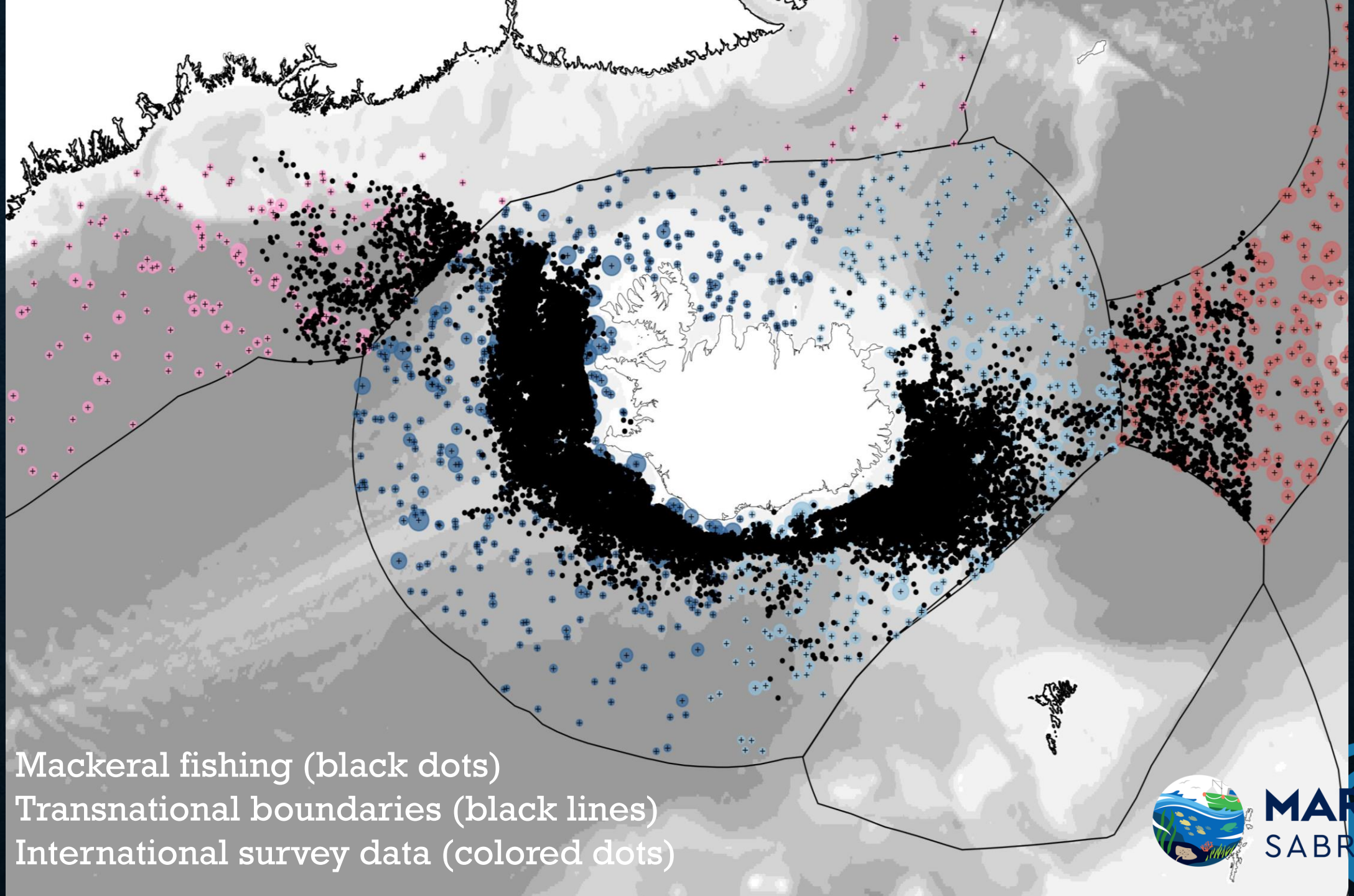




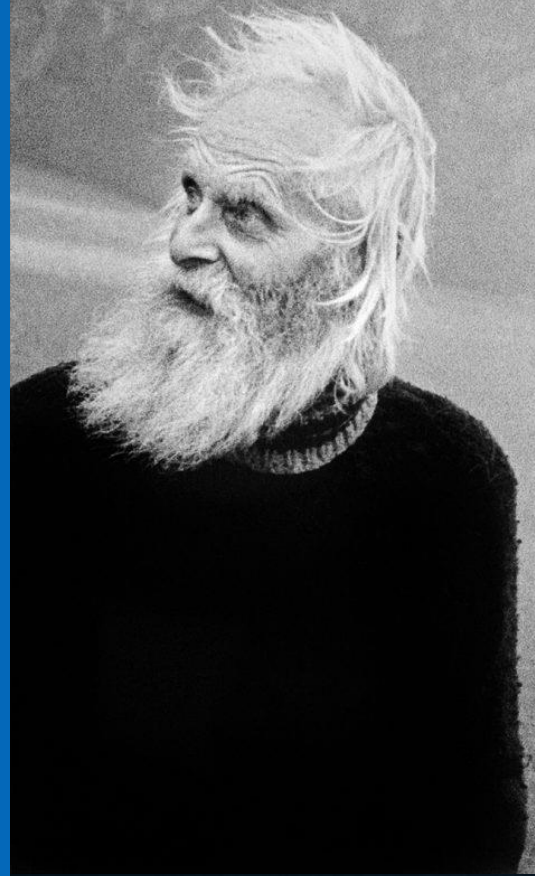
Iceland (Arctic DA)

- The setting
  - Only Iceland described here but the DA includes Greenland and the Faroes Islands


Mackeral fishing (black dots)
Transnational boundaries (black lines)
International survey data (colored dots)

RAX.is/faces-of-the-north

Iceland (Arctic DA)



- The people

RAX.is/faces-of-the-north

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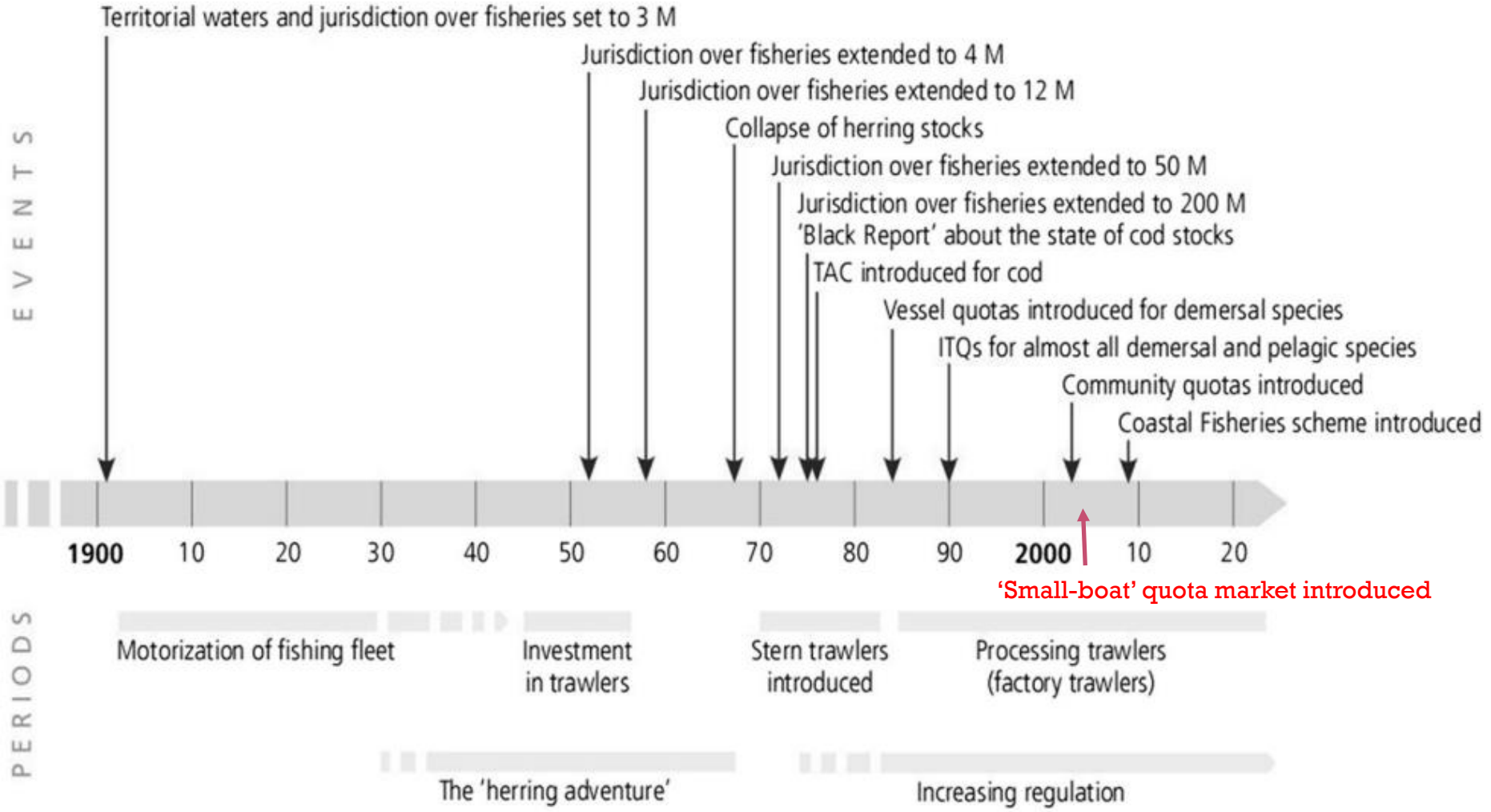
Fig. 1 Major events and general periods of growth, stagnation and decline in the Icelandic fisheries since 1900



Modified from: Kokorsch and Benediktsson 2018. Prosper or perish? The development of Icelandic fishing villages after the privatization of fishing rights. Maritime Studies 17: 69-83

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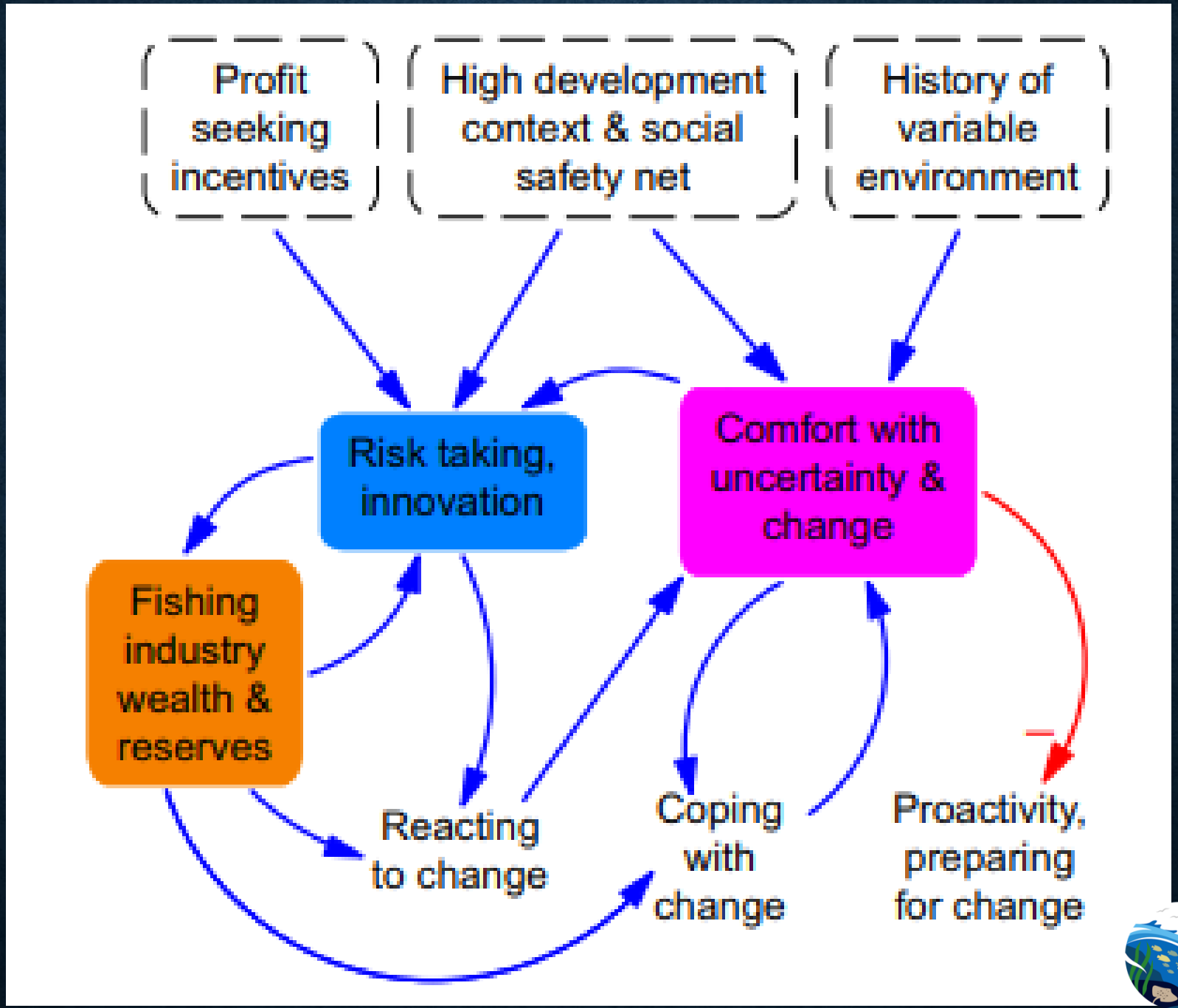
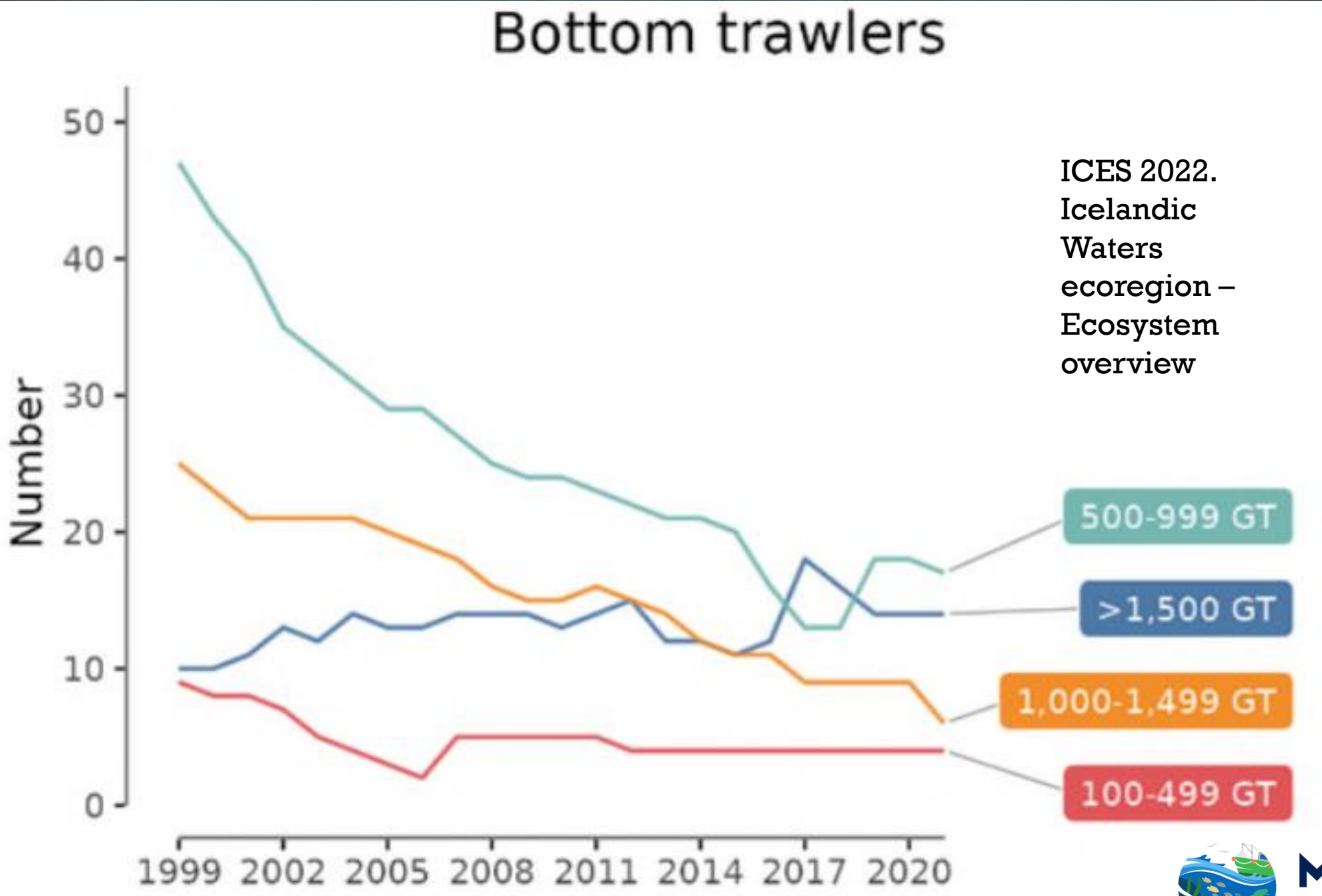
Mason, Stedman, and Kleisner, 2023. Climate resilience and risks of rigidity traps in Iceland's fisheries. Ambio





ICES 2022. Icelandic Waters ecoregion – Ecosystem overview

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Fig. 4 Spatial distribution of clusters in the fisheries dimension, 2014

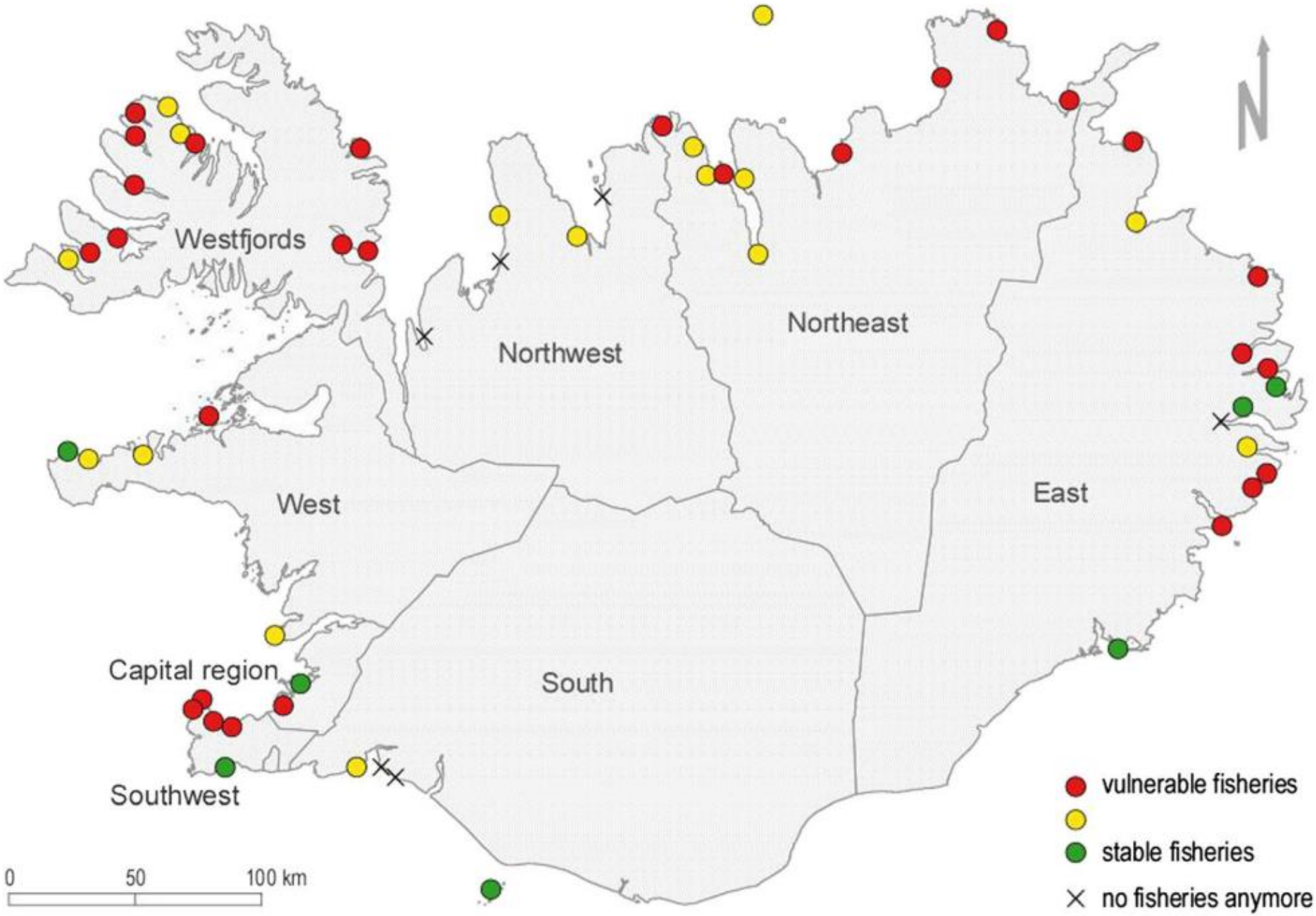

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Photo:
Anna Heiða Ólafsdóttir, MFRI

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Iceland (Arctic DA)

- The resources

Photo: Svanhildur Egilsdóttir, MFRI

ICES 2022. Icelandic Waters ecoregion – Ecosystem overview

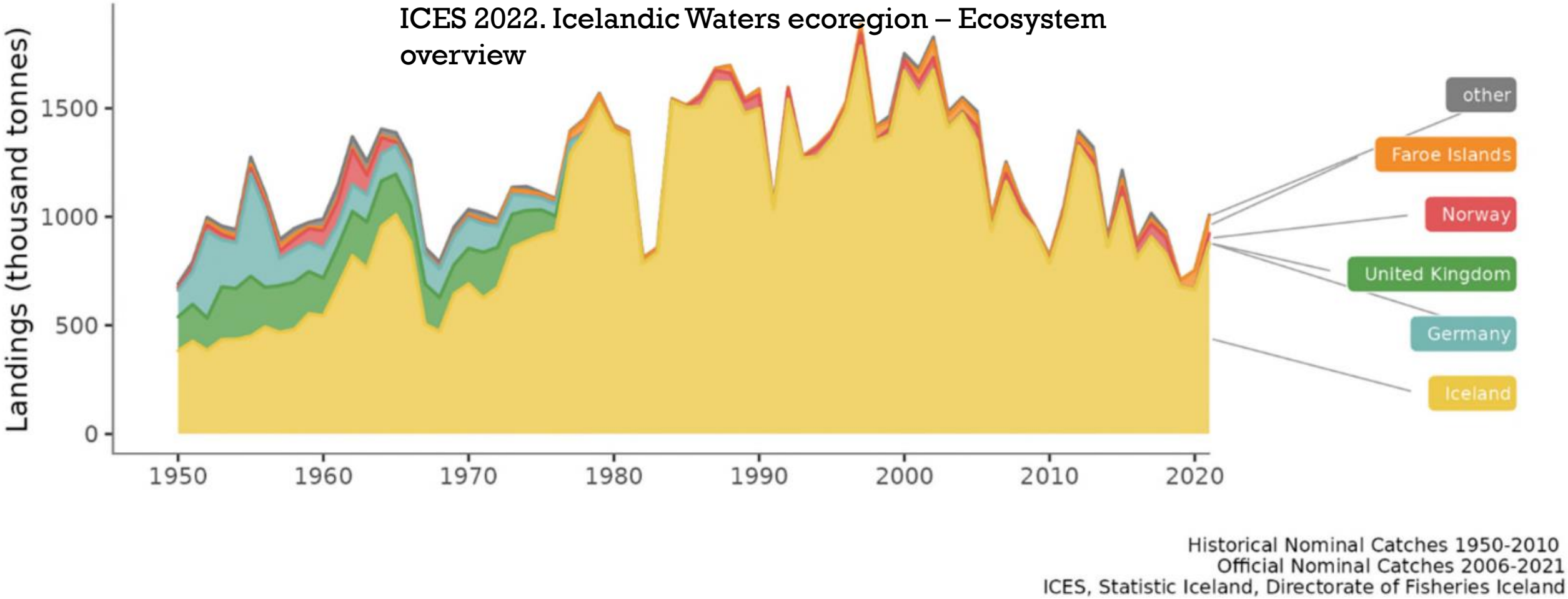

Figure 2 Landings (thousand tonnes) from the Icelandic Waters ecoregion 1950–2021, by country. The five countries with the highest landings are displayed separately, while the remaining countries are aggregated and displayed as “other”.

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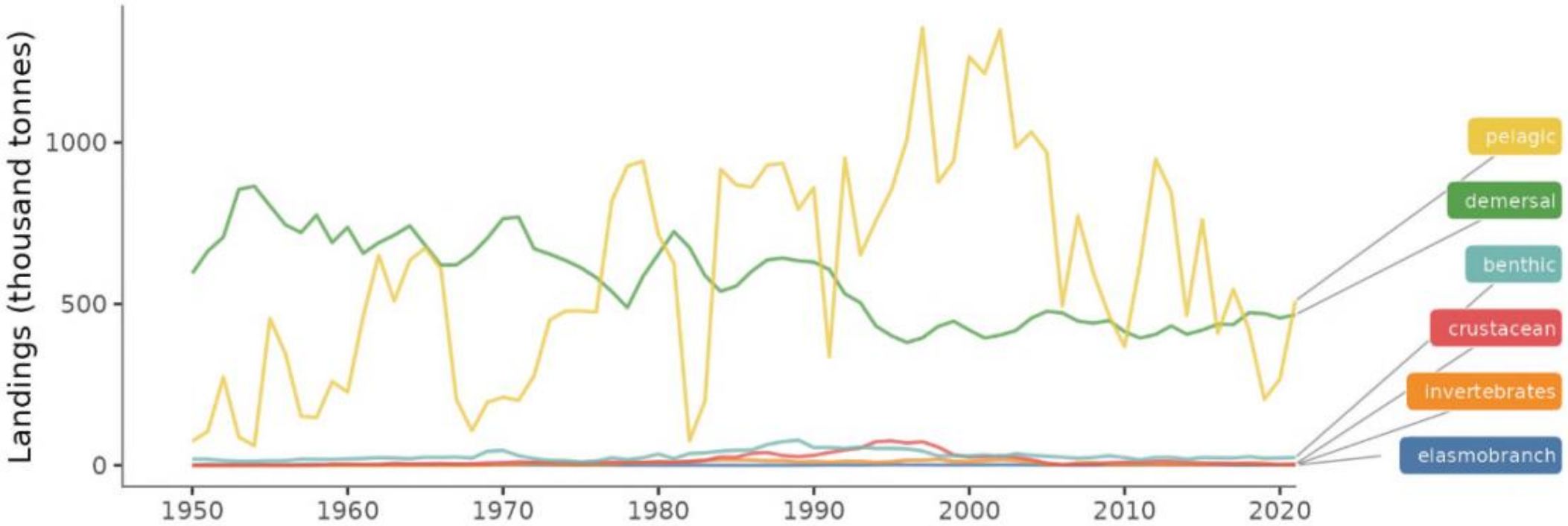


Figure 4 Landings (thousand tonnes) from the Iceland Waters ecoregion 1950–2021, by fish category. Table A2 details which species belong to each fish category.

ICES 2022. Icelandic Waters ecoregion – Ecosystem overview

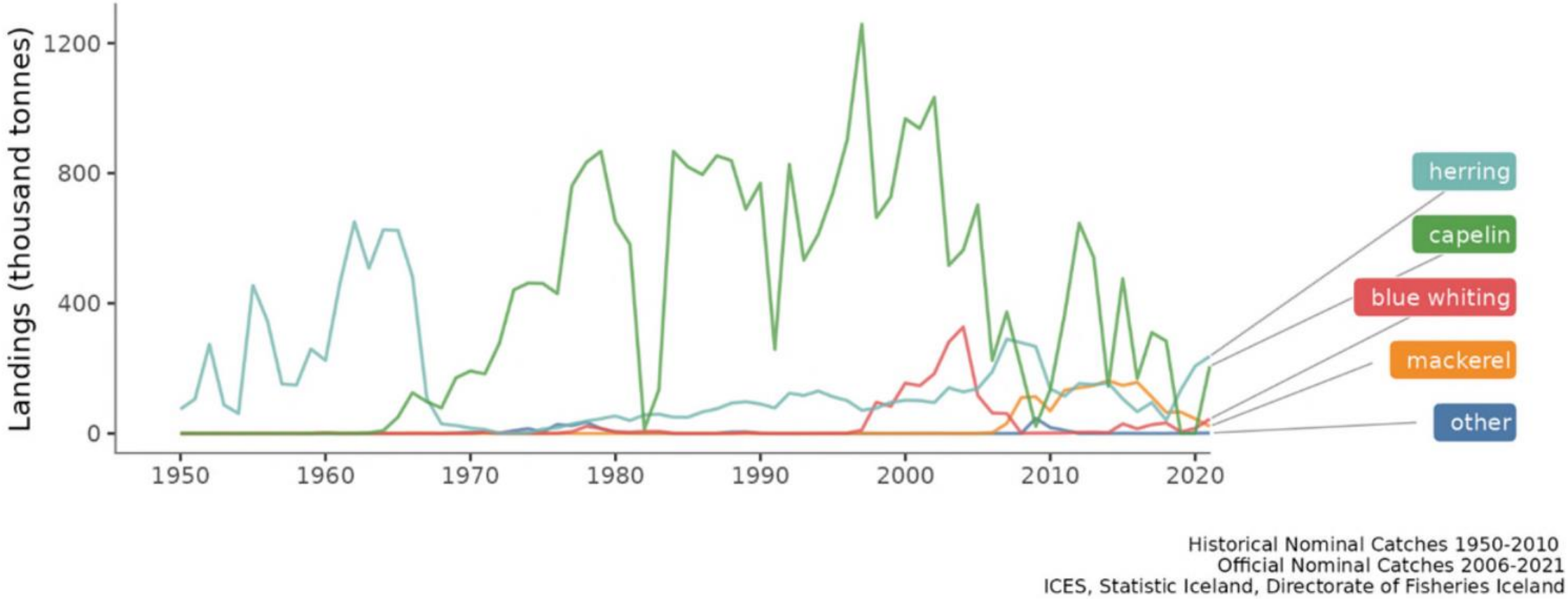
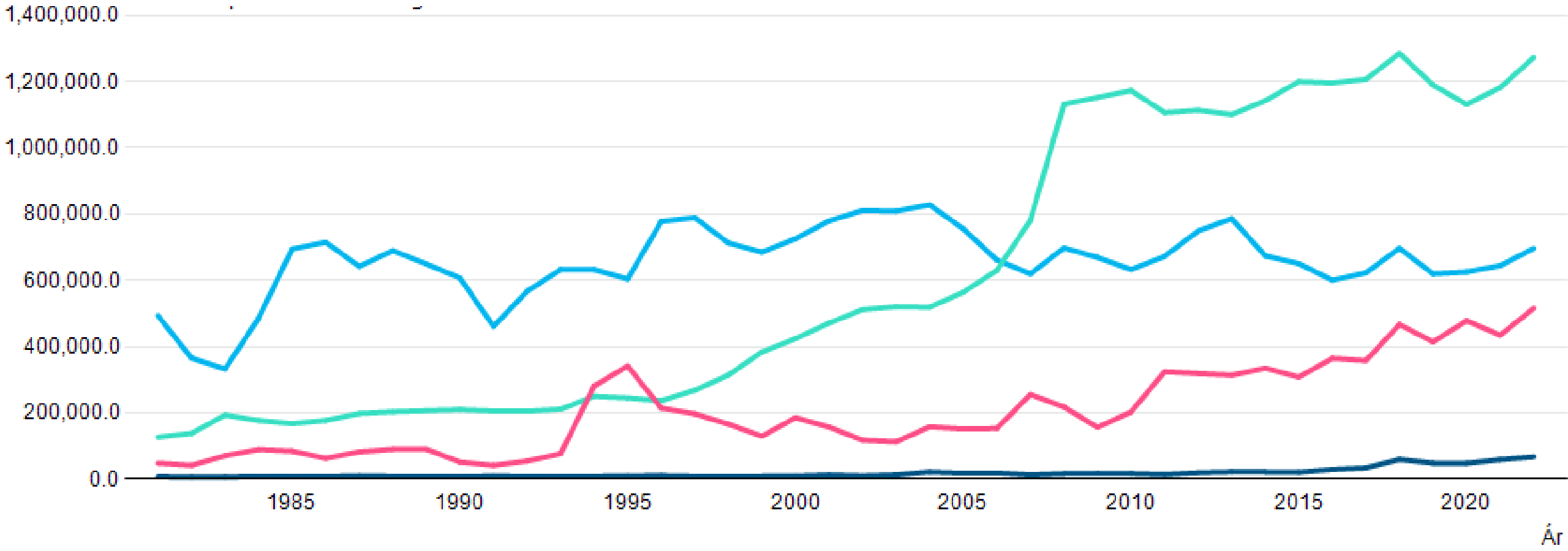


Figure 9 Landings (thousand tonnes) of four pelagic species from the Icelandic Waters ecoregion 1950–2021. The total landings of other species (Norway pout and Mueller's pearlside) are labelled as "other".

Statistics Iceland https://www.statice.is/



ource: Hagskinna/Utanríkisverslun

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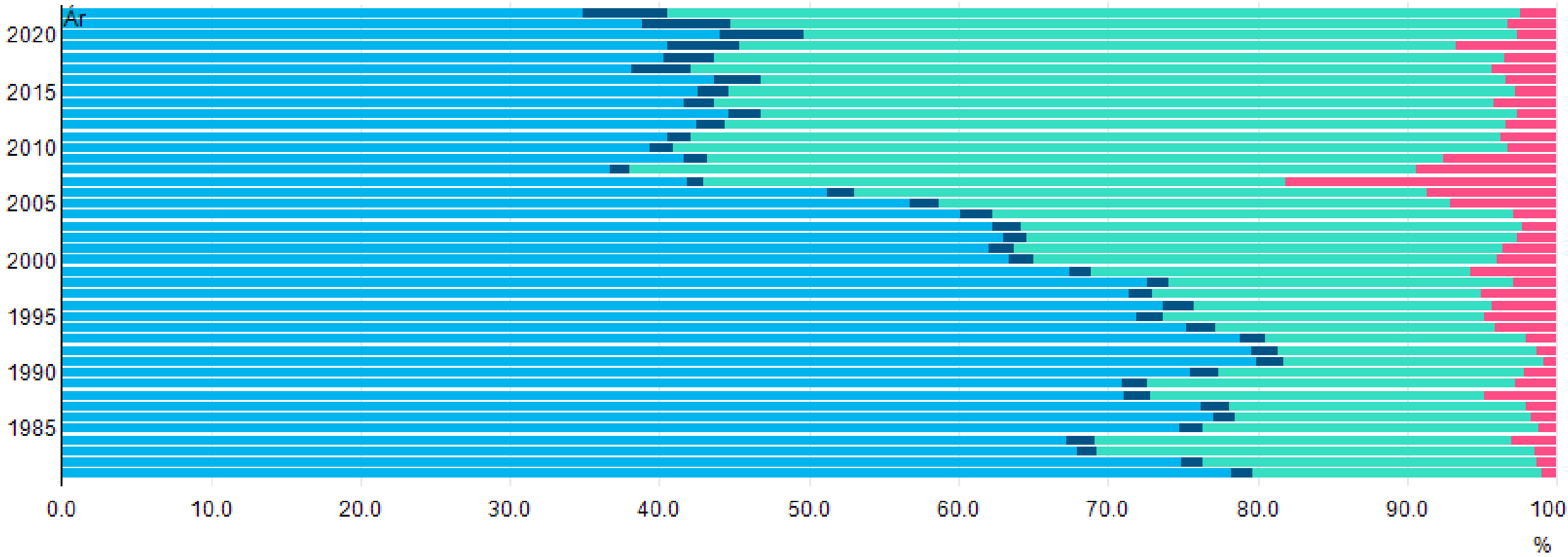
Statistics Iceland https://www.statice.is/



Marine exports

Agricultural exports

Industrial products (mostly aluminum)

4 Other

Source: Hagskinna/Utanríkisverslun

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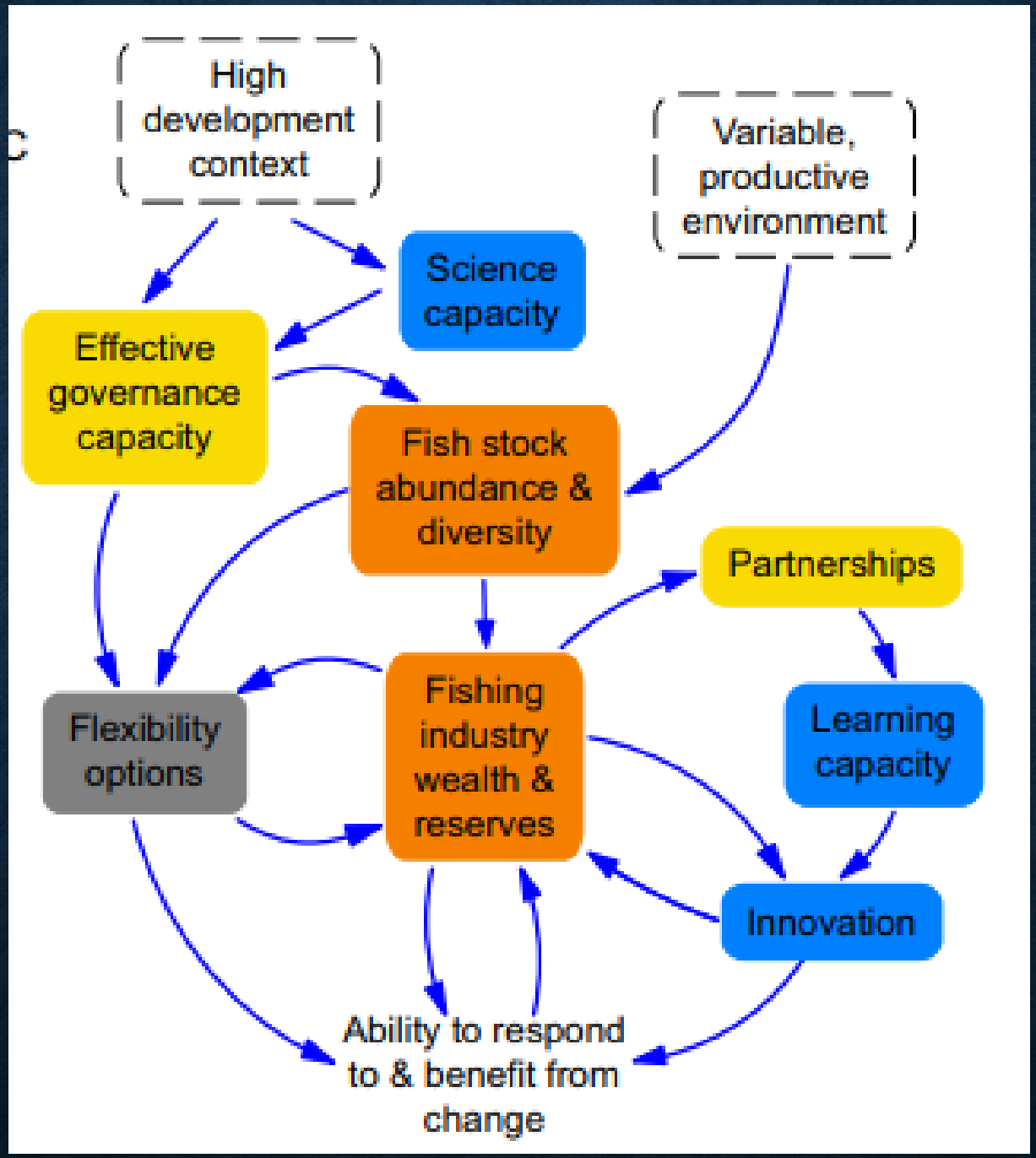
Iceland (Arctic DA)

- Governance

Mason, Stedman, and Kleisner, 2023. Climate resilience and risks of rigidity traps in Iceland's fisheries. Ambio



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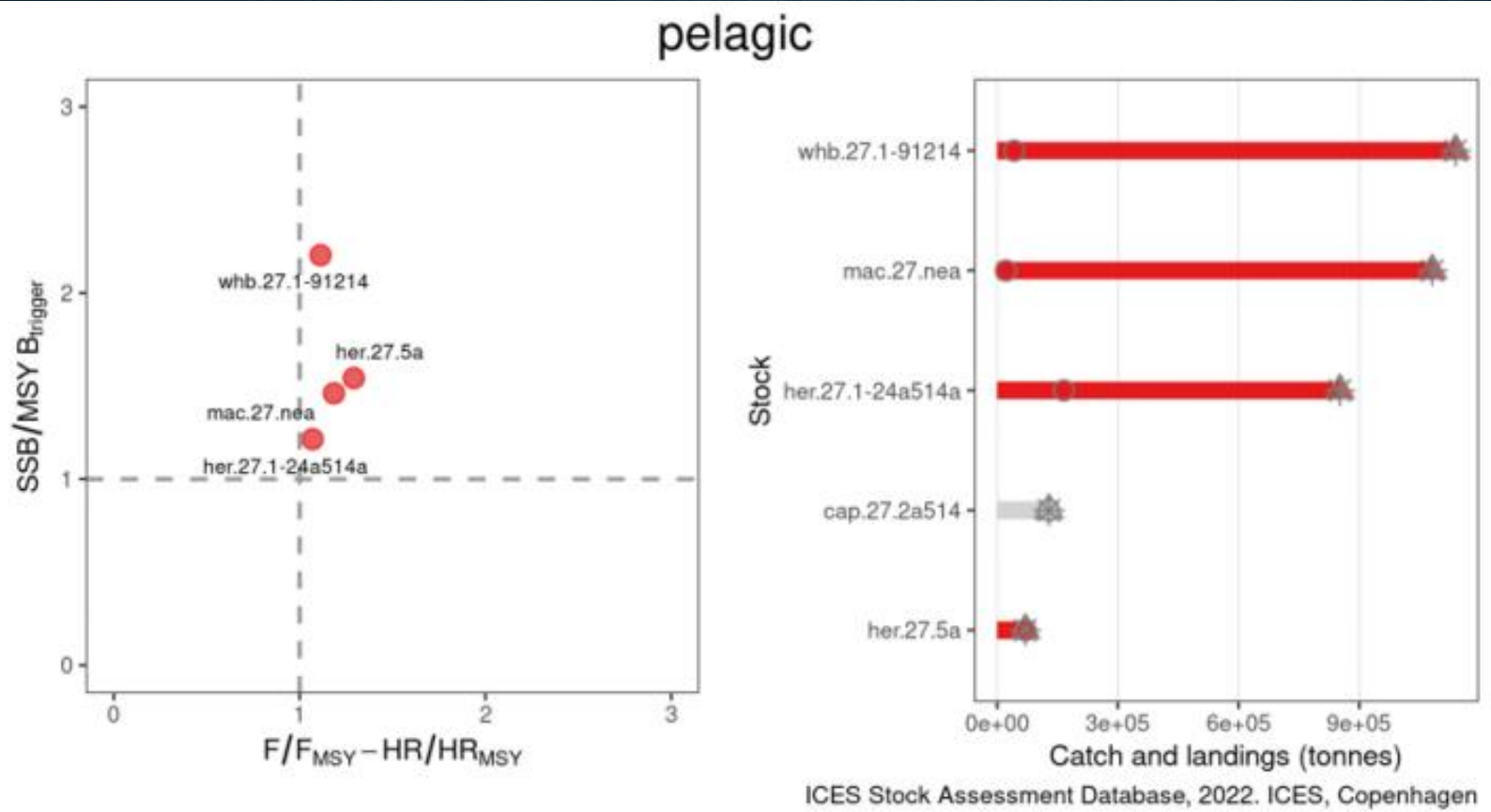

Figure 20 Status of Icelandic Waters ecoregion stocks assessed by ICES, relative to the joint distribution of exploitation (HR/HR_{MSY} and F/F_{MSY}) and stock size (SSB/MSY $B_{trigger}$) [left panel, by individual stocks] and catches (triangles)/landings (stars)/landings from Icelandic Waters ecoregion (circles) from these stocks in 2021 [right panel]. The left panel only includes stocks for which MSY reference points have been defined (MSY where available). Stocks in green are exploited at or below HR_{MSY} and F_{MSY}, while their sizes are also at or above MSY $B_{trigger}$. Stocks in red are either exploited above HR_{MSY} and F_{MSY} or their sizes are below MSY $B_{trigger}$, or both. "All stocks" refers to the ten stocks with the highest catch and landings across fisheries guilds in 2021. Note that reb.2127.dp is not included in the figure, as F/F_{MSY} is above 10. For full stock names, see Table A1 in the Annex. Note that Greenland halibut and plaice are considered demersal species.

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https://csr.sfs.is

110%

Fisheries Iceland

Icelandic fishing industry in harmony with the environment and society

Corporate Social Responsibility

About the project

Signatories

Voices of stakeholders

Carbon footprint

Transparency

Safety

Waste fishing gear

Photos: Svanhildur Egilsdóttir, MFRI

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Iceland (Arctic DA)

- The approach: SES

Cormier et al. 2013. Marine and Coastal Ecosystem-based risk management handbook.

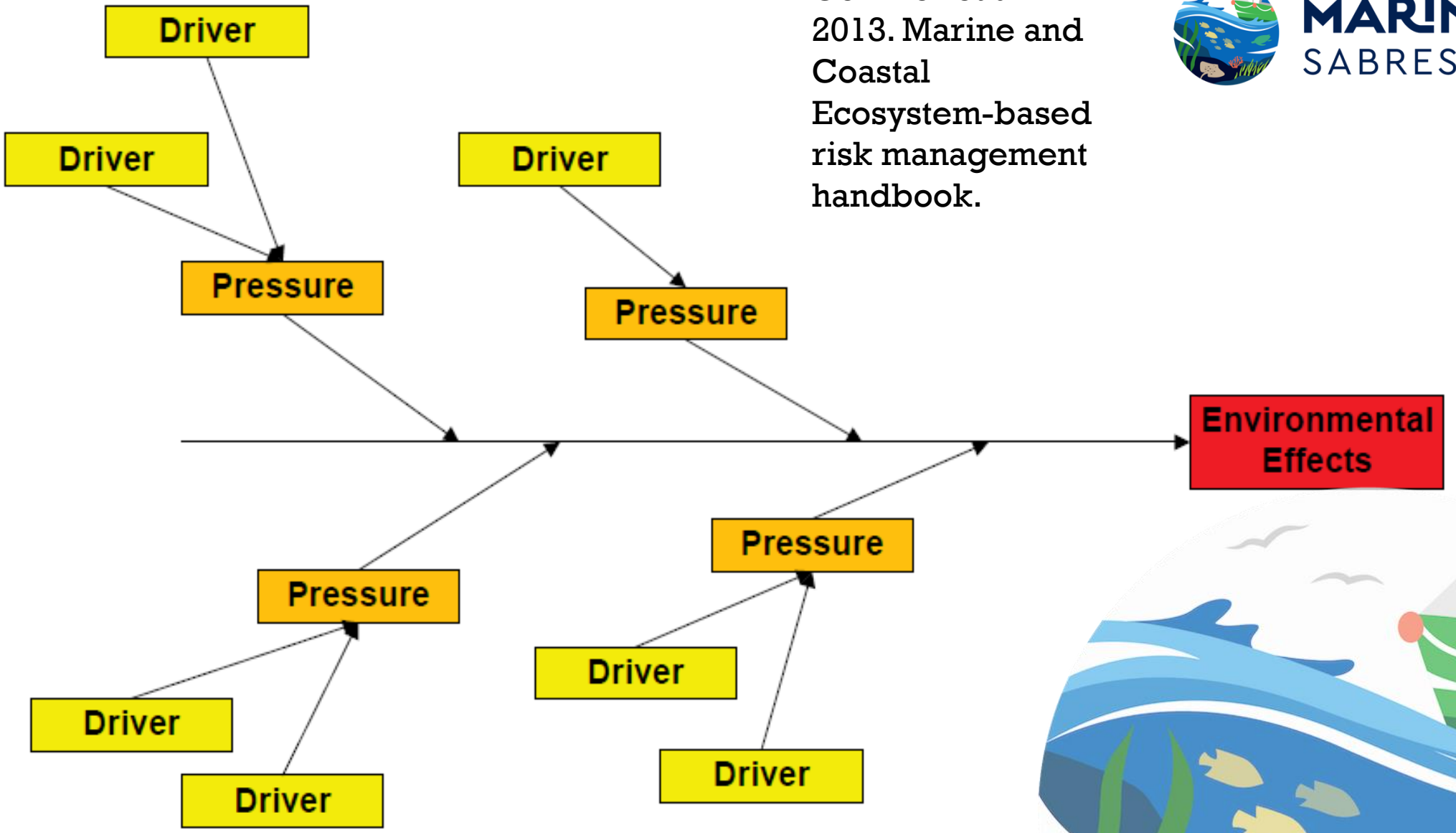


Figure 7.1. Environmental cause-and-effect pathways.

Cormier et al. 2013. Marine and Coastal Ecosystem-based risk management handbook.

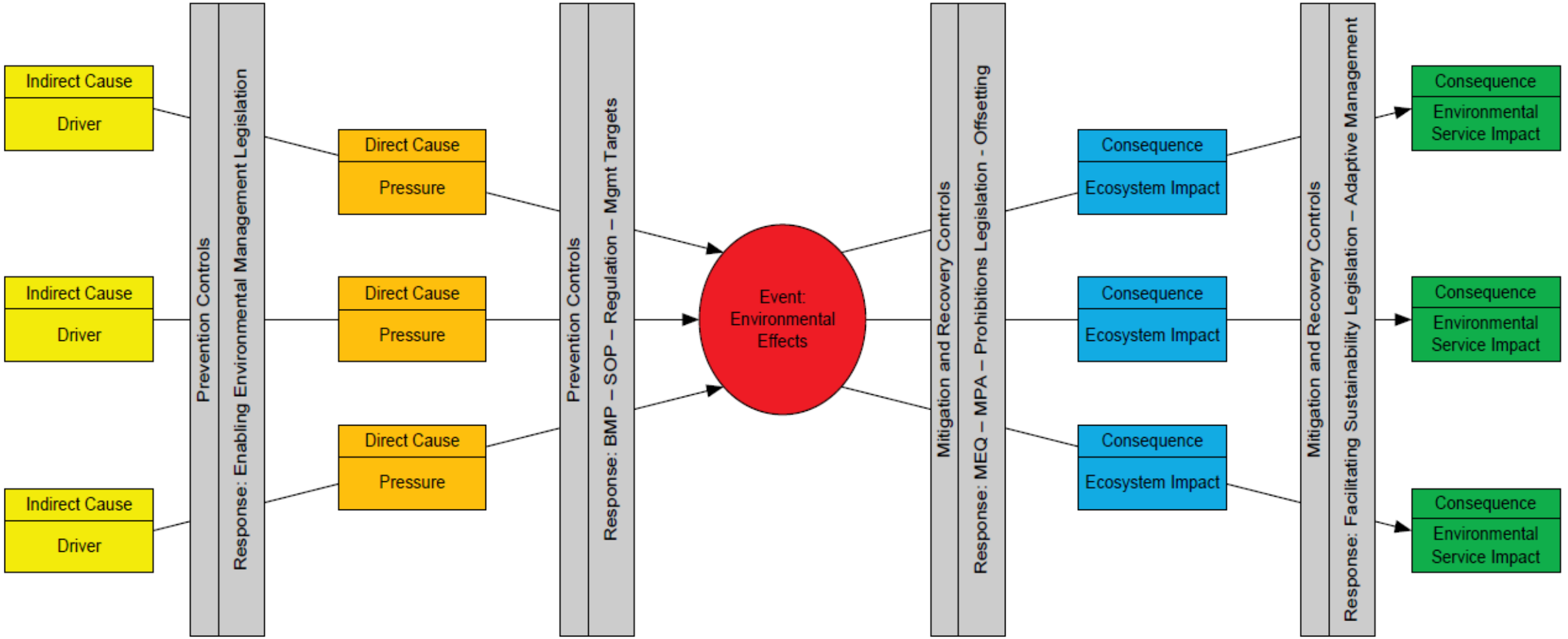


Figure 7.2. Control and mitigation measure gap analysis.

Elliott, M., Borja, A., Cormier, R. 2020. Activity-footprints, pressures-footprints and effects-footprints – walking the pathway to determining and managing human impacts in the sea. Marine Pollution Bulletin, 155: 111201; https://doi.org/10.1016/j.marpolbul.2020.111201.

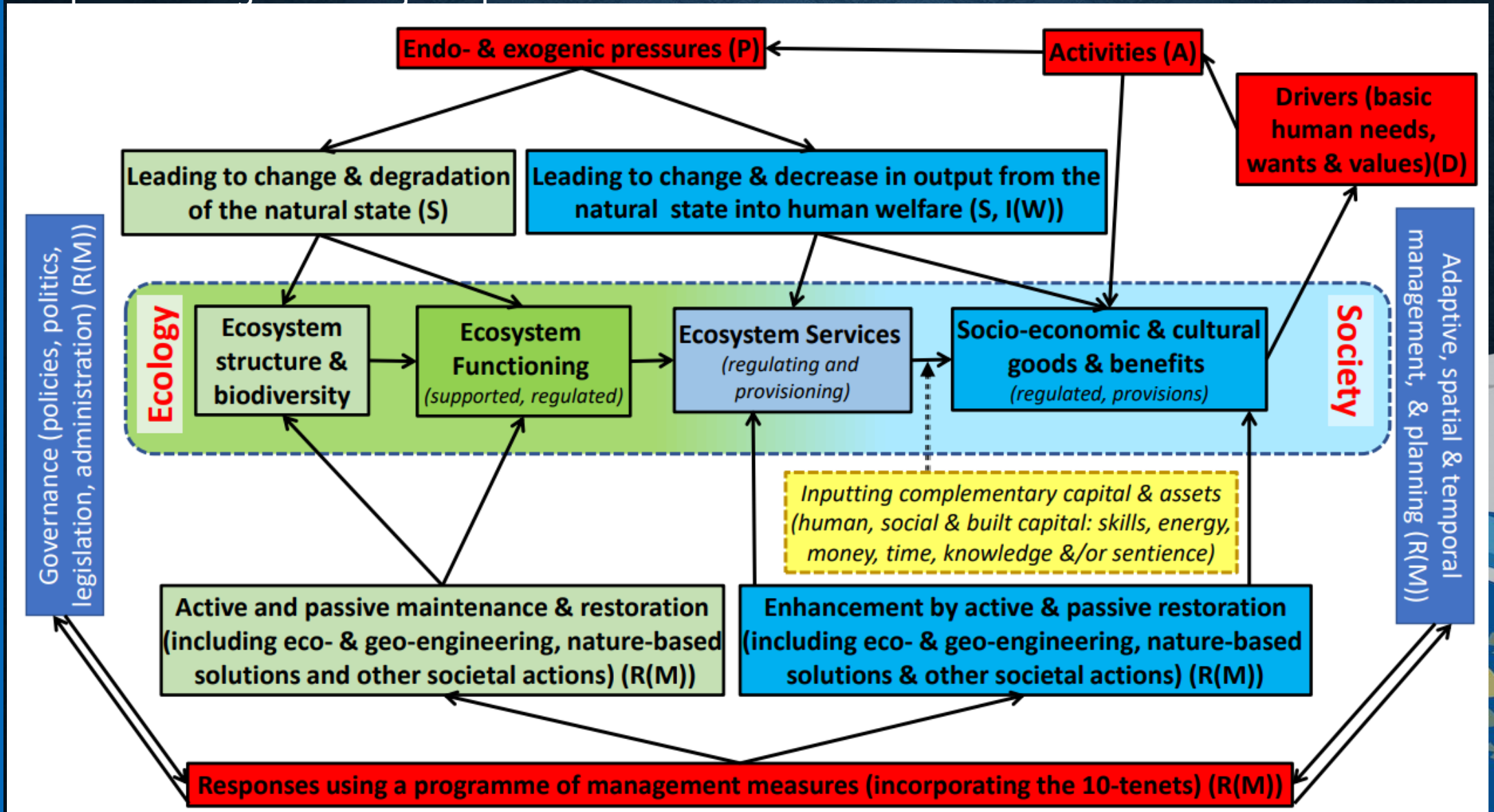


Figure courtesy of Mike Elliot

Ostrom, Elinor. 2007. A diagnostic approach for going beyond panaceas. PNAS 104(39):15181-15817.

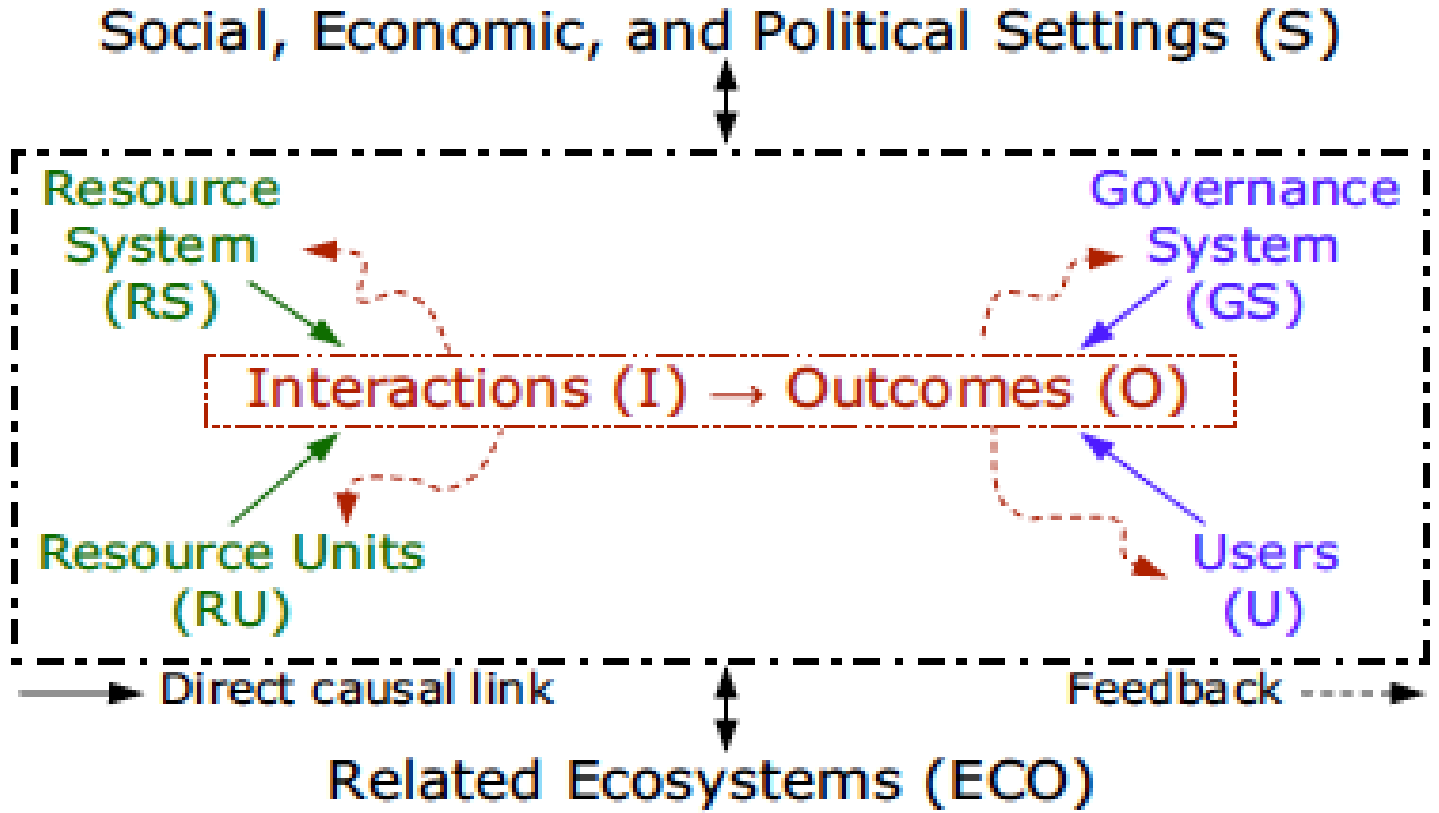


Fig. 1. A multitier framework for analyzing an SES.

Figure courtesy of Mike Elliot

PRESSURES

Climate change adaptation

Climate change mitigation

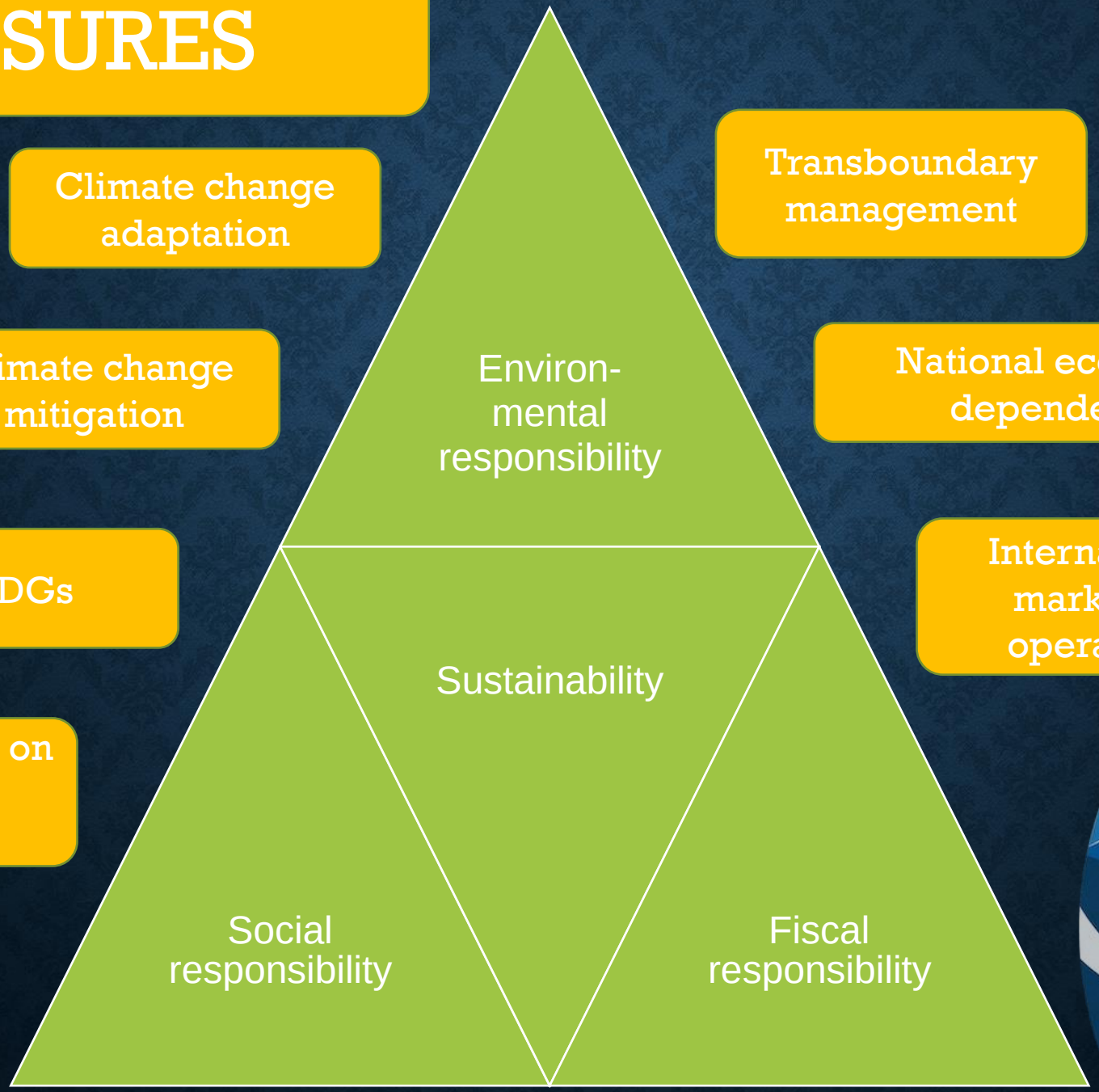
UN SDGs

UN Convention on Biodiversity (30x30)

Transboundary management

National economic dependency

International markets & operations



Topics to be considered

- Can transboundary management solutions be linked to climate change mitigation?
- Is social and environmental sustainability driven by stewardship or market opportunities in upper leadership?
- Adaptation planning:
  - What happens if the fish leave?
  - How would the industry implement 30x30?

Hopeful innovation in EBFM approach

- Begins with social data gathering
- Modeling not yet defined
- Not (exactly) “place-based”
- “Industry-based” but cross-sector
- Not focused on livelihoods or economic policy, but international incentives in vertically integrated companies
- More closely resembles an adaptation project
- Hopefully, stakeholder driven
- Focused on industry leaders

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Questions/ Feedback/ Discussion

- What data should we collect during initial interviews?
  - Transboundary governance in
    - Climate change
    - Fishing agreements
- Focus on leaders and international governance: economic theories to test?

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Funded by the European Union's Horizon Europe programme under grant agreement No.101058956.

Thank you!

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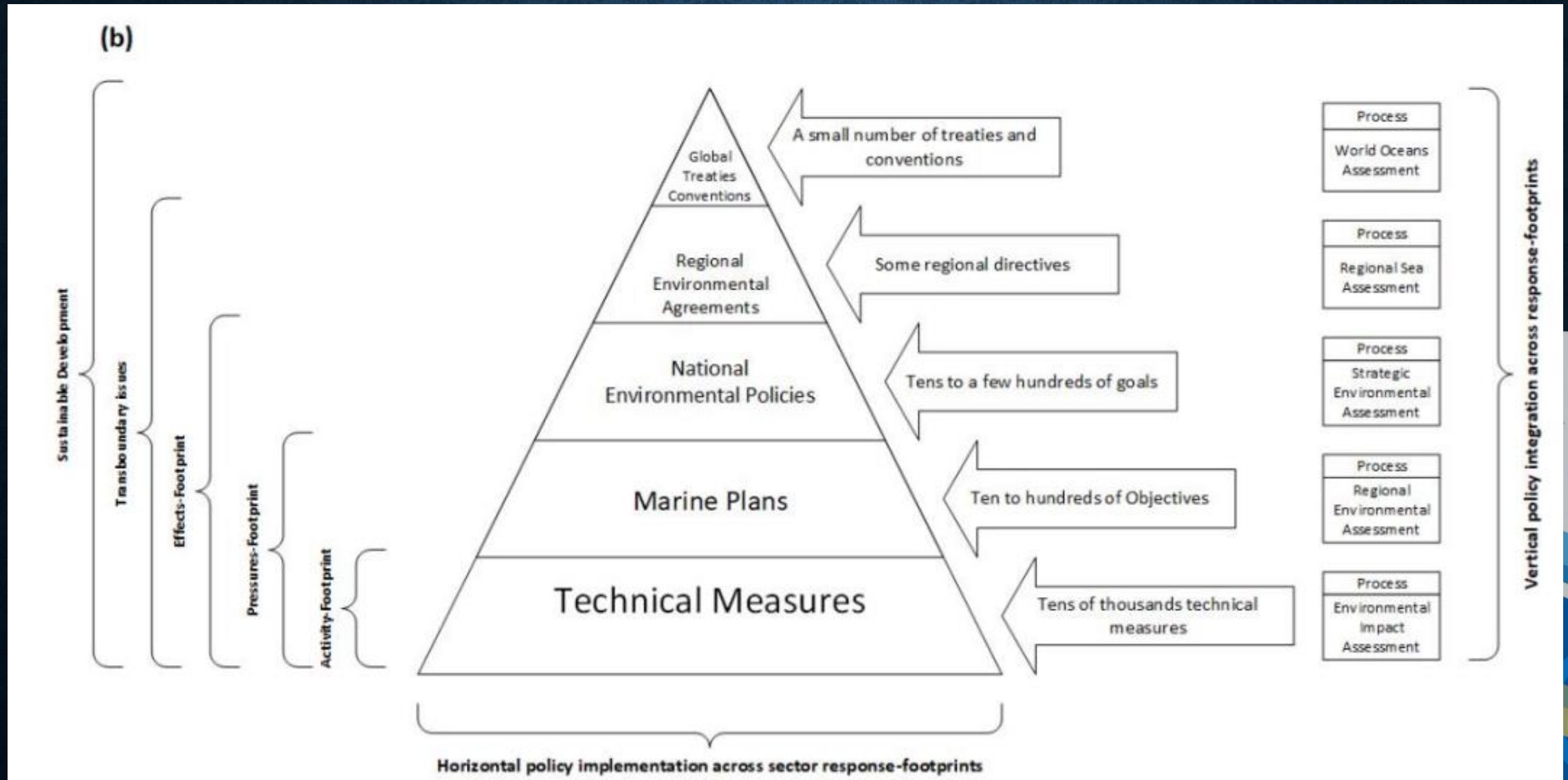
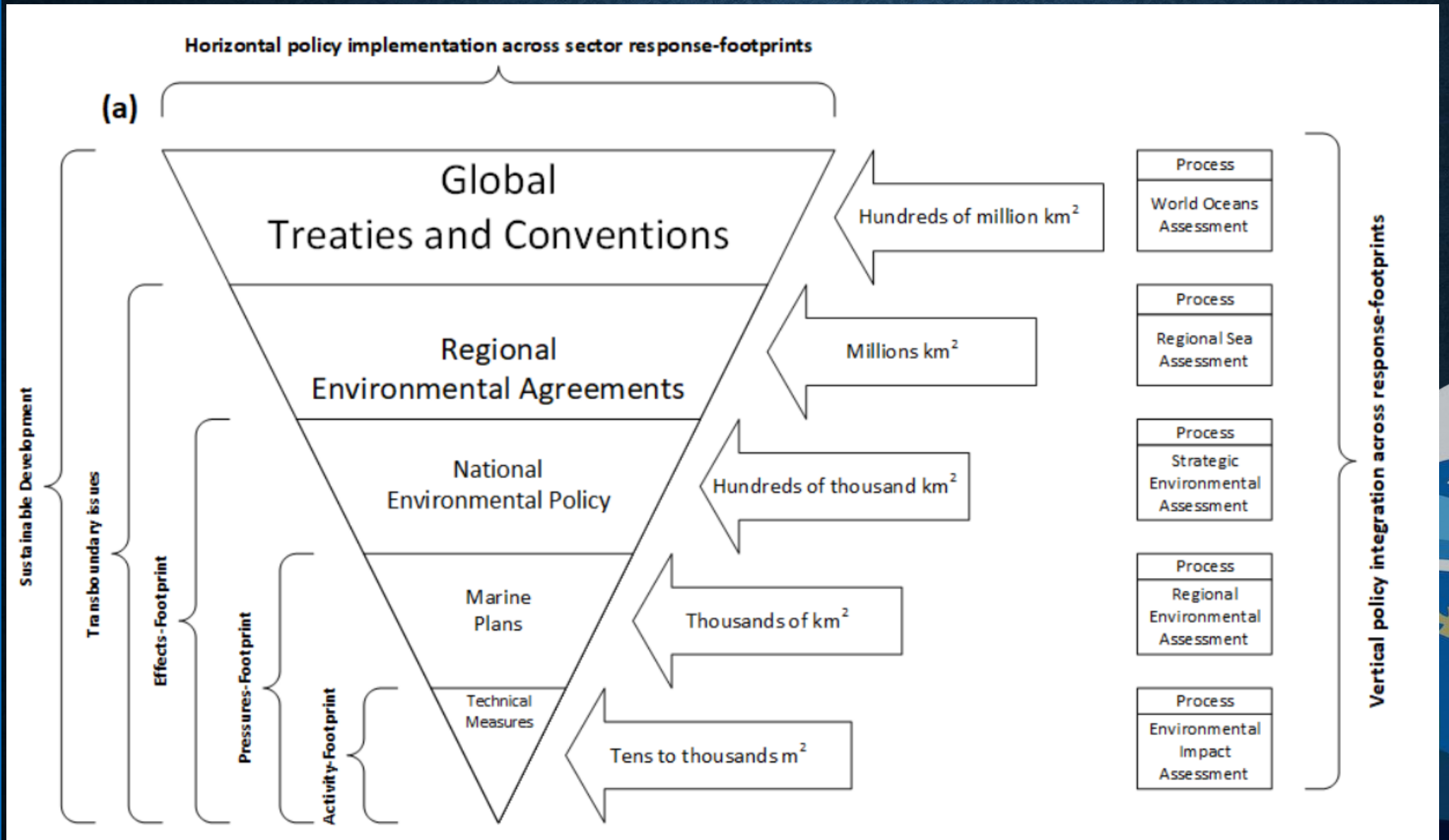
@MarineSABRES

Linkedin.com/company/MarineSABRES

Cormier, R., Elliott, M. & Borja, Á. 2022. Managing marine resources sustainably – the 'management response-footprint pyramid' covering policy, plans and technical measures. Frontiers in Marine Science, 9:869992. https://doi.org/10.3389/fmars.2022.869992.



Cormier, R., Elliott, M. & Borja, Á. 2022. Managing marine resources sustainably – the 'management response-footprint pyramid' covering policy, plans and technical measures. Frontiers in Marine Science, 9:869992. https://doi.org/10.3389/fmars.2022.869992.



INSPIRATION.....

How does MarineSABRES build on the strengths of est

1: **Explicitly focusing on the nested nature of marine social-ecological systems.** This is essential to meet the emerging challenges of global climate change caused by pressures.

2. **Directly addressing flows of supply and demand for ES at scales**, balancing the requirement of human use and benefits of healthy ecosystems.

3. **Emphasizing how social processes and subsystems can drive human behaviours** to provide a more realistic picture of the social system dynamics.

4. **Providing an analysis tool and a source of solutions for systemic and emerging problems** by **identifying pathways for transformation** to sustainable ecosystems and the Blue Economy.

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programm
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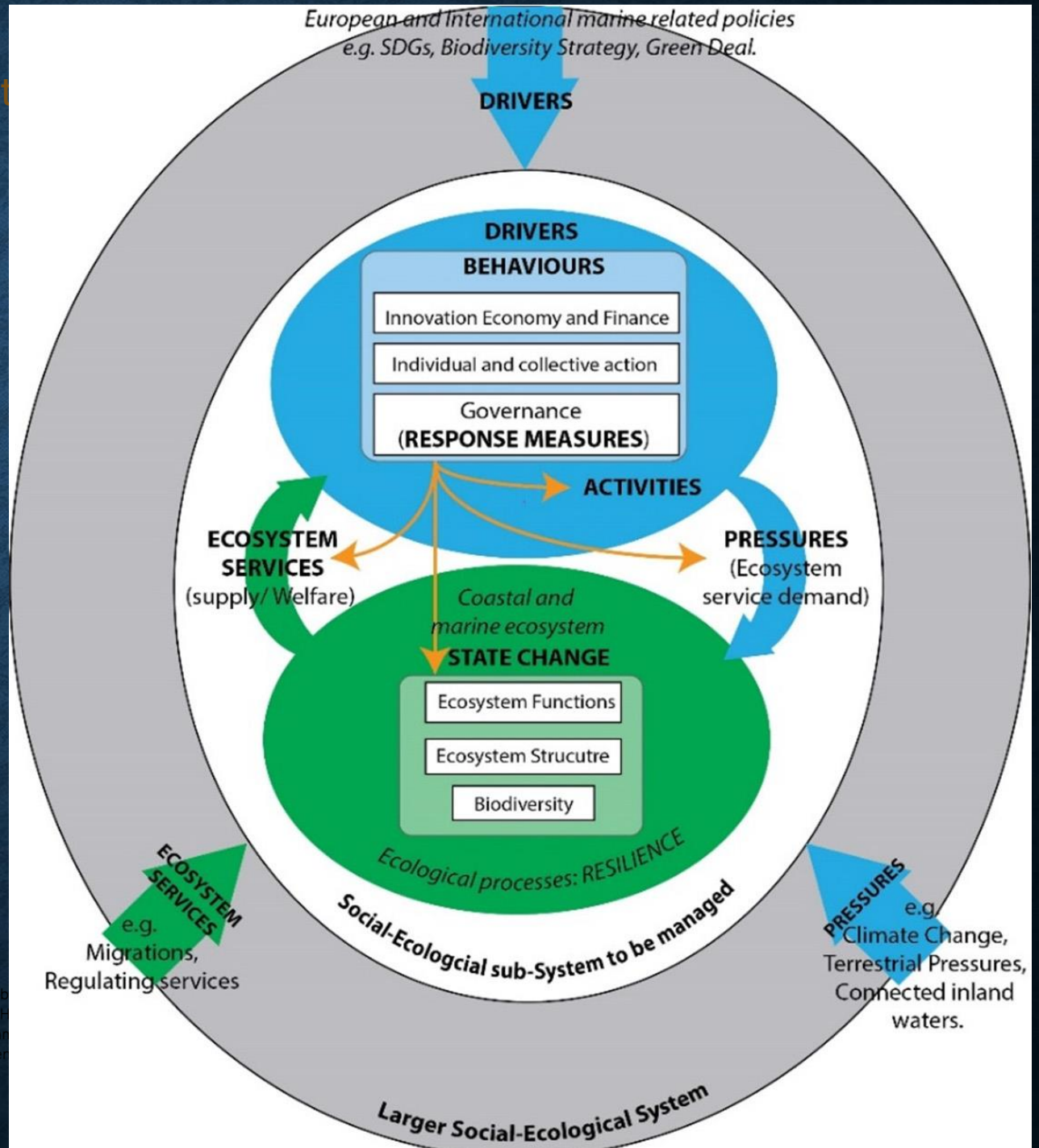

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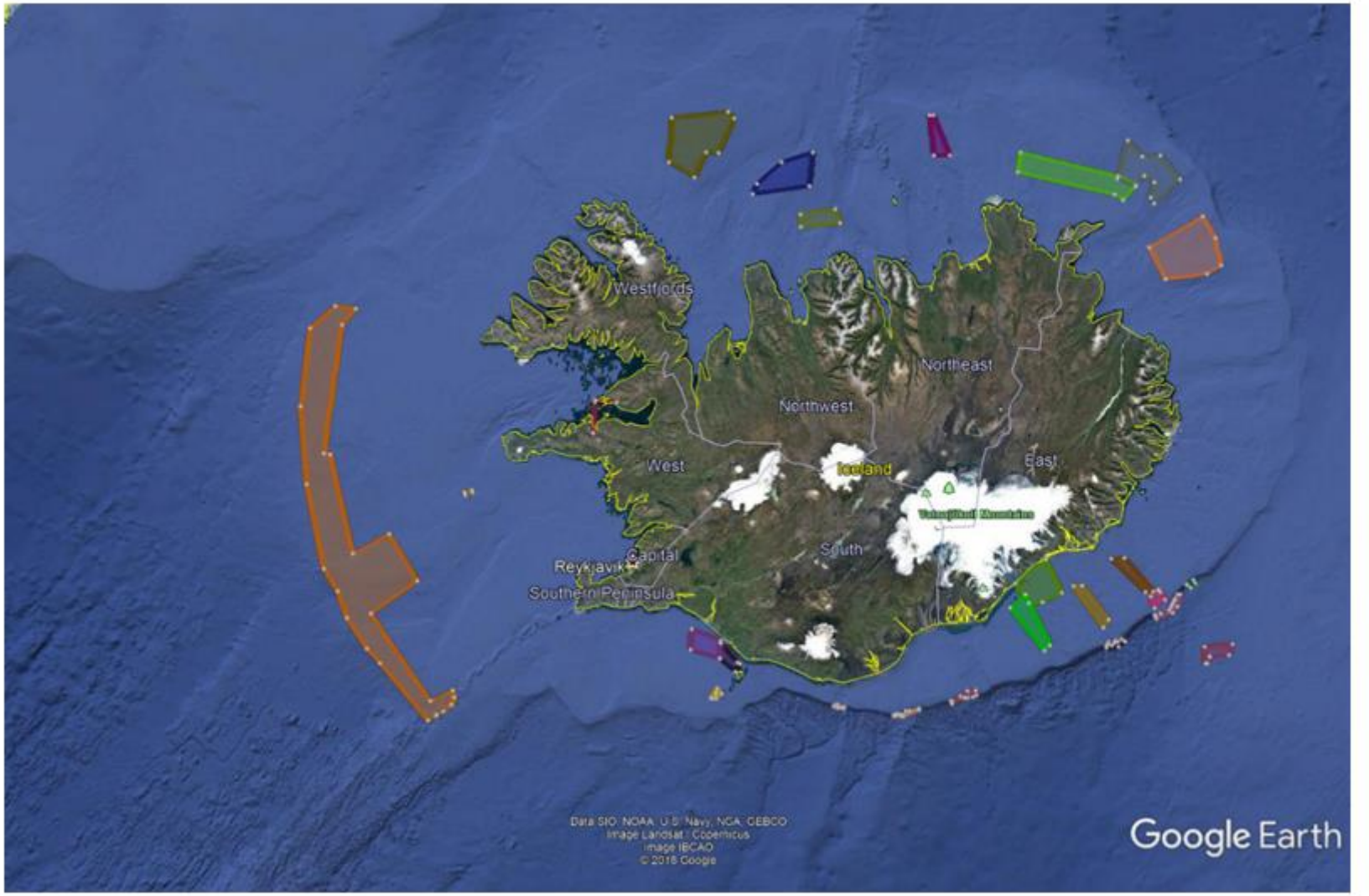
Westfjords
Northeast
Northwest
West
Iceland
East
South
Capital
Reykjavik
Southern Peninsula
Data SIO, NOAA, U.S. Navy, NGA, GEBCO
Image Landsat / Copernicus
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Dime

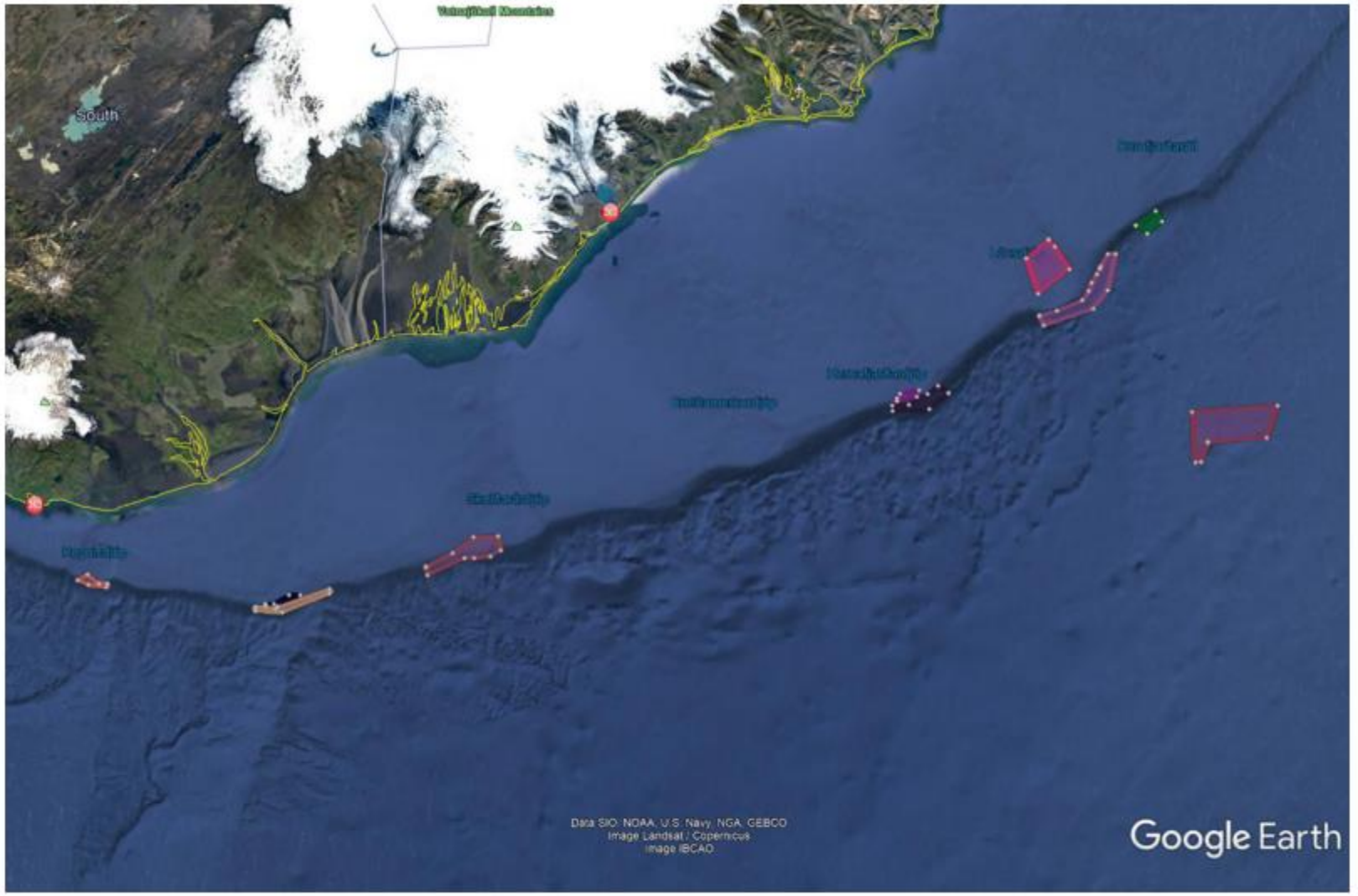

Figure 17 Top: permanently closed areas for otter trawling. Bottom: permanently closed areas for all fishing to protect cold-water corals.