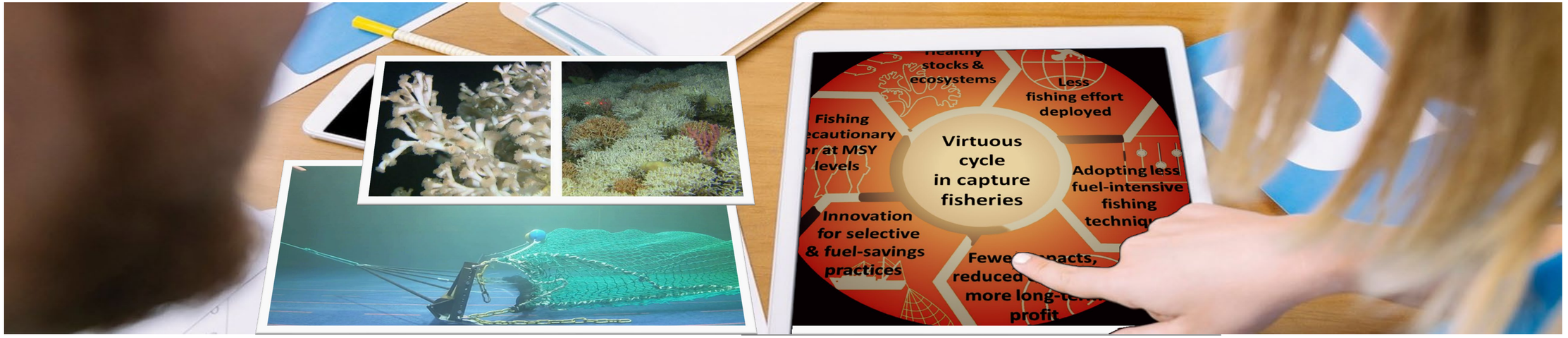


Exploring the viability of innovative fishing technologies as an alternative to bottom trawling in European marine protected areas

François Bastardie, 28th of November 2024, STOA study for the EU Parliament

Source: AI generated

From open access to regulated waters

'There was a time when, on the sea, it was a bit like no man's land. Everyone did what they wanted. There were no regulations. It was 'all ahead!', first come, first served, and too bad for tomorrow. We are no longer in this logic today. The sea is no longer a space of freedom. People need to get this out of their minds.' – quoted from a French fisher in Brittany

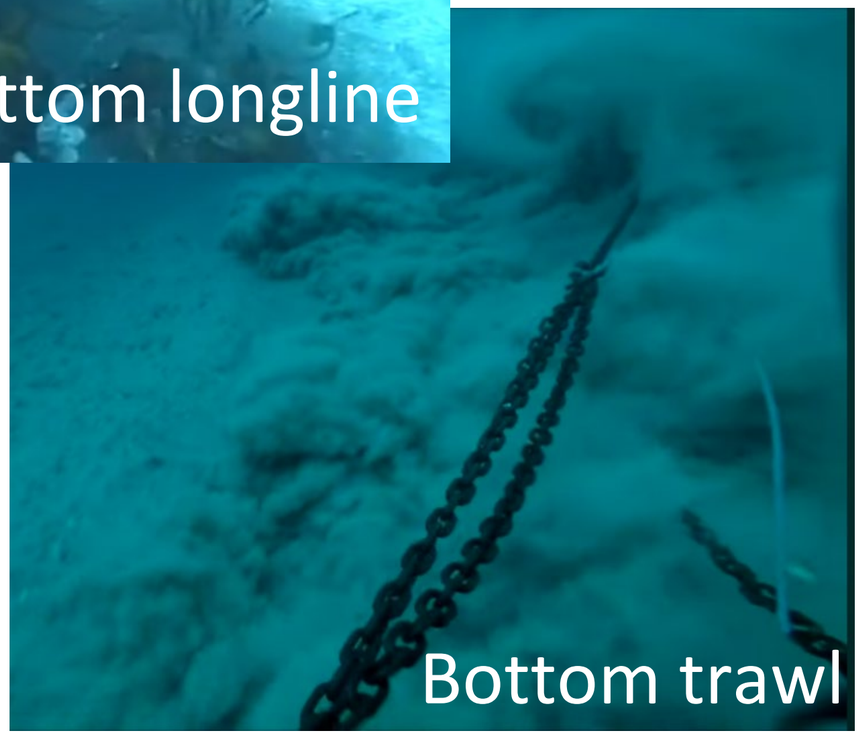
Why Explore Alternatives to Bottom Trawling?

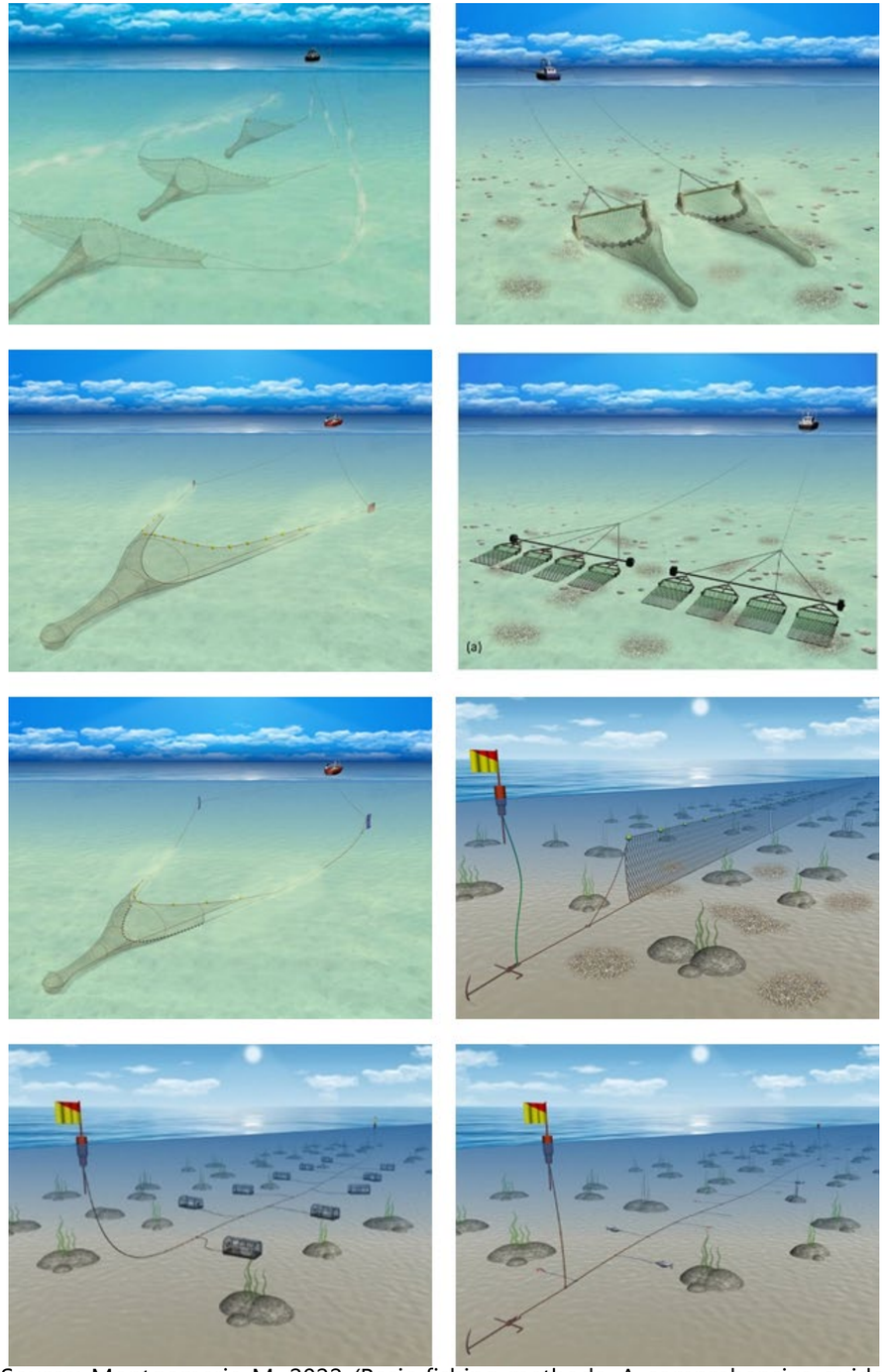
- **Impact on Marine Ecosystems**: Bottom trawling disrupts the seafloor, reduces biodiversity

- **Damage to Benthic Communities**: "Animal forest" affected, lowering ecosystem resilience

- **Alternatives**: Sustainable methods to target similar species with less environmental impact

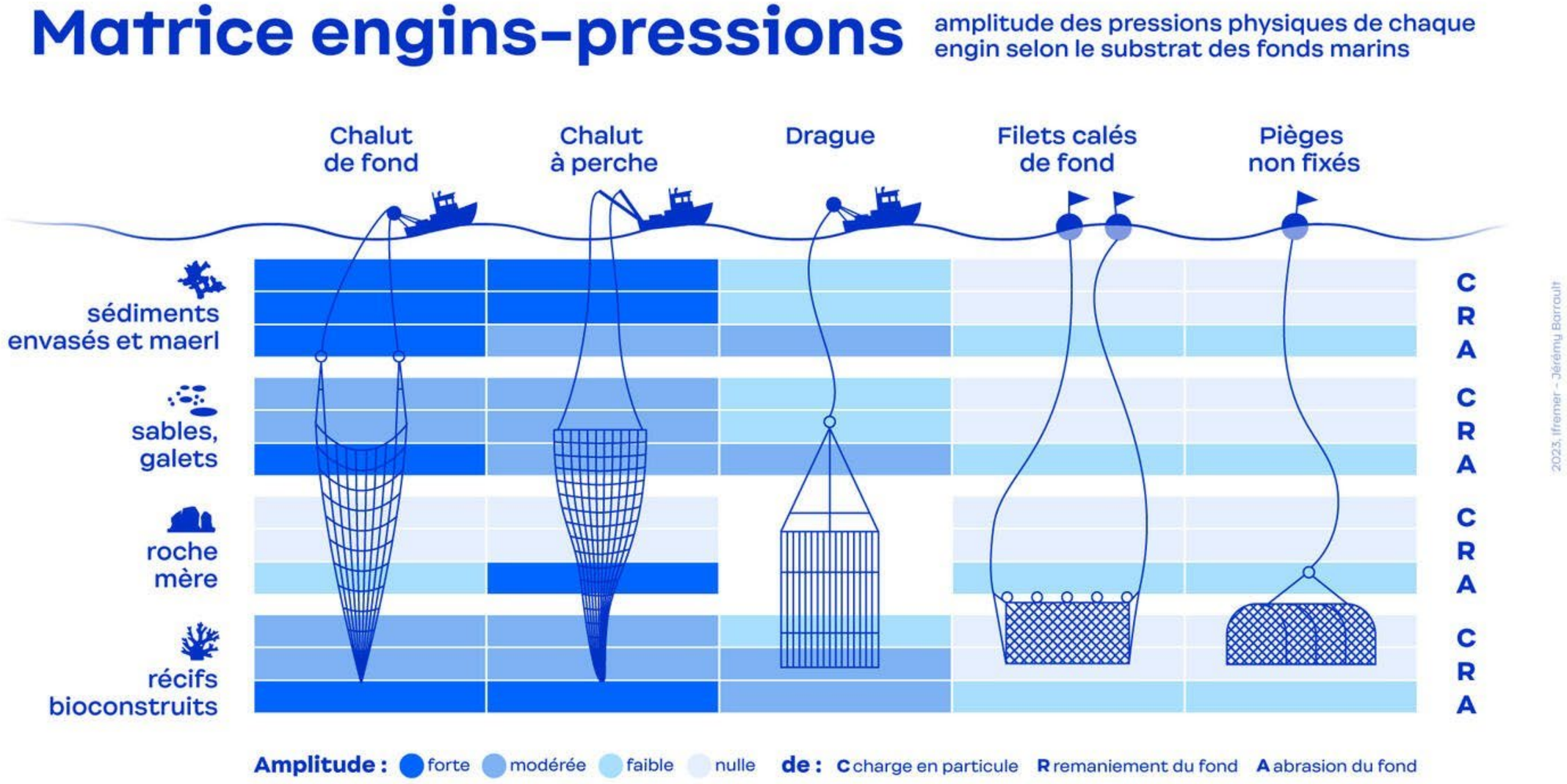
Different fishing techniques



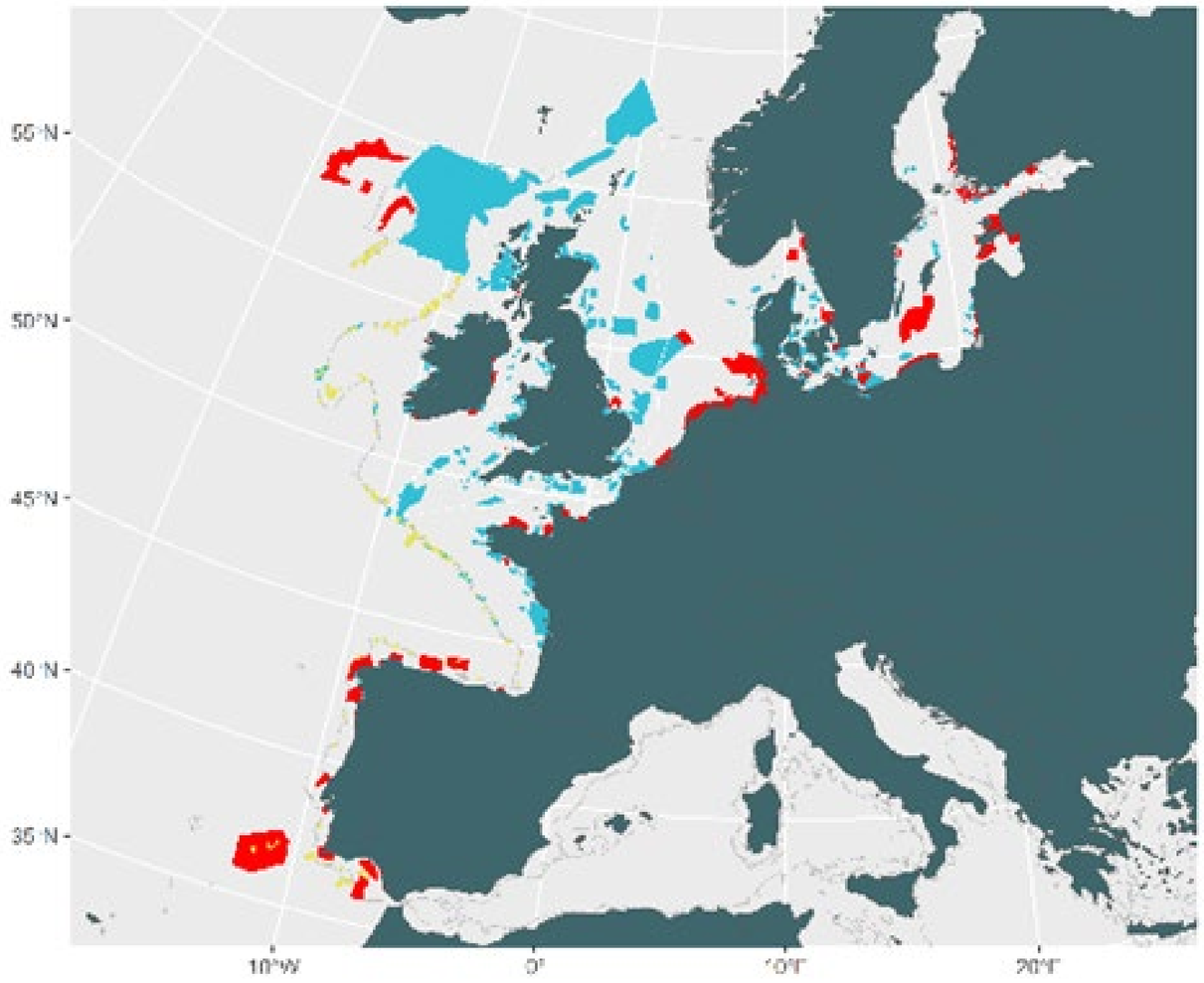


Source: Montgomerie M. 2022 (Basic fishing methods. A comprehensive guide to commercial fishing methods.)

Different pressures on different vulnerability lead to different impact



Source: Modified from https://www.natura2000.fr/outils-et-methodes/guides-et-ouvrages/arp-n2000 Annexe 4 of the methodological report, and Source Ifremer



Natura 2000 sites and other MPAs in North East Altantic deemed vulnerable to bottom trawling – in red and yellow: exclusion enforced.

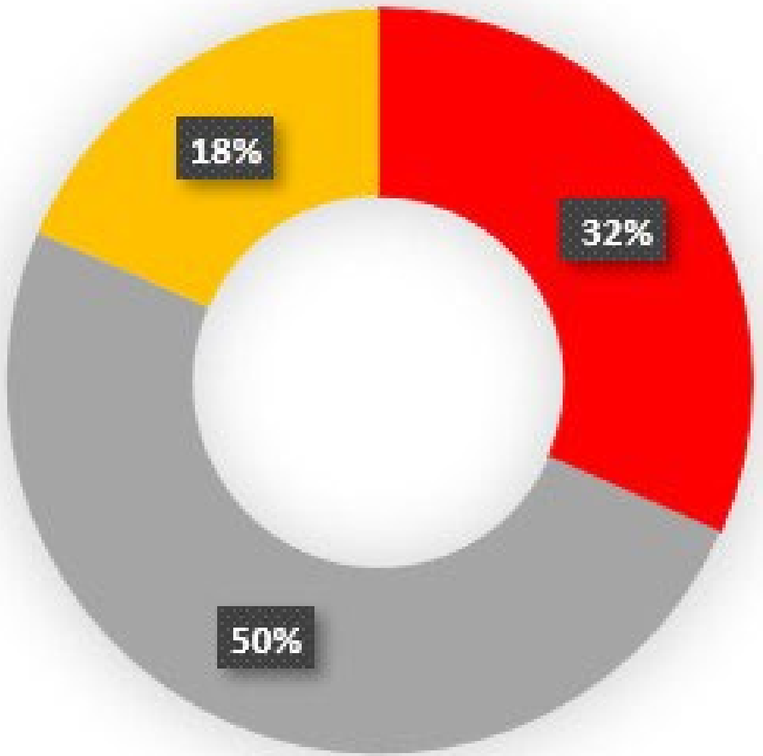
Impact of Bottom Trawling in Marine Protected Areas (MPAs)?

- **MPA Role**: Preserve biodiversity, prevent irreversible ecosystem changes, spill-over biomasses

- **Consequences of Trawling**: Simplifies ecological functions, hinders long-term fishing opportunities.

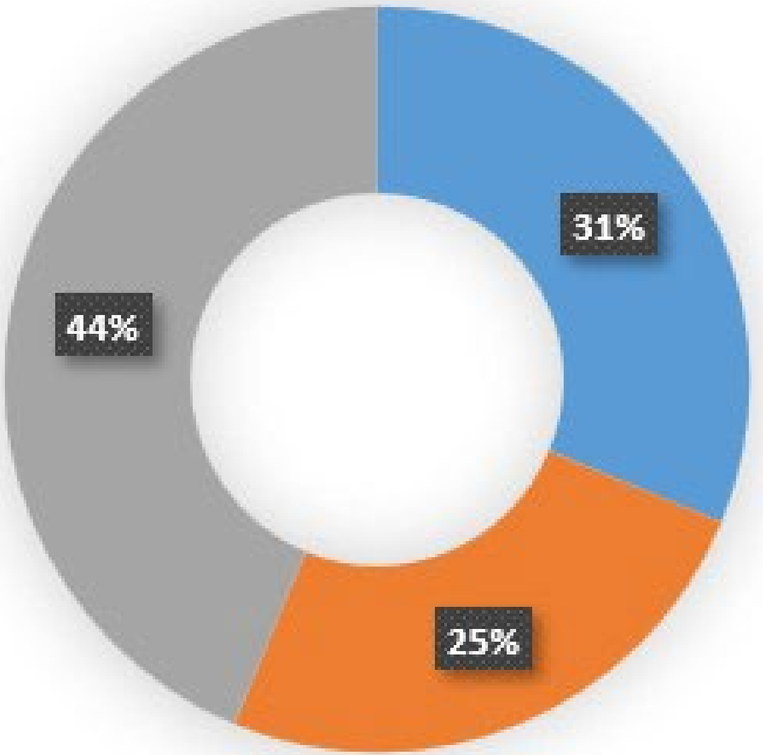
- **Importance**: Protecting MPAs supports ecosystem services beneficial to fisheries.

…Investigating the– Scientists´ opinion



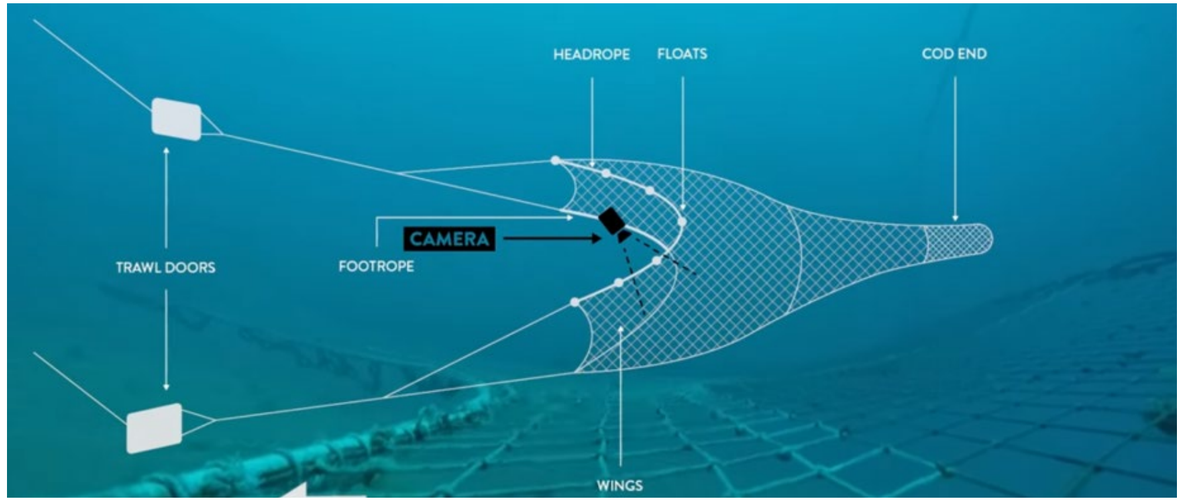
- All types of fishing techniques should be excluded from MPAs
- Mobile Bottom Contacting Gears should be substituted for other types of gears whenever fishing in MPAs
- Mobile Bottom-Contacting Gears (MBCGs) should still be permitted in MPAs whenever using some innovations proven to reduce impact

…Investigating the– Fishers´ opinion



- Excluding Mobile Bottom-Contacting Gears (MBCGs) from Marine Protected Areas (MPAs) has no benefits, just costs
- Mobile Bottom Contacting Gears should be substituted for other types of gears whenever fishing in MPAs
- Mobile Bottom-Contacting Gears (MBCGs) should still be permitted in MPAs whenever using some innovations proven to reduce impact

A review of gear modifications and innovations



Scale 1 to 5 alongside:
Return on Investment

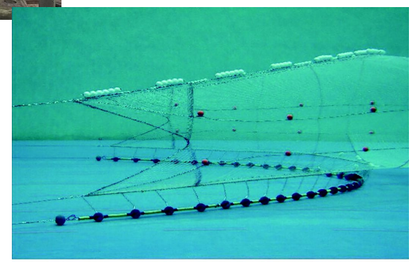
- Beam trawls
- Bottom trawls
- Seine
- Passive gears

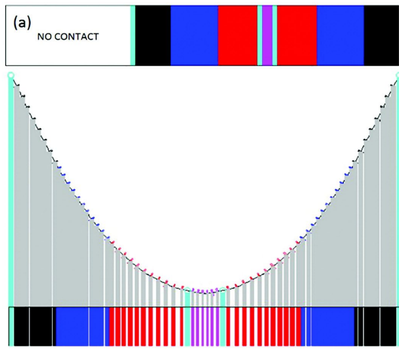
- Fish selectivity improvement
- Catch efficiency improvement
- Ecosystem/ environmental impact improvement
- **Seabed impact reduction**

Scale 1 to 3 alongside:
Technological readiness

Table 2: Possible innovations in Otterboard bottom trawl gears that would reduce the impact on seabed and vulnerable species. ROI: Return on Investment; Catch: Catch efficiency; Ecosystem: Potential for ecosystem impact reduction; Seabed: Potential for short term seabed impact reduction

Innovation	ROI	Select-ivity	Catch	Ecos-system	Sea-bed	Description	References
Reducing the otterboard impact on the seabed ('Connect' system)	2,2	2,3	2,3	4,3	5,3	Trawl doors (otter boards) are equipped with sensors used to calculate the physical impact of the door on the seabed in terms of shocks and vibrations. The	Sala et al. (2019) and octech.fr projet-connect





Promising Alternative Fishing Technologies/ innovations in trawl gears

- **Otter boards with lift** to reduce seabed contact.

- **Precision Fishing**: Uses AI for "smart trawl" and selective catches.

- **Semi-Pelagic Trawling**: Reduces sediment plume.

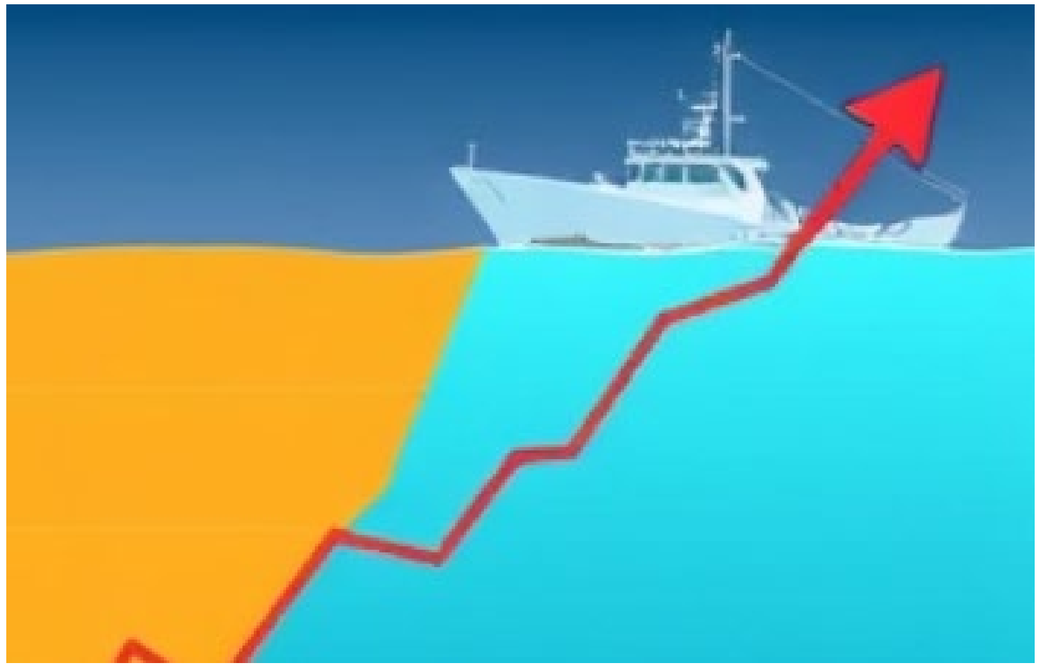
Challenge: Innovations can lower catch rates, affecting profitability

Source: AI generated

Feasibility of New Technologies in European Fisheries

- **Catch Rate vs. Profitability**: Innovations may reduce catches and profit margins
- **Resistance to Change**: Industry reluctant without profitability

Low uptake of innovations anyway



The study identified such reluctances induced by:

- **change in catch rate**
- **Upfront costs**
- Prioritisation of short term over long term effects ("**short-termism**")
- **Safety concerns**, difficulties in operating the new gears, and habits
- **Regulatory barriers** (capacity ceiling)
- Call for **scientific evidence** about performance on environmental and economic dimensions

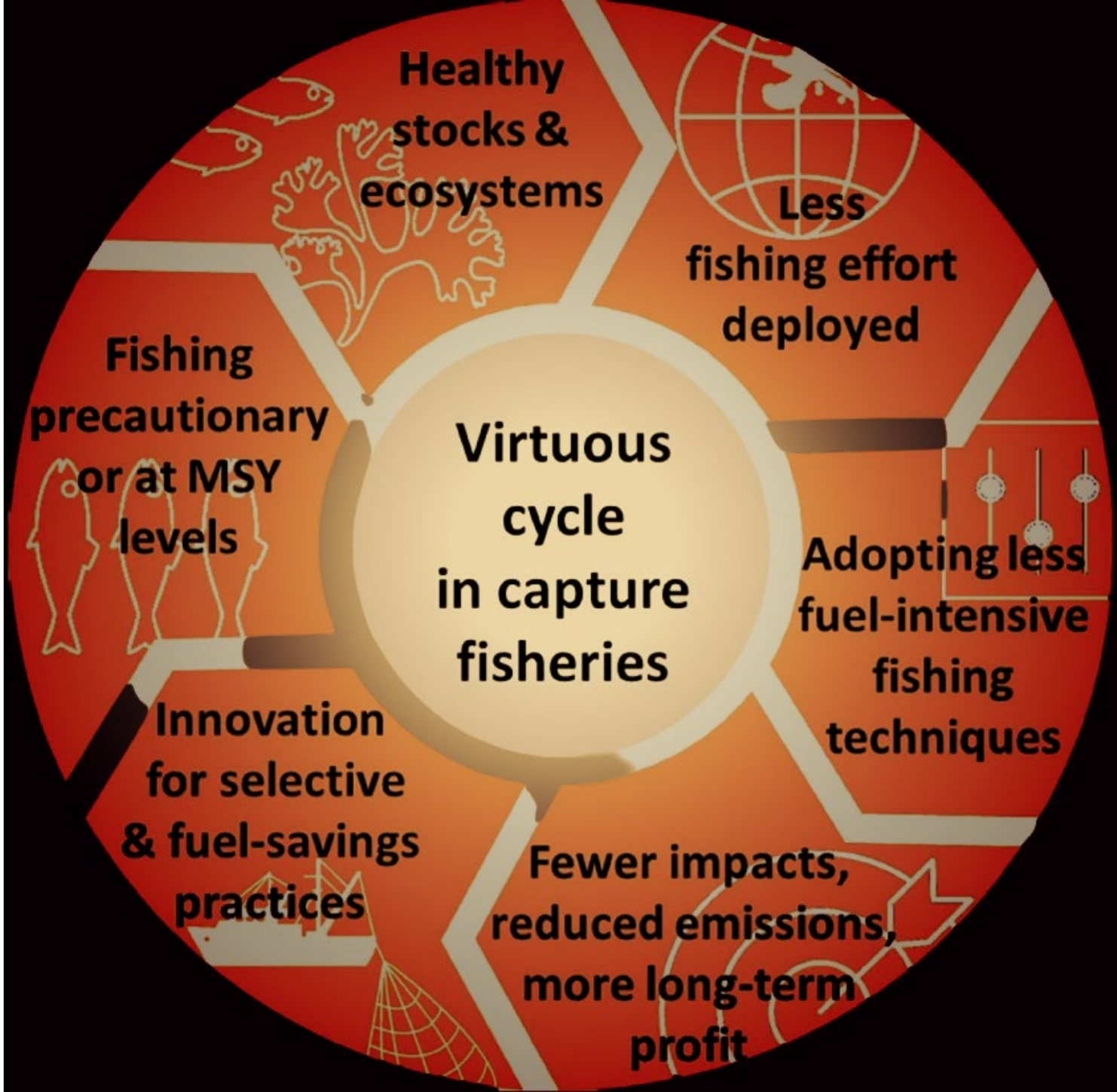
the need for mandatory adoption of innovative fishing technologies suggests that there's still a long way to go in terms of policy enforcement and industry compliance

Feasibility of New Technologies in European Fisheries

- **Catch Rate vs. Profitability**: Innovations may reduce catches and profit margins
- **Resistance to Change**: Industry reluctant without profitability
- **Marine life**: Potential exclusion of bottom trawling in MPAs for sustainable balance

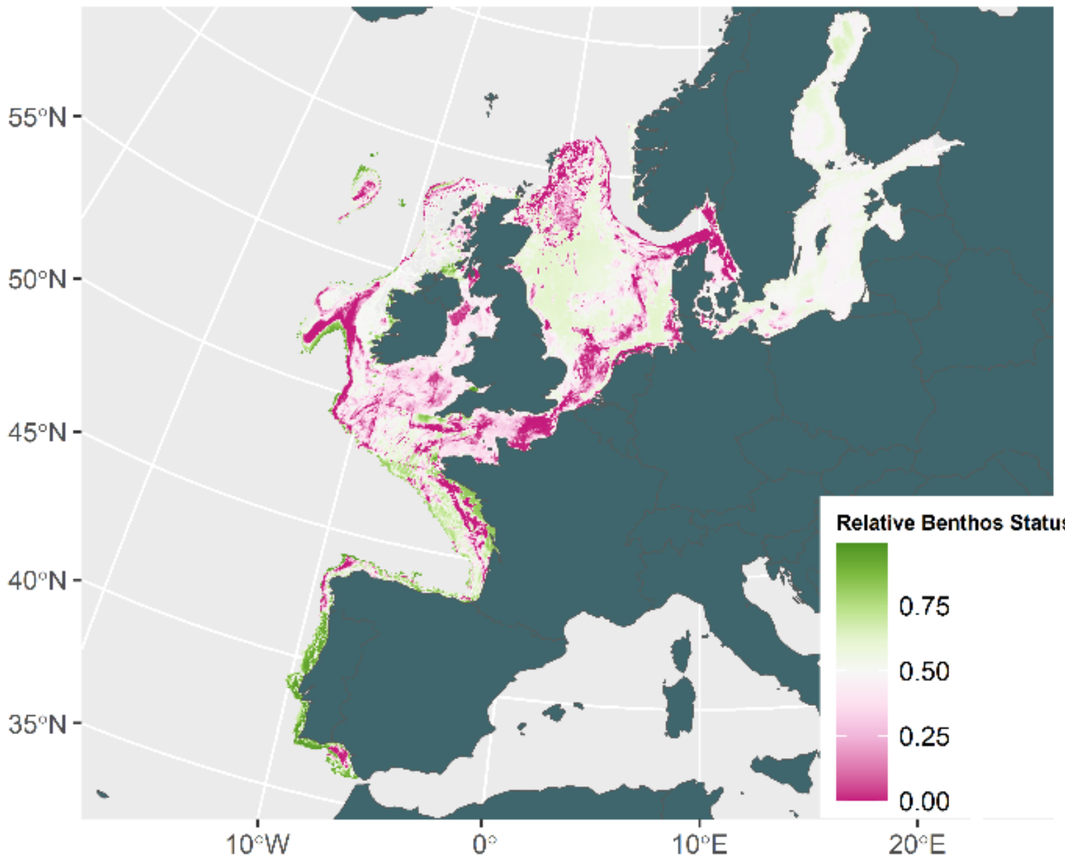
Miminizing Economic Impact and Protect Ecological Benefits

Need for an ecosystem approach to minimise the impact and ensure long term viability and sustainability

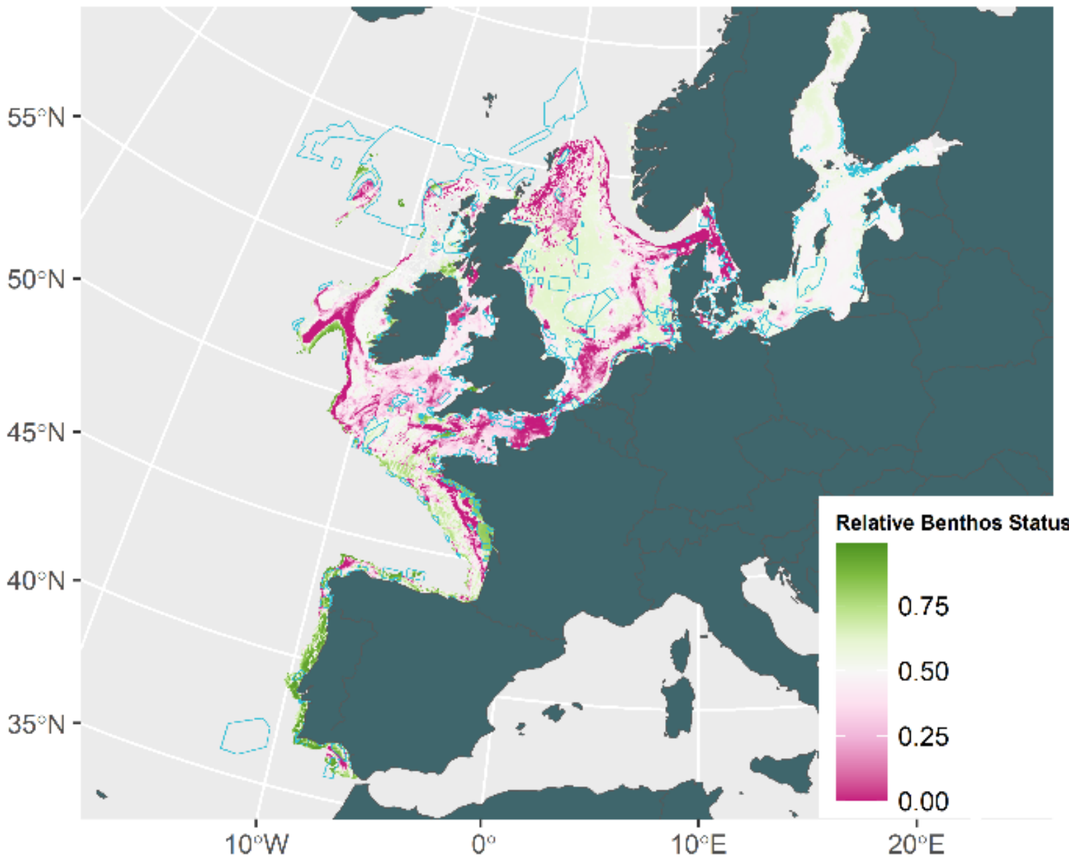


Implementing innovations for trawl in MPAs may lead to a counterproductive outcome seen at the regional scale…

Before…

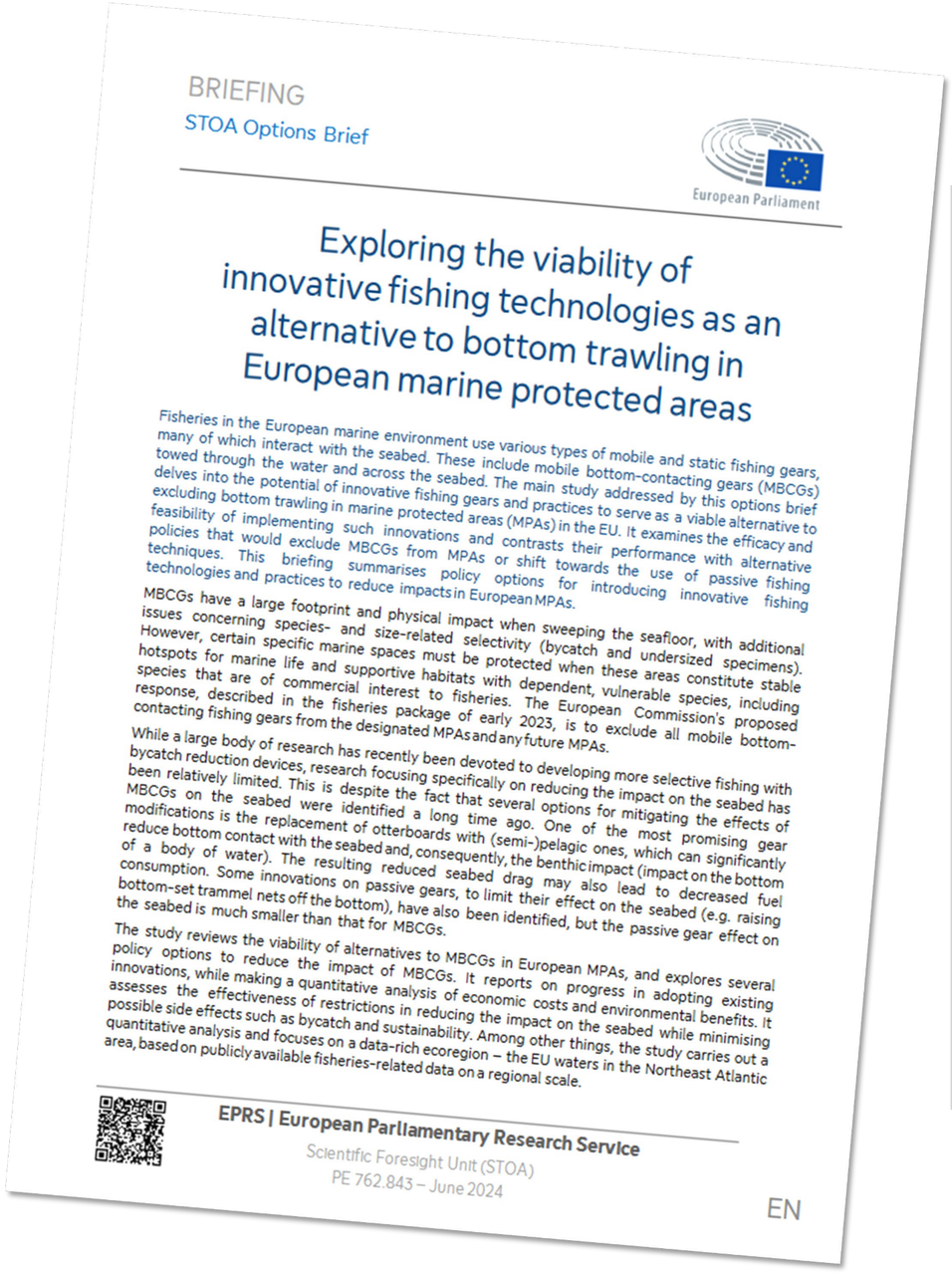


…**After** excluding mobile bottom contacting gears from MPAs deemed vulnerable



Modelling and upscaling with a quantitiative modelling

Policy Options



BRIEFING

STOA Options Brief

European Parliament

Exploring the viability of innovative fishing technologies as an alternative to bottom trawling in European marine protected areas

Fisheries in the European marine environment use various types of mobile and static fishing gears, many of which interact with the seabed. These include mobile bottom-contacting gears (MBCGs) towed through the water and across the seabed. The main study addressed by this options brief delves into the potential of innovative fishing gears and practices to serve as a viable alternative to excluding bottom trawling in marine protected areas (MPAs) in the EU. It examines the efficacy and feasibility of implementing such innovations and contrasts their performance with alternative policies that would exclude MBCGs from MPAs or shift towards the use of passive fishing techniques. This briefing summarises policy options for introducing innovative fishing technologies and practices to reduce impacts in European MPAs.

MBCGs have a large footprint and physical impact when sweeping the seafloor, with additional issues concerning species- and size-related selectivity (bycatch and undersized specimens). However, certain specific marine spaces must be protected when these areas constitute stable hotspots for marine life and supportive habitats with dependent, vulnerable species, including species that are of commercial interest to fisheries. The European Commission's proposed response, described in the fisheries package of early 2023, is to exclude all mobile bottom-contacting fishing gears from the designated MPAs and any future MPAs.

While a large body of research has recently been devoted to developing more selective fishing with bycatch reduction devices, research focusing specifically on reducing the impact on the seabed has been relatively limited. This is despite the fact that several options for mitigating the effects of MBCGs on the seabed were identified a long time ago. One of the most promising gear modifications is the replacement of otterboards with (semi-)pelagic ones, which can significantly reduce bottom contact with the seabed and, consequently, the benthic impact (impact on the bottom of a body of water). The resulting reduced seabed drag may also lead to decreased fuel consumption. Some innovations on passive gears, to limit their effect on the seabed (e.g. raising bottom-set trammel nets off the bottom), have also been identified, but the passive gear effect on the seabed is much smaller than that for MBCGs.

The study reviews the viability of alternatives to MBCGs in European MPAs, and explores several policy options to reduce the impact of MBCGs. It reports on progress in adopting existing innovations, while making a quantitative analysis of economic costs and environmental benefits. It assesses the effectiveness of restrictions in reducing the impact on the seabed while minimising possible side effects such as bycatch and sustainability. Among other things, the study carries out a quantitative analysis and focuses on a data-rich ecoregion – the EU waters in the Northeast Atlantic area, based on publicly available fisheries-related data on a regional scale.

EPRS | European Parliamentary Research Service

Scientific Foresight Unit (STOA)

PE 762.843 – June 2024

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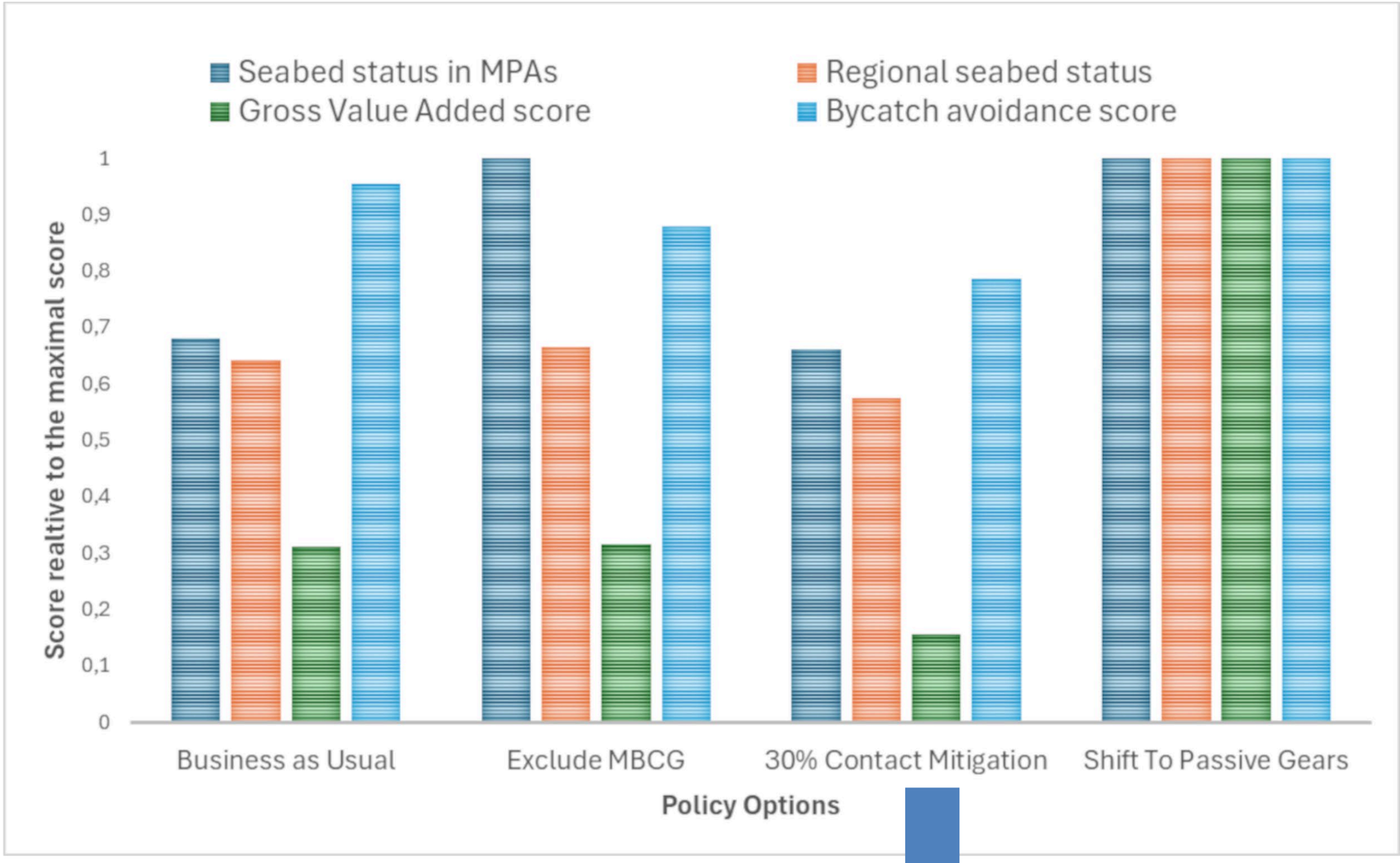


more fishing effort needed due to less catch efficiency

Policy Options

Policy Options	Effectiveness in reducing seabed impact in the short-term	Effectiveness in the long-term	Feasibility/resistance	Ecological consequences	Economic Consequences	Social consequences
Continued Bottom trawling fishing within MPAs	None	None	No change	Resource scarcity, habitat degradation and lower stock productivity	Lower incomes, lower resilience to environmental changes	Cross-sector conflicts induced by externalities
Exclude the use of all bottom trawling from the MPAs deemed vulnerable to mobile bottom fishing	**Medium Effectiveness**	**High Effectiveness in the long term**	**High feasibility**	**Habitat recovery within MPAs, extra pressure displaced outside but on already fished habitats**	**Lower income in the short term from loss of spatial opportunities, long-term benefits**	**Incentive toward shifting to alternative fishing techniques to access the MPAs. Possible equity issues**
Force the use of innovative trawl with reduced seabed contact	Low	Medium	Low (medium resistance)	A few improvements are depending on the skipper's ability, but mitigation technologies are not ready, and low uptake will likely persist	Degraded revenue in the short term from lower catch rates	Upskills needed for operating the innovations
Force a local or regional switch toward using alternative, passive gears	High	High	Medium (high resistance)	Increase of incidental catches if innovations are not used	Market disruption. Upfront costs. Higher revenue for the fishing sectors from co-benefits	Uncertain changes in the labour force. Stock recovery is taking time.

Key findings - economic viability and ecological health co-exist

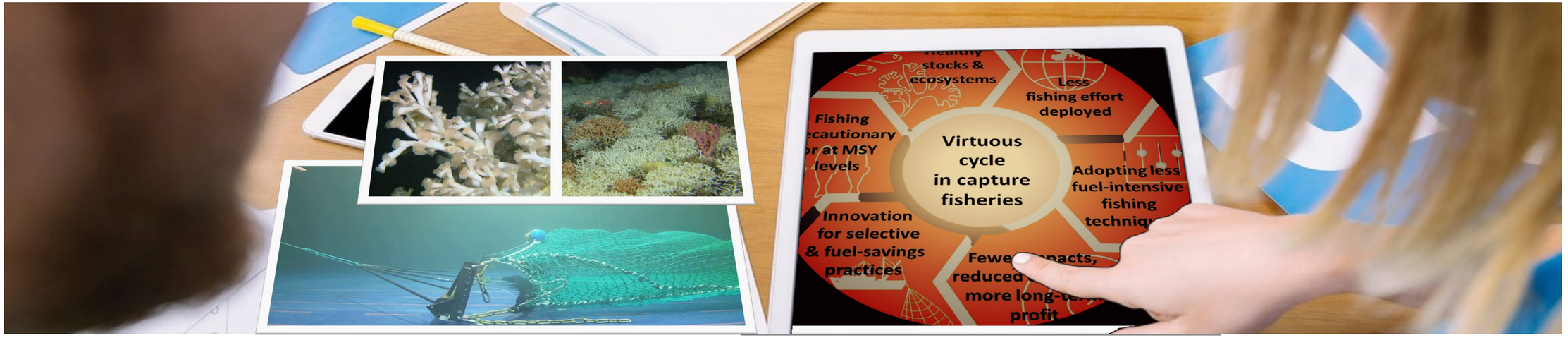
- Implement stricter regulations ban MBCGs in MPAs. Ensure new MPAs align closely with conservation needs
- Push for mandatory adoption of eco-friendly gears and practices in the fishing industry

Virtuous cycle in fisheries

- **Widespread use of 'best available fishing techniques'** to maintaining natural capital and the capacity for renewal of fish stocks, not only focusing on the maximum quantity of fish caught (e.g., MSY) but also the methods used to catch them
- **Fishing opportunities protected** by non-spatial conservation measures, and spatial for protecting seabed habitats
- **The regulators identify co-benefits**, compensate for trade-offs, and upfront costs during the transition
- **The EU Member States ensure a fair access to MPAs** when using passive gears (in the MPAs that are deemed not sensitive to those gears)

Mandatory Use of Sustainable Technologies

- **Legislation**: Potential for regulated mandatory use of low-impact gear
- **Need for continuing innovation**: Current options may still affect catch rates, making adoption slow/inexistent
- **Passive Gear Viability**: Reduces incidental catch; still requires innovation



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