Trawling: finding common ground for best practices

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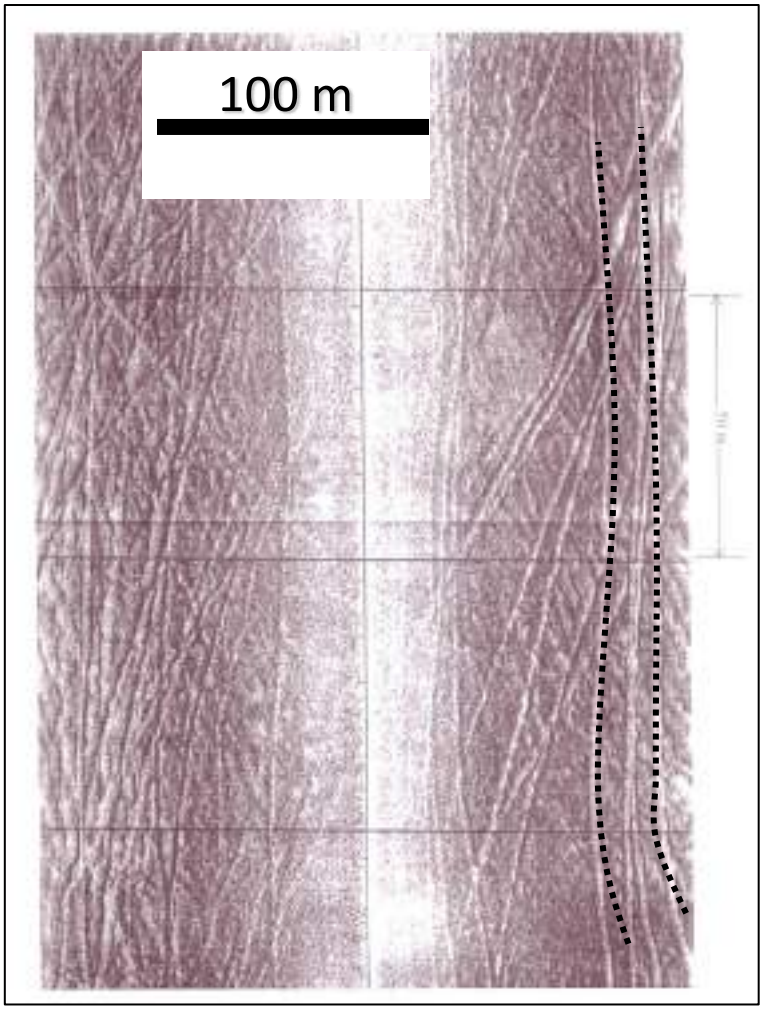
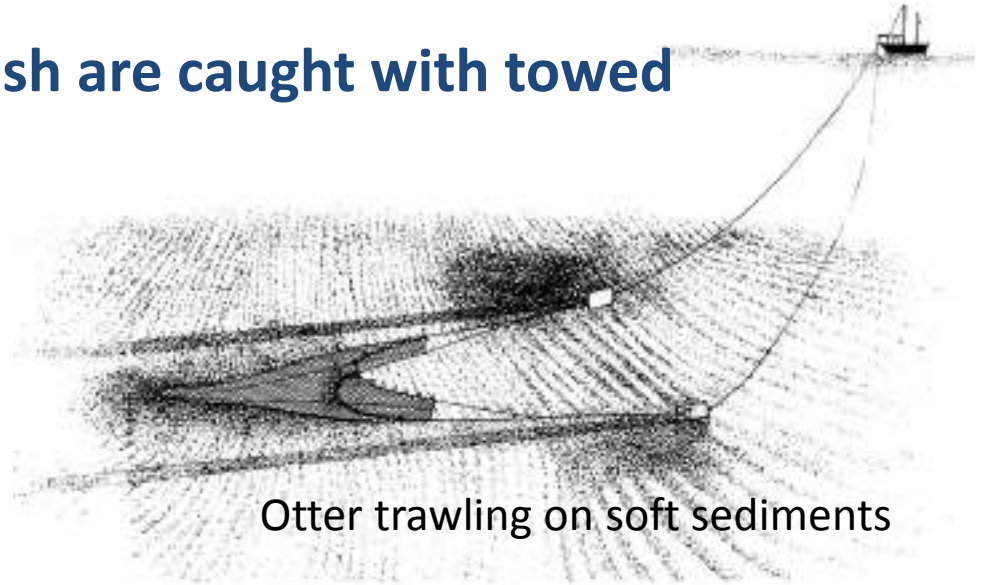
20% of the world's landings of fish are caught with towed bottom fishing gear

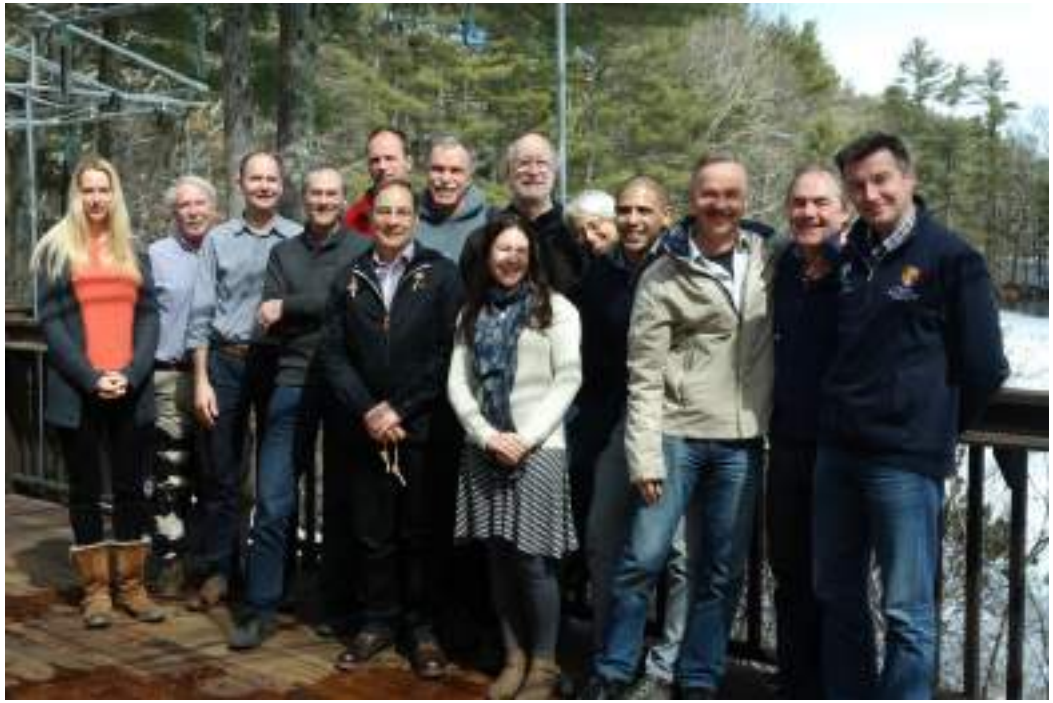




Otter trawling on soft sediments

Both fishing and farming alter landscape and diversity

Important to know: where, how much, consequences



Phase 1: Where does trawling occur and how much and often?
Phase 2: What does trawling kill and what modifies this?
Phase 3: Developing methods for risk assessment
Phase 4: Does trawling affect fish production?
Phase 5: Formulating policy for ‘best practice’

FISH and FISHERIES

Prioritization of knowledge-needs to achieve best practices for bottom trawling in relation to seabed habitats

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Rank		Knowledge-needs
3		What are the relative benefits of spatial management to constrain the trawl fleet footprint versus trawl effort and technical (gear modification) controls, and how can we evaluate the outcomes of using different combinations of these management measures?
10		What gear configurations (e.g. semi-pelagic) exist to mitigate habitat impacts and how can these benefits be quantified (e.g. through numerical models, physical models in a flume tank, or use of technology or direct observation)?
13		Within areas that have a history of being trawled, what ongoing ecosystem changes occur by continuing to trawl within the trawl footprint?
14		How do we evaluate risks and the opportunities associated with trawling in areas that presently are not trawled?
19		To what extent are the impacts of towed fishing gear mediated by variation in habitat susceptibility, in species recovery rates and in spatial overlaps between distribution of fishing effort intensity and the distribution of habitats?
24		What are the economic costs and total environmental impacts per unit value of fish caught, and how does this compare to other gears and practices?

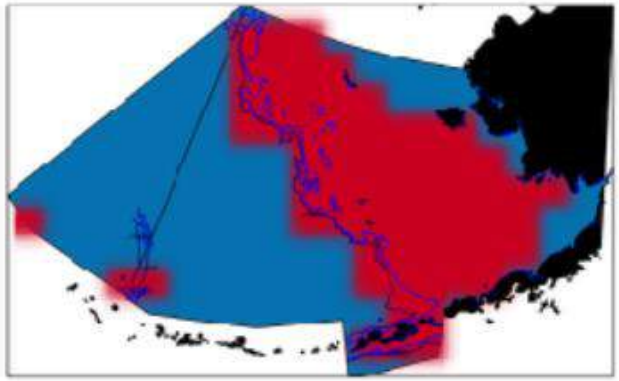
No tweeting of photos in this section - press embargoed ☹

What is the footprint of trawling?

Resolution matters

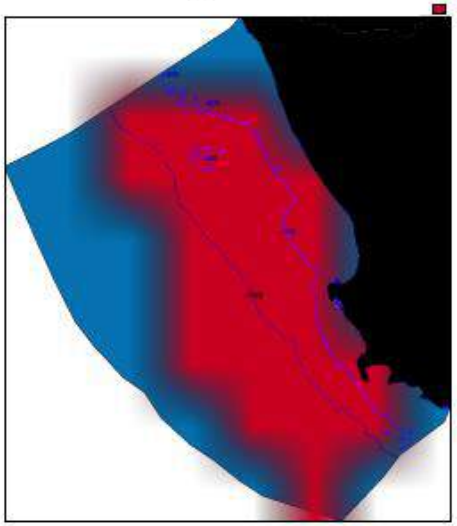
Alaska
East Bering Sea

Untrawled
Trawled



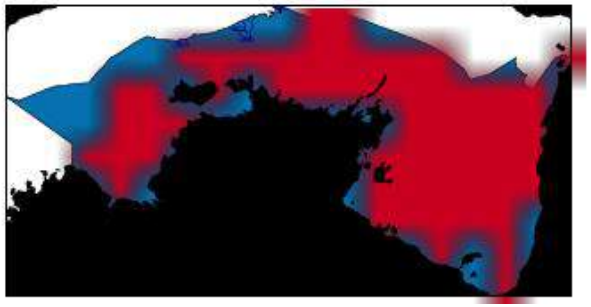
South Africa
S Benguela Current

Untrawled
Trawled

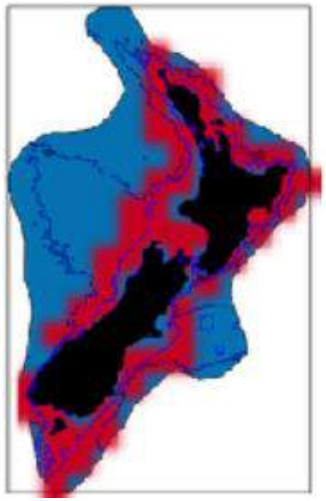


Australia
North Australian Shelf

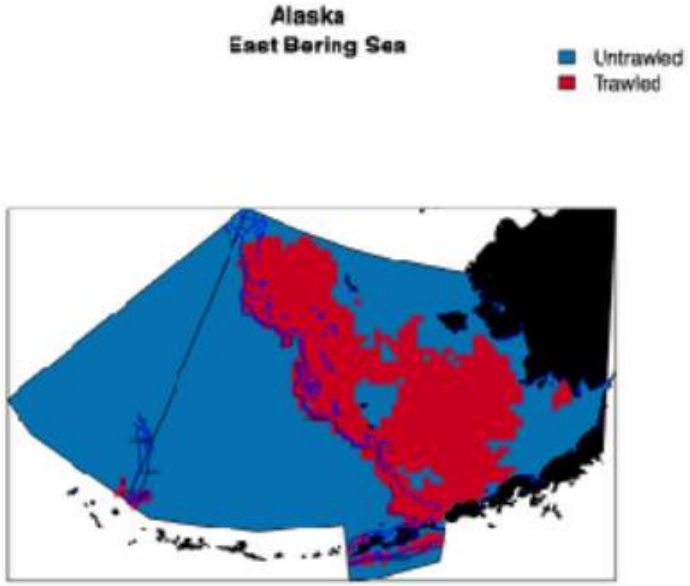
Untrawled
Trawled

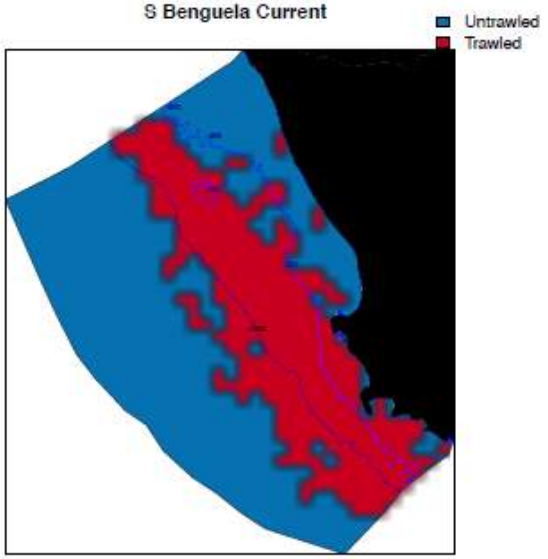


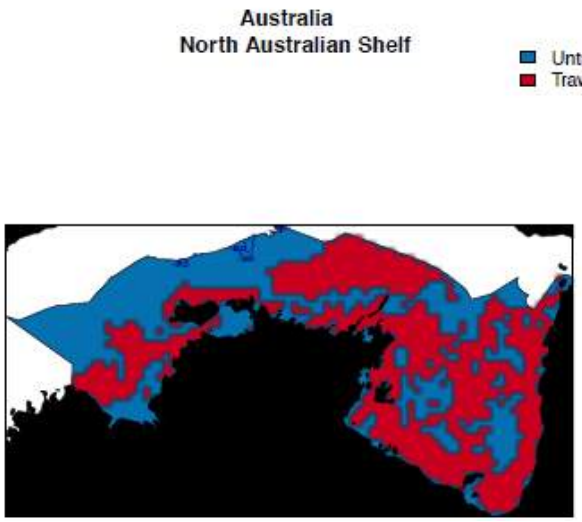
New Zealand
New Zealand Shelf

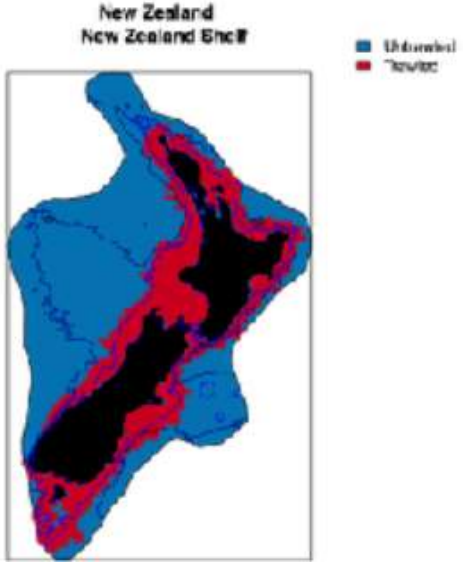


Resolution matters on how we perceive the footprint









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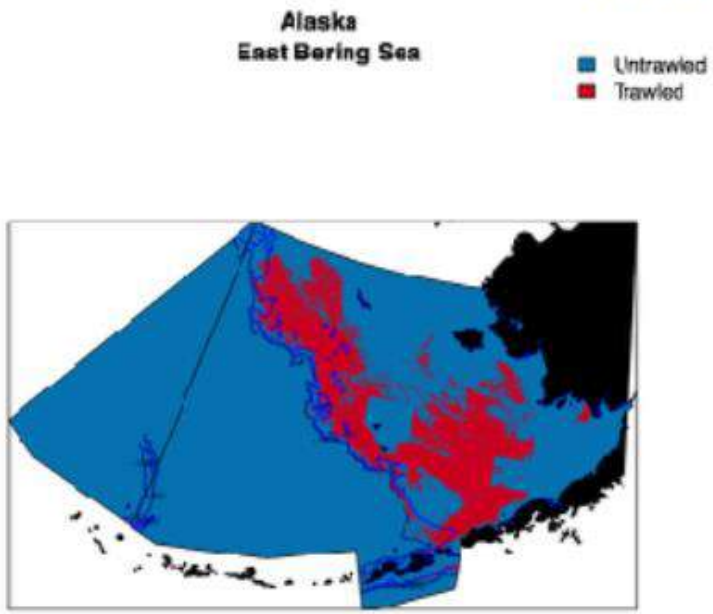
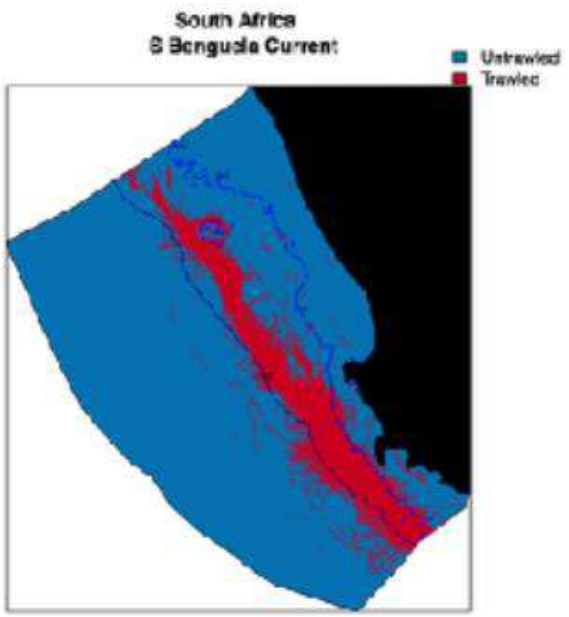
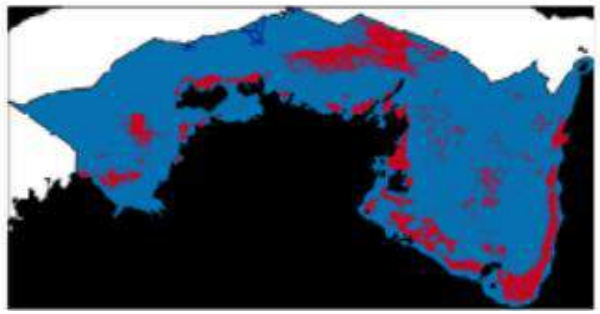
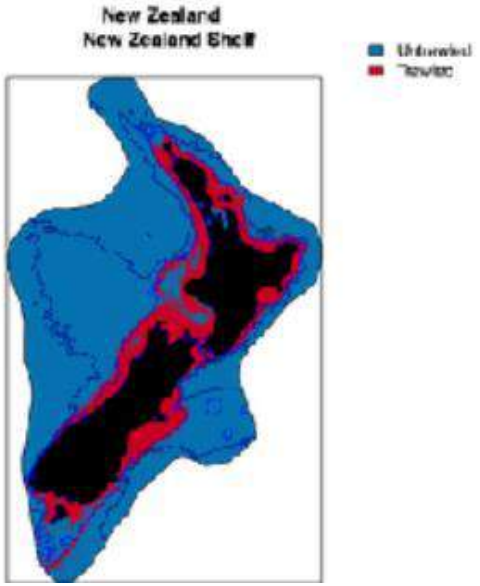
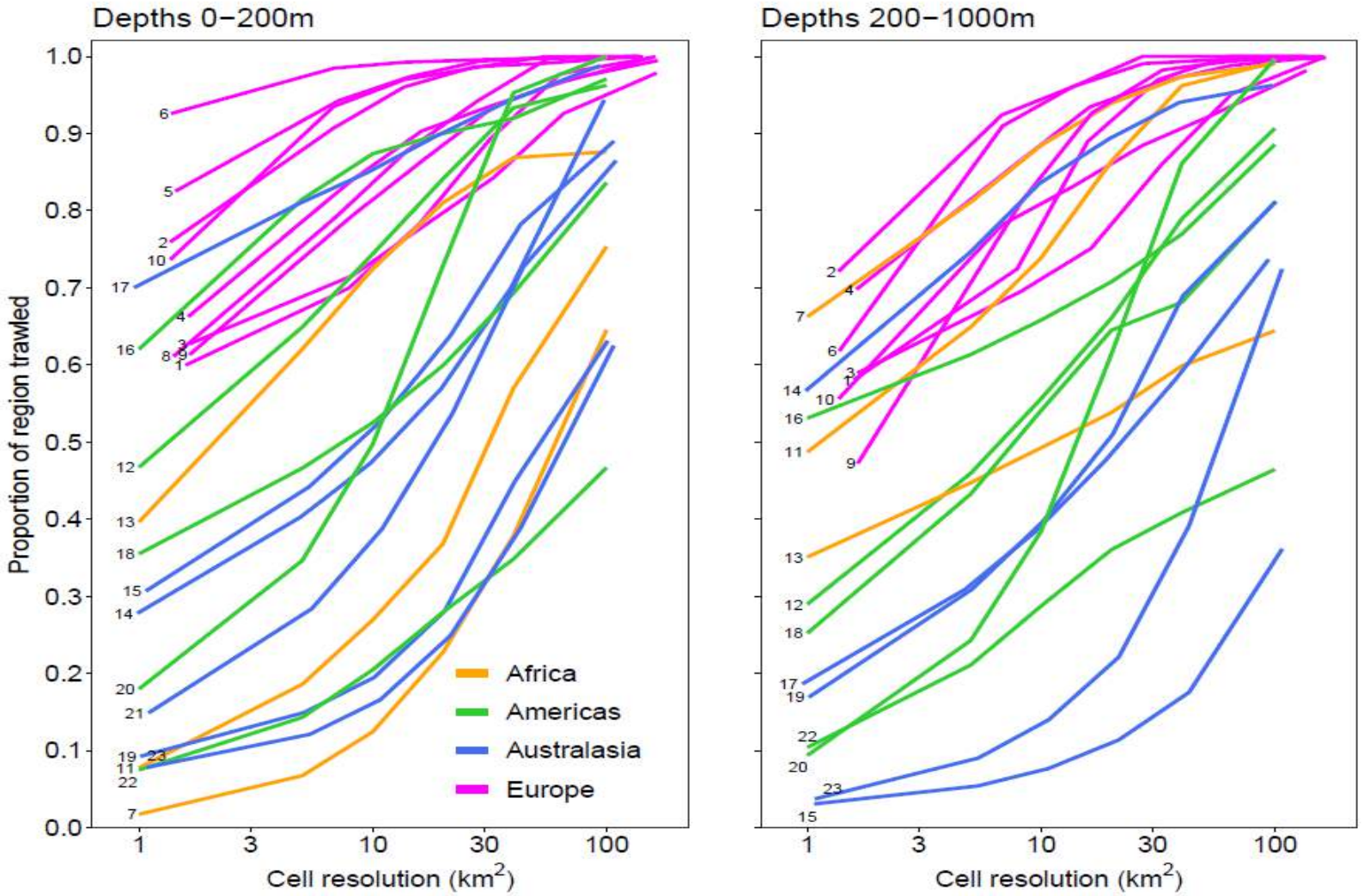


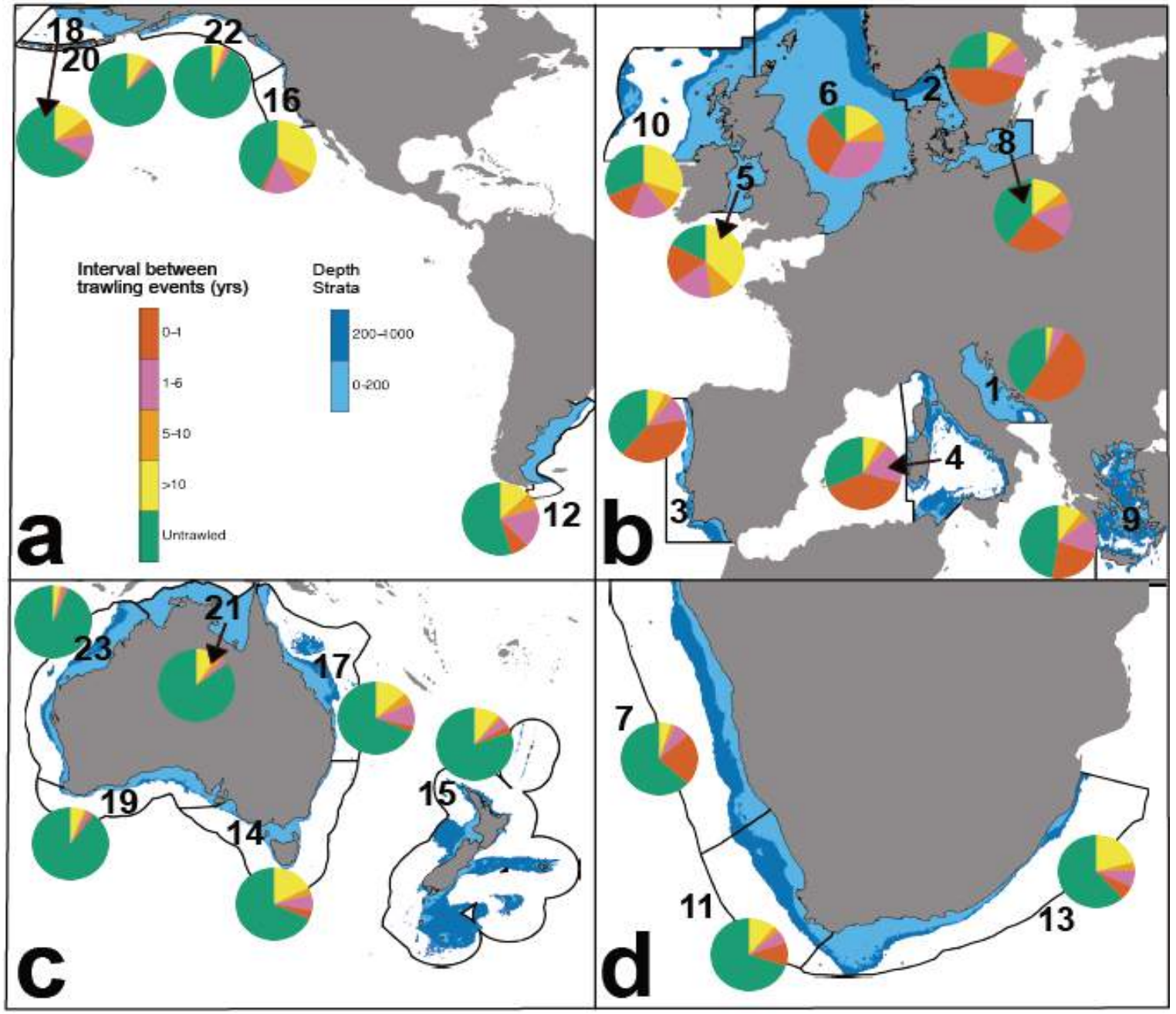




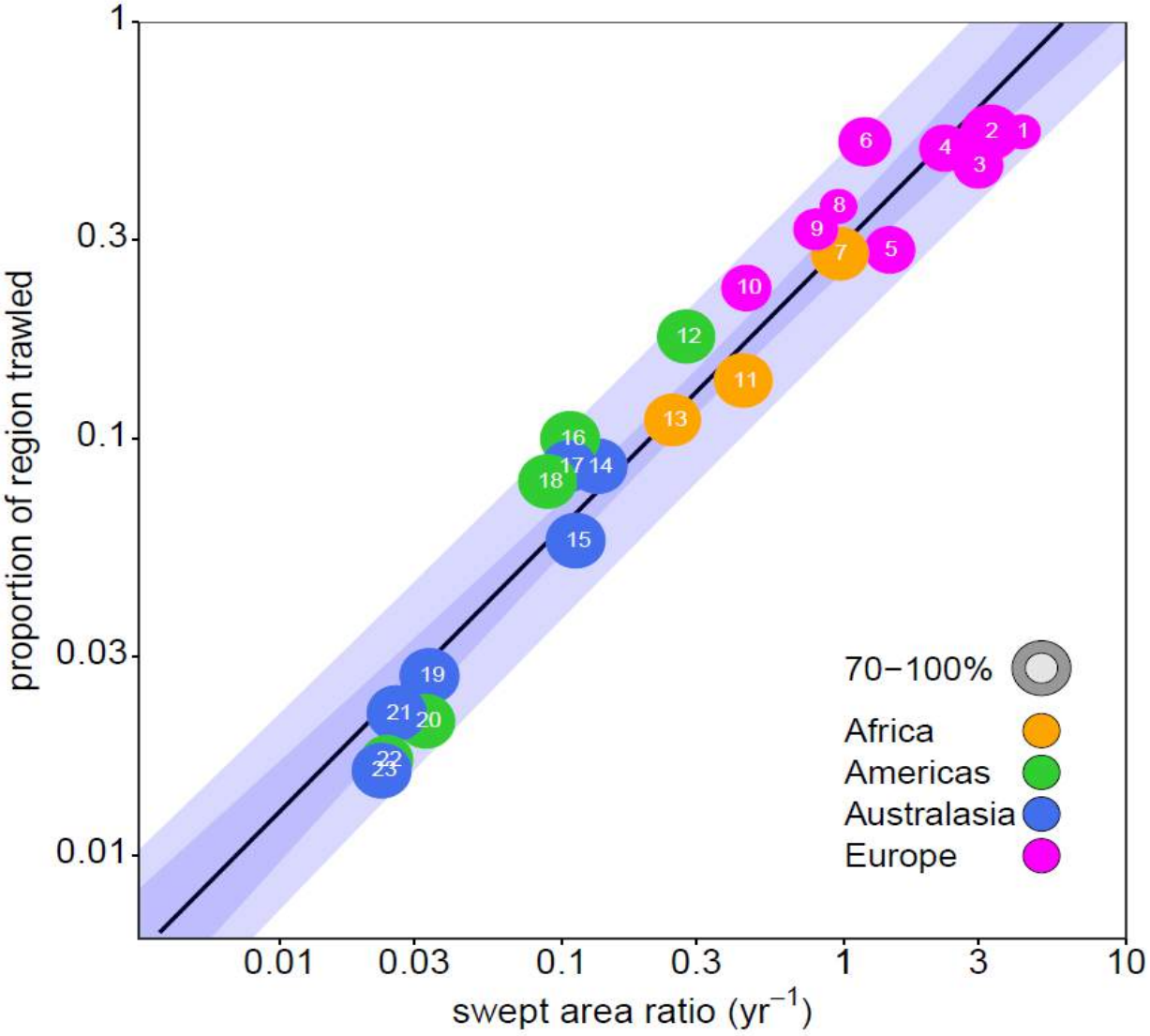


Footprint is mostly found on the shelf




18
20
22
16
12
a
Interval between trawling events (yrs)
0-1
1-5
5-10
>10
Untrawled
Depth Strata
200-4000
0-200
10
6
2
8
5
1
4
3
9
b
21
23
17
19
14
15
c
7
11
13
d

Some areas have very small fishing footprints

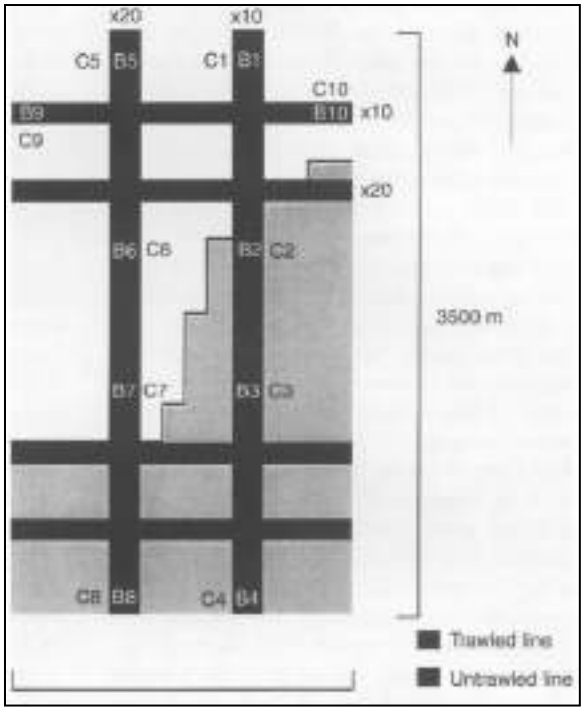


Tweeting allowed ☺

Two types of studies:

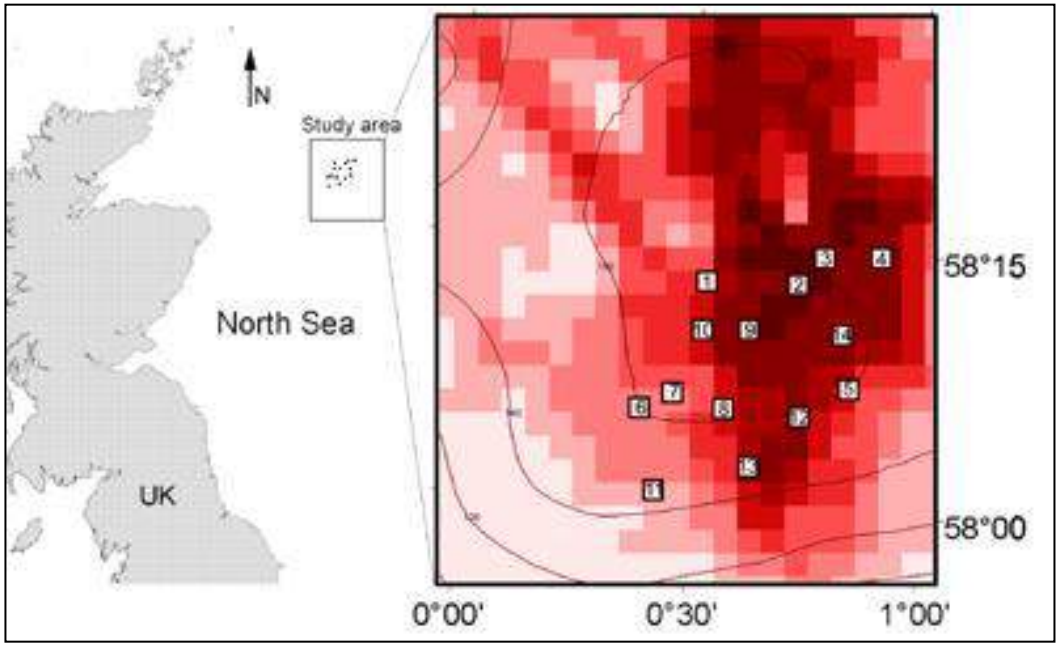
Experimental:

Study response to a precisely applied fishing regime with unfished controls

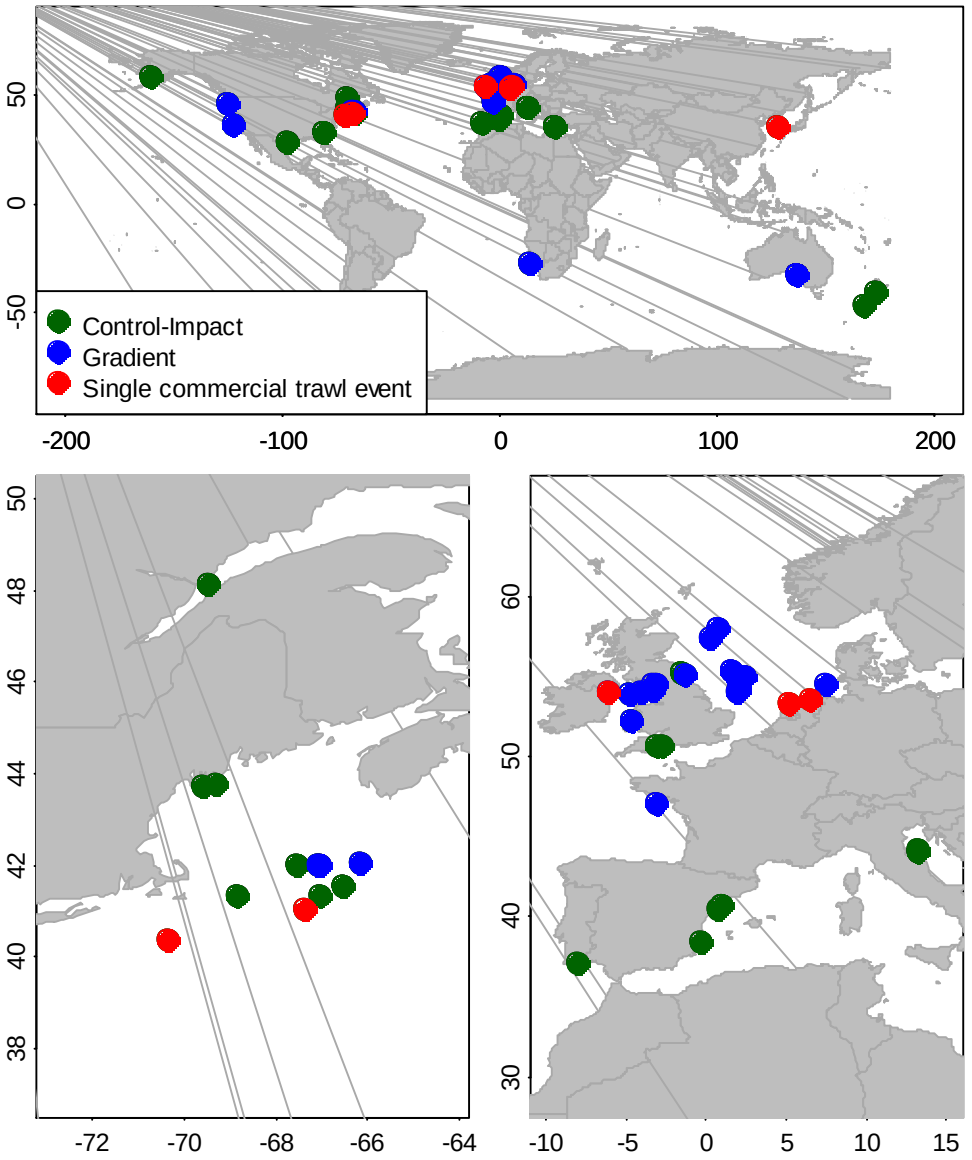


Comparative:

Study the response of seabed communities across a gradient of fishing exerted by the fleet or Control-impact studies



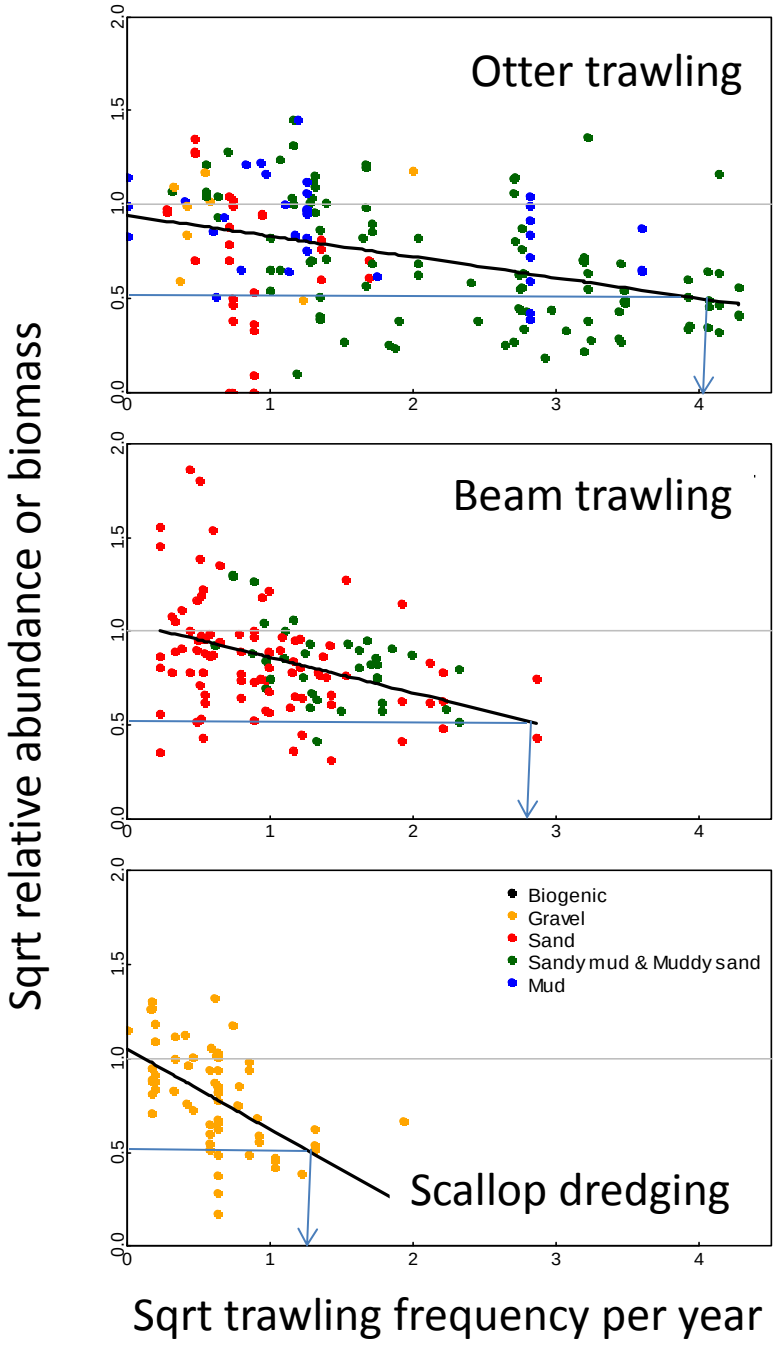
Global distribution of comparative studies



Aggregated effects of different fishing gears across all habitat types.

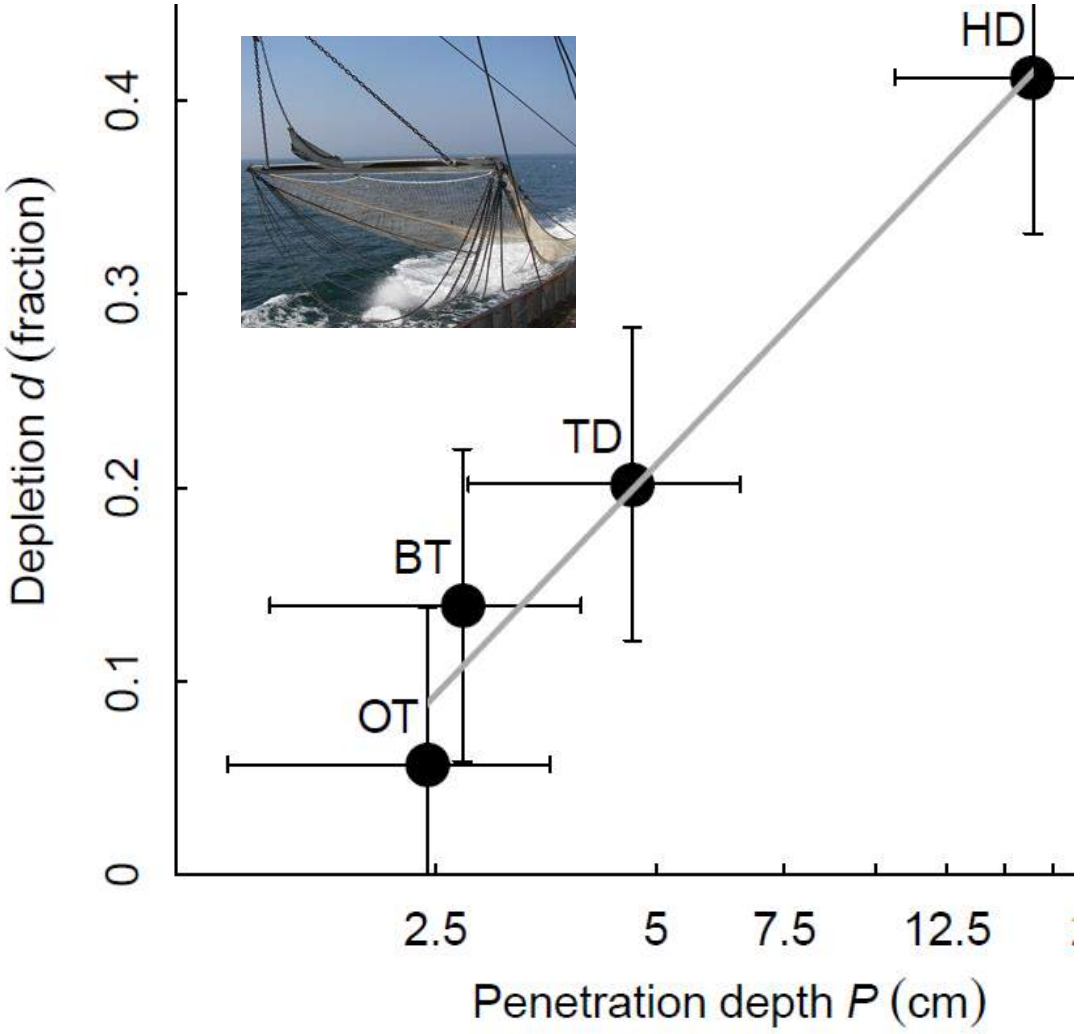
A rank order of impact emerges:

1. Scallop dredging
2. Beam trawling
3. Otter trawling



Calculation of animals killed in sediment by beam trawling

If we know how deeply the fishing gear penetrates the seabed we can calculate the proportion of animals depleted in the path of the trawl



Hiddink et al. 2017- PNAS

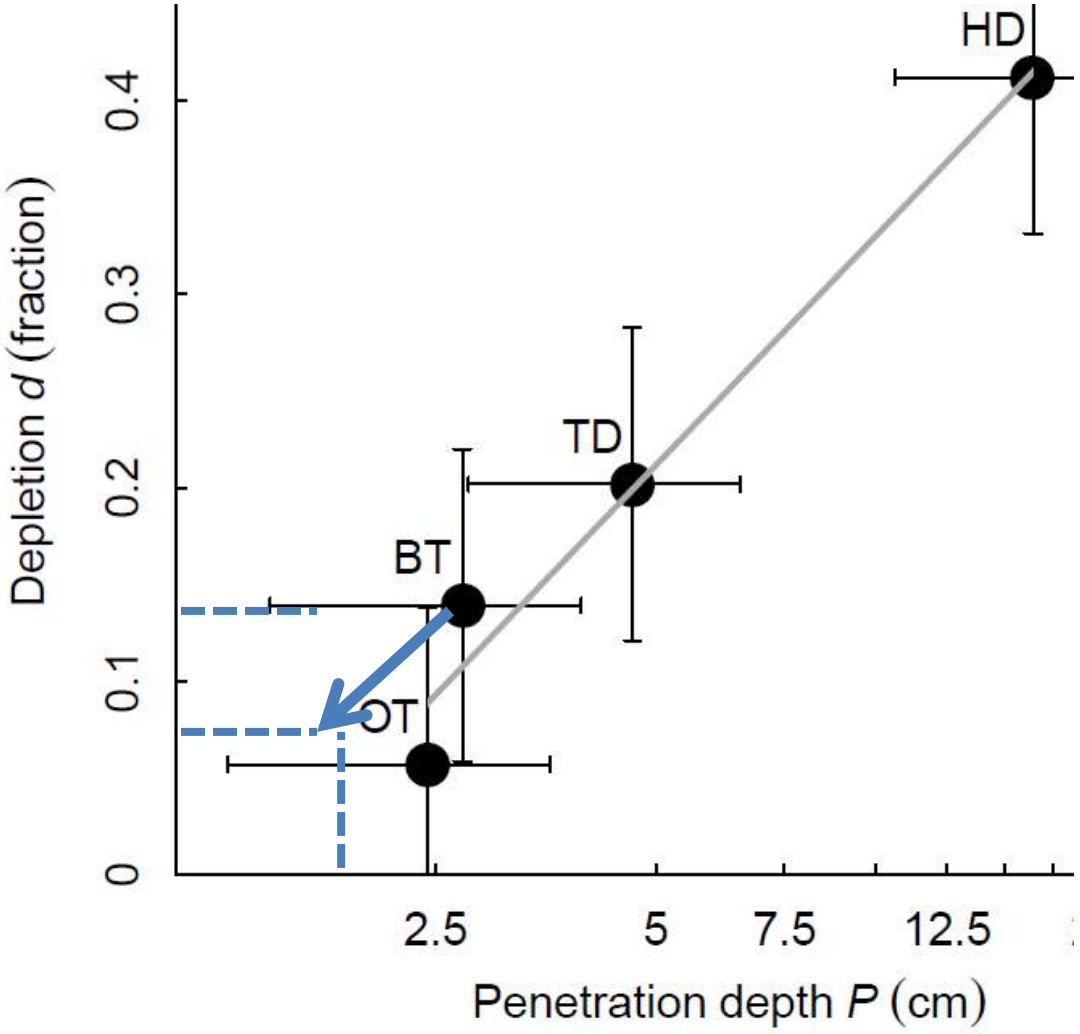
If pulse trawling reduces penetration it should reduce the proportion of animals killed in sediment

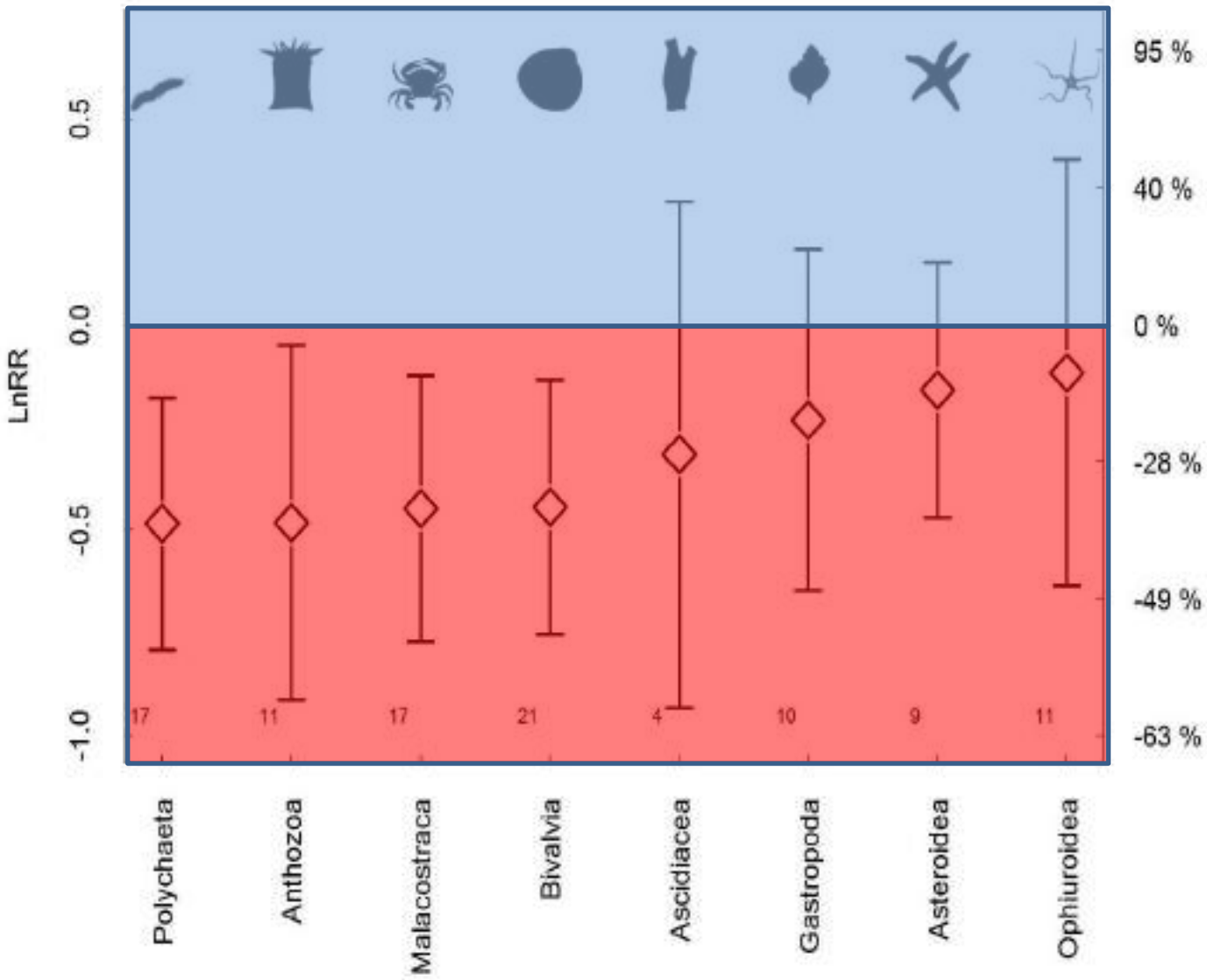
	Tickler chain beam trawl	Pulse trawl
2013	2.0 cm	1.2 cm
2014	1.5 cm	0.9 cm

Data from H Polet

Potential reduction of impact

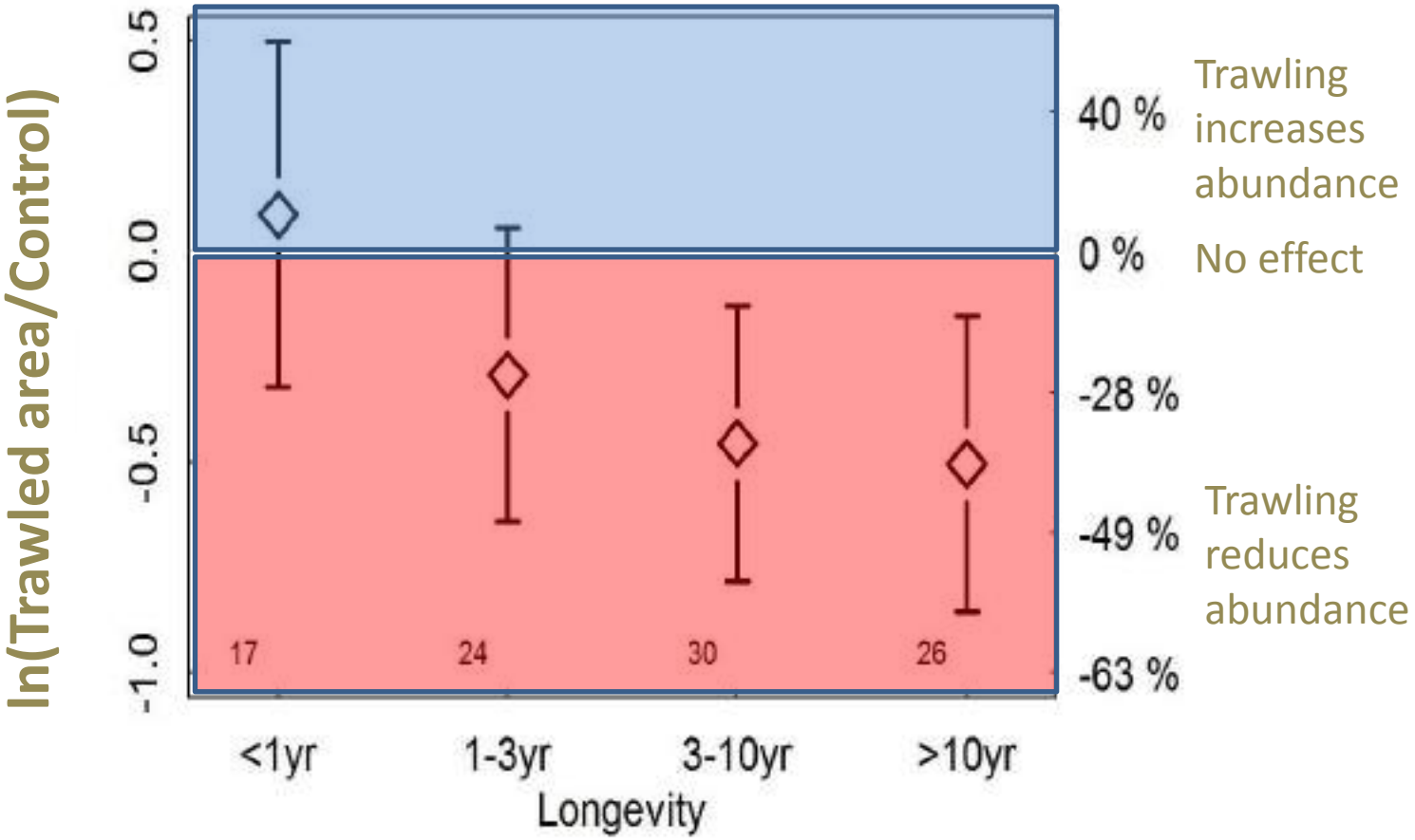
Reducing penetration of the seabed reduces the depletion of seabed organisms



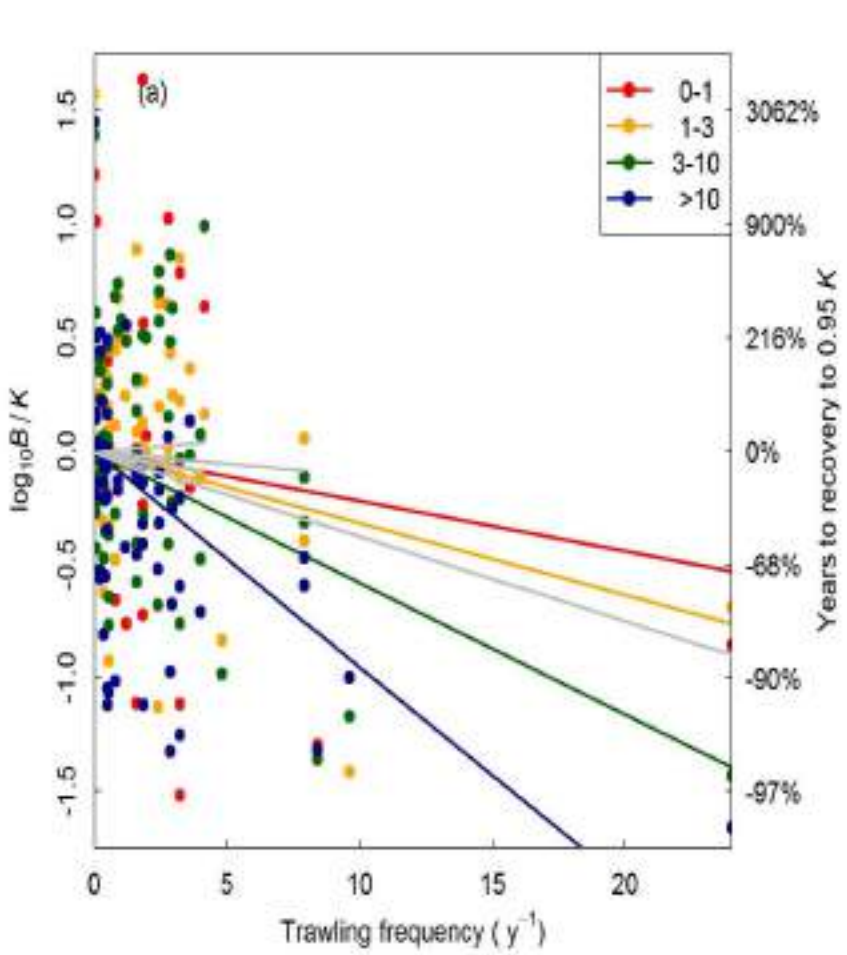


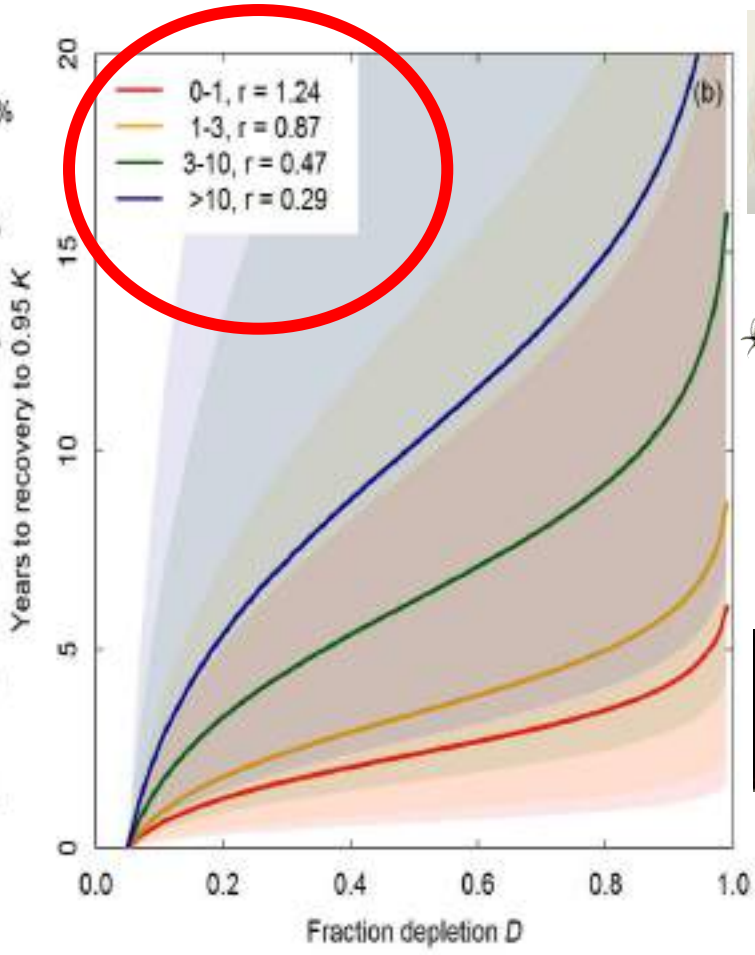
Control – impact studies, e.g. outside vs. inside MPA

Control – impact studies, e.g. outside vs. inside MPA

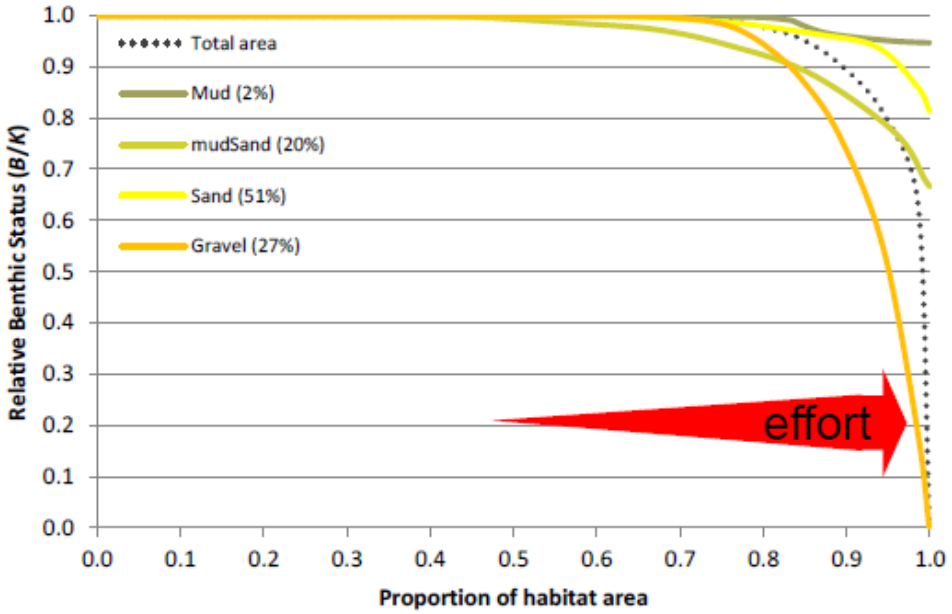


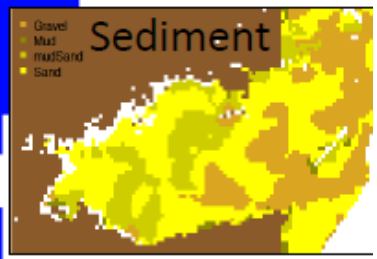
Longevity – abundance & biomass of taxa

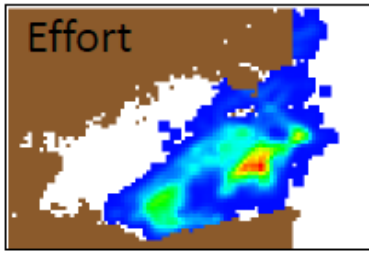




Relative benthis status of habitats







- Overall regional status is about ~97%
  - Mud=99%; mudSand=96%; Sand=99%; Gravel=93%
- Do this status assessment for many regions globally

Framework for BP Analysis

Management & Industry Practices

- Prohibitions by gear type
- Gear & fishing modifications
- Freeze fishing footprint
- Nearshore restrictions and zoning
- Prohibitions by habitat type
- Broad-scale habitat management
- Move-on rules
- Invertebrate bycatch quota
- Habitat impact quotas
- Removal of effort

Ecological & Economic Impacts

- Benthic biota
- Sustainable food production / food security
- Ecosystems and ecosystem services
- Fleet performance

Objective: evaluate trade-offs between benthic impacts and fish harvests

Where next?

Compile more VMS datasets for other parts of the world with capacity building where needed

Explore the possibility to apply to deep sea

Apply to other industries

Tool for MSC to assist accreditation bodies undertake formal assessment of P2 trawl impacts on the seabed

This will make assessment of this issue consistent and more transparent

Acknowledgements

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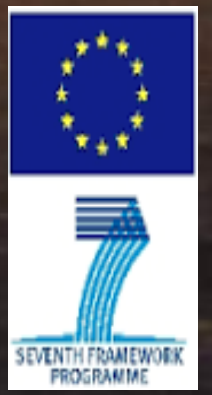

BENTHIS

Kaiser M.J., Hilborn R., Jennings S., Amaroso R., et al., & Sutherland W.J. (2016) Prioritisation of knowledge needs to achieve best practices for bottom-trawling in relation to seabed habitats. *Fish and Fisheries Fish and Fisheries* doi:10.1111/faf.12134

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