How can fisheries lower their carbon foot-print and emissions?

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Carbon emission challenges for fishing

Fuel (fossil fuel) consumption to catch fish

Solutions

- Reduce the time spent at sea by being more efficient at catching fish (e.g. rebuild stocks, improve capabilities)
- Transition to hydrogen (zero emissions)
- Improve vessel design
- Improve gear design, reduce drag
- Understand trade-offs in energy consumption per unit landings

Carbon storage challenges for fishing

Disruption or removal of carbon stores

Solutions

- Reduce footprint on the sea floor by being more efficient at catching fish (e.g. rebuild stocks, improve efficiency, data and management)
- Improve gear design, reduce contact with seabed where possible
- Improve understanding of location of important carbon stores (e.g. mud)

Carbon emission challenges for fishing

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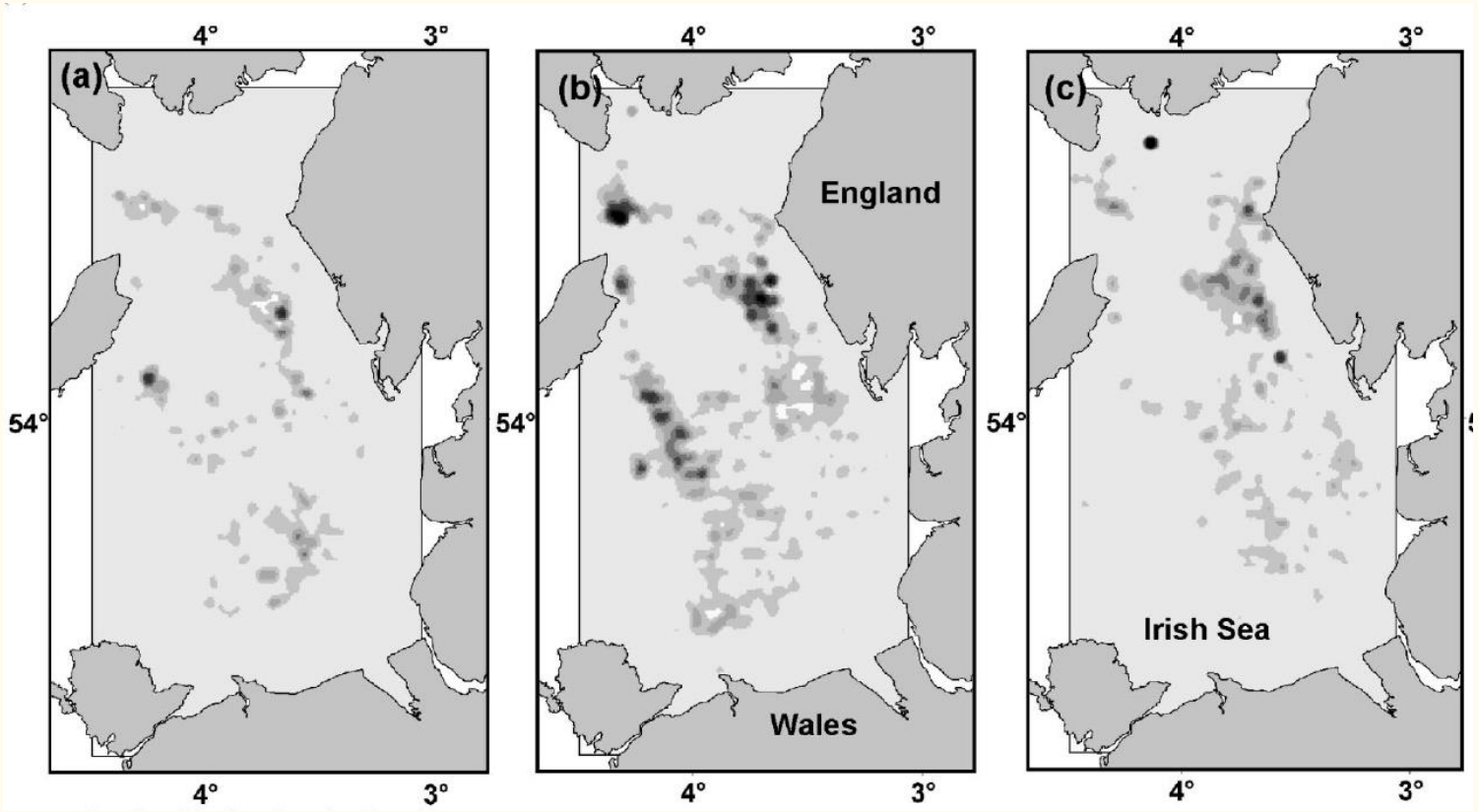

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Hydrogen

Carbon emission challenges for fishing

Fuel (fossil fuel) consumption to catch fish

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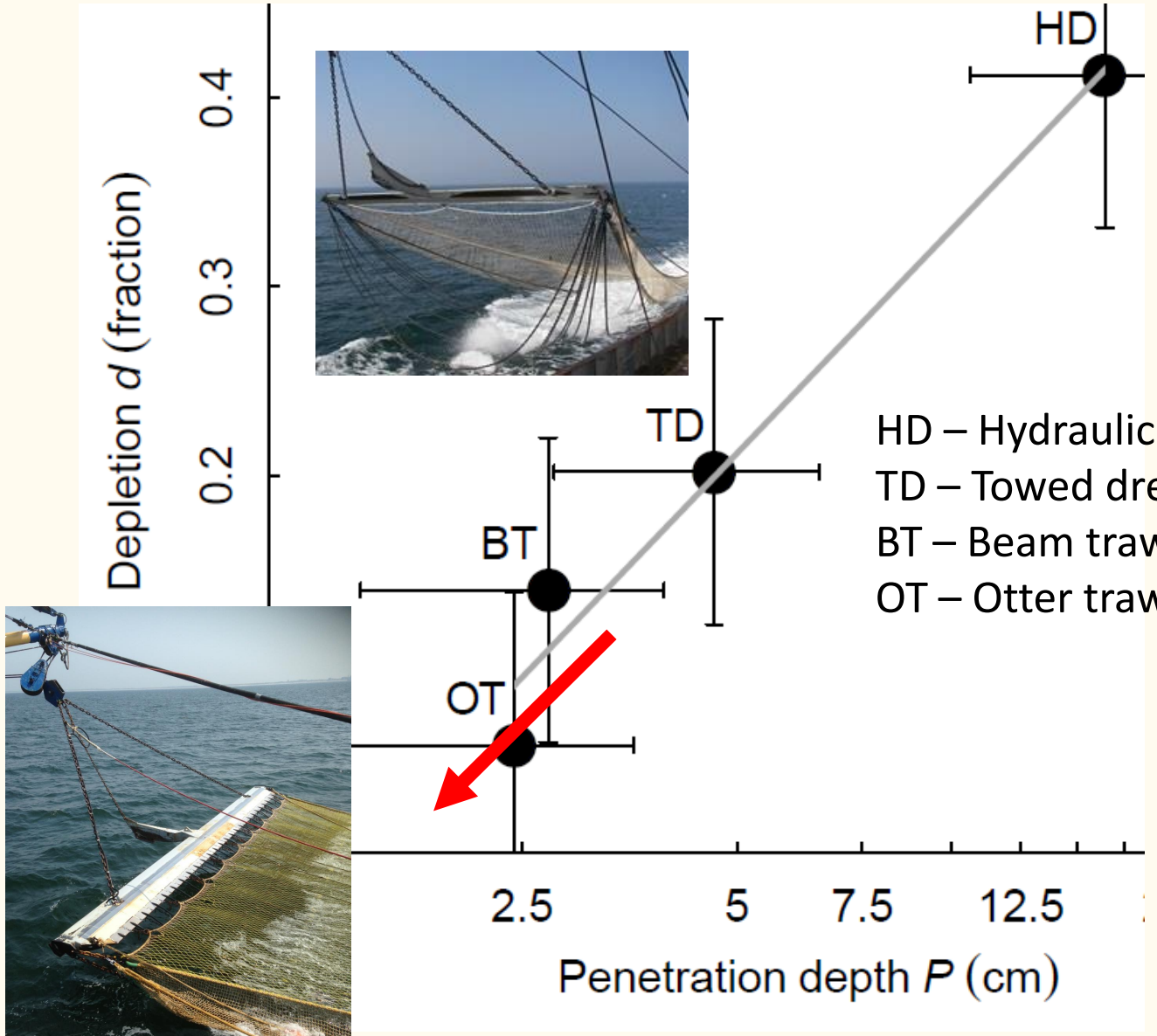
- Improve gear design, e.g. reduce drag, penetration

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 that bury carbon will be killed

Reducing contact with the seabed e.g. replacing beam trawls with pulse trawls would reduce animals killed in sediment

Hiddink et al. 2017- PNAS



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Hilborn et al. 2018 *Frontiers in Ecology and the Environment,* 16: 329-335

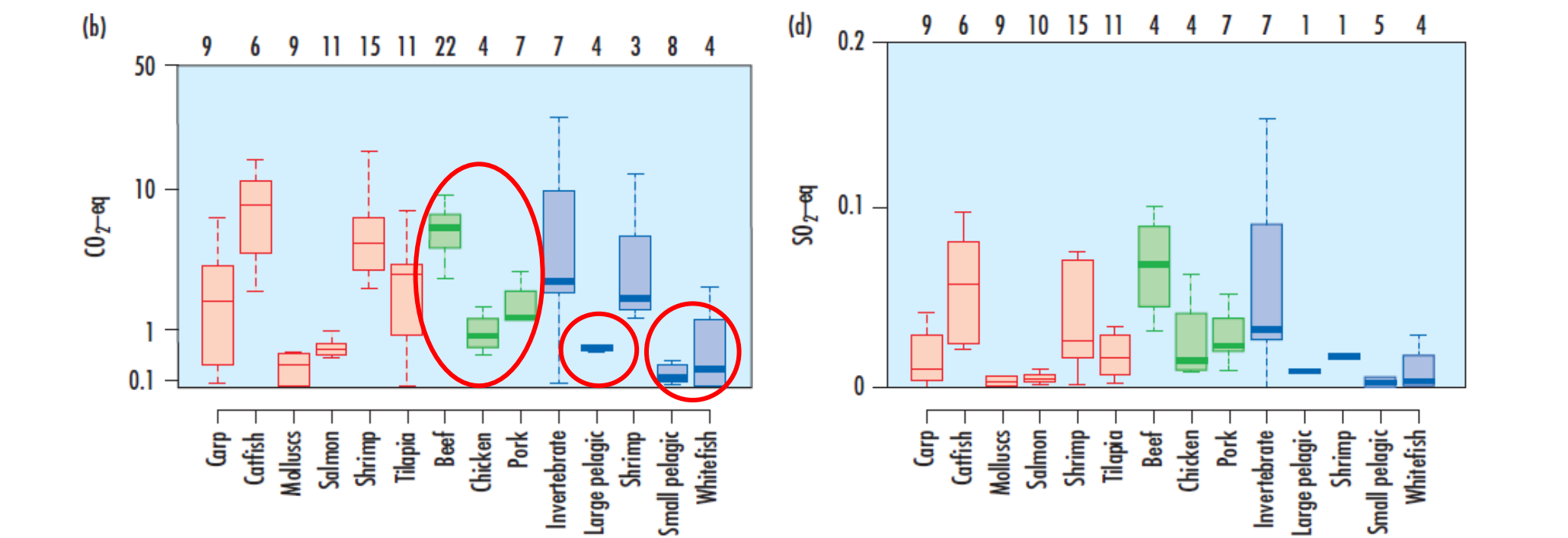

Figure 18.10 (a) Energy used (MJ), (b) GHG emissions (CO_2-eq), (c) eutrophication potential (PO_4-eq), and (d) acidification

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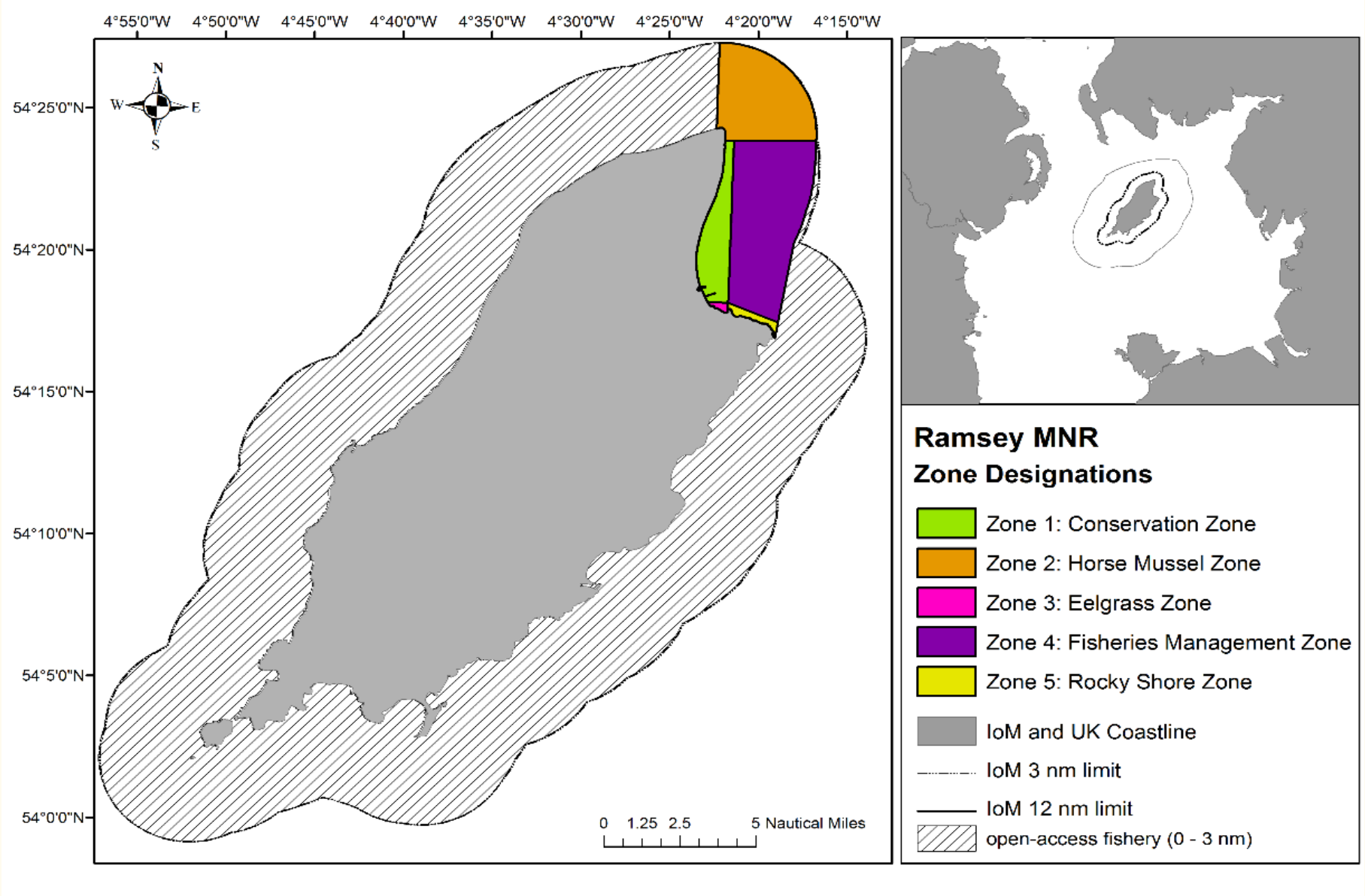
Ramsay Bay Marine Nature Reserve and Territorial User Right Fishery



Fishery features:

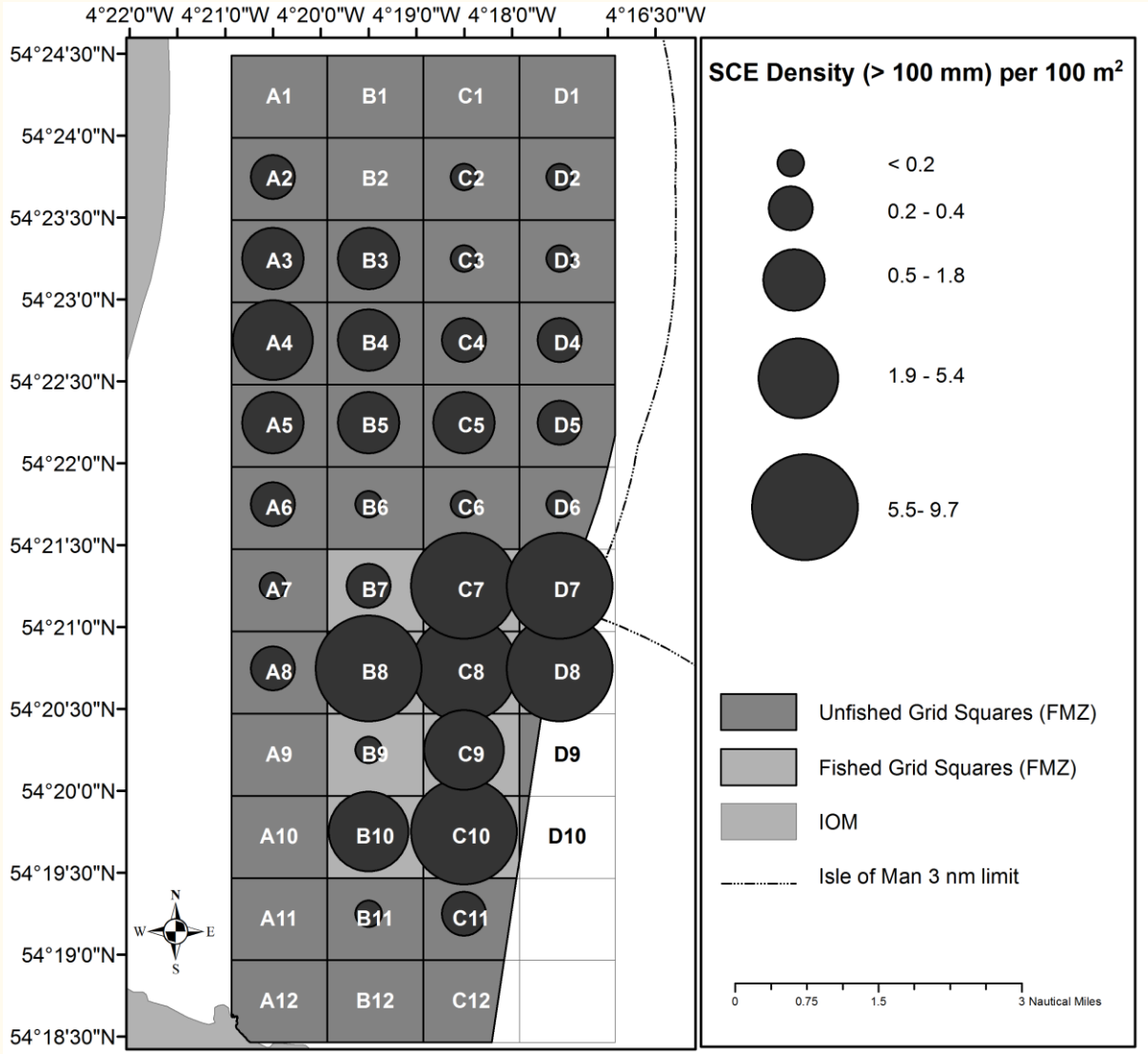
How it works:

- Lease to the Producer Organisation
- Industry – scientist pre season survey
- Joint setting of quota
- Area-targeted fishing
- Focus on high density areas

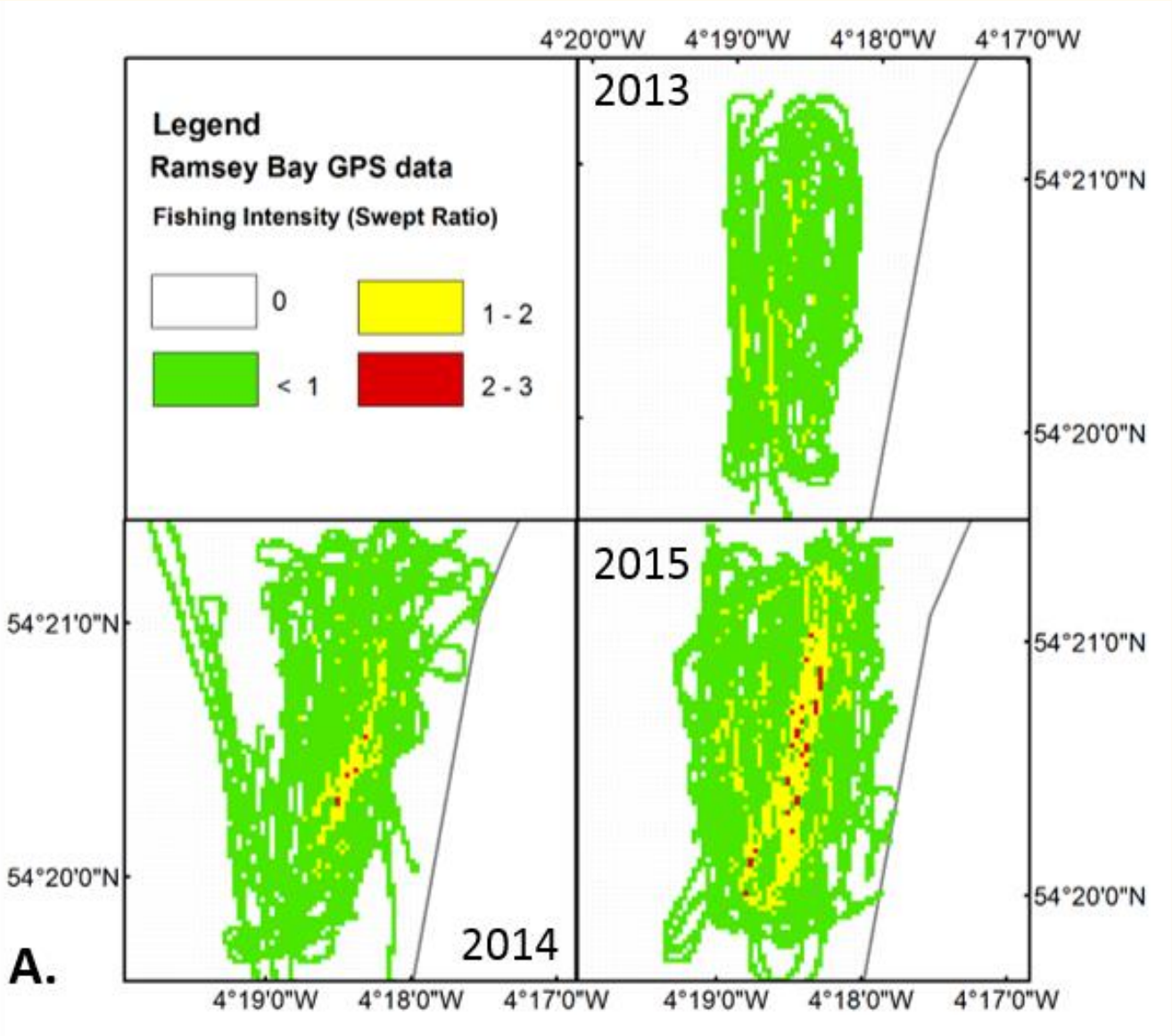
Outcomes:

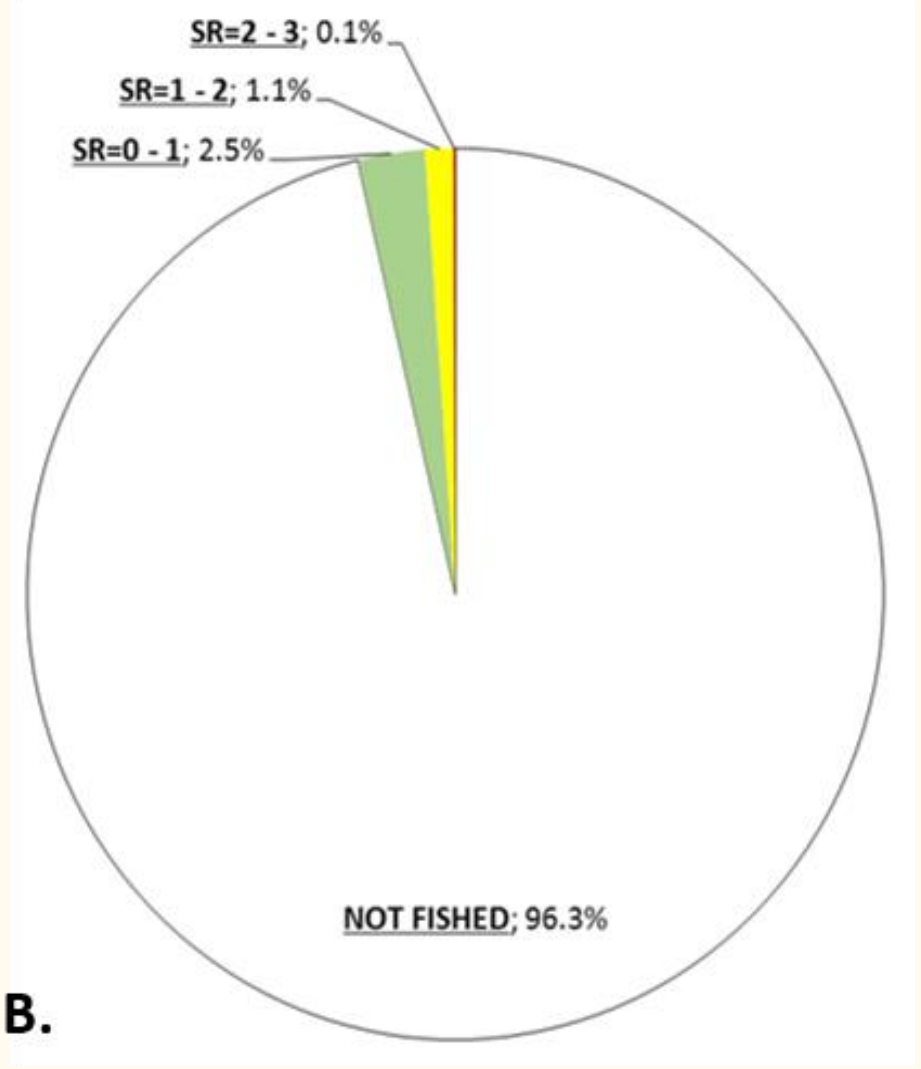
- Reduce fuel consumption
- Reduce environmental impact

Fishermen and scientists map scallop density and habitat



Area of seabed impacted ~ 3% of possible fishing ground

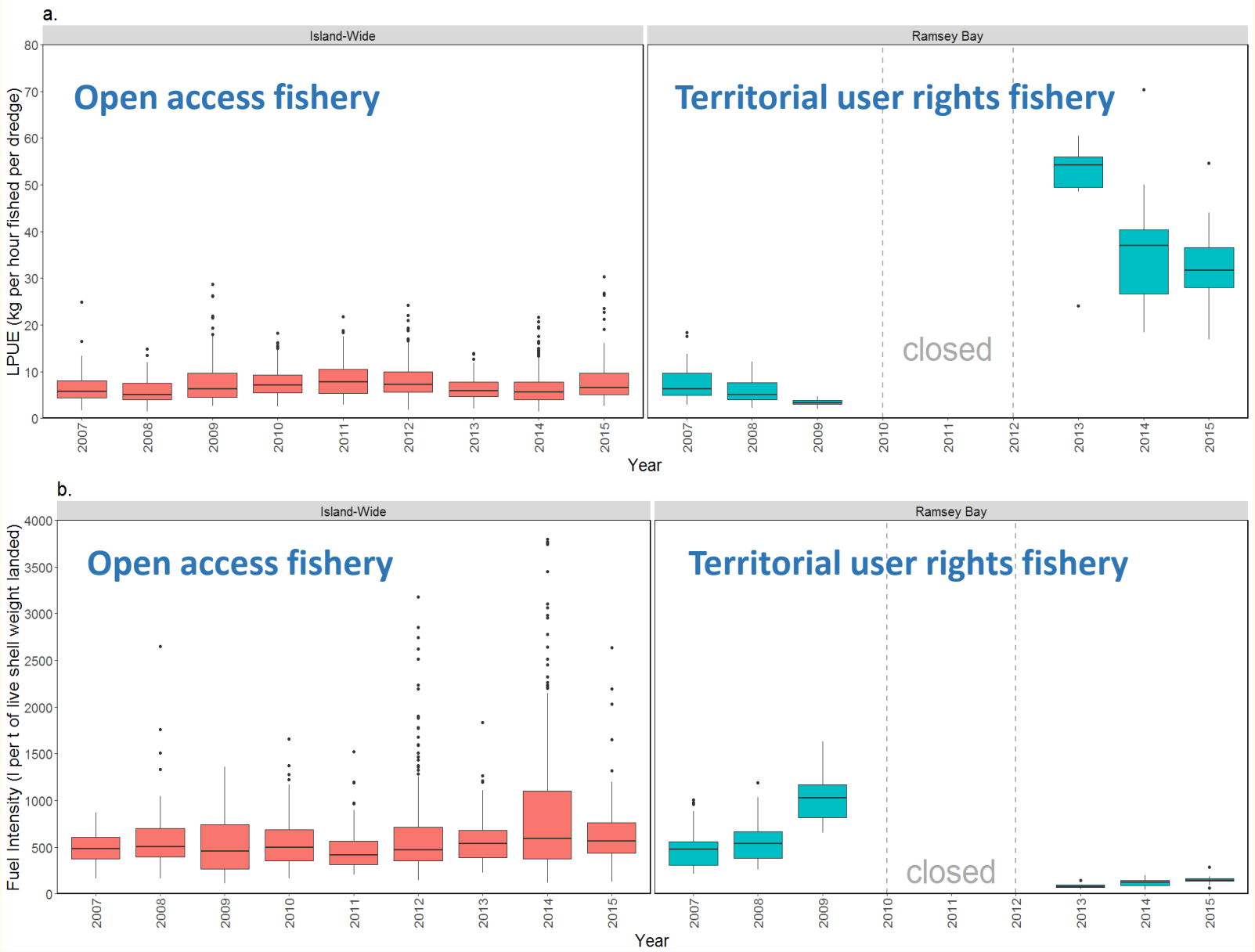




Changes in performance over time

Landings of scallop per hour fished per dredge

Fuel intensity in litres per tonne live weight



Edible protein Energy Return On Investment (EROI) ratio of scallops from the Ramsey Bay fishery with comparison to other proteins

	1	Landings (kg)	23400
	2	Average meat yield	20.24%
	3 = (1 x 2)	Total meat yield (kg)	4727
	4	Protein content scallops(1)	16.7%
	5 = (3 x 4)	Edible protein from fishery (kg)	790
	6	Fuel use (l)	12636
	7	Specific gravity diesel (kg / l)	0.83
	8 = (6 x 7)	Fuel use (kg)	10487
	9 = (5 / 8)	EROI	**0.075**

0.019

0.038

0.056

0.076