

# Partial protection or a whole-site approach to MPA management: support ecosystem processes

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# 25 year environment plan

At sea:

- Reversing the loss of marine biodiversity and, where practicable, restoring it.
- Increasing the proportion of protected and well-managed seas, and better managing existing protected sites.
- Making sure populations of key species are sustainable with appropriate age structures.
- **Ensuring seafloor habitats are productive and sufficiently extensive to support healthy, sustainable ecosystems.**

no detail as yet.....

Sites of greatest 'biodiversity'?

....we would also argue: sites should better enable 'ecosystem processes'.

E.g. Essential fish habitat.

What does this mean?

- Places where fish recruit to, breed, lay eggs, are resident as sub-adults or juveniles

Where is this?

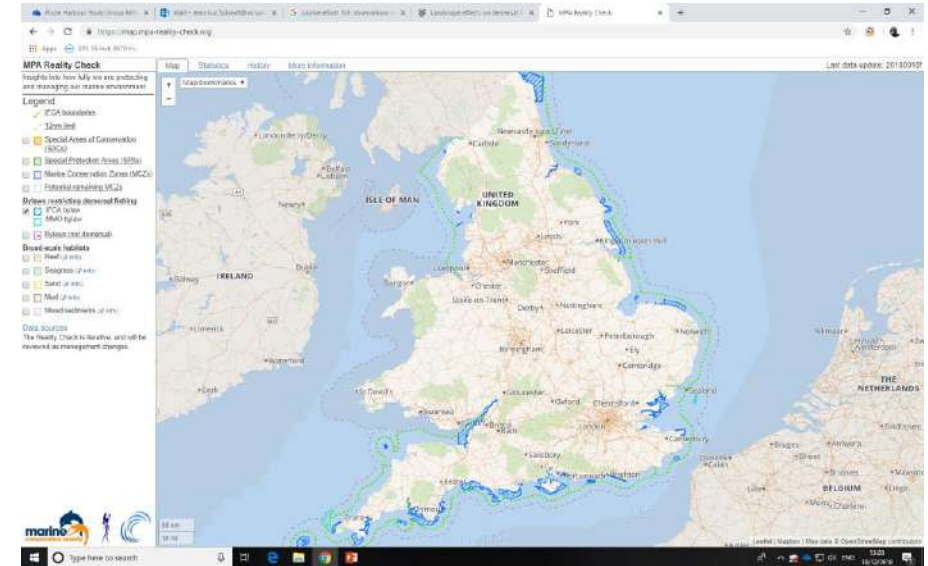
- Often inshore (e.g. estuaries; muds; sands; seagrass; diverse kelp beds; hydroids and bryozoans for scallops)
- Policy, legislation, and management measures should protect to enhance these habitats.

# What is the 'whole-site approach' to us?

Managing out the activities that prevents recovery of ecosystems to a more natural state

MSFD criteria effectively point to managing out bottom trawling to:

1. Improve seafloor integrity;
2. Prevent biodiversity loss (and recover it);
3. Lead to more natural food webs, and trophic structure.



<https://map.mpa-reality-check.org/>



# Inconsistencies in Government policy vs delivery

- whole site approach

BUT.....

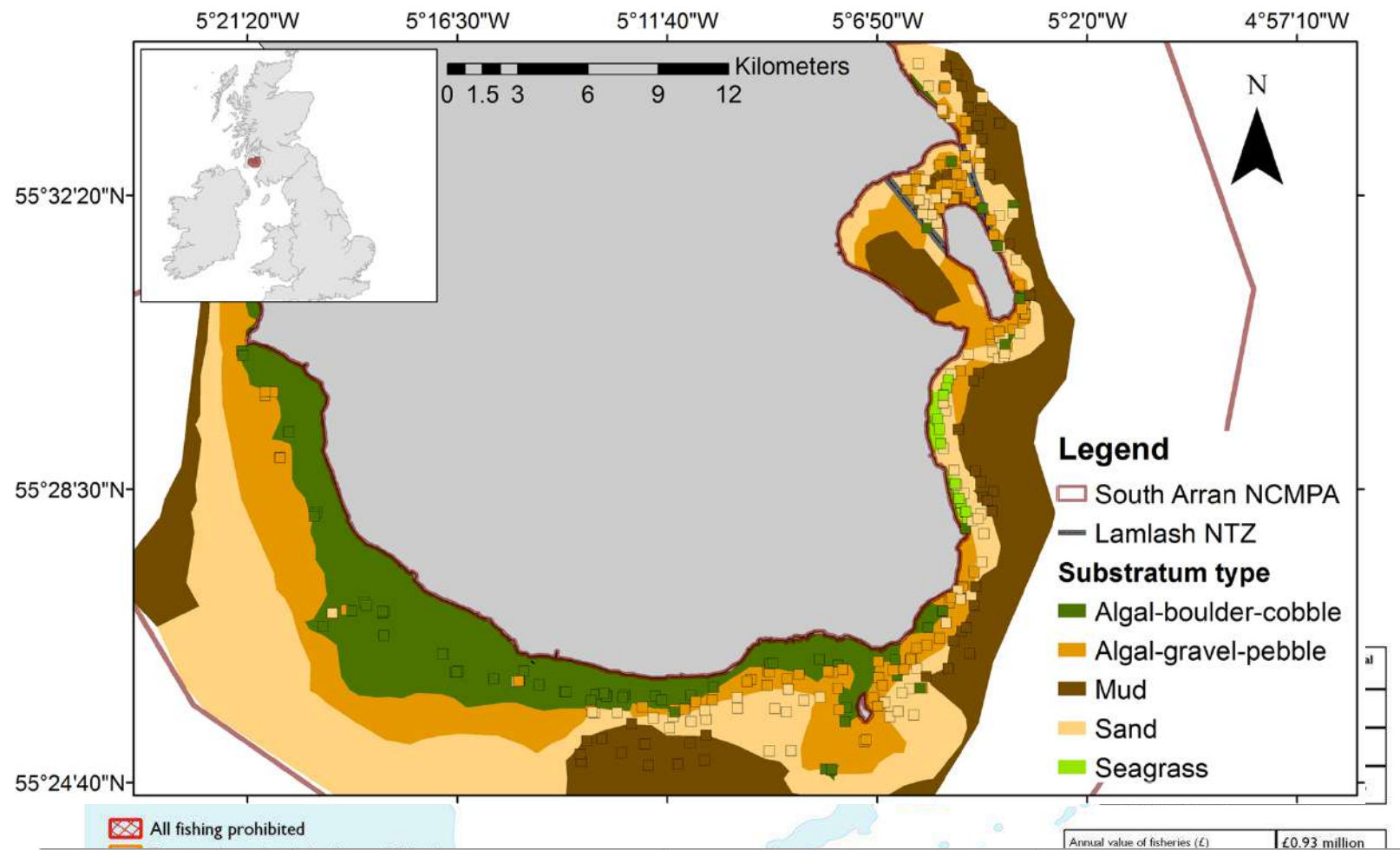
- iVMS consultation –

*‘This could assist in maximising fishing opportunities, such as zoned management within Marine Protected Areas. This means access may be allowed to certain types of fishing in areas where it was previously prohibited.’*

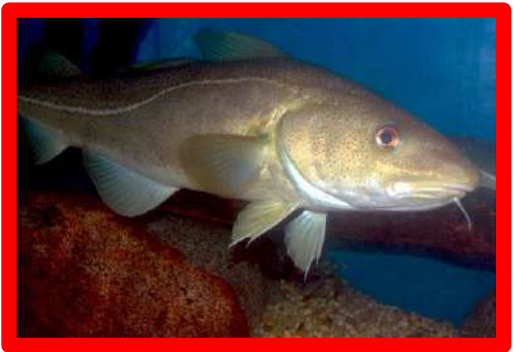
because of the ‘feature based approach’ to management



# Why are we neglecting essential fish habitat?



Substratum type	<i>Gadus Morhua</i>		<i>Melanogrammus aeglefinus</i>		<i>Merlangius merlangus</i>	
	MaxN	Mean MaxN ± s.e.	MaxN	Mean MaxN ± s.e.	MaxN	Mean MaxN ± s.e.
Algal-boulder-cobble	38	0.84 ± 0.22	3	0.07 ± 0.26	4	0.09 ± 0.29
Algal-gravel-pebble	338	4.57 ± 0.51	33	0.45 ± 0.23	32	0.43 ± 0.19
Mud	0	0	39	0.87 ± 0.19	53	1.20 ± 0.17
Sand	22	0.67 ± 0.30	158	2.03 ± 0.24	130	1.67 ± 0.26
Seagrass	52	1.38 ± 0.48	21	1.31 ± 1.15	3	0.19 ± 0.31



<https://doi.org/10.1371/journal.pone.0189011.t002>

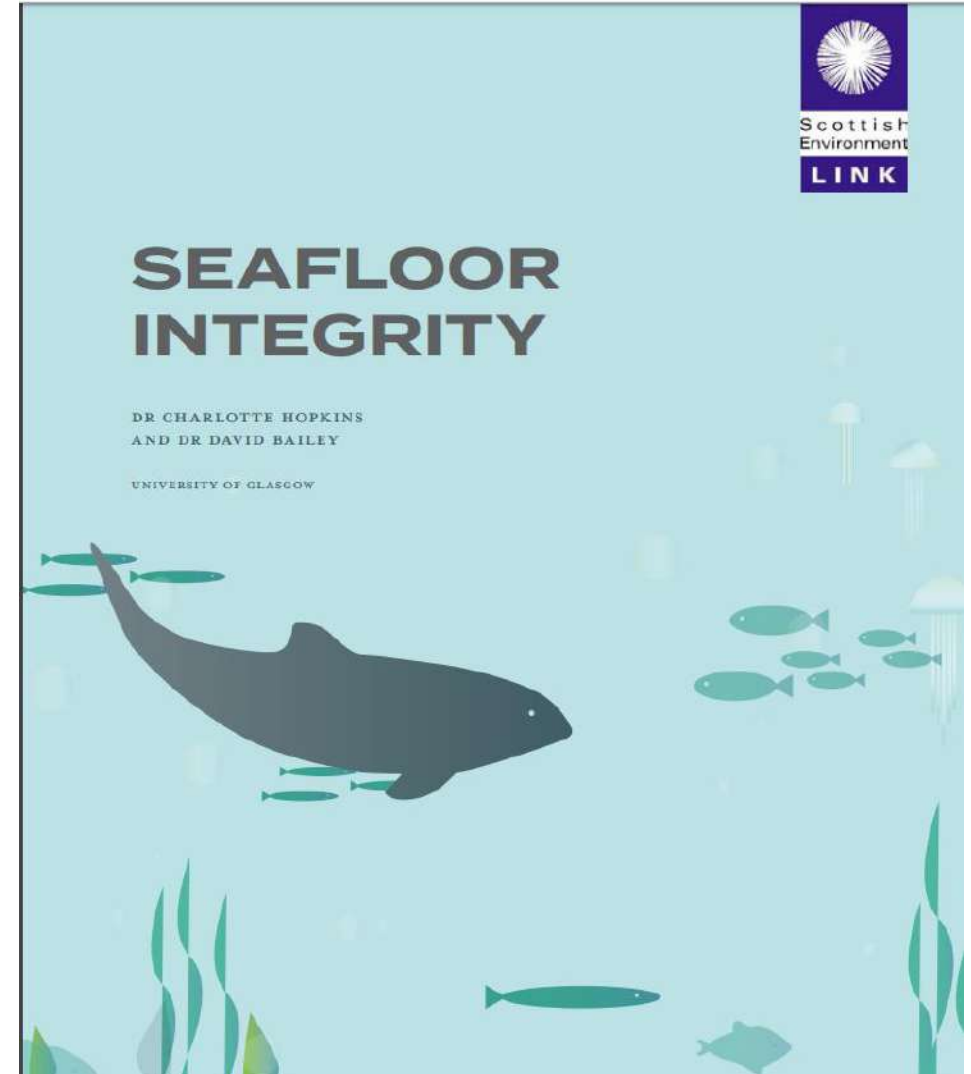


# Don't be specific about 'restoration'.

*'attributes must show a clear trend towards their pre-perturbation conditions, and the trend is expected to continue (if pressures continue to be managed) until the attributes lie within their range of historical natural variation. '*

Could be:

1. Fish size
2. Fish numbers
3. Number of fish species
4. Residency time of predators in sites
5. More physically complex and diverse seabed
6. Greater functional and biological redundancy



# Northumberland

Is essential fish habitat threatened because of local politics rather than benefits to all?

## ECOLOGIST

THE JOURNAL FOR THE POST-INDUSTRIAL AGE

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### Weak regulation jeopardises marine life

Jean-Luc Solandt and Horatio Morpurgo | 8th November 2018



Infractions against Marine Protected Areas in Northumberland don't bode well for post-Brexit fishing regulations.

The failure of local authorities in the UK to enforce protection zones today is threatening fish populations - including the very young, with no evidence of any benefit for fishing communities.

In 2012 the Marine Conservation Society (MCS) and ClientEarth were at the point of challenging the UK government in court over its failure to protect Special Areas of

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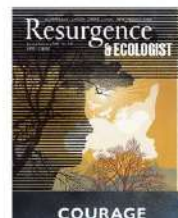
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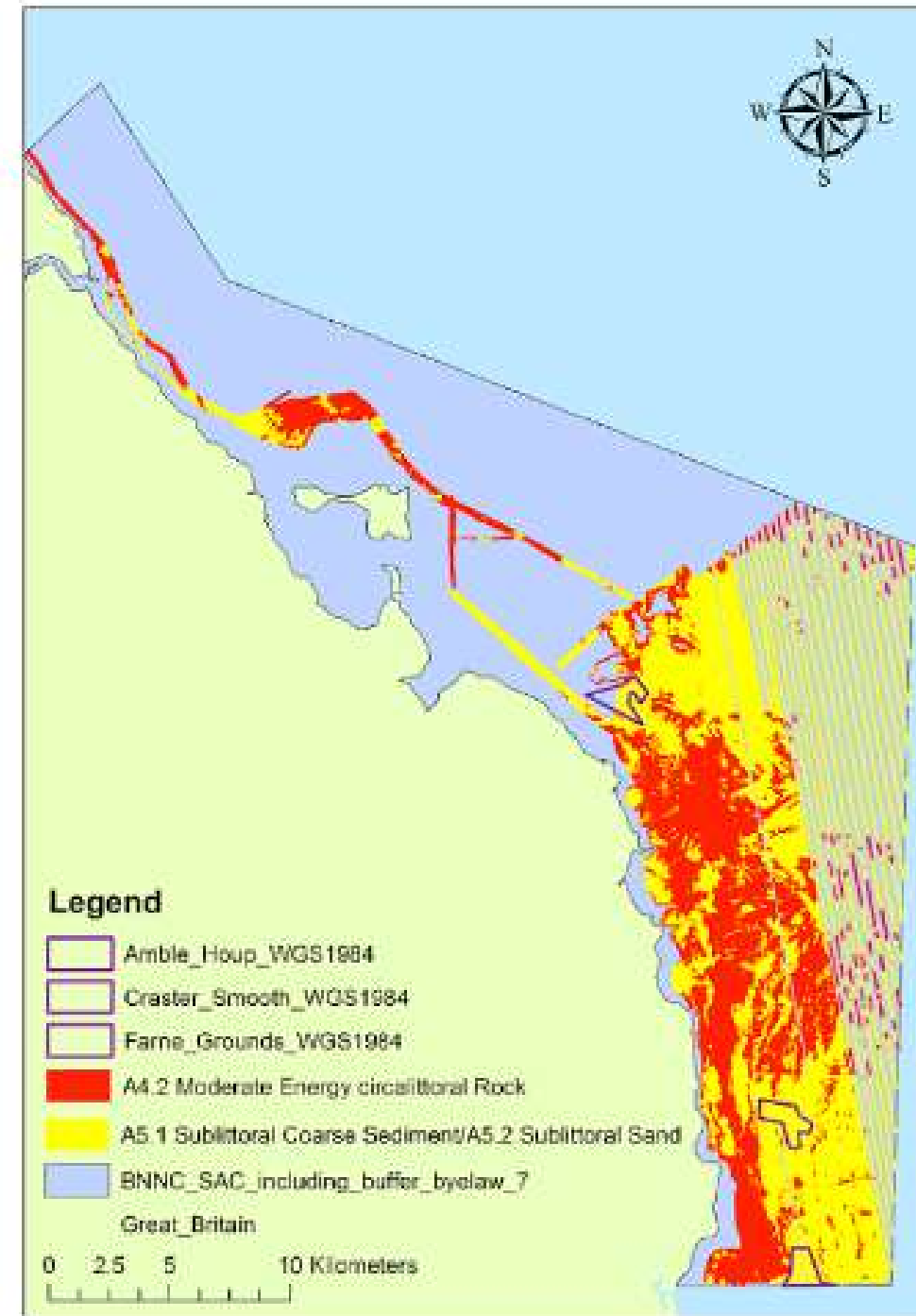
Marine Protected Areas  
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Report

#### LATEST EDITION

The latest edition of Resurgence & Ecologist is out now, and available to buy from the Resurgence Trust website.



*"I am familiar with the study you quote but wonder how relevant research from a warmer sea with a different species mix will be."*





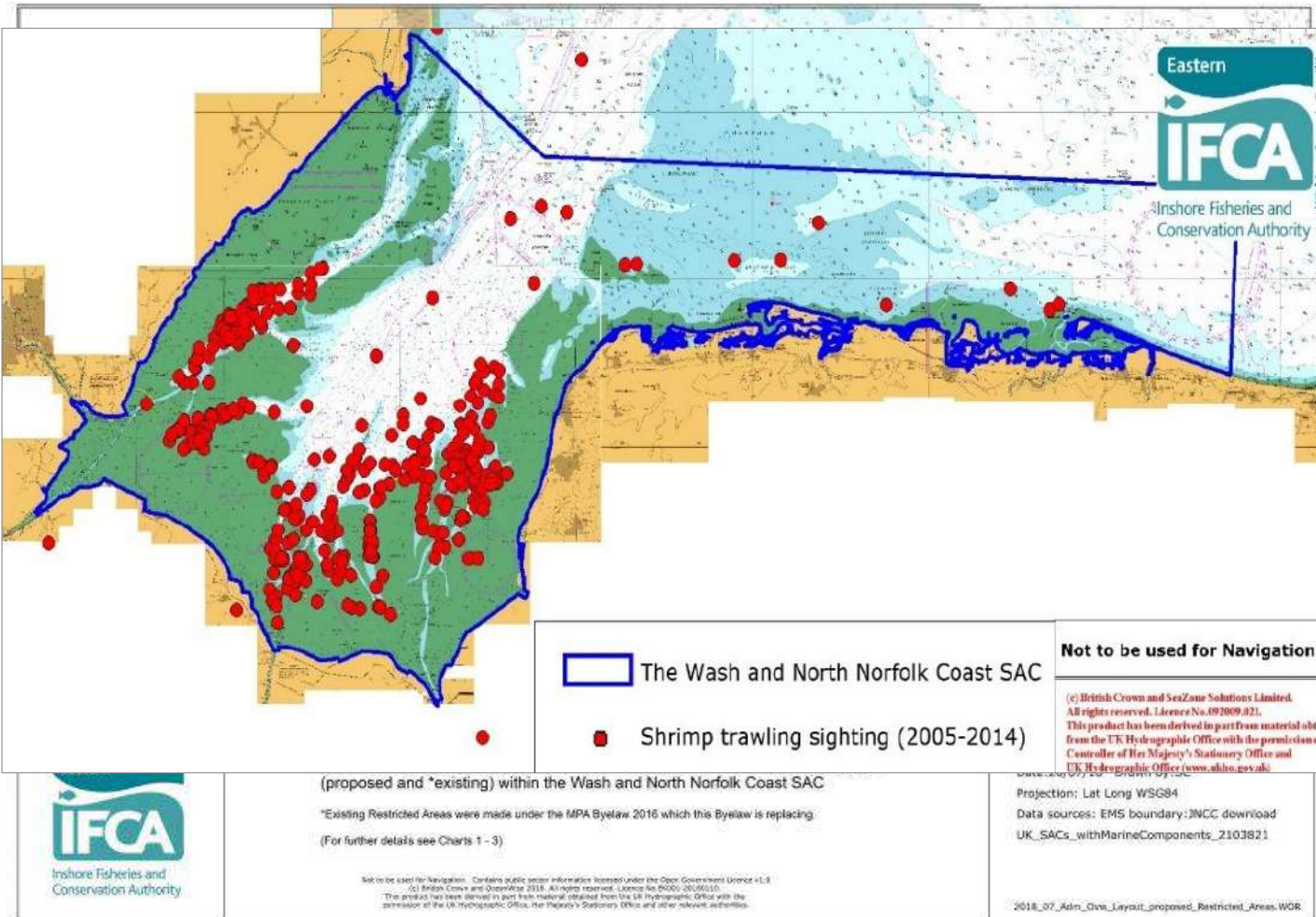
# In practice, we have partial protection of sites

Quote from MSC report on shrimp bycatch (2011):

*'It was estimated that during 2006 the UK brown shrimp fishery discarded approximately 4.5 ( $\pm$  0.5) million plaice, 1.2 ( $\pm$  0.2) million dab, 1.6 ( $\pm$  0.2) million whiting and approximately 0.1 million cod during 2006 even with the use sieve nets (Catchpole et al., 2008). However, landings between 2000 and 2010 were lowest during 2006 (Figure 3.1.2.1), thus, average annual numbers of discarded fish are likely to be higher than those suggested by Catchpole et al. (2008).'*

Site metrics and features:

Feature (% of site)	Vulnerable sub-features	Associated species feature at threat from shrimp trawls
H1110 – sandbanks which are slightly covered by seawaters (41% of site)	Fish (dab, sole, plaice, sandeels, cod, dab, whiting), benthic inverts (sand-mason worms, ross corals, dead men's fingers). Sabellaria crusts, echinoderms, brittlestars, crabs.	Grey seal, harbour seal, seabirds (SPA feature) that feeds on fish and molluscs
H1160 – Large shallow inlets and bays (39% of site)	All the above, juvenile fish, adult fish.	Grey seal, harbour seal, seabirds (SPA feature) that feed on fish and molluscs
H1140 – Mudflats and sandflats not covered by seawater at low tide (17% of site)	Mussel beds, juvenile fish, and other features, brittlestars, echinoderms.	Seabirds that feed on mussels





# Opportunities via 'revised approach' to modify the fishery to achieve 'whole site' approach

## ARTICLE

### Preliminary Study of Trap Bycatch in the Gulf of Maine's Northern Shrimp Fishery

Cinamon Moffett,\* Yong Chen, and Margaret Hunter

School of Marine Sciences, University of Maine, 218 Libby Hall, Orono, Maine 04469, USA



#### Abstract

Shrimp are one of the most economically valued and internationally traded fisheries products in the world, but there are persistent concerns over the environmental impact of shrimp fisheries, particularly the bycatch. In the Gulf of Maine (GOM), the northern shrimp *Pandalus borealis* are fished by two types of gear—trawls and traps. Bycatch rates for the trawl fishery were studied previously, but little has been documented for the trap fishery. In this study, onboard observers quantified bycatch on several trap boats along the central coast of Maine during the 2010 and 2011 fishing seasons (i.e., winter). This study found that the average bycatch level for Maine's northern shrimp trap fishery for the areas covered in the study was 1.21% in 2010 and 1.11% in 2011 by weight of landed catch. Although bycatch level and bycatch species composition varied on both temporal and spatial scales, the level of bycatch involved with the GOM's northern trap shrimp fishery was low compared with the global wild-caught shrimp fisheries. This study adds evidence of the low ecosystem impact of sustainably harvested coldwater trap-caught shrimp. Additional samples are needed for a complete understanding of bycatch levels on both temporal and spatial scales in Maine's northern shrimp trap fishery.

Shrimp are one of the most economically valued and internationally traded fisheries products in the world with an annual catch worth approximately U.S.\$10 billion (Gillett 2008). Concerns persist over the environmental impact of the fishery, particularly the high bycatch. Understanding the impact of bycatch is an important component of fisheries management, especially as more ecosystem-based management systems are adopted.

Both location and type of fishing gear impact shrimp bycatch. Proportions of bycatch levels in the total catch weight in warmwater shrimp fisheries have been documented at 80% or higher (Harrington et al. 2005; Gillett 2008). According to

This study explored the bycatch levels in the Gulf of Maine (GOM) northern shrimp *Pandalus borealis* trap fishery. The southwest region of the GOM is the southern end of the northern shrimp species range in the North Atlantic. The GOM northern shrimp population is considered a single stock unit. Northern shrimp are hermaphroditic, maturing first as males at about age 2.5 years and transforming to females at around age 3.5 years. Most northern shrimp transform into females when they have reached a carapace length of 22 mm (ASMFC 2004). In the GOM, when nearshore waters cool, egg-bearing shrimp move inshore, increasing the concentrations of



# Essex Estuaries: limited management of data gaps



Figure 1. Blue areas: closed to bottom towed fishing. Red area where most fishing occurs.

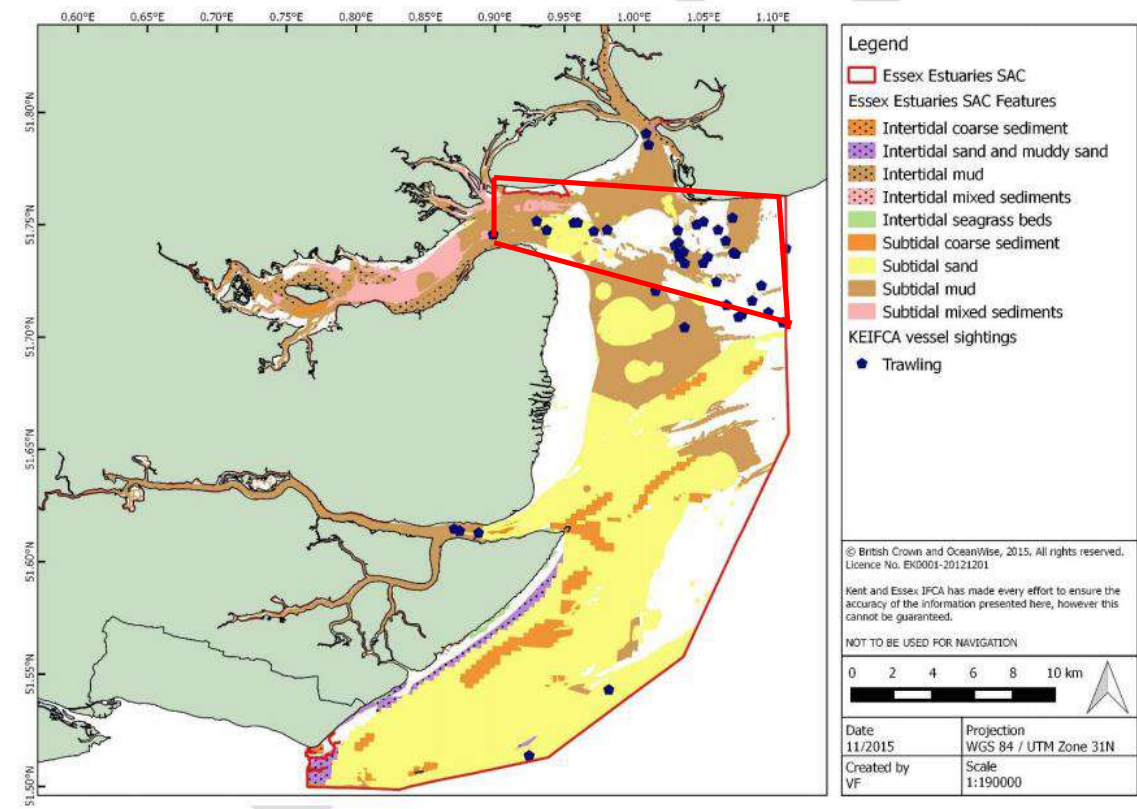
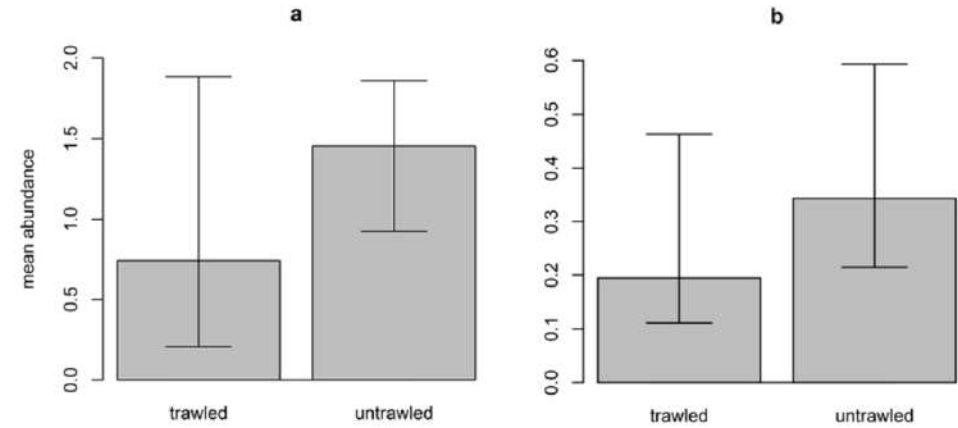


Figure 2. Essex Estuaries SAC features and sightings of fishing vessels engaged in trawling from 2010 to mid-2015.

# Evidence for sand and mud recovery?

- Too few, but some in deep water muds and sand habitats.
- Trawling around oil and gas infrastructure project (SNH) 2015.
- Sound of Canna 3.9km<sup>2</sup> fan mussel aggregation.
- Loch Torridon Nephrops size and density & seapen populations.
- Clare Bradshaw work Isle of Man (2001) on horse mussel, bryozoan and hydroid.
- ...the studies are there to show the trend if trawling is prevented...



**Figure 6.** Mean abundances with 95% CI of trawled and untrawled frames in a 0.65 m<sup>2</sup> area for (a) the total abundance of invertebrates and (b) the abundance of sea pens.

Harrauld et al (2018) SNH report 9(13): 25pp



[www.nature.scot](http://www.nature.scot)

# The bigger picture...

wider seas management:

protection of entire swathes of habitats that provide for important ecosystem services

i.e. inshore trawling bans?

## Journal of Applied Ecology



Journal of Applied Ecology 2015, 52, 1216–1226

doi: 10.1111/1365-2664.12483

### REVIEW

## Potential effects of kelp species on local fisheries

I. Bertocchi<sup>1\*</sup>, R. Araújo<sup>1</sup>, P. Oliveira<sup>1</sup> and I. Sousa-Pinto<sup>1,2</sup>

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### Summary

1. Kelp species are ecosystem engineers in temperate coasts, where they provide valuable services to humans. Evidence of the declines of kelp forests exists from several regions, but their effects on fisheries still need to be elucidated. More effective management strategies for sustainable fisheries require a synthesis of research findings and an assessment of how research could be improved to fill current gaps.

## Live Consultations



On this page you will find information on our current consultations. If you are a stakeholder with regard to these consultations then please help us get the best management decisions made for our sustainable fisheries and conservation sites.

[Contact us](#)  
[Consultation archive](#)

### NEARSHORE TRAWLING MANAGEMENT REVIEW



We are Reviewing the management of nearshore trawling in Sussex District. The informal consultation stage is now closed. We have reviewed the consultation responses and a summary document is available [here](#).

The Authority is now considering management options. Any further formal consultation will take place in 2016.

### DISTRICT WIDE NETTING MANAGEMENT REVIEW

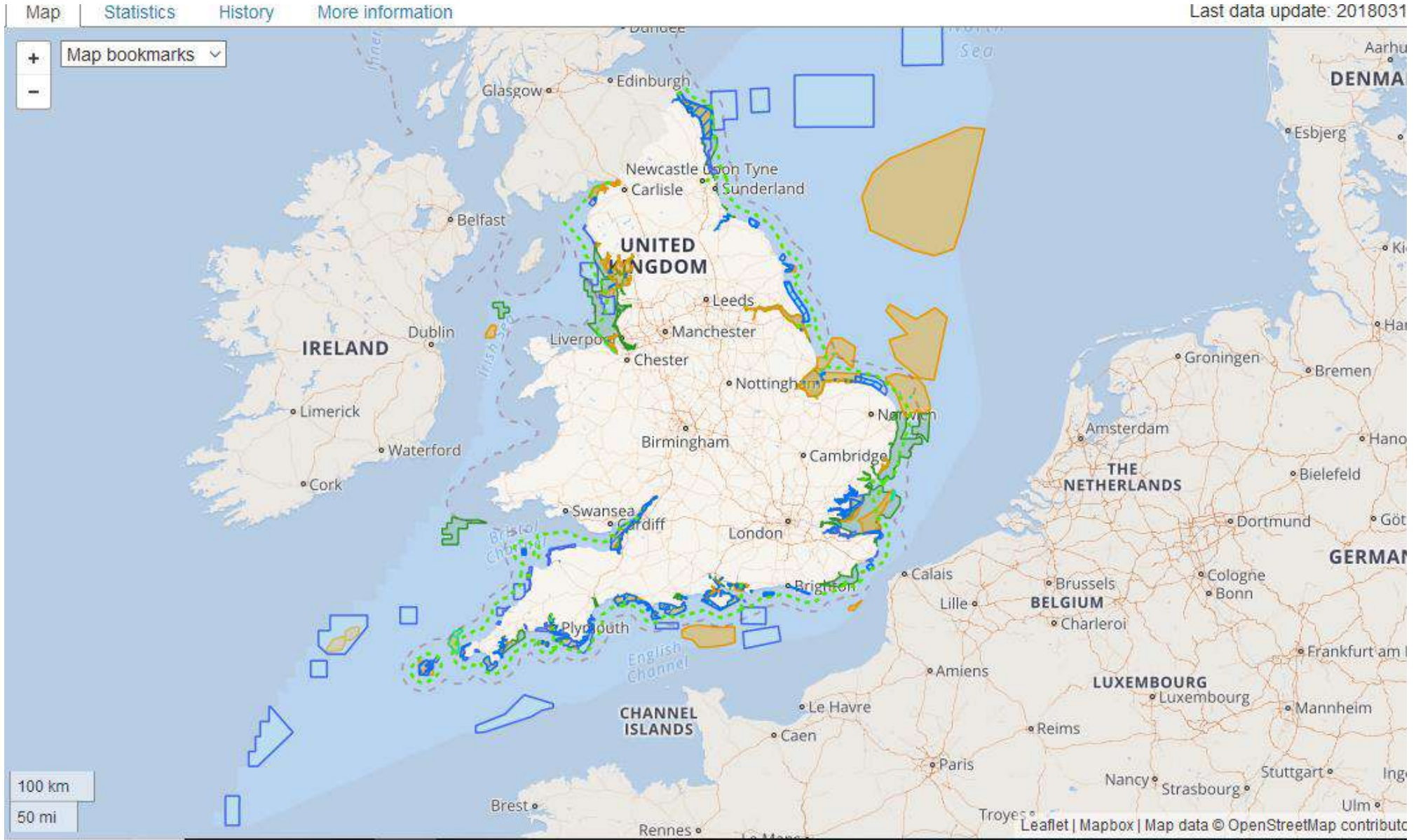


We are Reviewing the management of commercial and recreational netting in Sussex District. The informal consultation stage is now closed. We have reviewed the consultation responses and a summary is available [here](#).

The Authority is now considering management options. Any further formal consultation will take place in 2016.



# ....Costly inability to deal with the BIG picture





## MARINE PROTECTED AREAS

# Elevated trawling inside protected areas undermines conservation outcomes in a global fishing hot spot

Manuel Dureuil<sup>1,2\*</sup>, Kristina Boerder<sup>1</sup>, Kirsti A. Burnett<sup>2</sup>, Rainer Froese<sup>3</sup>, Boris Worm<sup>1</sup>

Marine protected areas (MPAs) are increasingly used as a primary tool to conserve biodiversity. This is particularly relevant in heavily exploited fisheries hot spots such as Europe, where MPAs now cover 29% of territorial waters, with unknown effects on fishing pressure and conservation outcomes. We investigated industrial trawl fishing and sensitive indicator species in and around 727 MPAs designated by the European Union. We found that 59% of MPAs are commercially trawled, and average trawling intensity across MPAs is at least 1.4-fold higher as compared with nonprotected areas. Abundance of sensitive species (sharks, rays, and skates) decreased by 69% in heavily trawled areas. The widespread industrial exploitation of MPAs undermines global biodiversity conservation targets, elevating recent concerns about growing human pressures on protected areas worldwide.

In light of mounting anthropogenic pressures, spatial protection of sensitive habitats and species has emerged as a leading strategy to halt ongoing biodiversity loss, both on land and in the sea (1). However, it has been shown recently that about one-third of terrestrial protected areas experience intense human pressure, potentially undermining global conservation targets and sustainable development goals (2). We asked to which extent this conflict may also oc-

are often regulated under the EU Common Fisheries Policy (table S2).

By far the most common industrial fishing method in Europe is trawling (3), which targets mainly bottom-associated fishes, often with a high rate of unwanted bycatch (fig. S1). This fishing technique has been identified as a threat to many endangered species in Europe, including most elasmobranchs (sharks, rays, and skates) (9), and has well-documented impacts on seafloor bio-

trawling in 2017, with more than 225,000 hours occurring inside MPAs (Table 1). Trawling intensity (hours per square kilometer) across the entire MPA network was 38% higher inside MPAs compared with unprotected areas (Fig. 1A and Table 1) and 46% higher inside MPAs when comparing trawling intensity per trawled area (Table 1). This suggests that MPAs do not reduce fishing pressure under current management.

Elevated trawling intensity inside MPAs was especially pronounced in large-scale EU-wide MPA types, whereas untrawled MPAs were often small and designated by individual countries (Fig. 1, C and D, and fig. S2). Of all 727 MPAs, 489 were located in territorial waters (inside 12 nautical miles, 67%).

The MPAs with highest commercial trawling effort were typically located along the continental coastline (fig. S3), were recently designated, and in IUCN categories II or V (fig. S4). No trawling effort was detected in 295 of the 727 MPAs considered in this study, implying that at least 59% of MPAs experienced commercial trawling. Of these 295 MPAs, 171 were located in territorial waters. MPAs with no commercial trawling were generally smaller and older and had some IUCN category assigned, yet only 40% had management plans, compared with 60% of commercially trawled MPAs (table S3).

We addressed the cited IUCN criterion regarding fishing impacts on other species and ecological values (7) by assessing elasmobranchs inside and outside of MPAs and over time. We used randomized scientific trawl surveys by the International Council for the Exploration of the Sea

# Isle of Man has always led the way....



*The new designations take the number of MNRs to 10 (details [here](#)), which cover 10.8% of the entire territorial sea and 51.8% of the inshore (0-3 nautical mile area).*

*...closed to all demersal towed fishing gears*



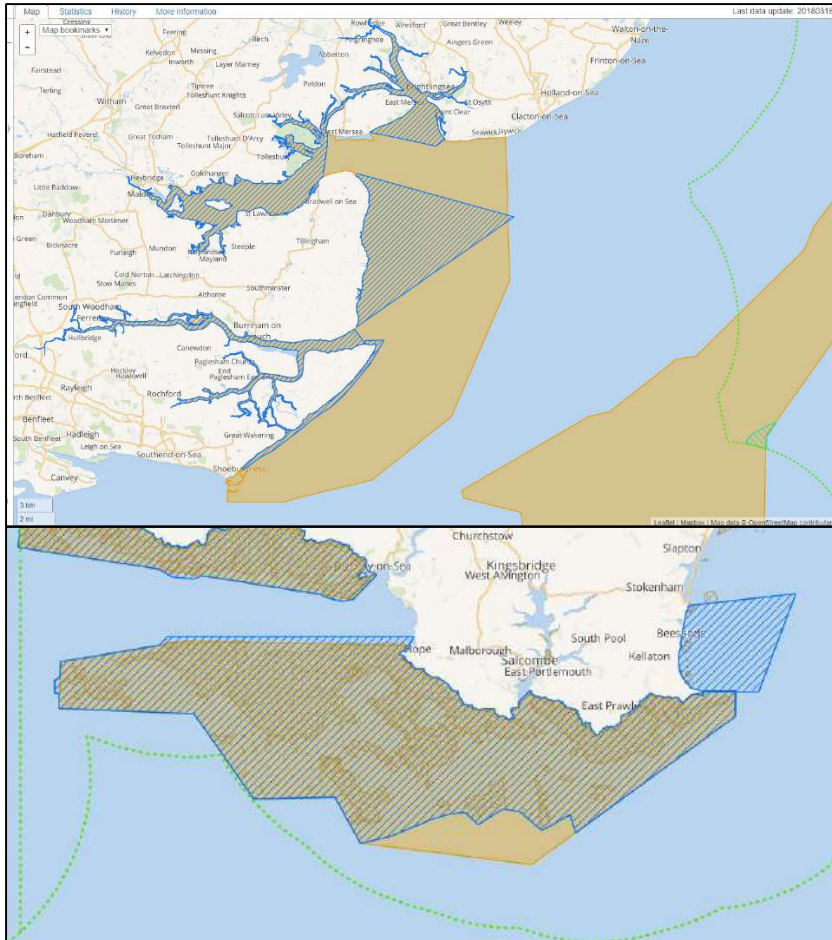
# Whole site approach is needed for effective MPAs

<sup>1</sup> [https://cmsdata.iucn.org/downloads/iucn\\_categoriesamp\\_eng.pdf](https://cmsdata.iucn.org/downloads/iucn_categoriesamp_eng.pdf)

Most UK MPAs don't meet IUCN ranking criteria<sup>1</sup>.

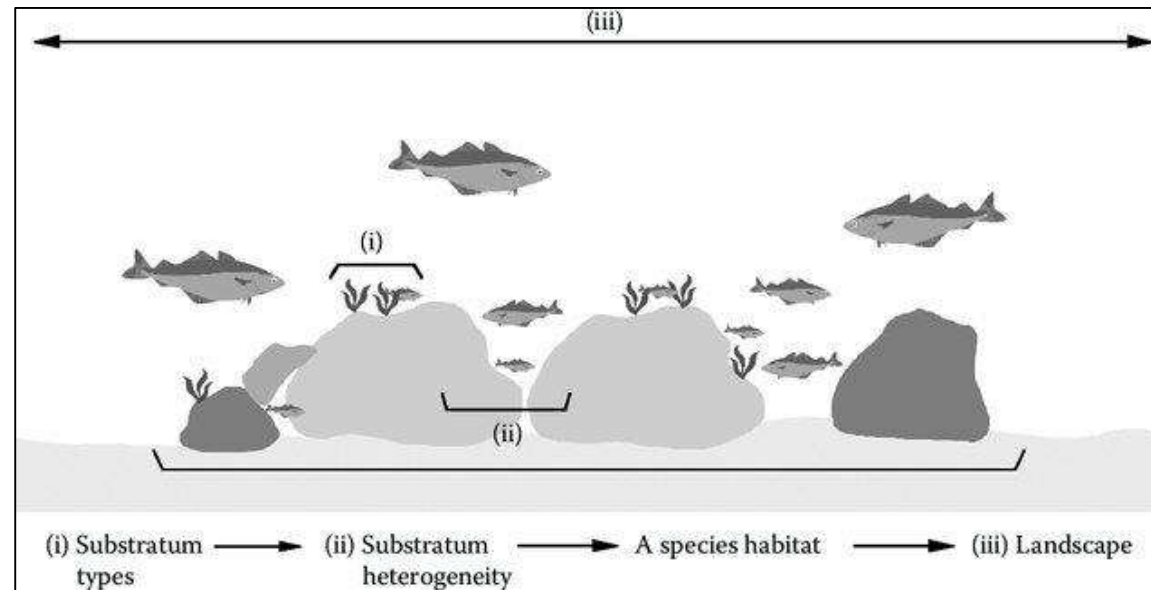
Reefs are protected whilst sedimentary sites receive partial protection.

Feature-based approach discounts ecosystem-scale effects of fuller protection.



Upper image: Essex estuaries SAC - bottom trawling closures (in blue).

Lower image: Start point SAC - protection of sands and cobbles between reef features.



Substratum rugosity and heterogeneity relative to the size of fish. A species' habitat during a particular stage in its ontogeny may encompass rugose or heterogeneous substrata. Over the course of its life cycle, an individual may occupy different parts of the submarine 'landscape'.

After Elliott *et al.* (2016) Disentangling habitat concepts for demersal fish management. *Oceanog. and Mar. Biol.* **54**

J-L Solandt, T. Mullier, S. Elliott & E. Sheehan (*in prep*). Managing MPAs in Europe: Moving from 'feature-based' to 'whole-site' management of sites. IN: *Marine Protected Areas: Evidence, Policy and Management*. J Humphreys and R Clarke (eds). *Estuarine Coastal and Shelf Sciences*, Poole MPA conference 2017, Elsevier.

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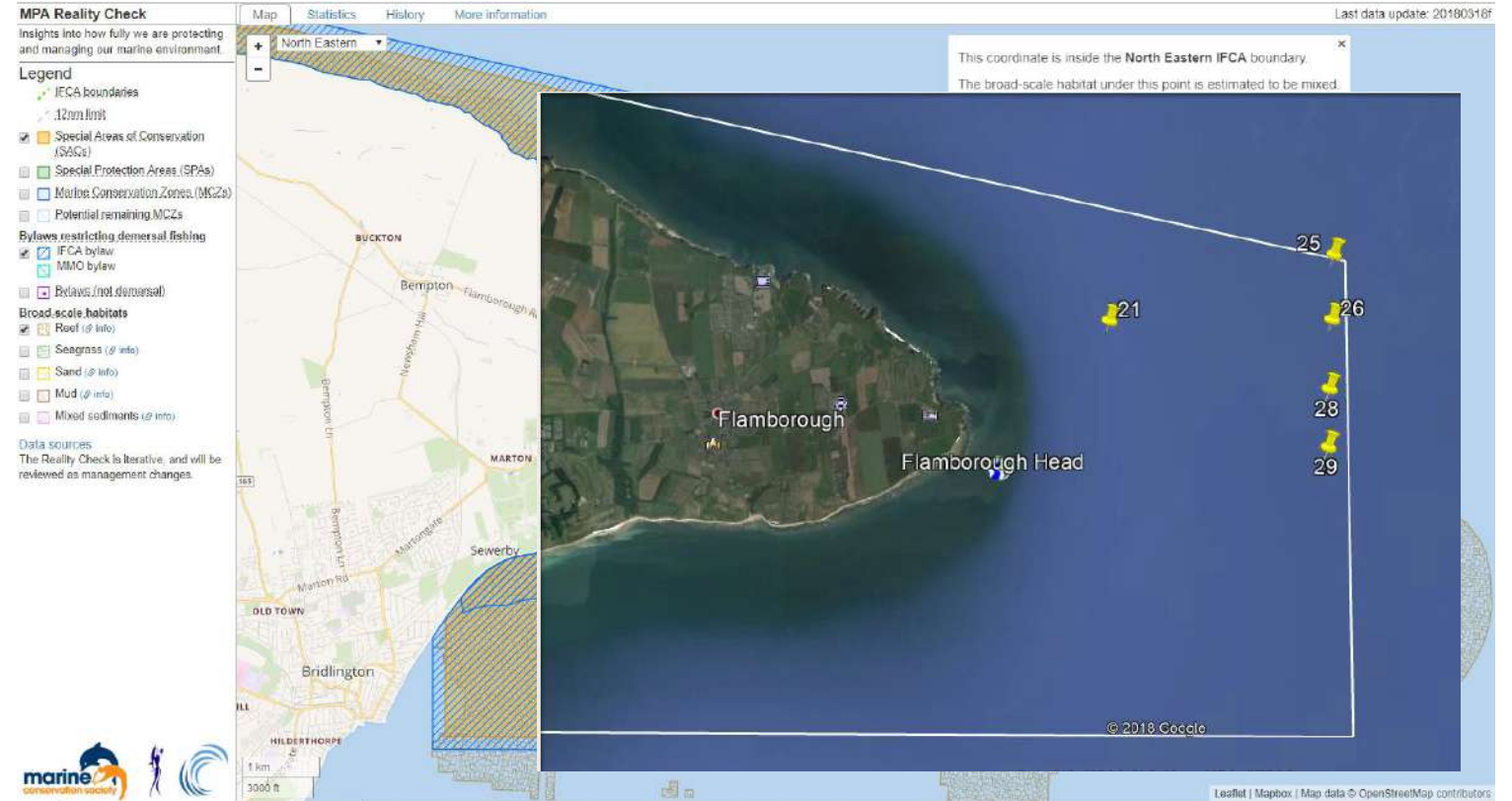


# Flamborough Head – limited protection of reefs

Camera surveys by NE 2013

Large areas remain open to BTG.

Resistance from IFCA members & NFFO



25



26



28



29



21

