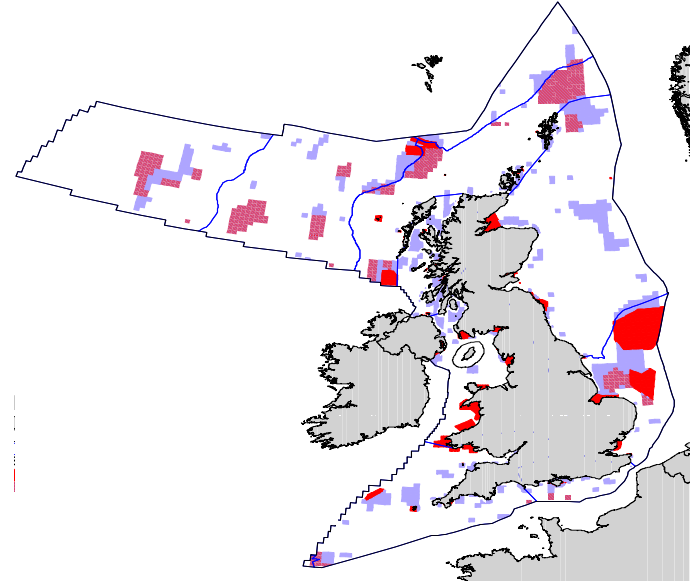


The design and monitoring of MPAs in a changing environment

Michel Kaiser



What do we want to achieve with marine protected areas?

- **To ensure the maintenance or improvement of marine biodiversity in the territorial seas of the UK**
- **These are NOT fisheries management tools, but fisheries and other activities may need to be managed if they impact upon the goal above**

Marine Conservation Zones: the UK process

Project board (Key Government Stakeholders)

Science Advisory Panel (independent UK academics)

Net Gain
(North Sea)

Irish Sea
Conservation
Zones

Balanced
Seas (South
East)

Finding
Sanctuary
(South
West)



Key guiding criteria

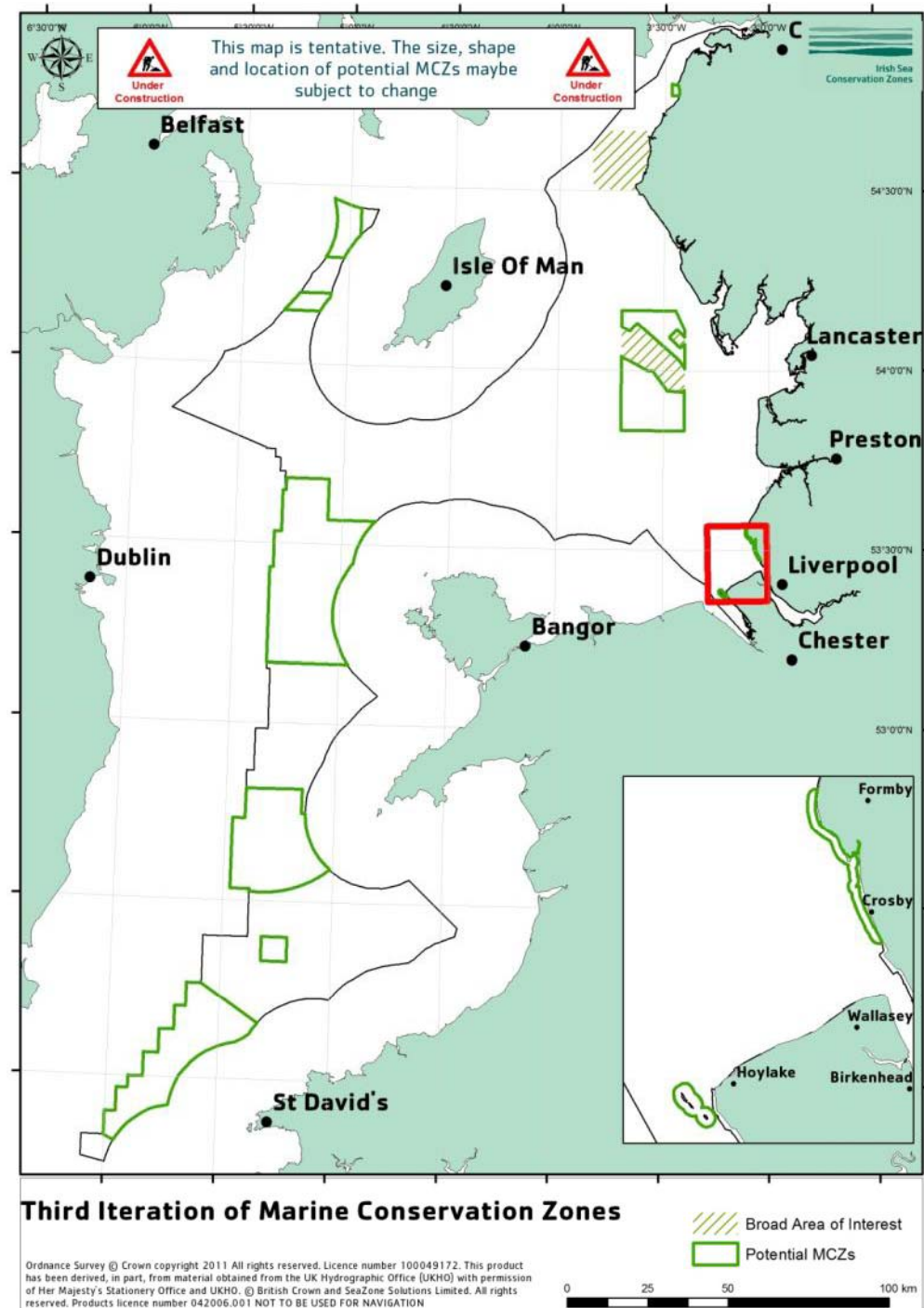
- Chosen on the basis of the 'Ecological Network Guidance' document
- Representative
- Sufficient
- Replicated
- Connected

Informed by biodiversity, species etc

Irish Sea Conservation Zones

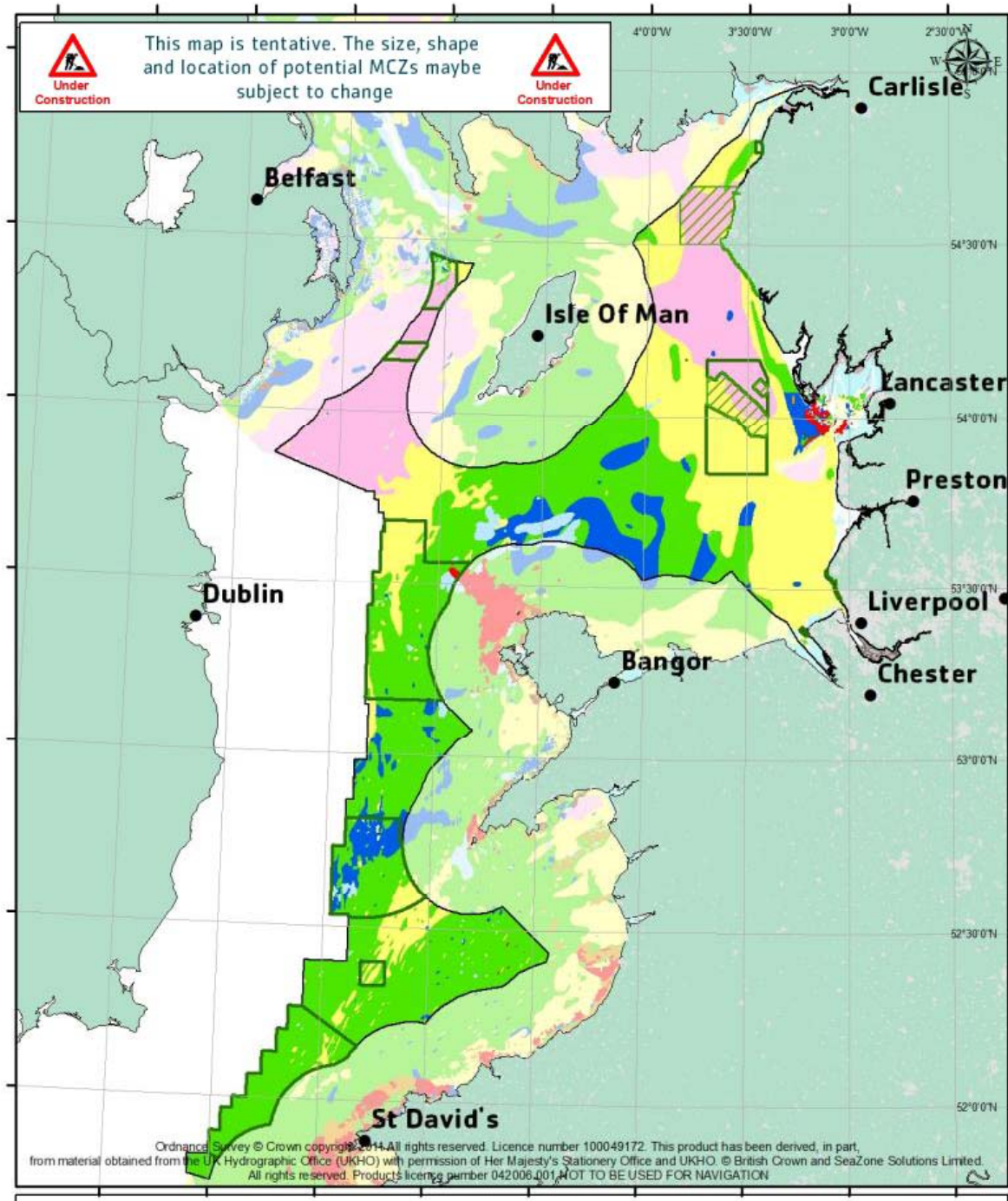
1. Complex shape
2. Lots of adjacent administrations
3. Complicates communication and negotiation

The Marine Conservation Zones are in addition to existing MPAs that would include SACs, SPAs, RAMSAR sites etc.

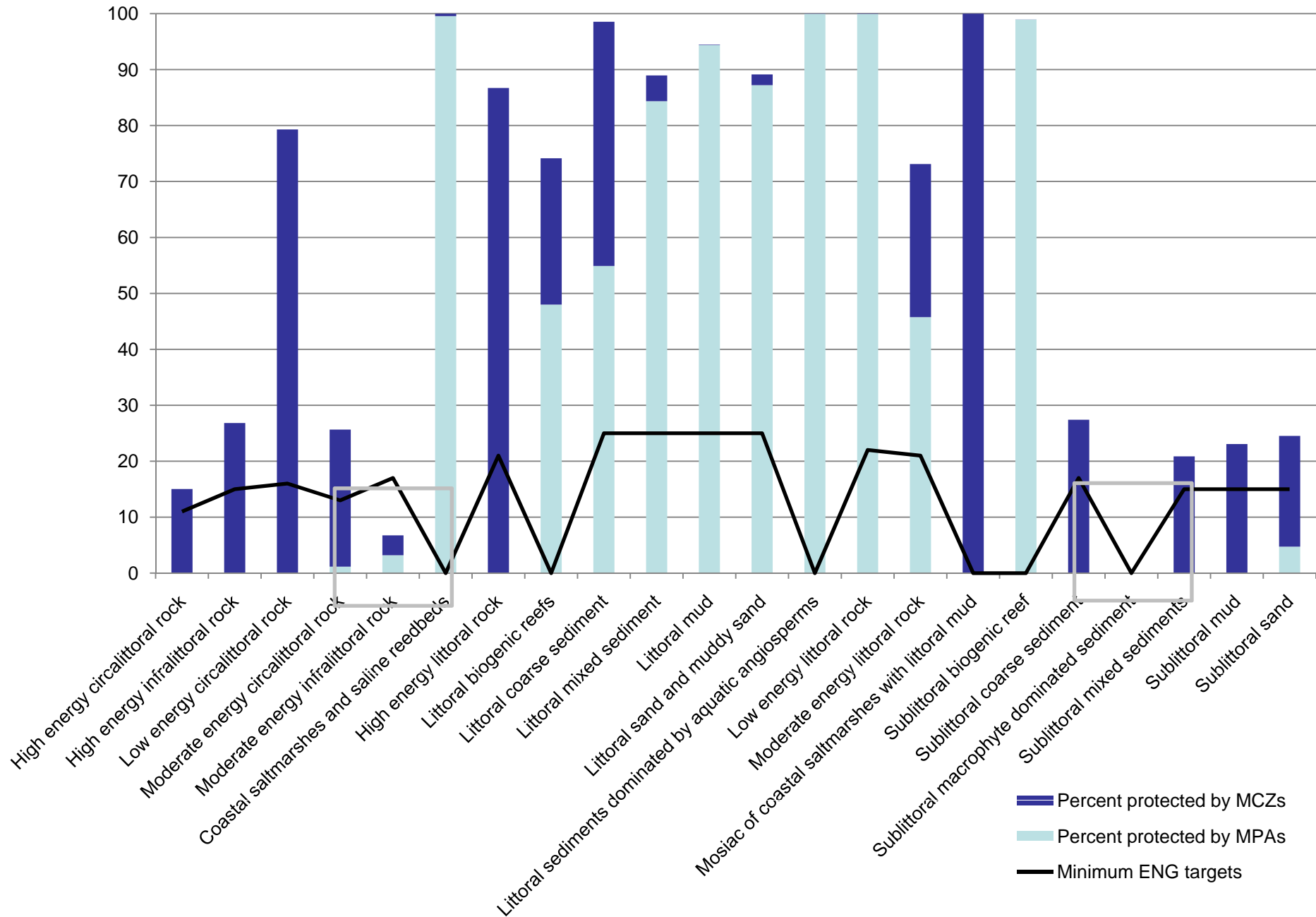


**Broad-scale
habitats**

**...but this
map is not
perfect**



Broad-scale habitats

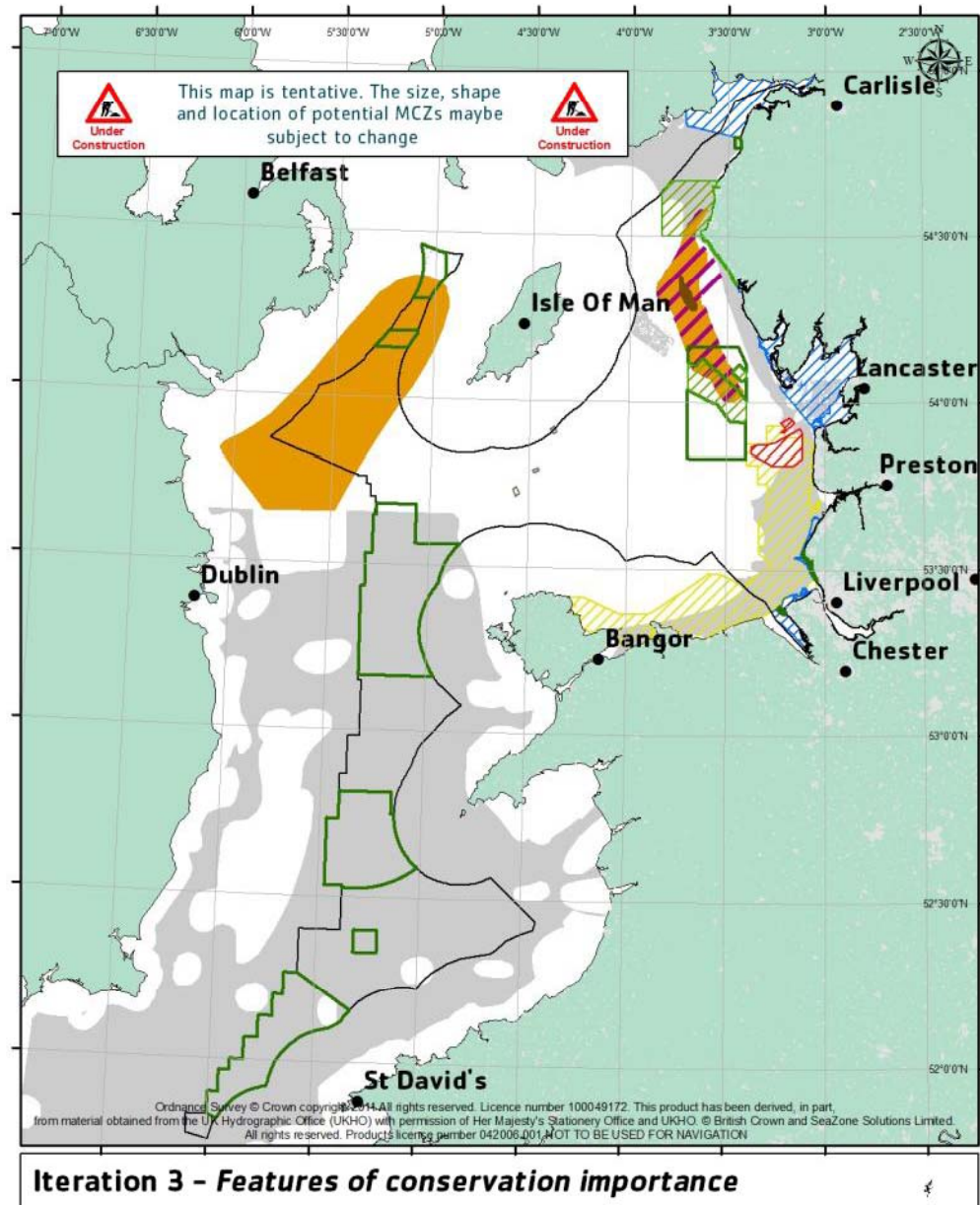


Features of conservation importance

FOCI	Total area in project	Area (km ²) protected	Percentage	No. points in project	Number of points protected	Percentage	Replicates
Estuarine Rocky Habitats	0	0	100	7	4	57.14	3
Honeycomb worm Reefs	2.44	1.56	63.95	58	0	20.69	5
Horse mussel beds	7.31	0	0	18	15	83.33	2
Intertidal Mudflats	0	0	100	304	6	1.97	9
Intertidal Underboulder Communities	0	0	100	6	6	100	2
Mud habitats in deep water	1810.39	330.37	18.24	0	0	0	4
Peat and Clay exposures	0.1	0.02	19.6	6	6	100	3
Seapens and burrowing megafauna	732.34	230.1	31.42	0	0	0	2
Sheltered muddy gravels	5.62	0	0	0	0	0	0
Subtidal mixed muddy sediments	0	0	100	3	1	33.3	1
Subtidal sands and gravels	7646	2837	37.1	40	40	100	9

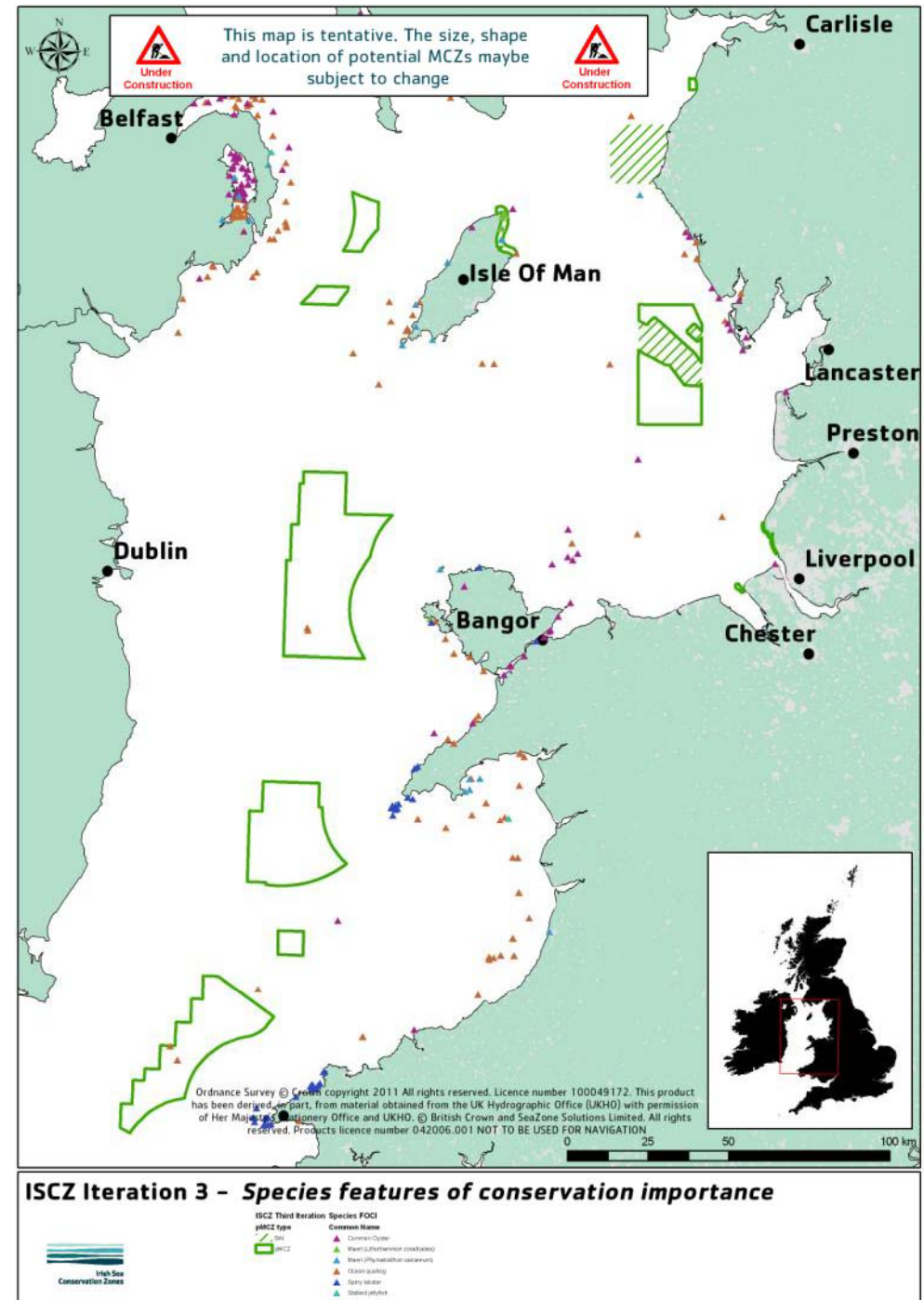
Features of conservation importance

.....again the map is not perfect but stakeholders invited to provide evidence to improve it



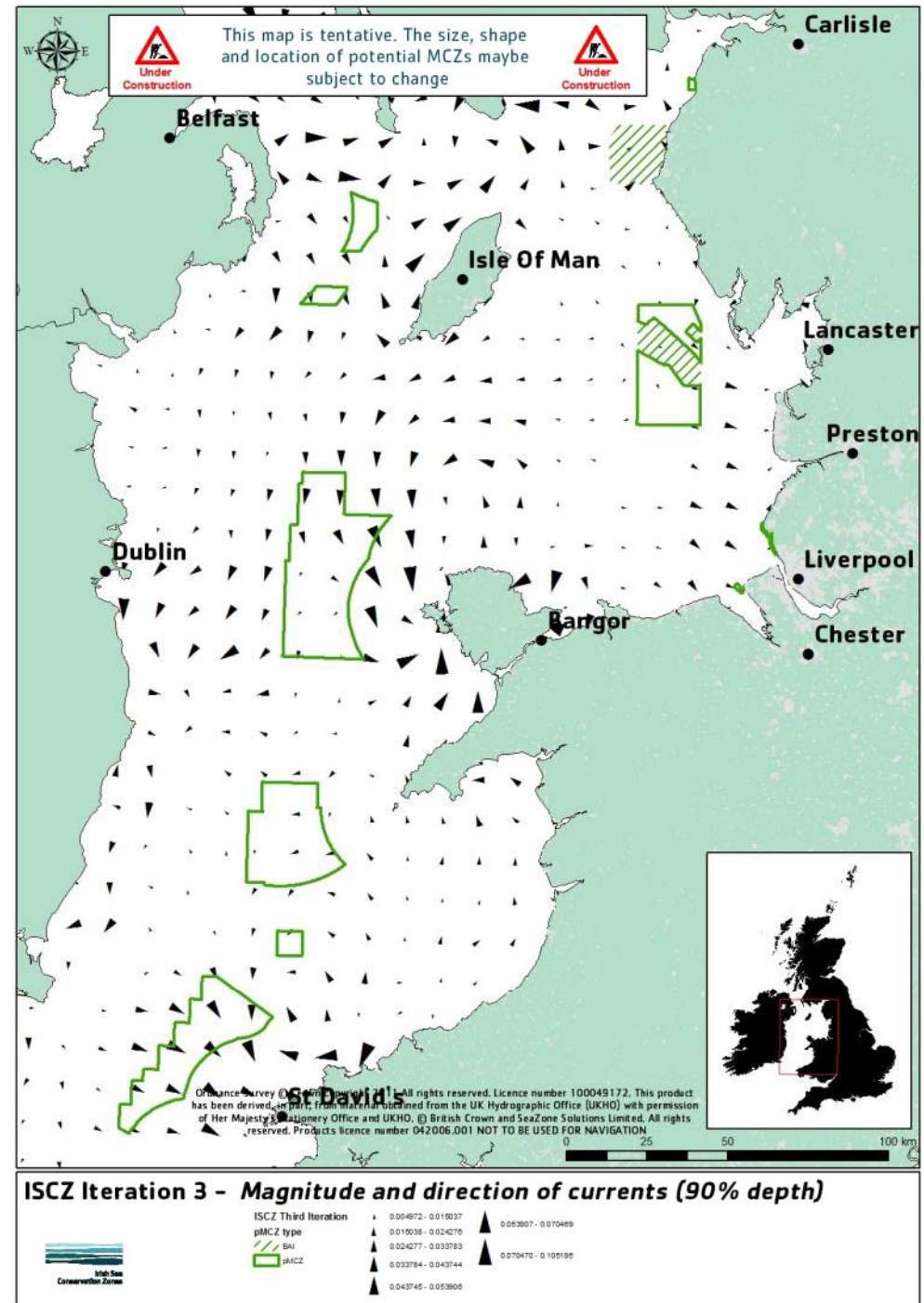
Species features of conservation importance

...is biased by the distribution of sampling effort, but at least we are relatively certain about occurrence



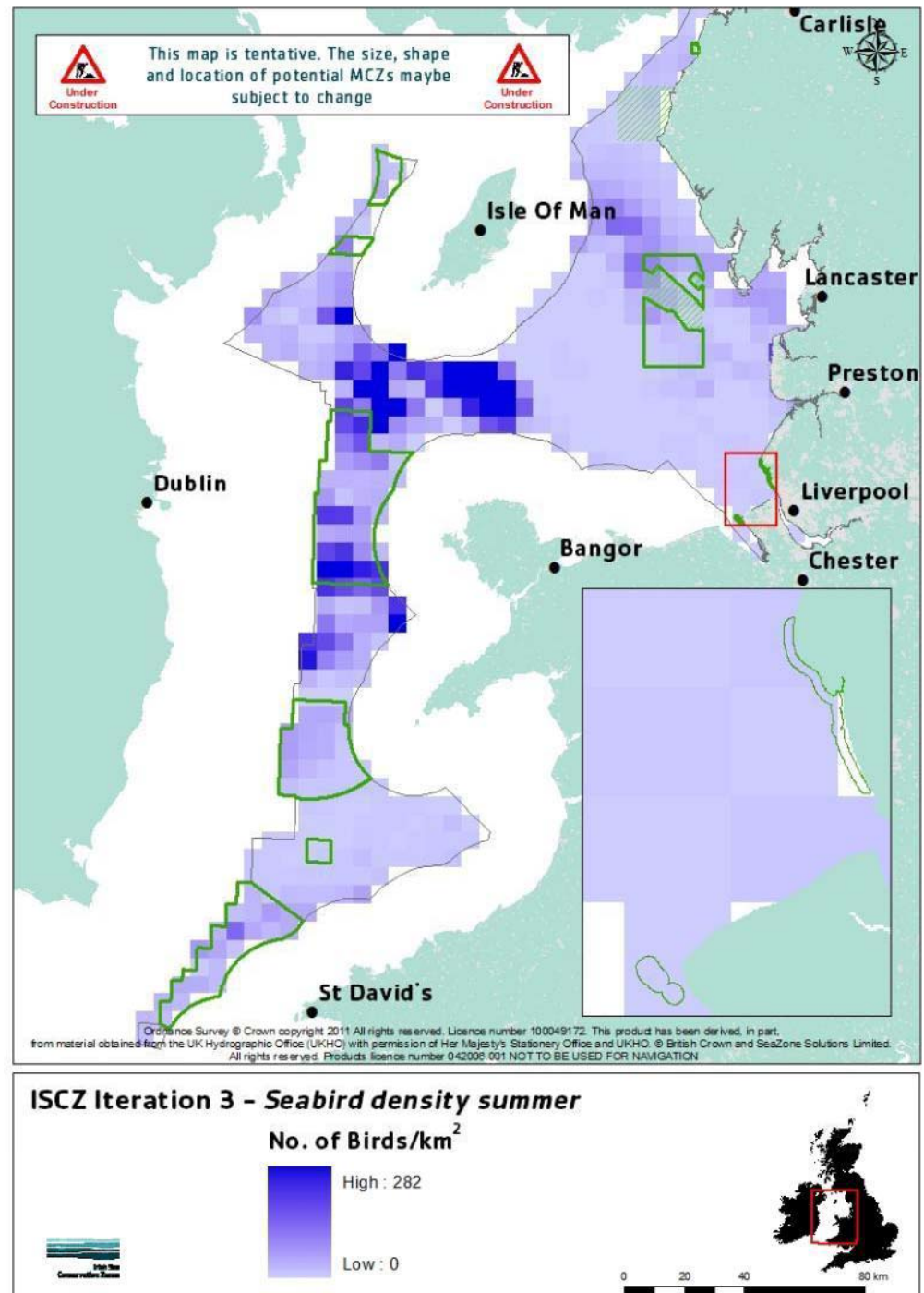
Connectivity

The areas encompass both high energy and low energy areas which is important and correlates with the different habitat types

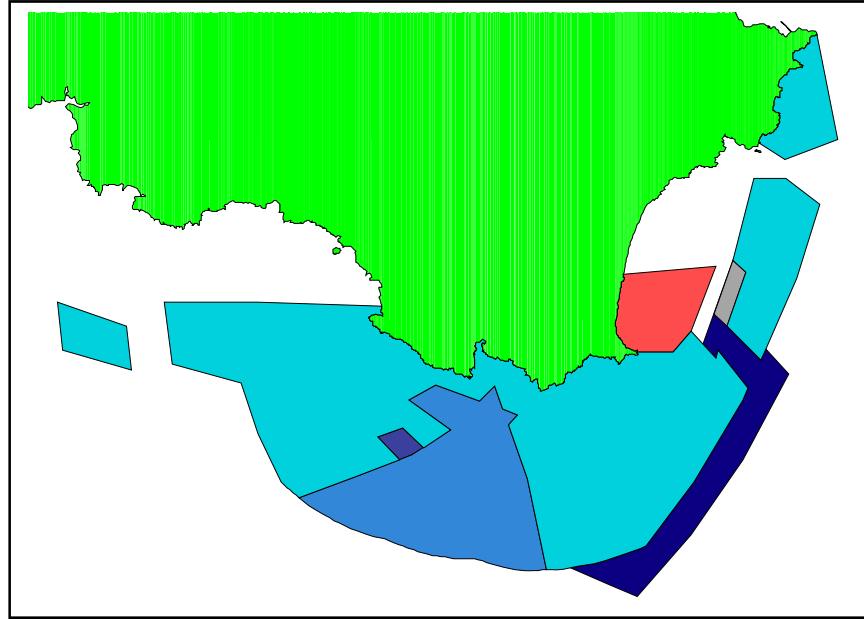


Other features, such as seabird distribution are probably linked to key water column processes and indicate areas of high production

Stakeholders may tend to avoid these if they coincide with areas of fisheries or renewable energy interest.....and we can only designate on the basis of seabed features

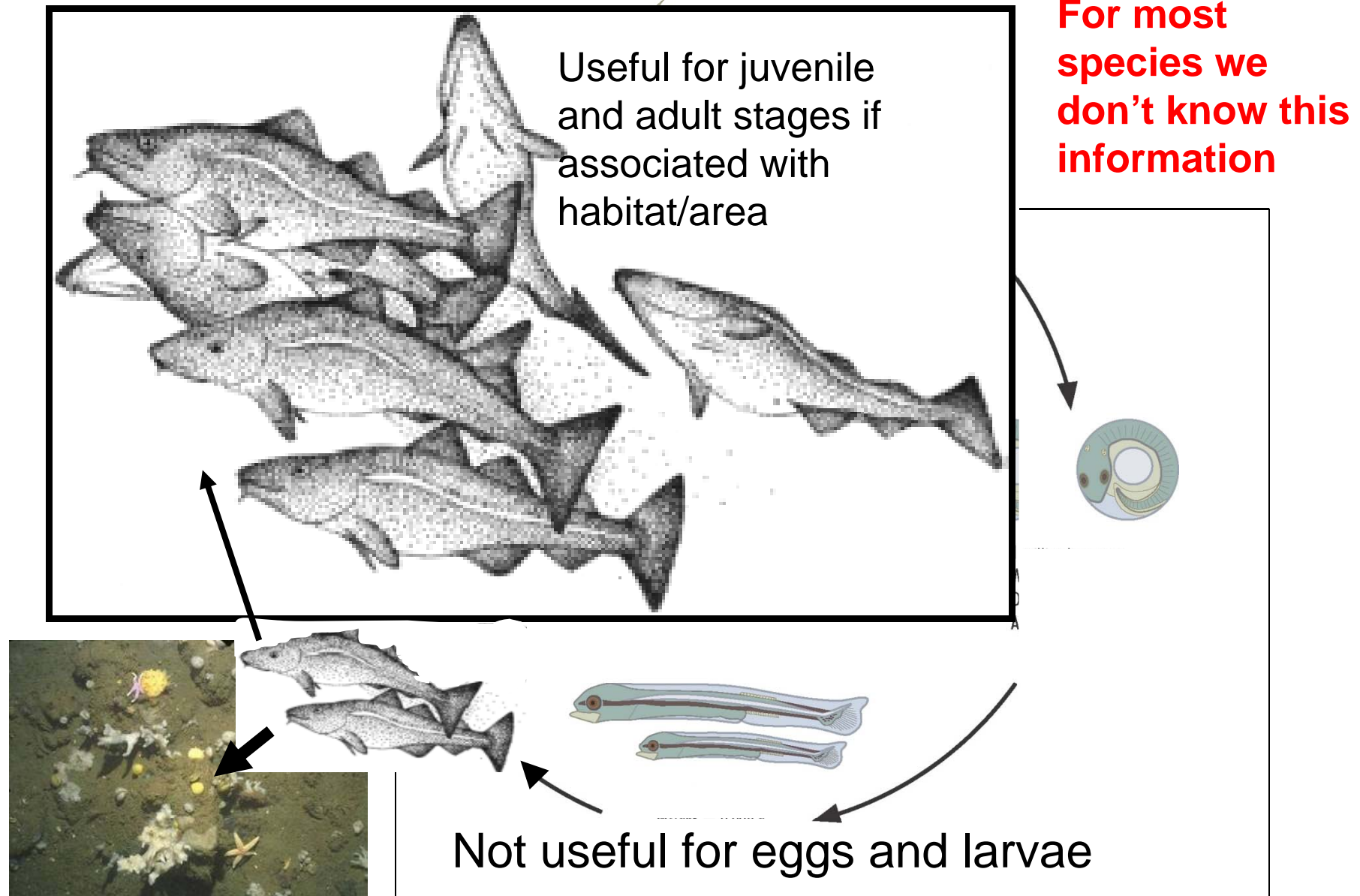


And then there's the changing climate.....

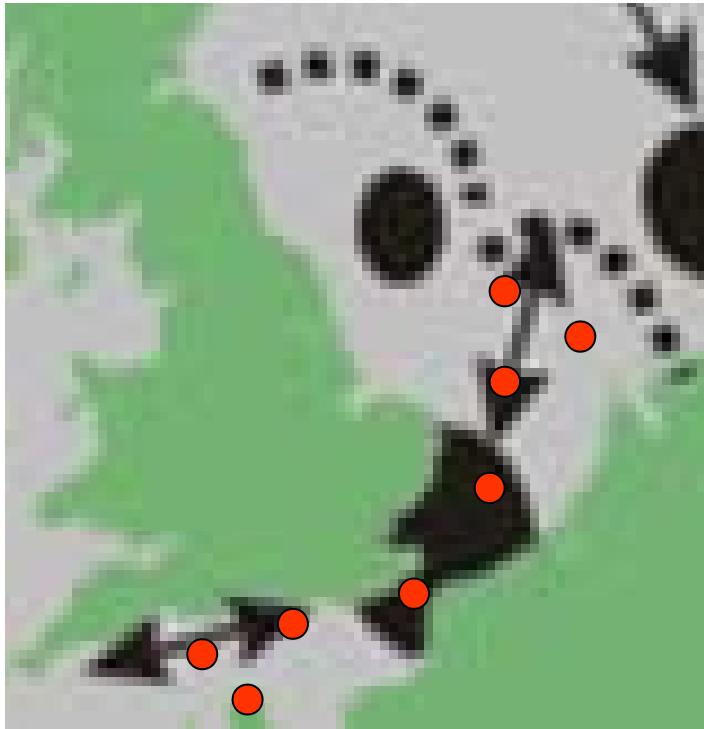


- Most MPAs are located within 12 nm of the coast on continental shelf areas and in water < 100 m deep
- This makes them subject to changing physical parameters which could undermine current objectives

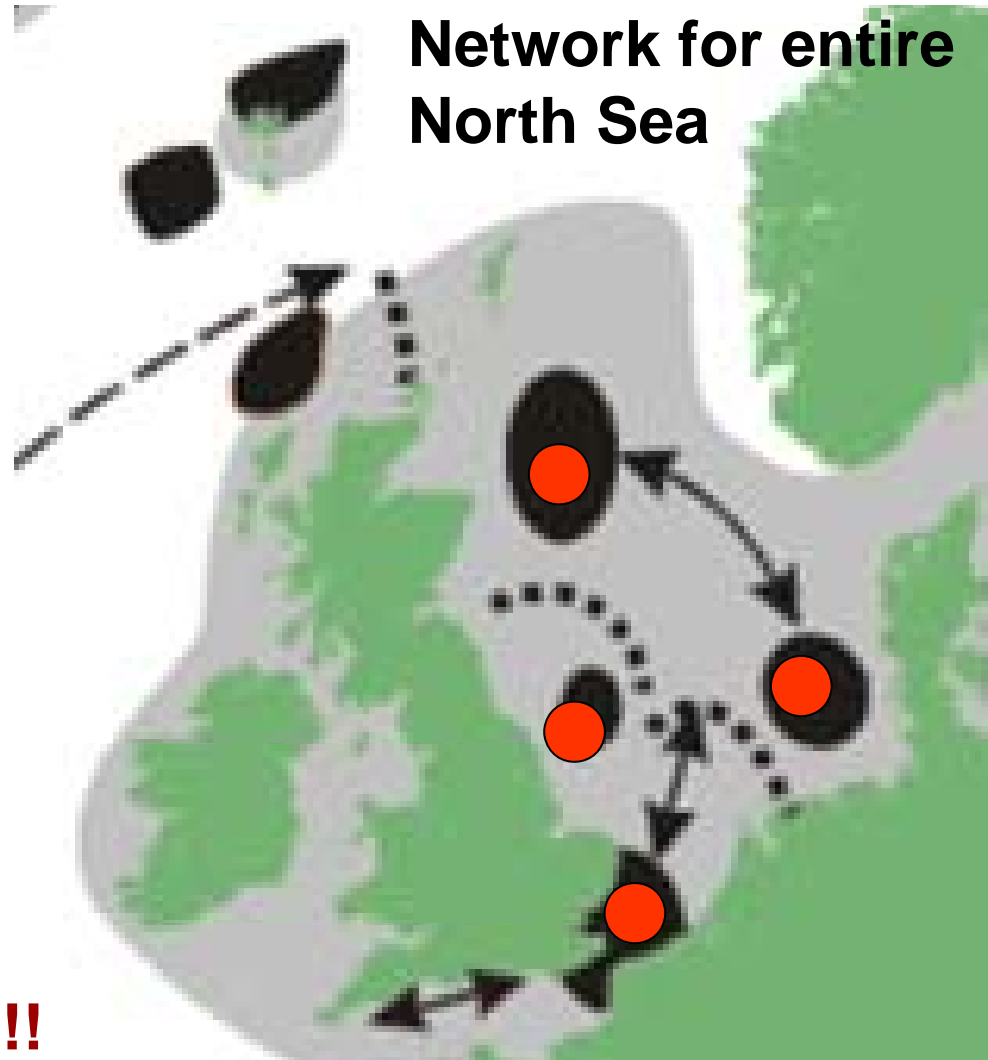
Some of the issues: life history and bottlenecks



Some of the issues: design and scale of networks of spatially managed areas

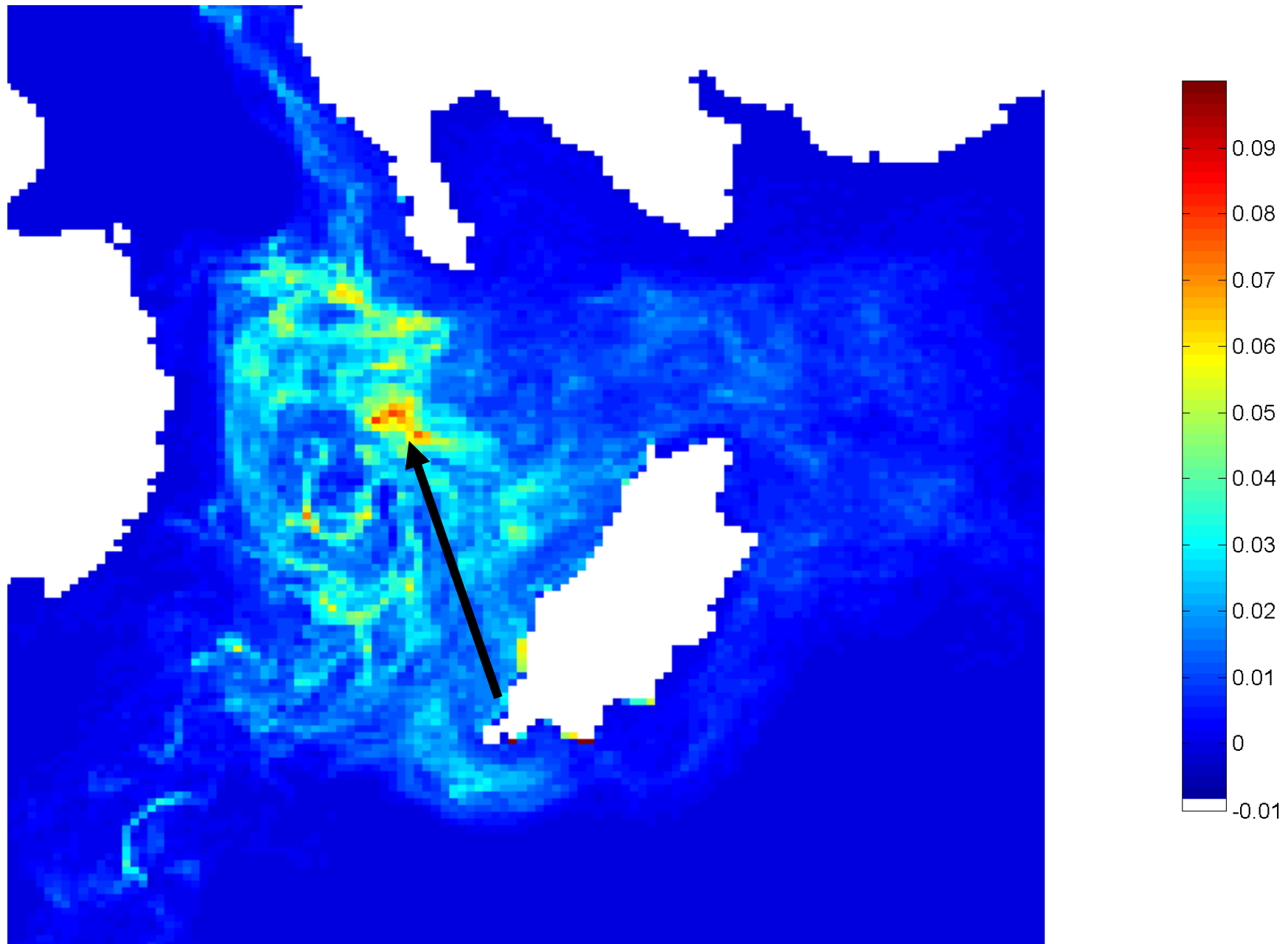


**Network within the
sub-population**



ILLUSTRATIVE ONLY!!!!!!

Some of the issues: connectivity

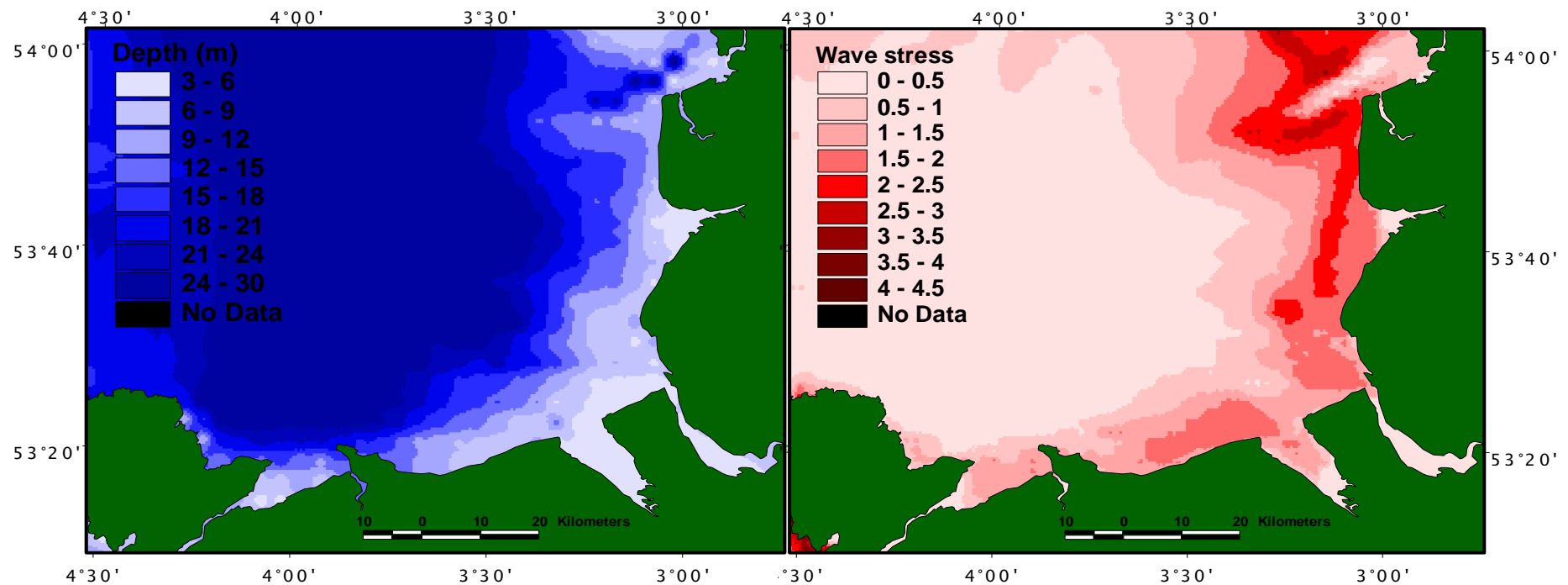


Key limiting physical factors

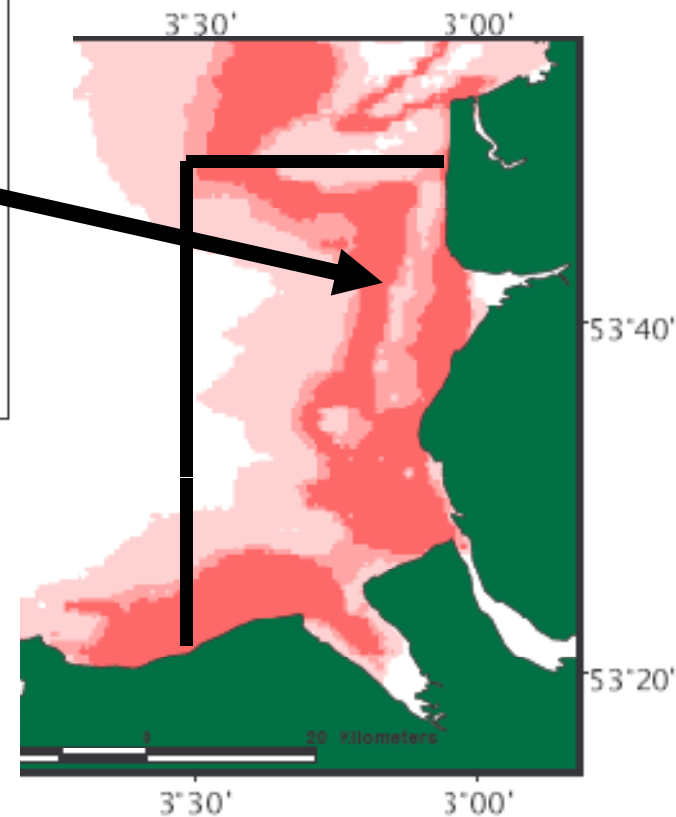
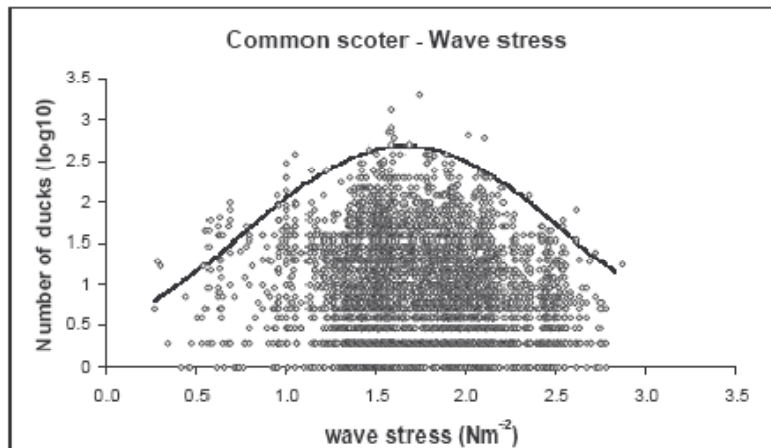
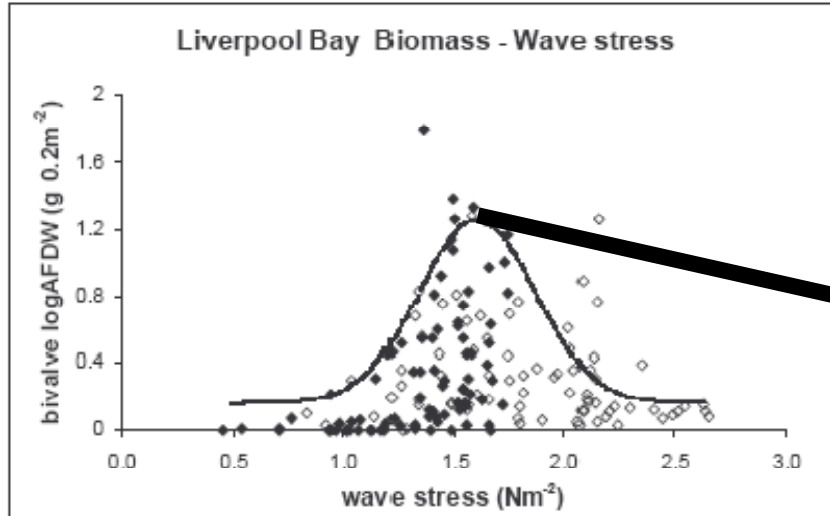


Depth

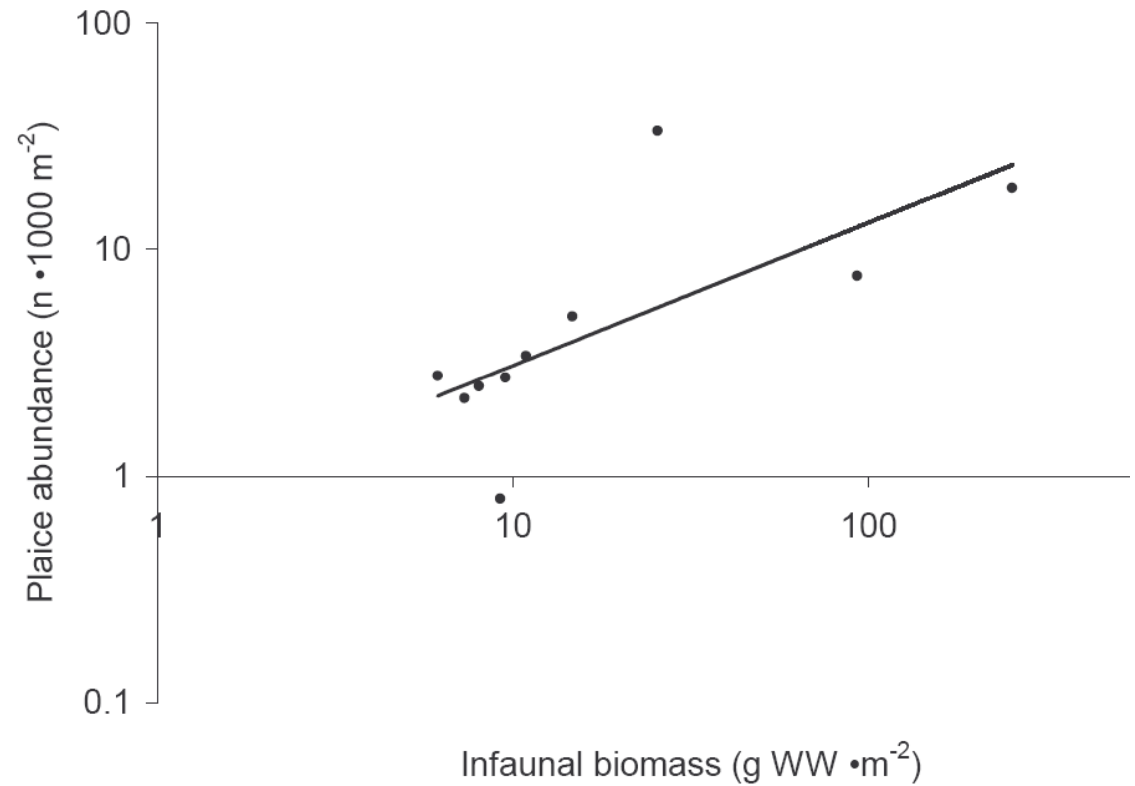
Wave stress



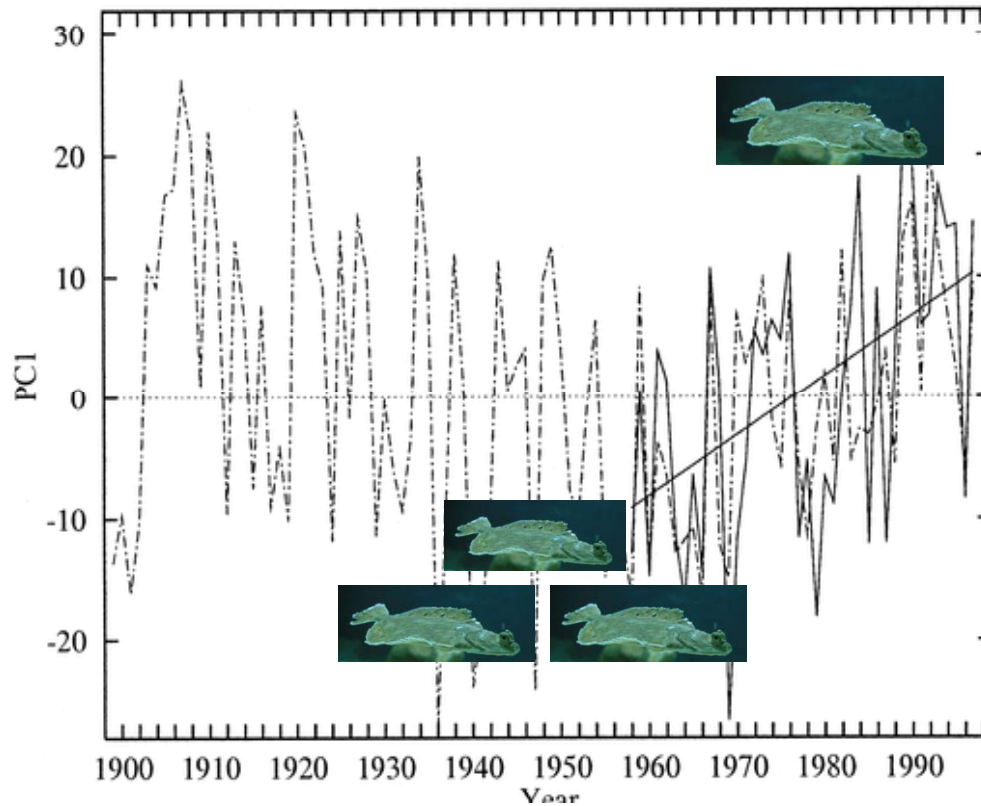
Physical parameter predict and limit carrying capacity



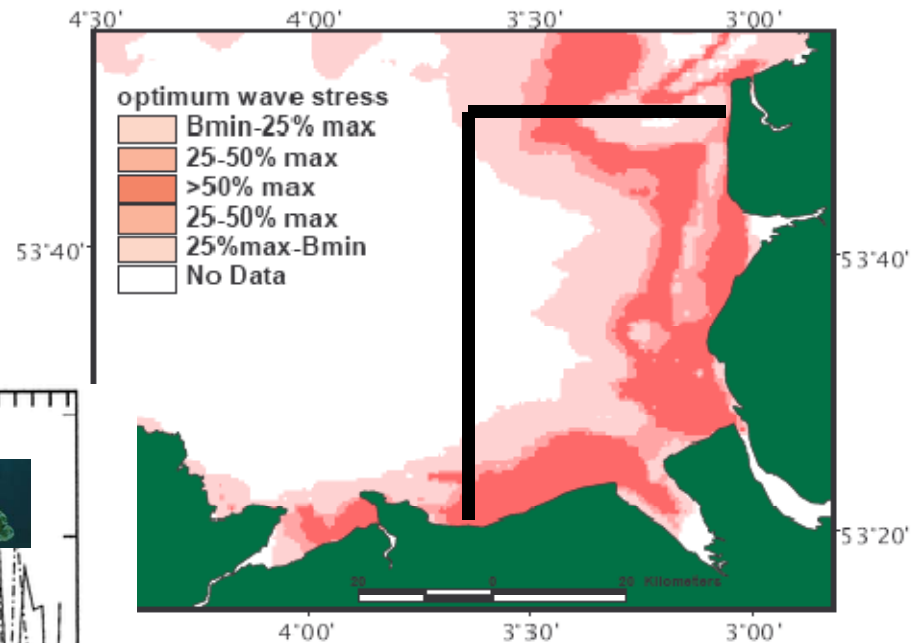
Carrying capacity: how might it change in the future?



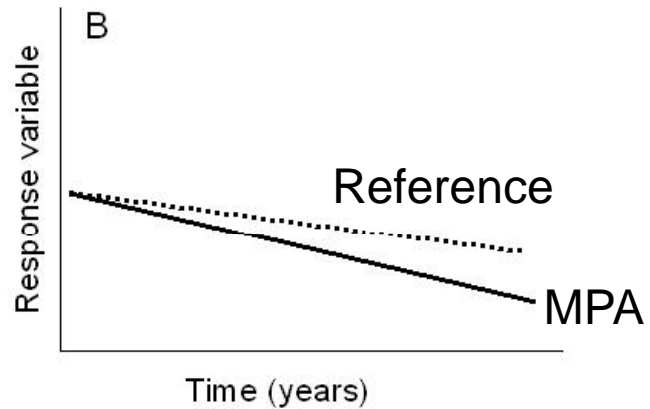
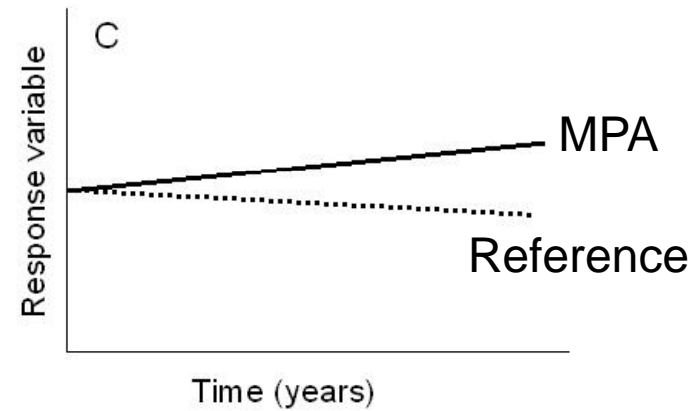
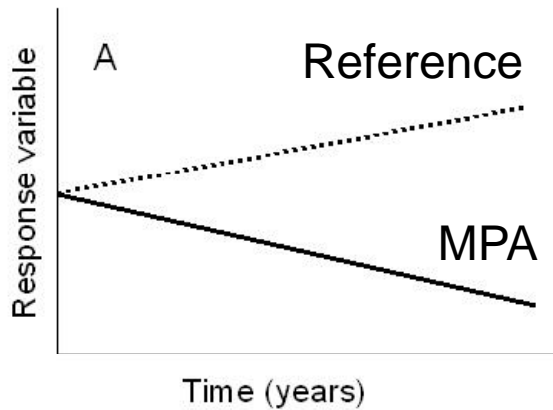
Carrying capacity of nearshore systems is likely to change over longer-time scales than are currently considered in MPA planning



Long-term changes in NAO and wind forcing



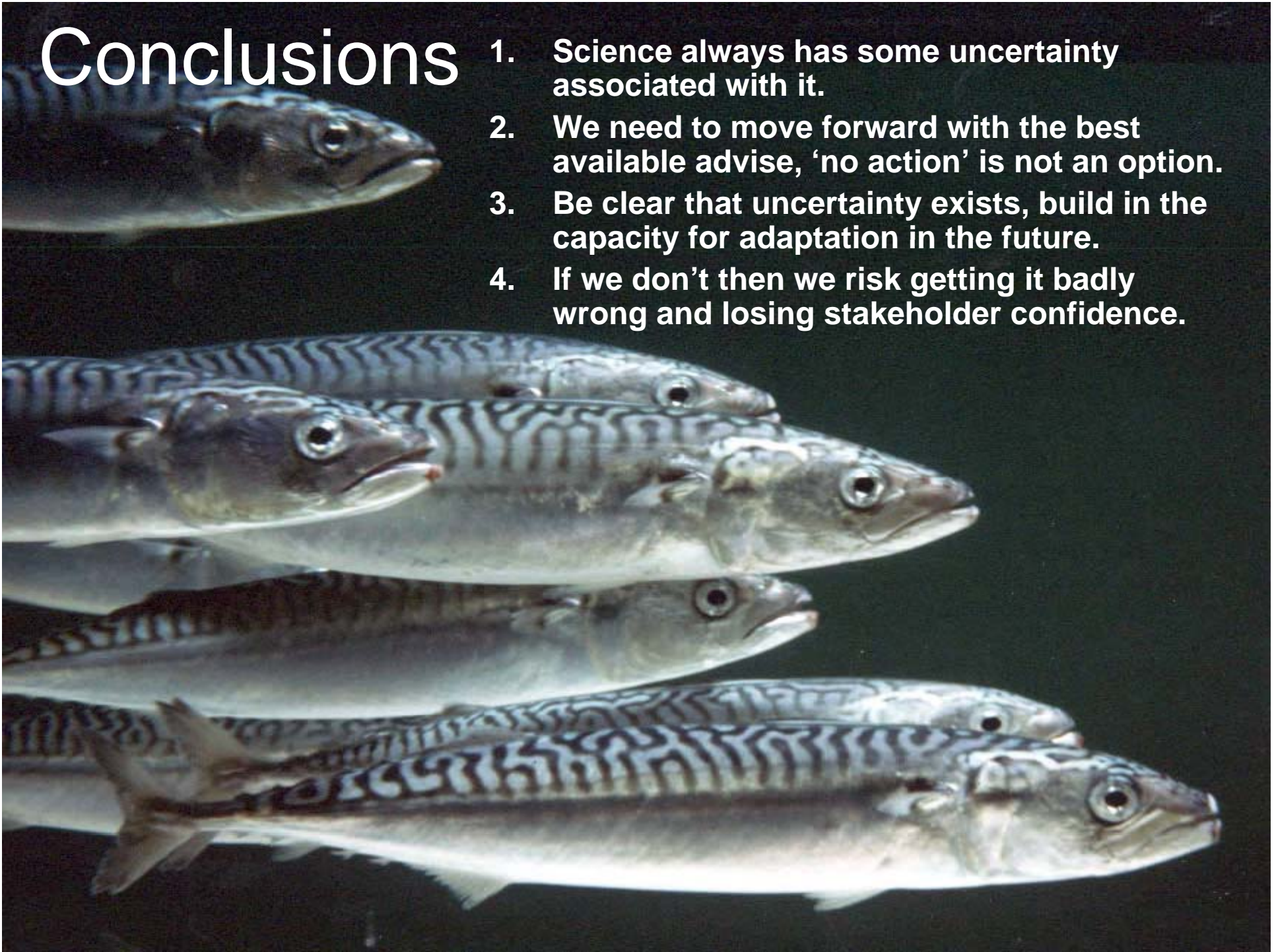
Importance of valid reference areas



Example 'C' is the
rather unusual 'plaice
box' outcome

Conclusions

1. Science always has some uncertainty associated with it.
2. We need to move forward with the best available advice, 'no action' is not an option.
3. Be clear that uncertainty exists, build in the capacity for adaptation in the future.
4. If we don't then we risk getting it badly wrong and losing stakeholder confidence.



Some issues and critical knowledge gaps:

This MPA configuration was based on minimal science, it was an optimisation problem...yet it is now touted by some as the definitive network!

