

Annex IV Environmental Research Webinar Series

Fisheries Interactions with Marine Renewable Energy Development

Presenters

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Michael Bell

Fisheries Interactions with Marine Renewable Energy Developments

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Mike Bell

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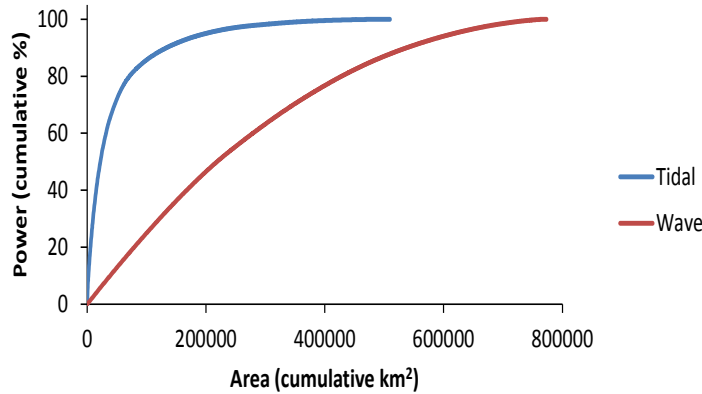
Stromness, Orkney, UK

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- How much overlap is there in the resources targeted by the two industries?
 - Probability of interaction depends on co-occurrence of ‘essential habitat’ for the two industries
- What is the nature of potential interactions where overlaps occur?
 - Direct and indirect ecological interactions
 - Mediated by human interactions
- Are there opportunities as well as impacts?
 - Habitat enhancement
 - Spatial fishery management
- Inshore fishing in Orkney
 - VMS monitoring tells us how inshore fisheries use areas licensed for wave and tidal energy developments

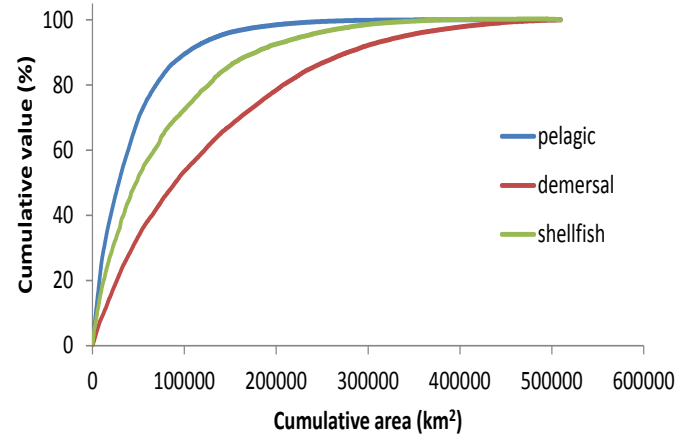
Neither energy resources nor fishery resources are distributed homogeneously

All Areas



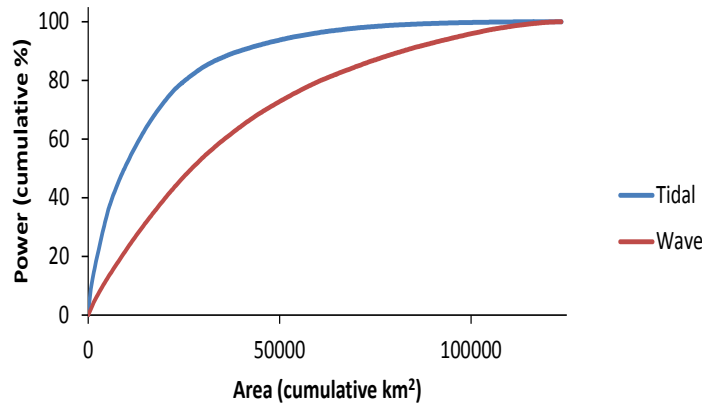
**UK
ENERGY
RESOURCES**

All areas

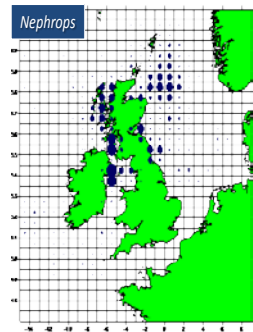
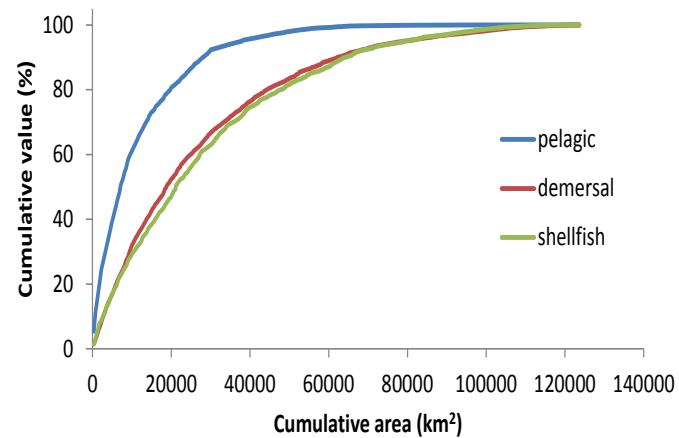


**UK
FISHERY
RESOURCES**

Inside 12 miles

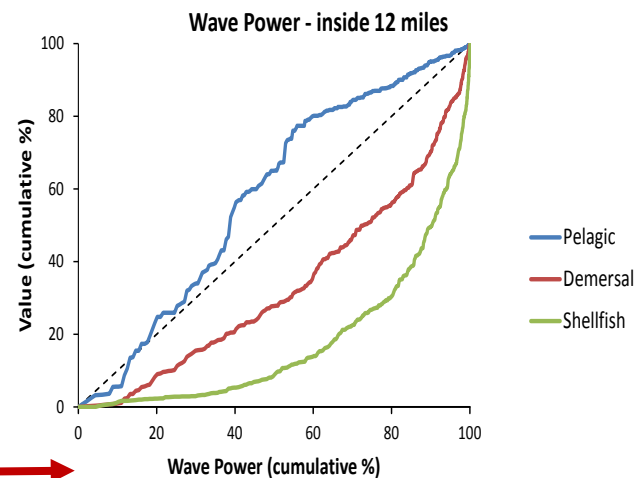
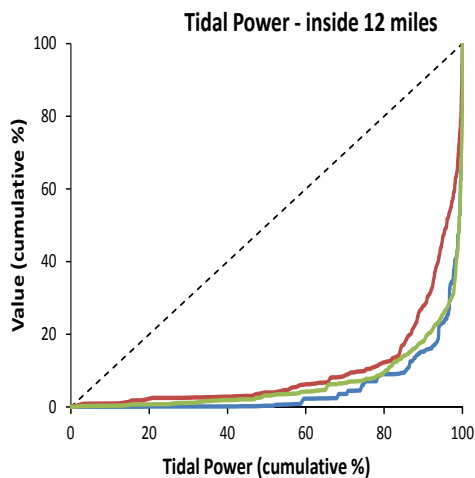
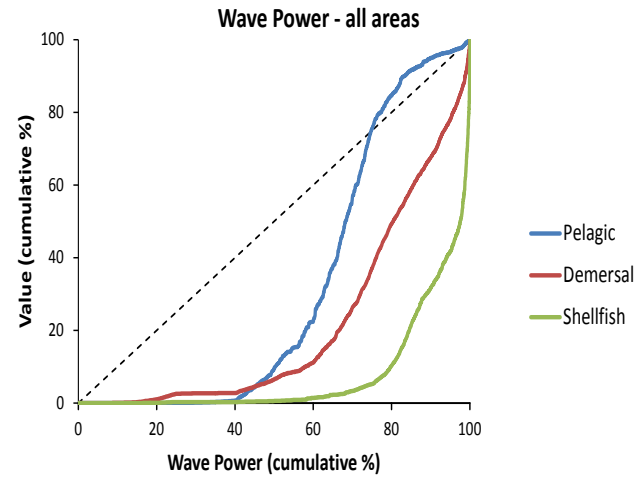
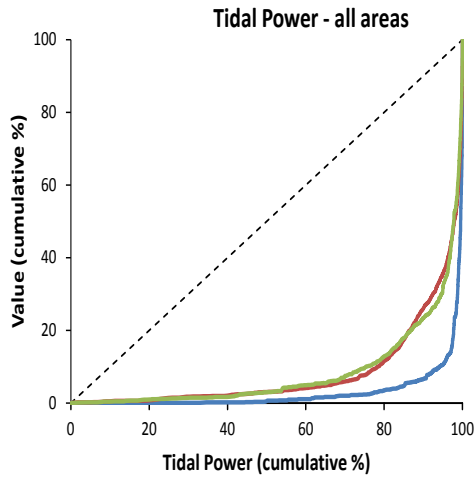


Inside 12 miles



The areas where energy is available are mostly not the areas that deliver value to fisheries

UK FISHERIES VALUE ↑



→ UK ENERGY RESOURCE

Proportion of fishery value* overlapped by top 10% of energy resource

*inside
12 miles*

	Tidal	Wave
Pelagic	<0.1%	5.6%
Demersal	1.0%	0.9%
Shellfish	0.4%	1.3%
Total	0.5%	1.7%

* N.B. Selected species only

Potential spatial overlaps

- Overlaps of even the most accessible energy resources with fishery landings appear to be low at a *national* scale
- But this is not necessarily true at a local or regional scale, particularly in inshore waters
- Overlaps may be more important for sedentary species, likely to include shellfish (*more later...*)
- At this scale, and particularly at the scale of individual developments, we need data on the fine-scale distribution of fishing activities...

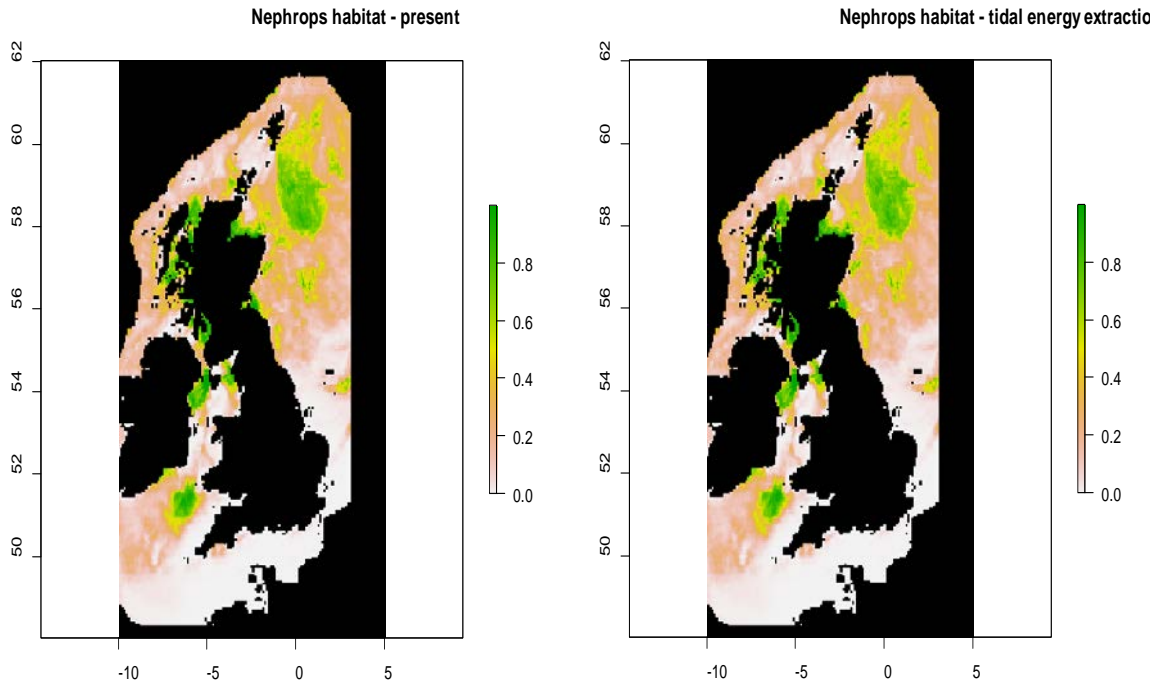
Nature of Interactions

- Energy extraction impinging on natural processes
 - Could extend to far-field effects, especially tidal energy extraction affecting large-scale circulation patterns
 - Depends principally on scale rather than method of energy extraction
- Operational effects on marine biota, acting through device operation, maintenance and decommissioning
 - Collision (fish mincing!), noise, near-field habitat modification, ...
- Provision of new ecological space through physical of devices and other development structures
 - New habitat, reef effects, de facto MPAs, FAD effects \Rightarrow *possible opportunities?*
- Displacement of other human activities, modifying locus and nature of impacts
 - Potentially important, scope for further analysis \Rightarrow *possible opportunities?*

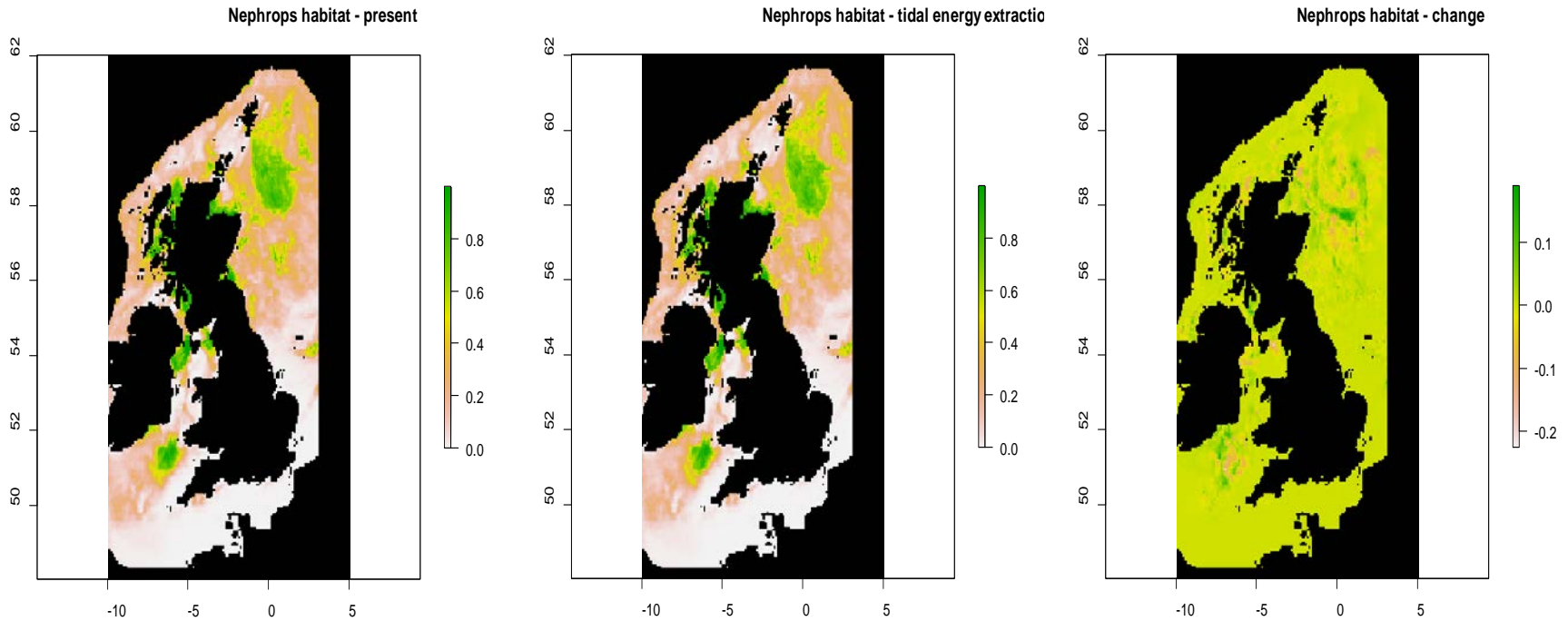
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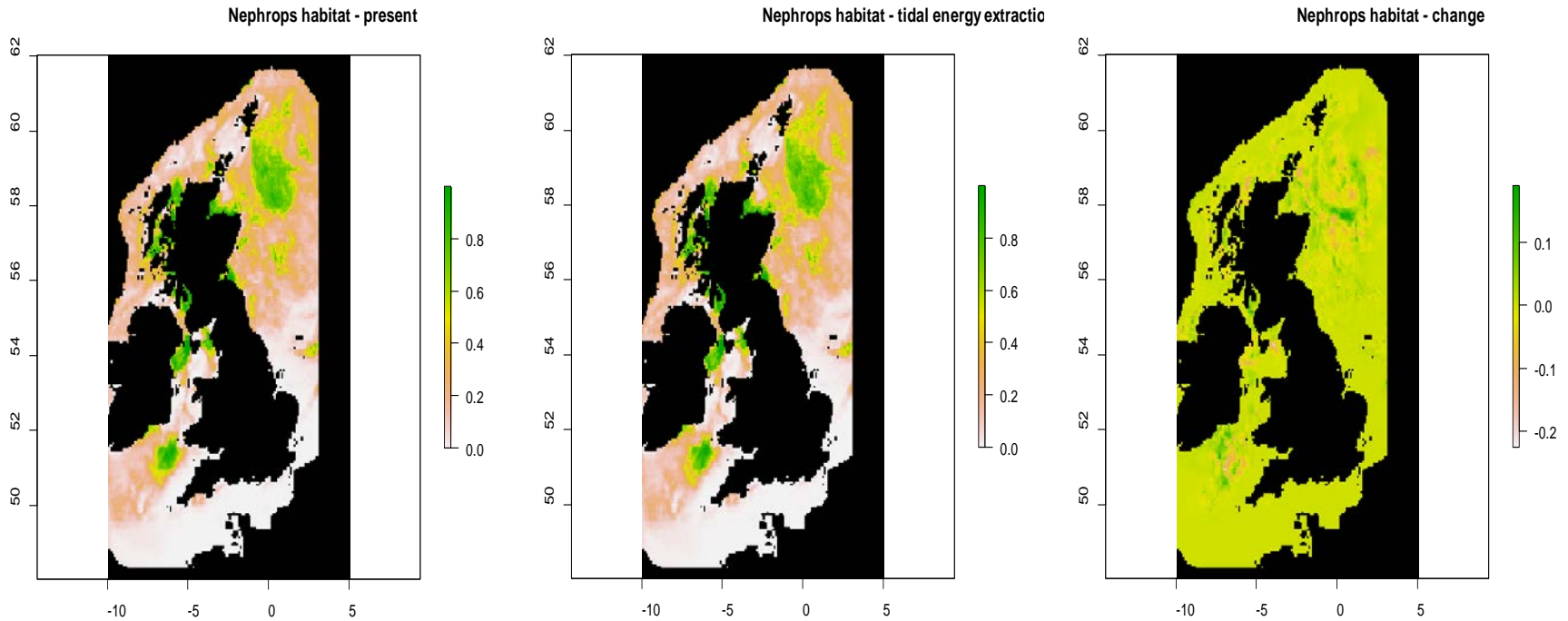
Models of habitat now and with tidal energy extraction



Models of habitat now and with tidal energy extraction



Models of habitat now and with tidal energy extraction



Expected changes under scenarios of climate change may be much bigger than this, with or without energy extraction

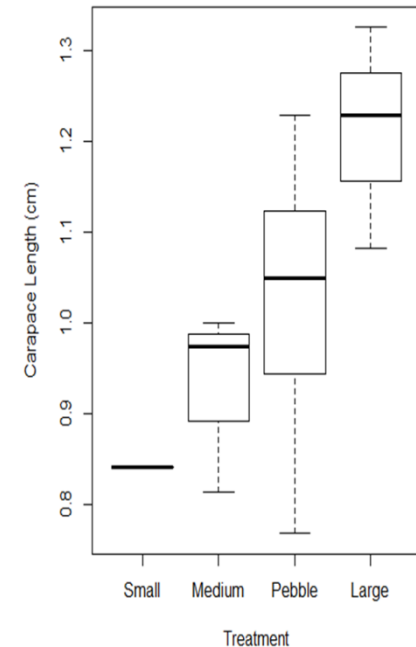
Models of habitat now and with tidal energy extraction

- Ongoing modelling will shed light on the extent to which oceanographic changes owing to energy extraction may affect habitat availability for commercially important species
- What are the limits of acceptable change?
- What metrics of change should we use?
 - Change in amount of habitat within given spatial domain
 - Spatial scale of any shift in habitat in relation to species mobility
- Effects of climate change are an important background to this
- More research needed on effects of energy extraction on connectivity
 - changes in transport of larvae and eggs to suitable grounds

Opportunities – habitat enhancement



- New seabed or water column structures – opportunity for habitat creation?
- Juvenile lobster habitat selection – for selection of substrates for habitat enhancement at marine renewable energy developments – *Matthew Coleman, Orkney Sustainable Fisheries Ltd.*

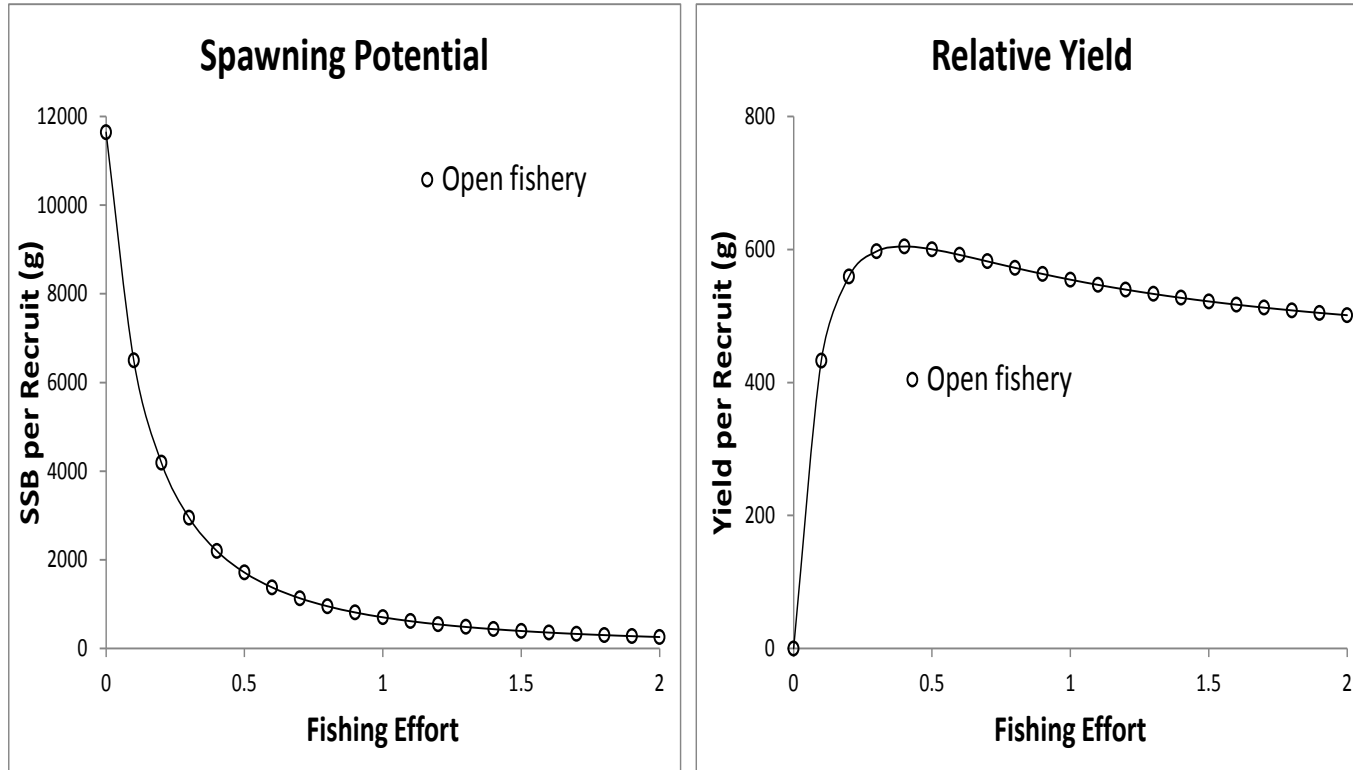


Opportunities – spatial fishery management

- Exclusion of fishing from development areas has implications for the relationship between fishing and the target stock, depending on:
 - The spatial scale of the closure compared with the total stock/fishery area: *greater influence from relatively large areas*
 - The mobility of the target species: *more movement means less influence of closure*
 - Habitat value of development area: *effective size of closed area increases with value of habitat for the target species*
 - Behaviour of the target species towards development infrastructure: *increased site fidelity means greater influence of closure*
- These factors can affect both spawning potential (likely positive) and fishery yield (possibly negative, but with increased resilience to high levels of fishing effort)

Opportunities – spatial fishery management

Some of these factors can be explored using simple spatial models:

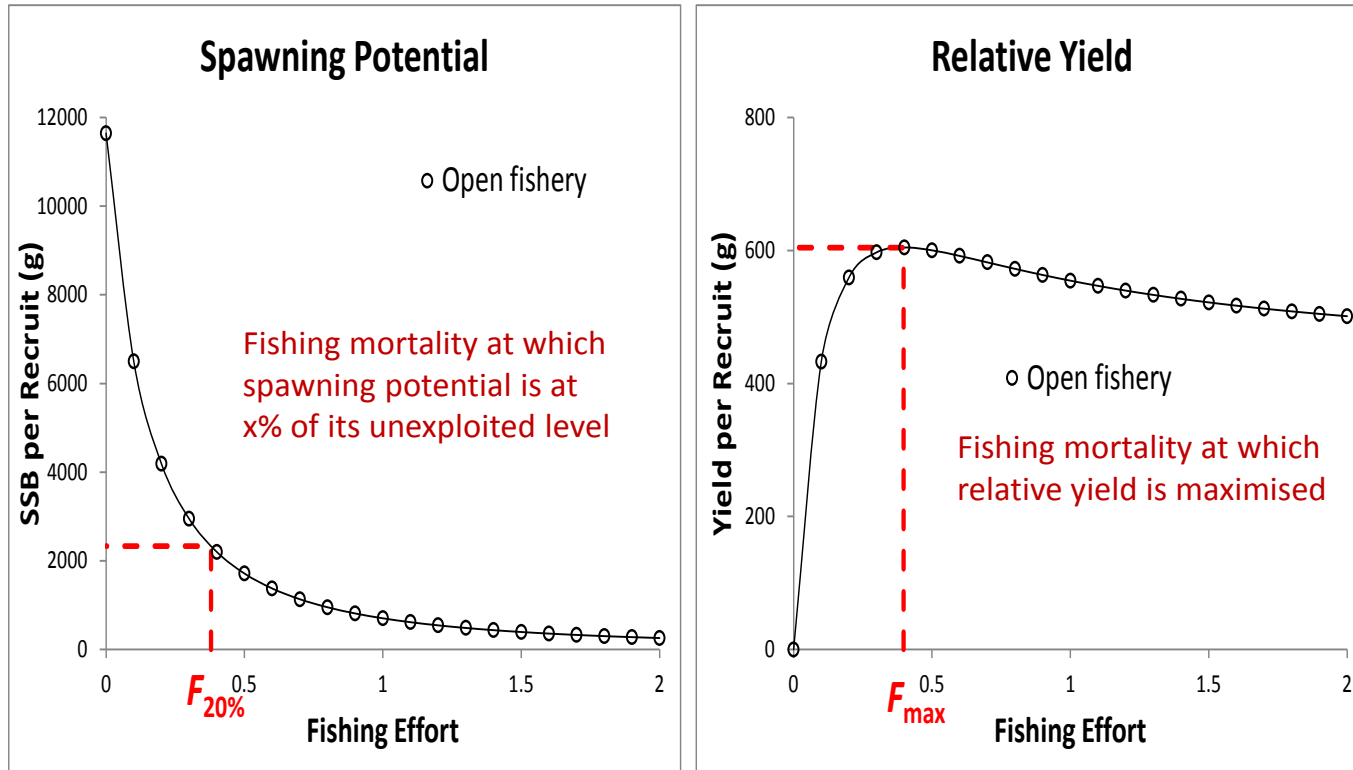


H.Zell, Wikimedia Commons

Example using biological parameters for Orkney lobsters

Opportunities – spatial fishery management

Some of these factors can be explored using simple spatial models:



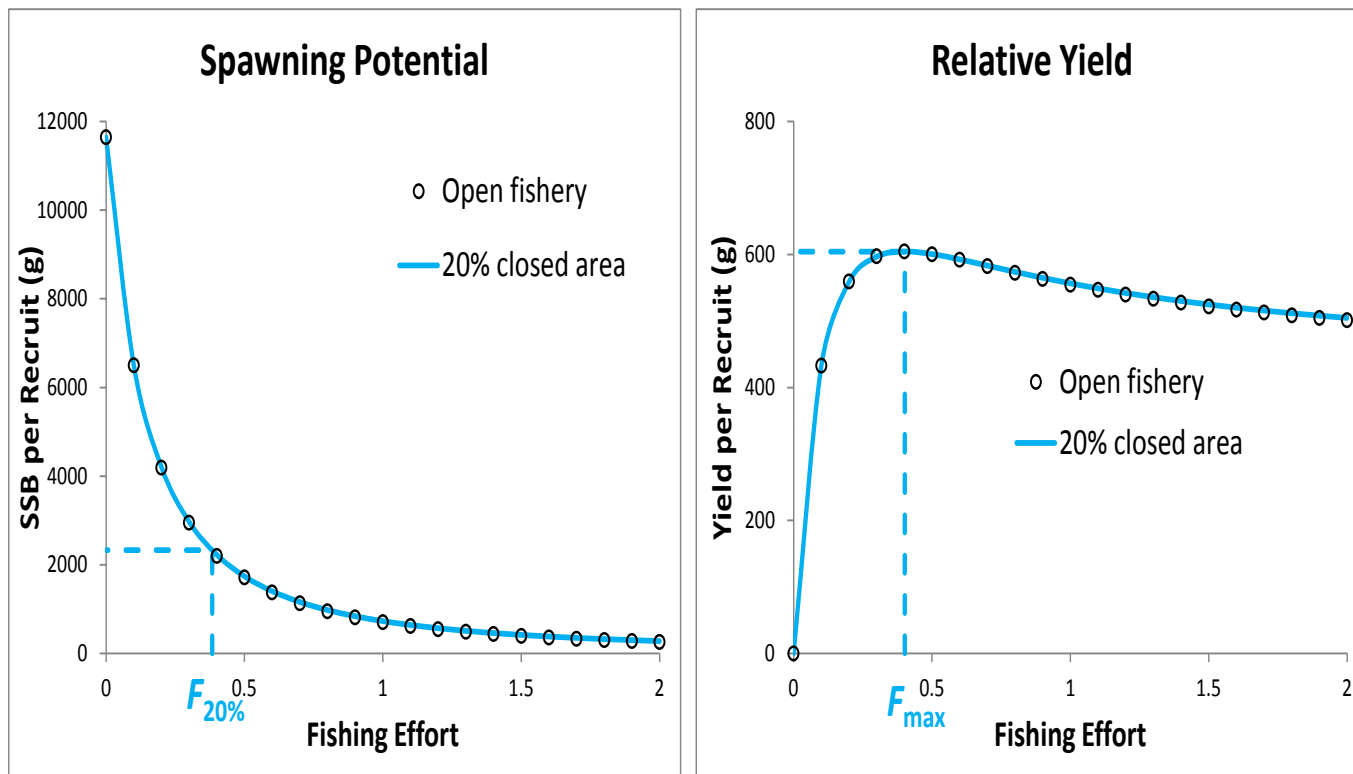
H.Zell, Wikimedia Commons

Example using biological parameters for Orkney lobsters



Opportunities – spatial fishery management

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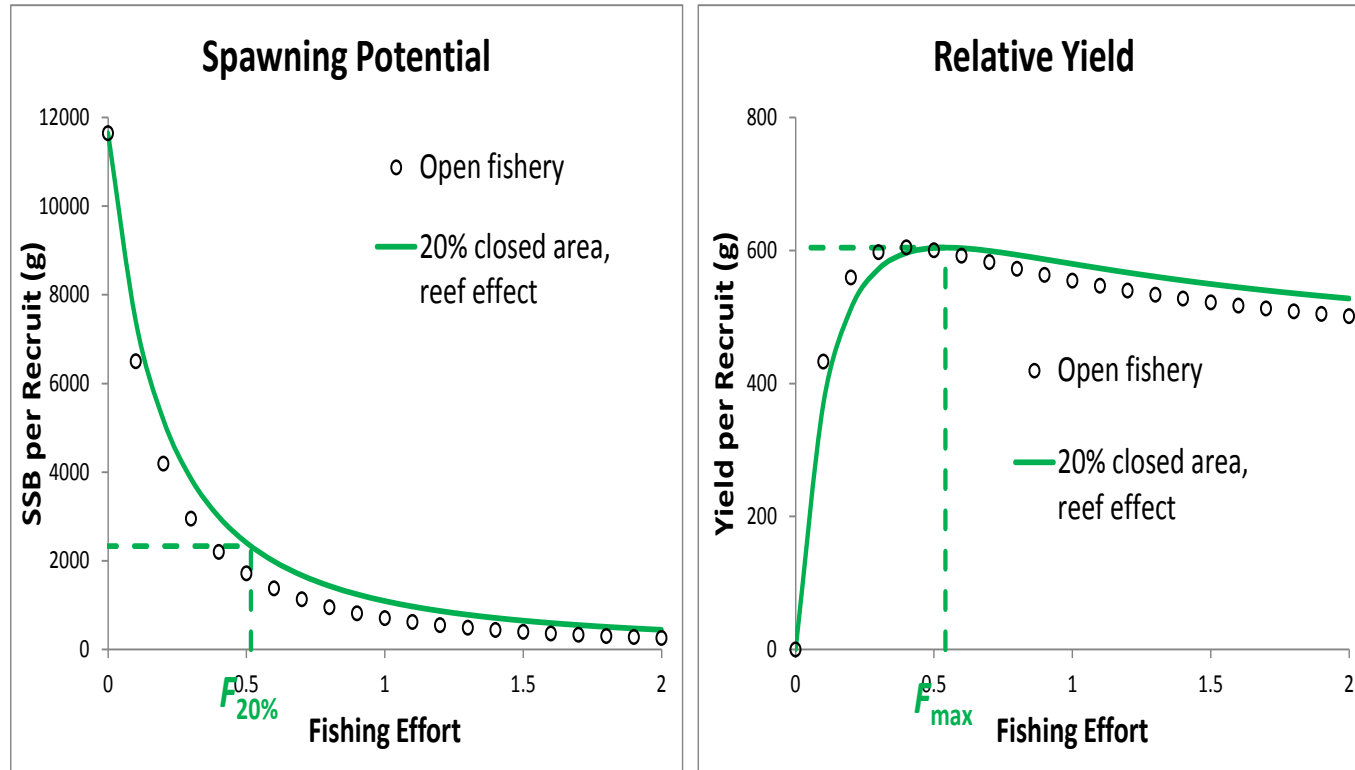
In this example, even a substantial closure coupled with modest mobility has almost no effect on fishery management quantities

H.Zell, Wikimedia Commons



Opportunities – spatial fishery management

Some of these factors can be explored using simple spatial models:



But increased habitat value within the closed area can change that – management criteria shift upwards, i.e. increased resilience

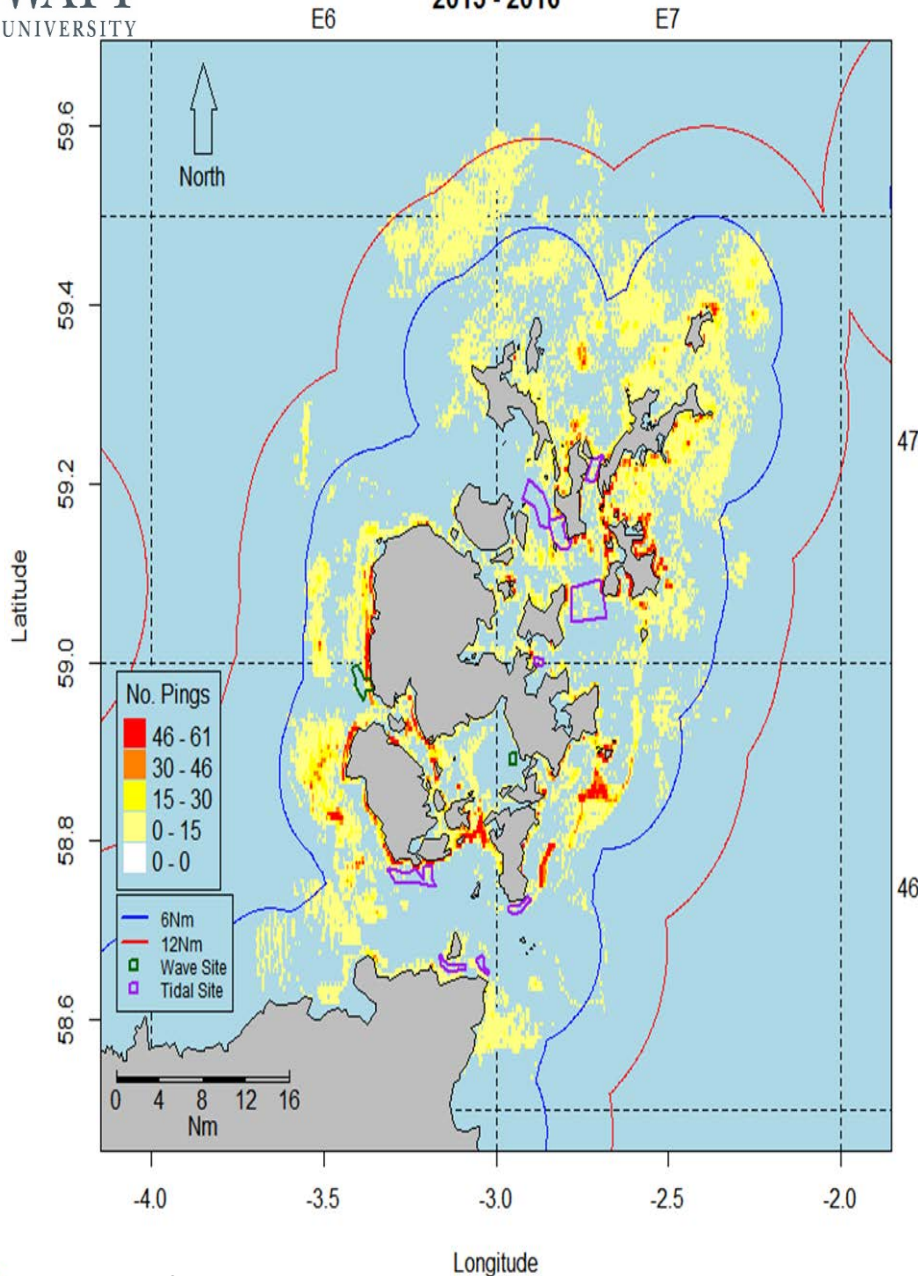
H.Zell, Wikimedia Commons



Opportunities – spatial fishery management

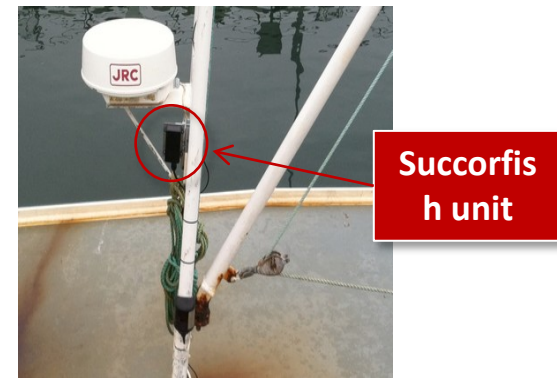
- Models are useful, but monitoring of real fishery outcomes must accompany real deployments
- And there is a big BUT...
 - Outcomes for individual fishermen depend on extent to which fishing effort is free to re-distribute – questionable, particularly for static gear fisheries on traditional grounds

Fishing Density
2013 - 2016

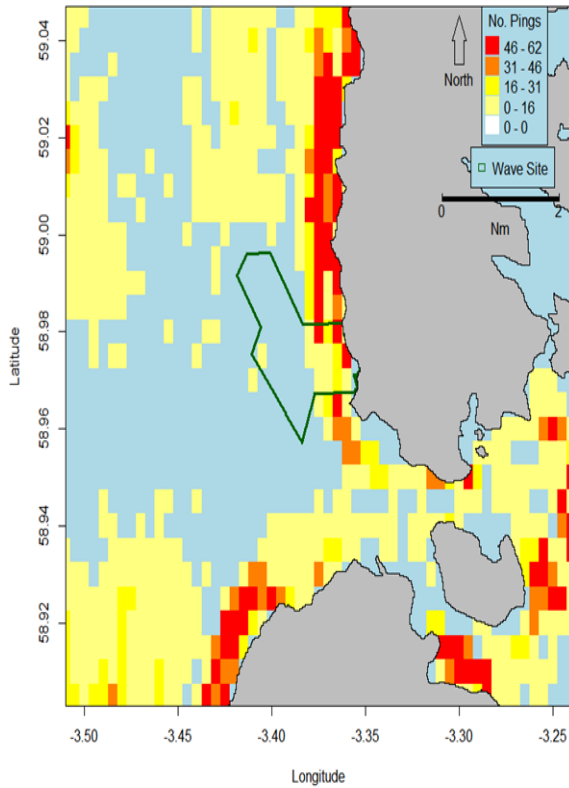


It is crucial to understand the distribution of fishing effort in relation to potential development areas

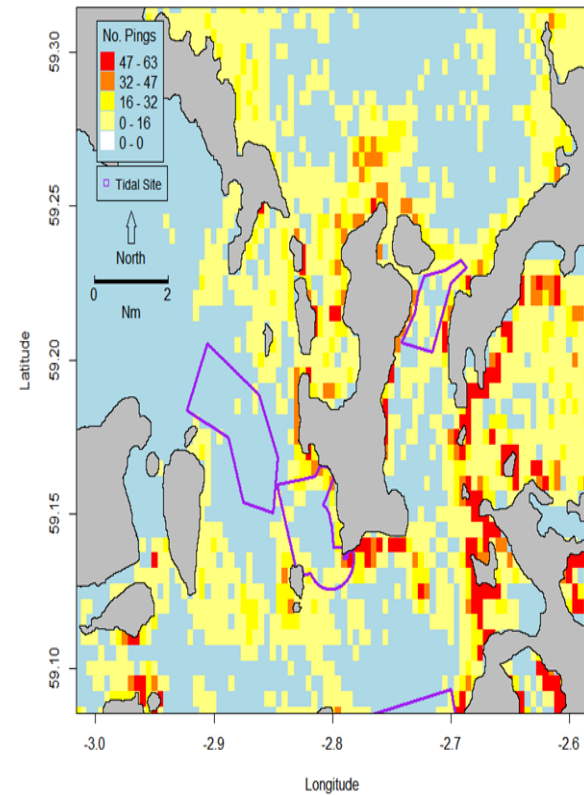
- Resource for developers in planning and impact assessment
- Evidence of value for fishermen
- The Crown Estate have funded the use of Succorfish monitoring in Orkney waters, equipment sponsored by Marine Scotland Science



Billia Croo wave test site



Falls of Warness tidal test site



Concluding remarks:

- Most important interactions between marine renewables and fisheries are likely to be spatial in nature
- For wave and tidal developments at least, interactions with locally important inshore fisheries are likely to be most significant, especially for target species of limited mobility
- Some opportunities as well as potential impacts
- Crucial to understand the fate of displaced fishing effort
- Projected far-field effects on habitat need further consideration – climate change is an important back-drop to this, and effects on connectivity warrant investigation
- Monitoring of real deployments is essential

Kieran Reilly

The attitudes and perceptions of fishermen on the island of Ireland towards marine renewable energy development

The attitudes and perceptions of fishermen on the island of Ireland towards marine renewable energy development

- Annex IV webinar, 19th June 2017
 - Kieran Reilly

Layout

- Introduction
- Case study sites
- Methodology
- Results
- Key conclusions and recommendations

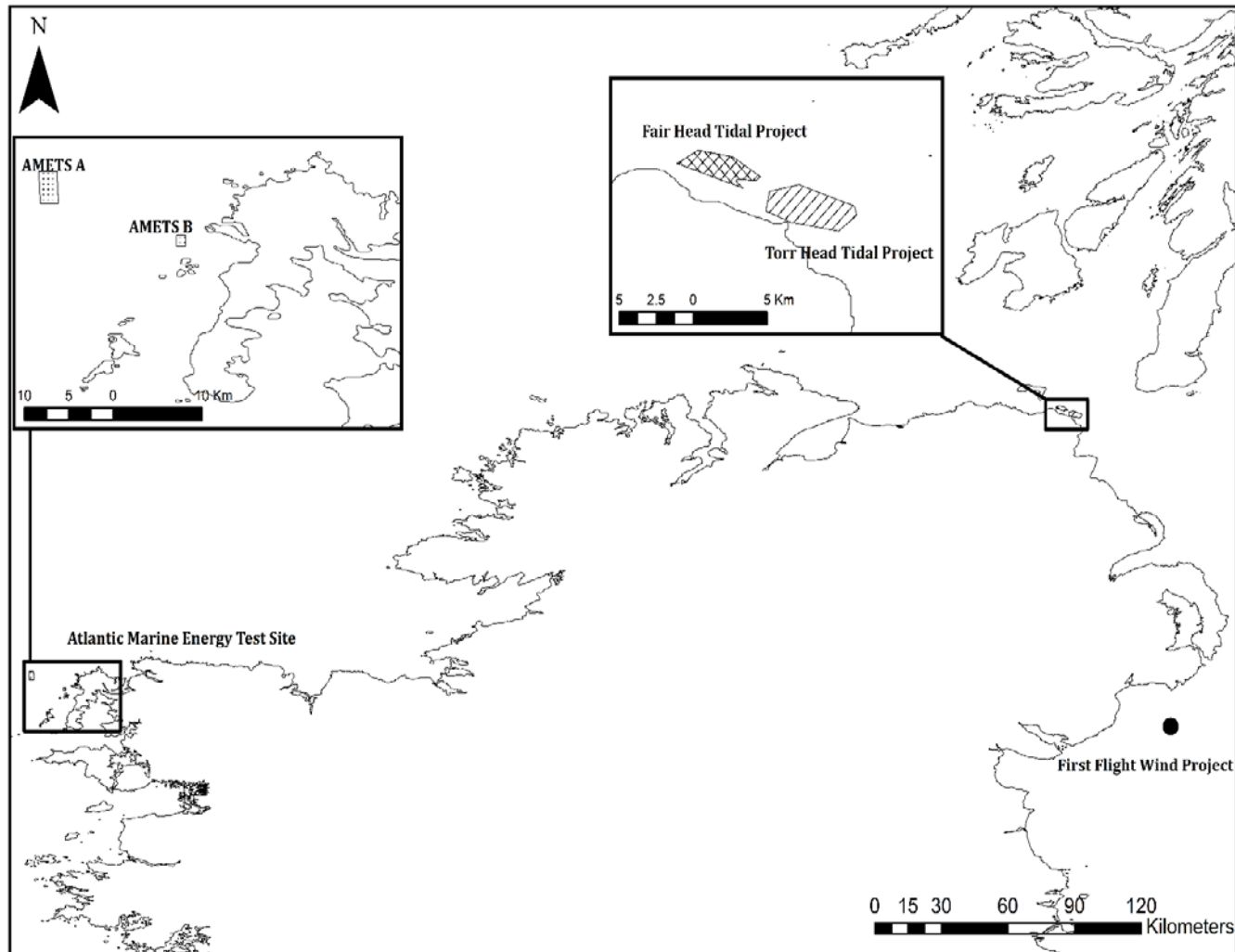
Introduction

- Marine renewable energy (MRE) refers to offshore wind, wave and tidal energy.
- Expansion of MRE will inevitably have some effect on commercial fishermen.
- Expected effects are largely unknown.
- Impacts and opportunities for fishermen.
- There is significant potential for spatial conflict.

Aims and objectives

- The key objectives for this study are to:
 - i. gather information on the attitudes of Irish fishermen towards MRE developments in their locality;
 - ii. identify the perceived impacts and opportunities associated with MRE;
 - iii. identify potential mitigation measures.

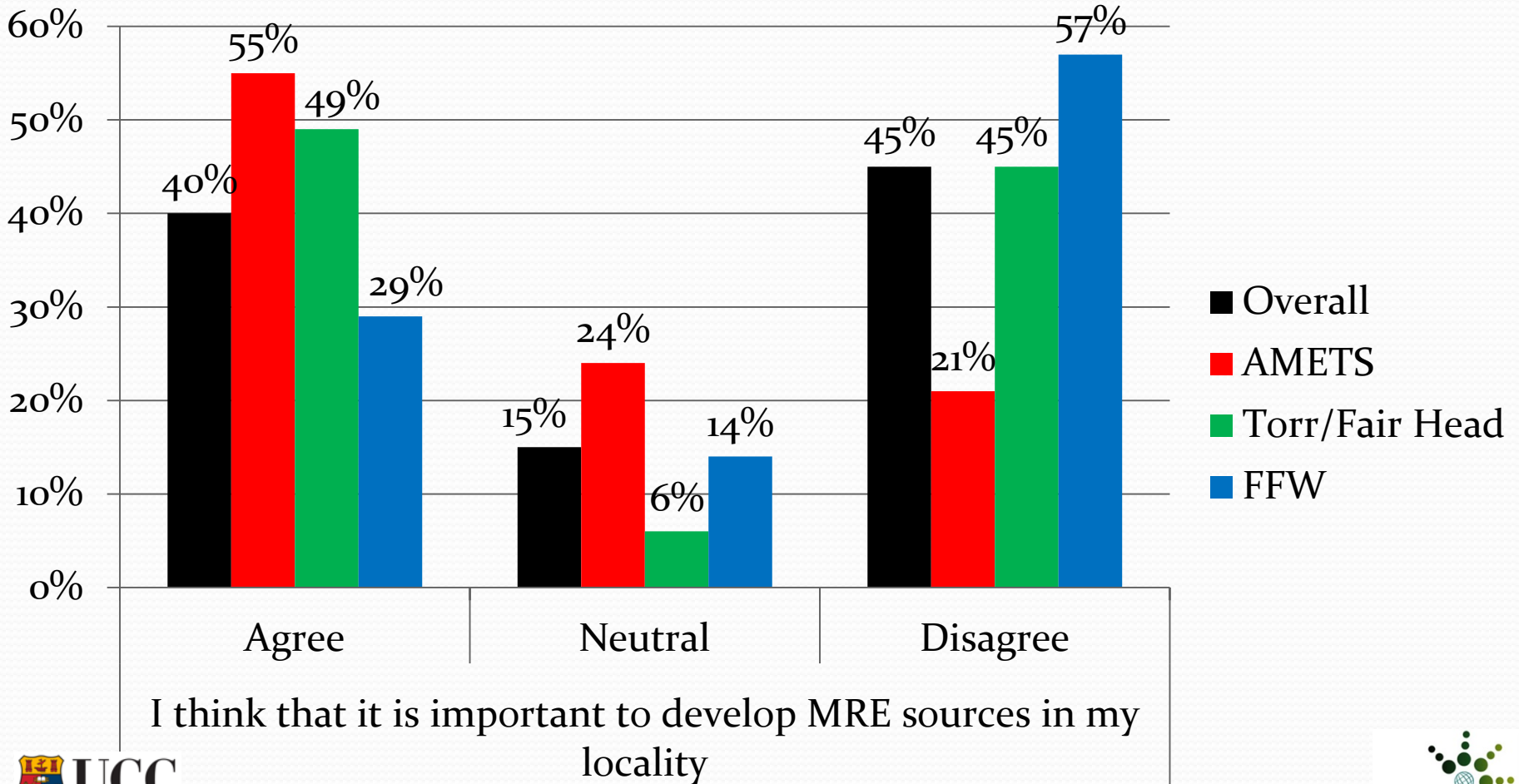
Case Study sites



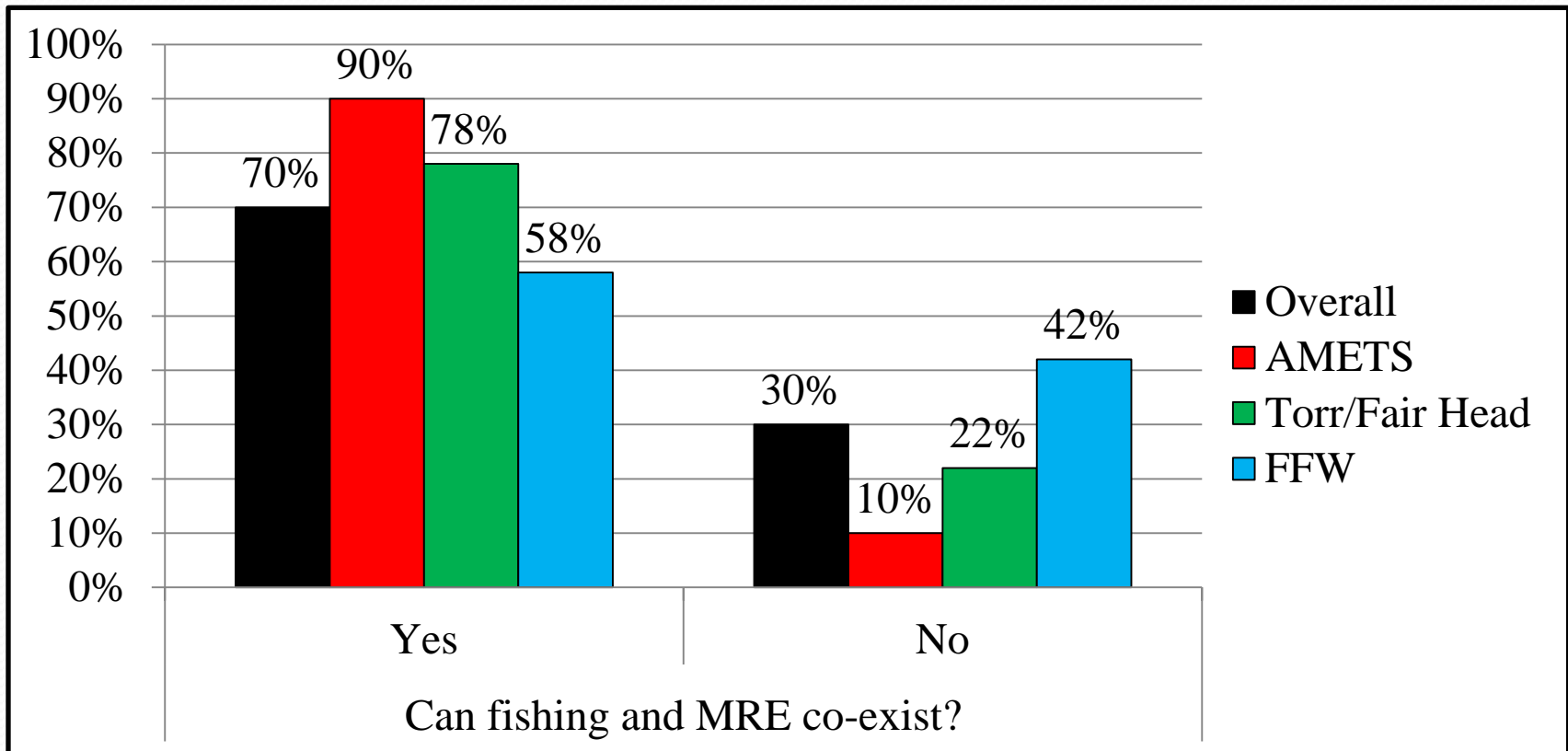
Mixed methods

- A mixed methods approach was used to gather quantitative and qualitative data from fishermen.
- For the quantitative research a questionnaire survey was designed to gather the information.
 - Building on a study carried out in Scotland
- For the qualitative research a semi-structured interview approach was chosen.

Attitudes towards MRE

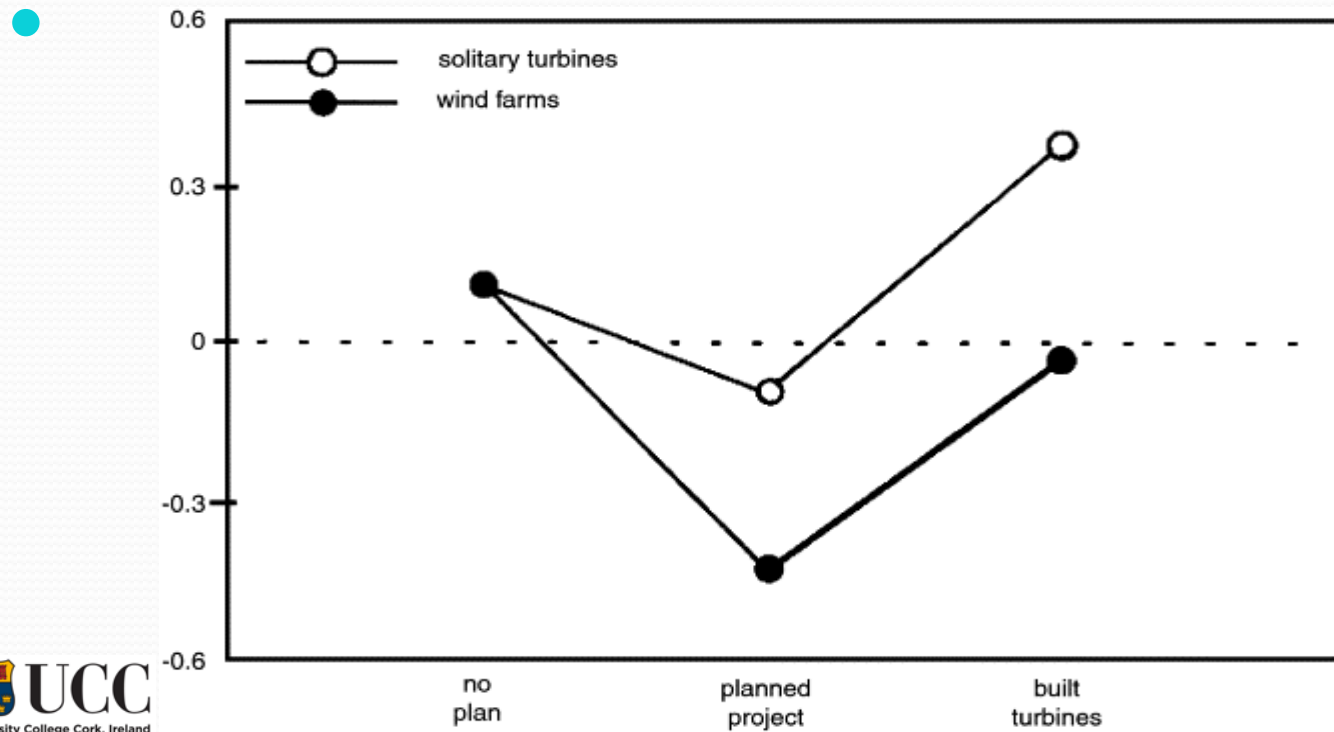


Co-existence of MRE and fishing



Attitudes

- Attitudes towards renewable energy development follow a U shaped curve (Wolsink, 2007).



Opportunities

	Times cited (n=104)
Alternative employment	58
Creation of marine habitat/artificial reef	7
Harbour/Infrastructure improvements	6

Alternative employment

- A number of fishermen acknowledged the potential for employment on MRE projects.
- Guard vessels, survey vessels, fisheries liaison work.
- However, there was uncertainty over:
 - whether they would be sufficiently qualified to avail of this.
 - whether their vessels would meet the standards required to carry out work on MRE projects.

Alternative employment

- *“On a very short term basis there probably would be guard ship opportunities for what?...2 boats, 3 boats, 4 boats?...To those 3 or 4 individuals who would get a guard ship job, which would last for the duration of the construction, that would be some benefit to them during that period. Thereafter, there’s the servicing of those which is done by specialist vessels... So it wouldn’t be us servicing them, it would be a firm that has Windcats that would be coming in. And, fair enough, you might sell a bit of fuel locally to those Windcats, maybe the hotel up the road would put up the engineers to service them so there would be some small benefit to the local community, but it would be far outweighed by the damage done to the fishing industry.” - Nephrops Trawl fisherman, FFW project*

Impacts

	Times cited (n=104)
Loss of access to fishing ground	82
Impact on fish species	24
Obstruction/Navigation hazard	11
Displacement of fishermen	7

Impacts

- *“It’s going to obstruct our fishing operations. And I’d be very cynical that we would get anything, or if there would be a spin off into the local fishing communities or any benefit at all. In fact, if the harbour facilities on our three fishing ports were going to be used in any degree at all by the offshore wind people it would deny us harbour space.” - Nephrops Trawl vessel owner, FFW project*

Mitigation

	Times cited (n=104)
Consultation	36
Locating in areas not used for fishing	16
Compensation	14

Mitigation

- *“...if they (planning authorities) were to sit down with fishermen’s representatives at a very early stage, at a stage before a particular piece of ground has been put out to tender, so that when it is put out for tender the objections are minimised at an early date rather than put in for tender and now they’ve been successful they have to fight every stakeholder there for every inch of the ground. That’s not a very sensible way to go about doing business.” - Nephrops Trawl fisherman, Kilkeel, FFW project*

Key Conclusions

- Further research is required on whether the attitudes of fishermen change and whether there is an increased level of acceptance towards them.
- Alternative employment will help to retain the benefits locally.
- Local hire and training programmes would help reduce uncertainty.
- Preferential hiring of displaced fishermen could be adopted by MRE developers.

Key Conclusions

- Data deficiencies are a key barrier to site selection.
- Early engagement provides an opportunity to fill gaps in baseline data.
- Mapping exercises can also enable the participation of fishermen, provided that the information is used before sites are selected for development.
- This could lead to a collaborative siting process and also inform Maritime Spatial Planning (MSP).

Thank you



Questions & Answers

THANK YOU!

- ▶ Recordings of presentations will be posted on Tethys at:
<https://tethys.pnnl.gov/environmental-webinars?content=water>
 - Information on previous and upcoming Annex IV webinars
- ▶ Watch for announcements on *Tethys* and your email for the next Annex IV webinar
- ▶ For those of you who are not on the webinar mailing list, visit
<https://tethys.pnnl.gov/tethys-blasts/join>

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