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aMER – applied Marine Ecosystems Research




AQUACULTURE FOR A THRIVING
FUTURE: BIODIVERSITY, INNOVATION,
AND ECONOMIC SUSTAINABILITY IN
THE UK - THE FISHMONGER'S COMPANY



**ROPES
TO REEFS**

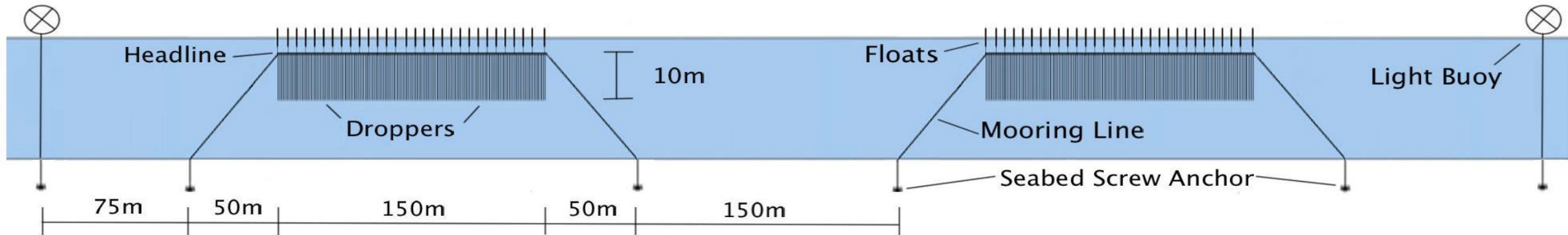
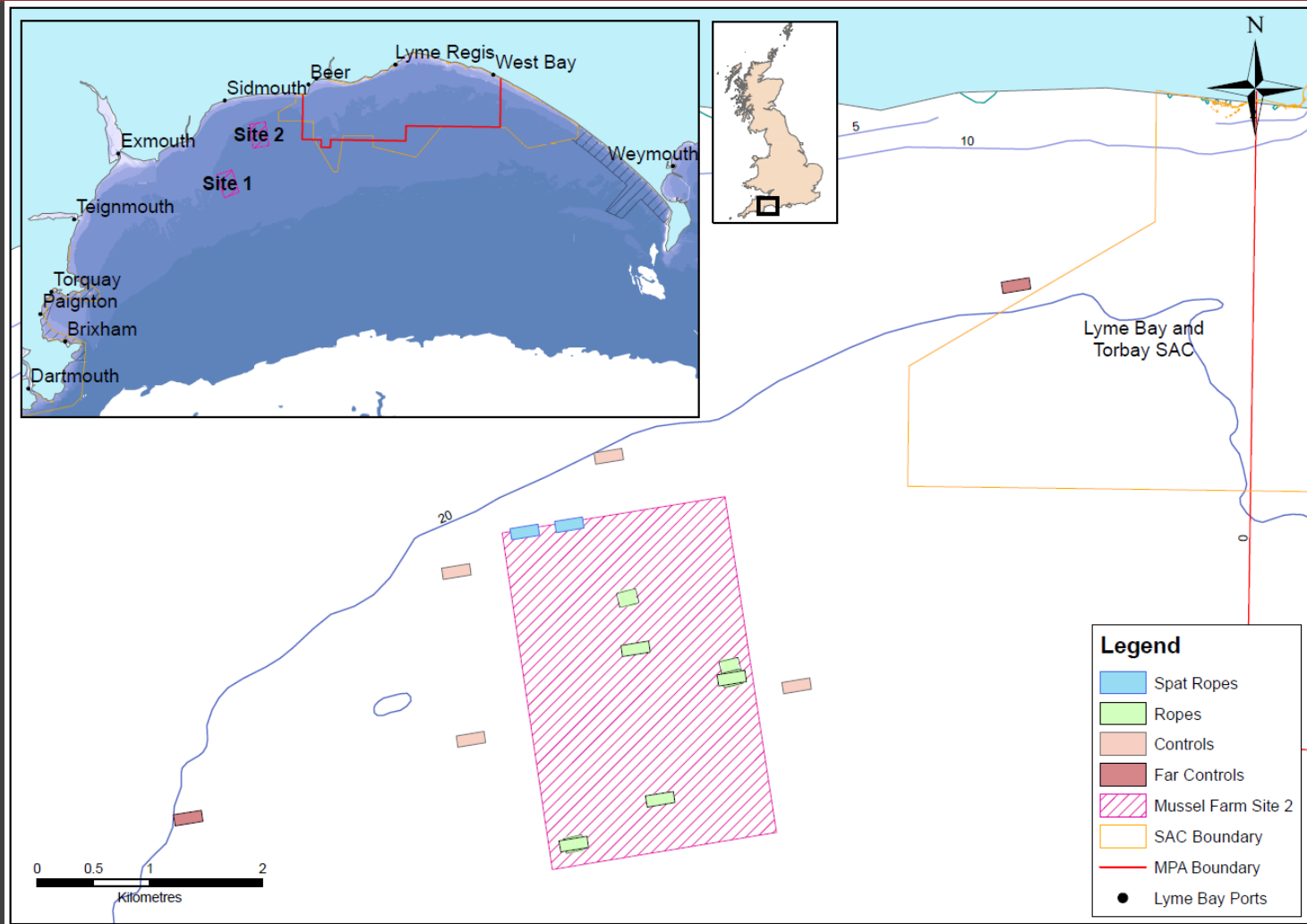
Ecological impacts of farming mussels offshore: The Lyme Bay case study



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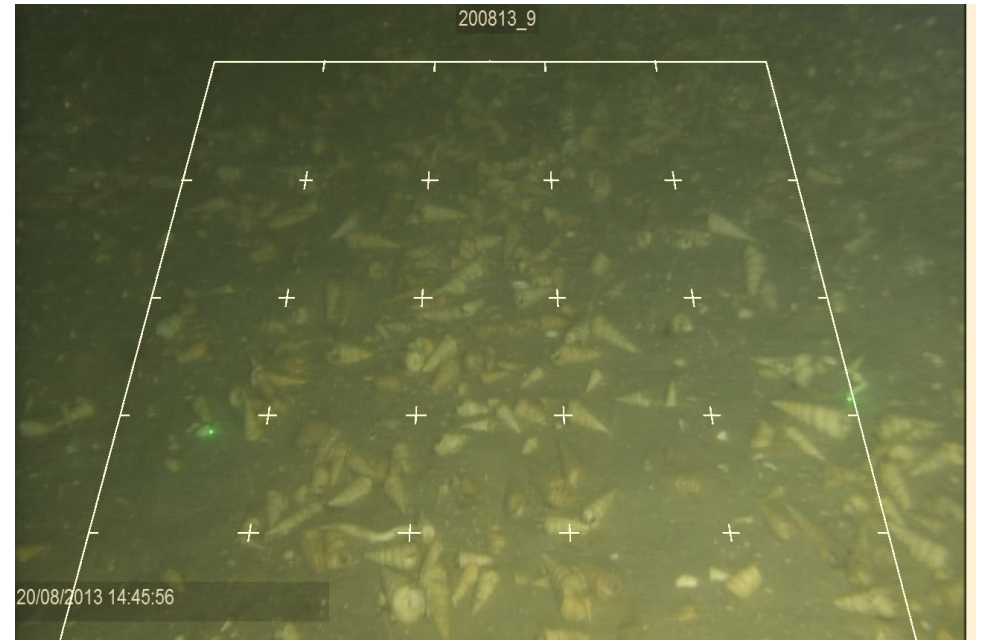
Study site

- UK's first large scale offshore mussel farm
- Two developed sites (10km²)
- Located on heavily trawled ground
- 150m longline headlines
- 10m rope droppers
- Buoys keep the structure floating

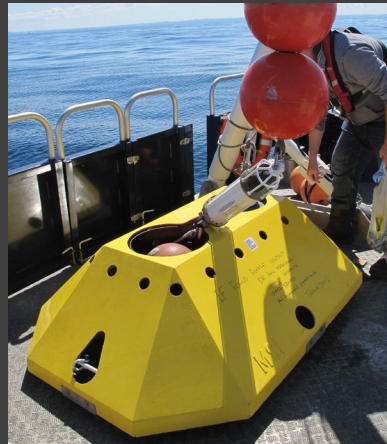
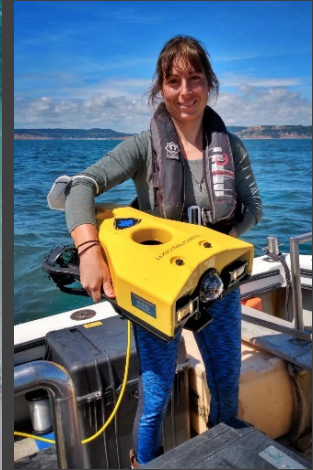
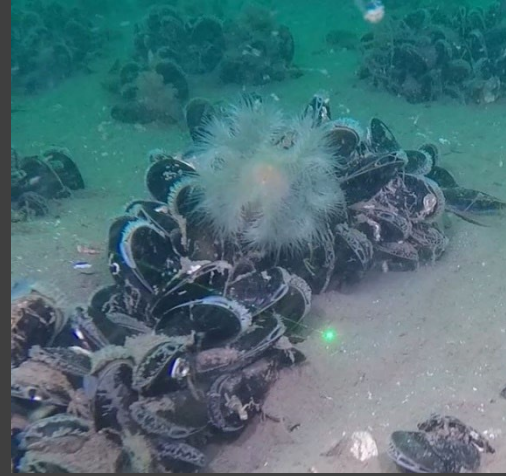
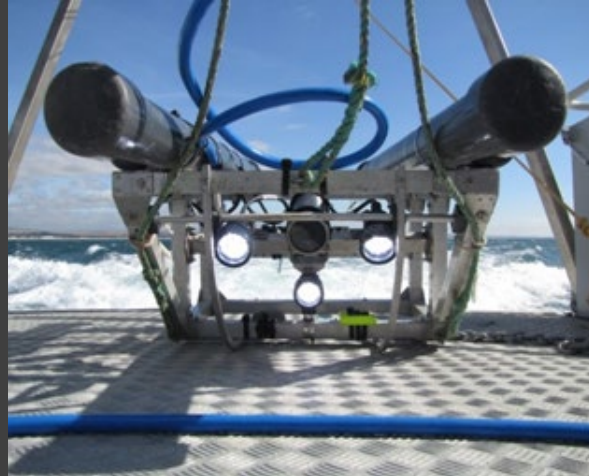


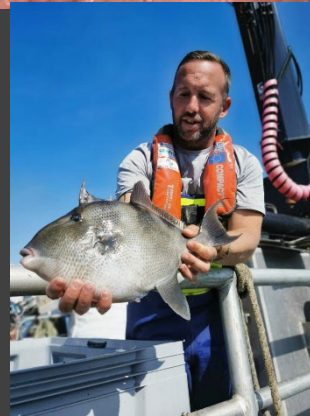
Long-term research study

- To assess the overall footprint of the farm
 - Hydrodynamic changes
 - Sediment transport & plankton depletion
 - Functional change of benthic & pelagic species (commercially targeted)
- Before After Control Impact (BACI) design
 - Baseline – 2013/2014 (degraded)
 - PhD#1 - 2015/2017 (Site 1 and 2)
 - PhD#2 - 2018/2020 (Site 2)



Survey techniques





RESULTS

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REVIEWS IN Aquaculture



Reviews in Aquaculture, 1–24

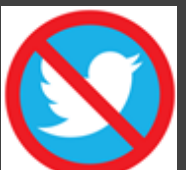
doi: 10.1111/raq.12549

Offshore longline mussel farms: a review of oceanographic and ecological interactions to inform future research needs, policy and management

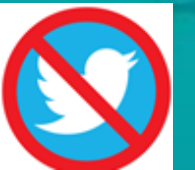
Llucia Mascorda Cabre , Phil Hosegood, Martin J. Attrill, Danielle Bridger and Emma V. Sheehan

School of Biological and Marine Sciences, Faculty of Science and Engineering, University of Plymouth, Plymouth, UK

Highly hydrodynamic offshore conditions



Pelagic communities



Dpt: 24.0m
Hdg: 85.9° [88.7°]

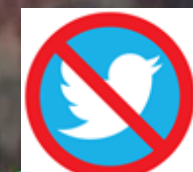
Biogenic reef development

P: -2.8°
R: 6.8°



Temp: 15.8° C
07/30/20 10:30:20

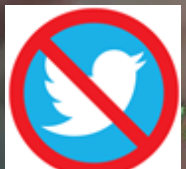
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Dpt: 24.0m
Hdg: 90.0° [90.7°]

Benthic communities

P: -3.3°
R: 7.2°



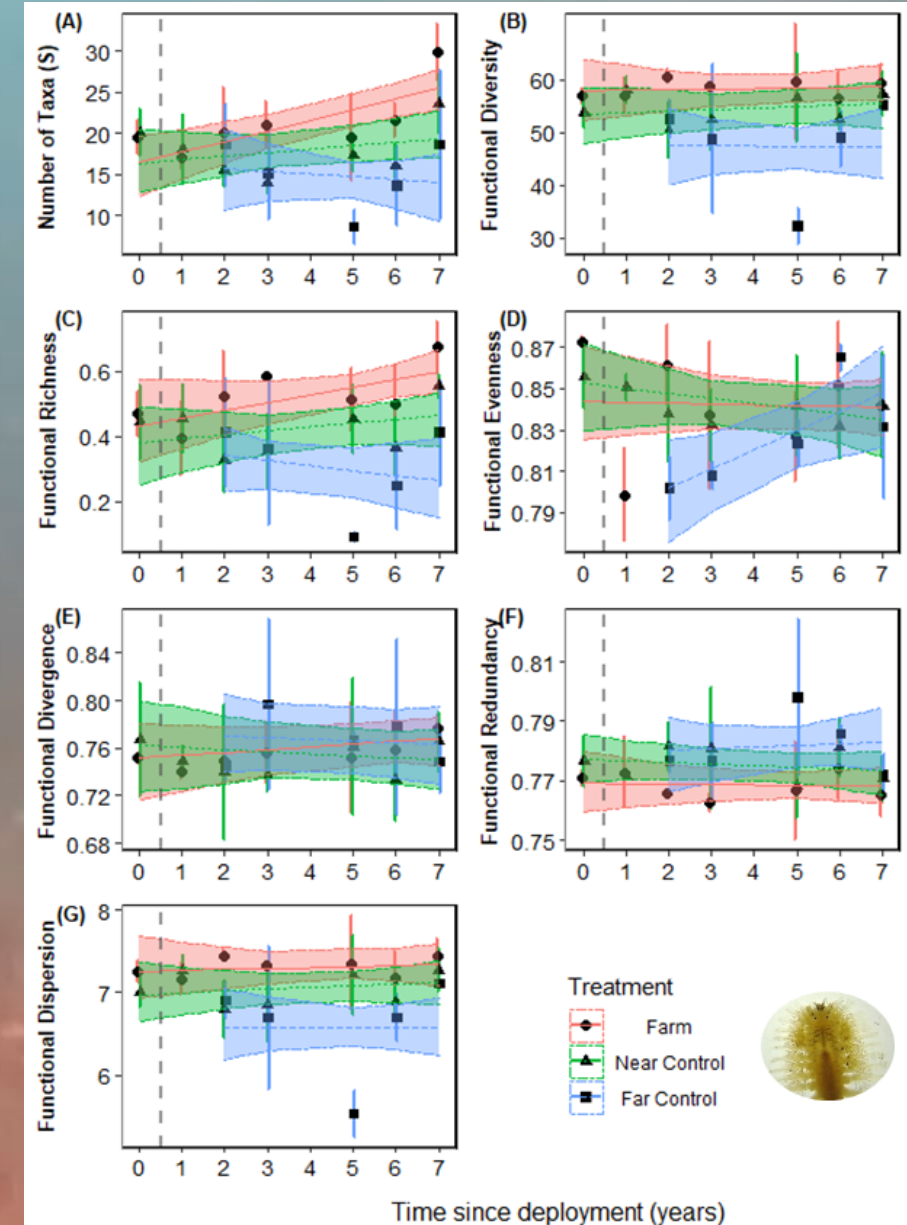
15.8° C
20 10:26:28

300720_C16__01rope

Dpt: 23.9m
Hdg: 282.1° [281.7°]

Infauna communities

P: -7.8°
R: 6.3°



Contents lists available at ScienceDirect

Marine Pollution Bulletin

journal homepage: www.elsevier.com/locate/marpolbul

Detecting sediment recovery below an offshore longline mussel farm: A macrobenthic Biological Trait Analysis (BTA)

Lucia Mascorda-Cabre^{*}, Phil Hosegood, Martin J. Attrill, Danielle Bridger, Emma V. Sheehan

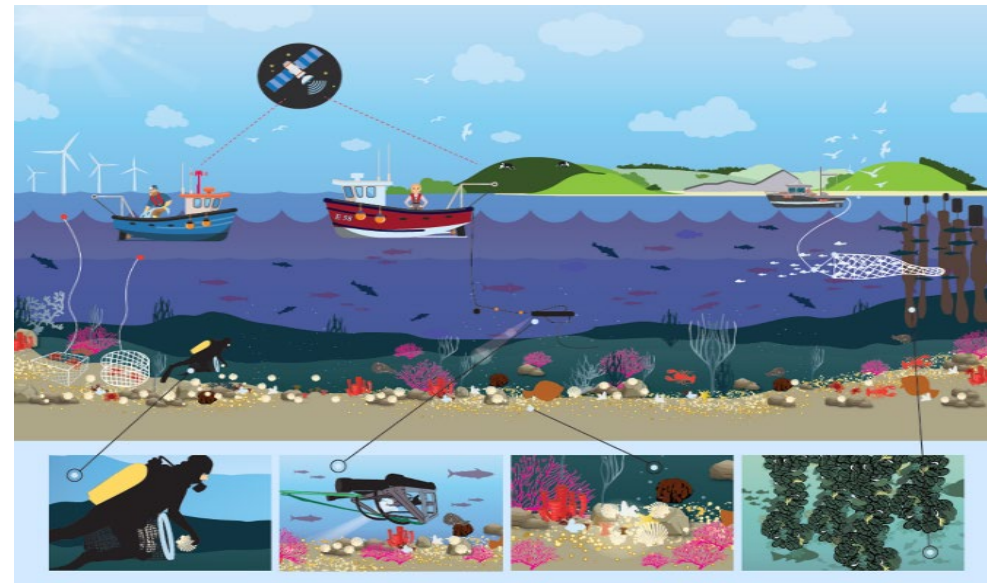
School of Biological and Marine Sciences, Faculty of Science and Engineering, University of Plymouth, Plymouth, UK



- Offshore aquaculture as ***de facto*** MPA
 - Exclusion of fishing activities (mobile gear)
 - Restoration & habitat recovery
 - FAD, nursery, refuge and shelter
 - Boost biodiversity - Spillover effect
 - Sustainable sources of protein



The age of extinction
A happy food chain: can mussel farming restore the UK's damaged coastline?



OECMS
In marine capture fisheries

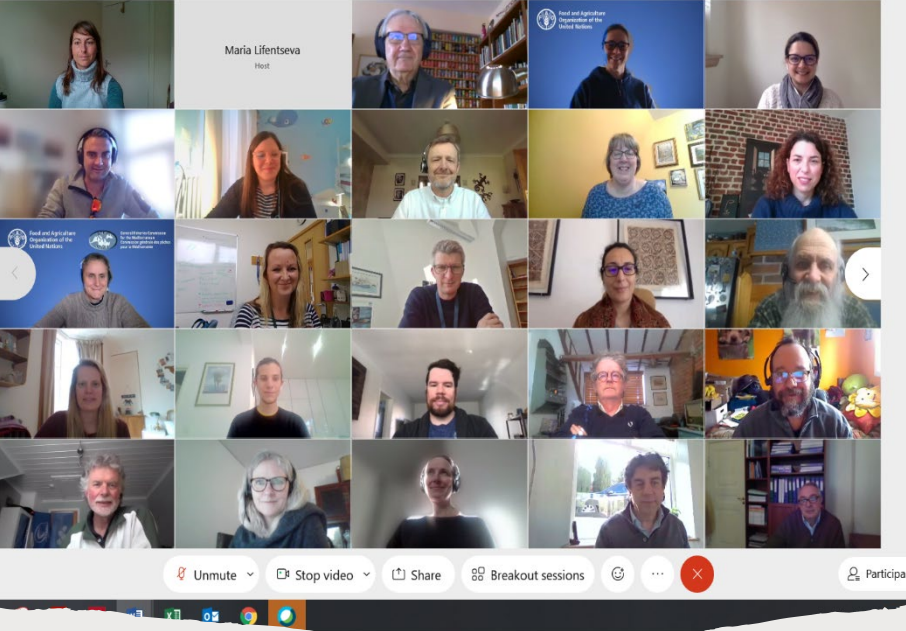
OECMS
In marine capture fisheries

Systematic approach to identification, use and performance assessment

Brief for policy-makers and managers

Conservation & Sustainable development - Offshore aquaculture as *de facto* MPAs

- Marine biodiversity declines
- International conservation targets – Aichi Target 11 & 6, SDGs 14 & 2
- Blue Economy's role – offshore aquaculture
- Offshore aquaculture as *de facto* MPA =
- Conservation achieved as a by-product of other management- OECM



OTHER EFFECTIVE AREA-BASED CONSERVATION MEASURES

- As defined by the 14th Conference of Parties of the Convention on Biological Diversity in 2018:

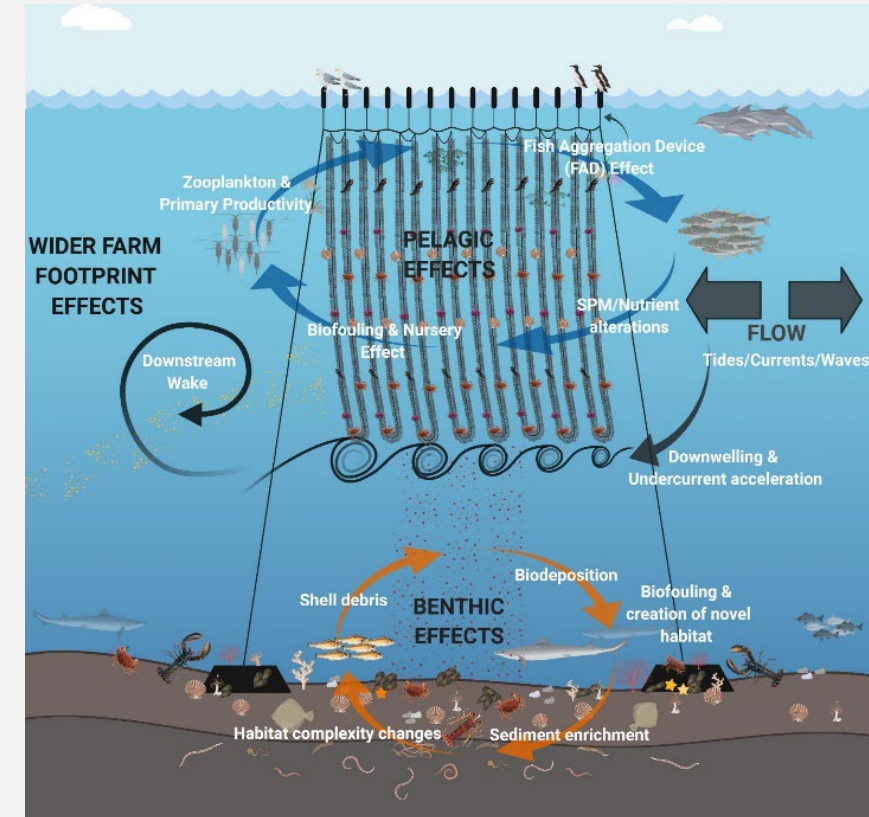
"A geographically defined area other than a Protected Area, which is governed and managed in ways that achieve positive and sustained long-term outcomes for the in-situ conservation of biodiversity, with associated ecosystem functions and services and where applicable, cultural, spiritual, socio-economic, and other locally relevant values."

Joint ICES/IUCN-CEM FEG workshop on testing OECM practices & strategies

**OECMs –
Lyme Bay
Offshore
Mussel farm: as
a case study**

OECEM - Assessment of the area against CBD Criteria

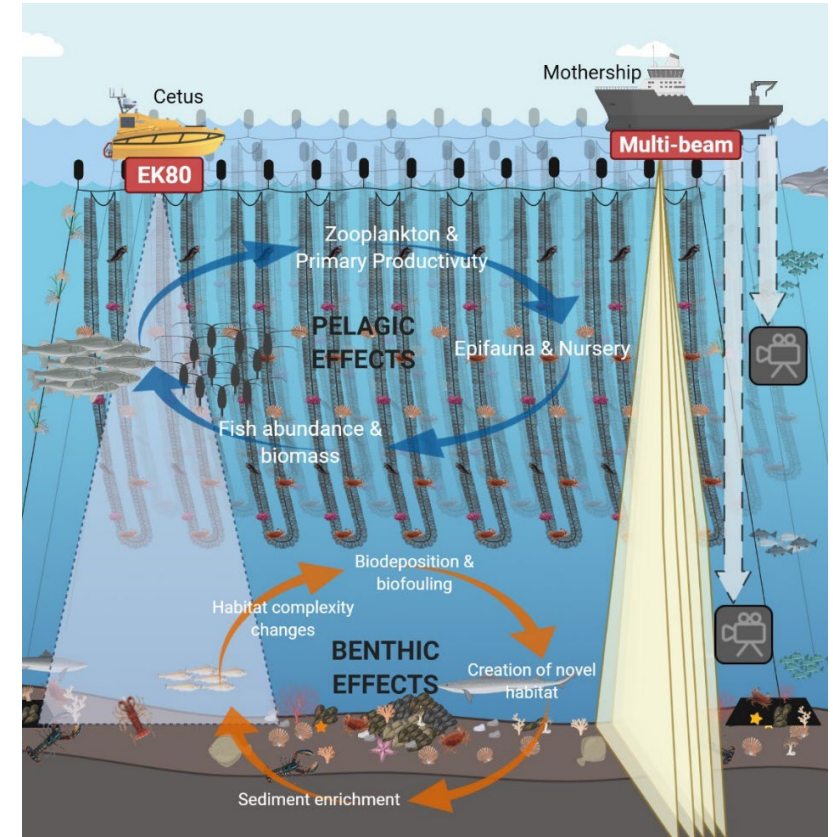
Criterion	Description	Mussel Farm
A	Area is not recognized as a protected area	<ul style="list-style-type: none"> ✓ Not an MPA
B	Area is governed and managed	<ul style="list-style-type: none"> ✓ Licence (MMO & The Crown State) ✓ Geographically defined space ✓ Contribute to restoration & conservation of biological diversity
C	Achieves sustained & effective contribution to <i>in situ</i> conservation of biodiversity (Long-term <i>in situ</i> biodiversity conservation outcomes)	<ul style="list-style-type: none"> ✓ Exclusion of destructive activities ✓ Allowing recovery ✓ Create habitat ✓ Restoration ✓ Increase in biodiversity ✓ Long-term monitoring
D	Associated ecosystem functions and cultural, spiritual and socio economic values	<ul style="list-style-type: none"> ✓ Potential climate change positive industry: increase water quality, carbon sequestration ✓ Spillover/commercially valuable species/ecosystem services ✓ Improving local/recreational fishing grounds - create jobs



Ropes to Reefs

UK Seafood Fund: Fisheries Industry Science Partnerships scheme (FISP)

- A fisher, farmer, scientist collaboration to evidence fish stock and habitat benefits of Offshore Aquaculture to inform future management and policy.
- To assess the **ecosystem services** and benefits of offshore aquaculture, assess the **restoration of essential fish habitat (EFH)**, biodiversity and associated healthy **fish stocks (biomass)** in Lyme Bay.
- Session 5. Frontier Thinking: Recognising Opportunity

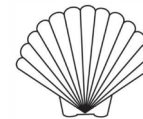


**ROPES
TO REEFS**



**UNIVERSITY OF
PLYMOUTH**

**offshore
shellfish** ltd



The FISHMONGERS'
Company's
FISHERIES CHARITABLE TRUST

Marine
Management
Organisation

**BIOME
ALGAE LTD.**

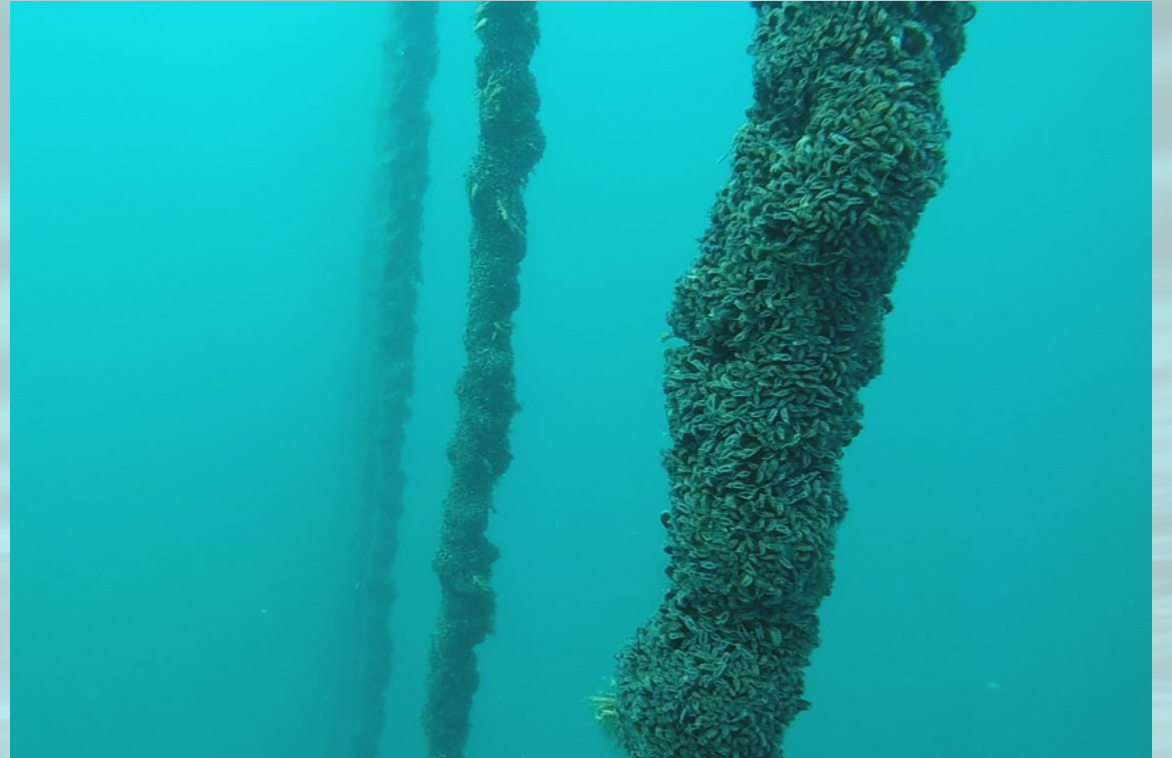
Devon & Severn
IFCA
Inshore Fisheries and
Conservation Authority

**NATURAL
ENGLAND**

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- John and George Holmyard from Offshore Shellfish Ltd
- Our skippers and deckhands
- Team Sheehan (University of Plymouth)
<https://sheehanresearchgroup.com/>
- My supervisors





Thank you
