55th Annual Conference

Shellfish Association of Great Britain

#SAGB55

University of Essex

Shellfish Association of Great Britain

Restricting UK aquaculture does not suppress spread of the Pacific oyster

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Shellfish Association of Great Britain

Advances in Ecological Research – Review:

Evaluating the net impacts of a naturalised non-native species and attempts to control its spread in the UK: Addressing the oyster in the room

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Aims

- **Present overview of a Rapid Evidence Review on the spreading of the Pacific oyster and resulting conflicts**
- **Provide expertise for informed discussion and identification of suitable future policy**

https://www.wivenhoegallery.com/richardallen

Pacific oyster

Current status

- **Invasive Non-Native Species**

Large Pacific oyster reef in the Lister Deep in Germany

Nehls and Büttger (2007) Spread of the Pacific Oyster *Crassostrea gigas* in the Wadden Sea. The Common Wadden Sea Secretariat, Wilhelmshaven.

Pacific oyster

Current status

- **Invasive Non-Native Species**

Distribution of the Pacific oyster *Magallana gigas* in European waters

Hansen *et al*. (2023) Too late for regulatory management on Pacific oysters in European coastal waters? doi:10.1016/j.seares.2022.102331

Pacific oyster

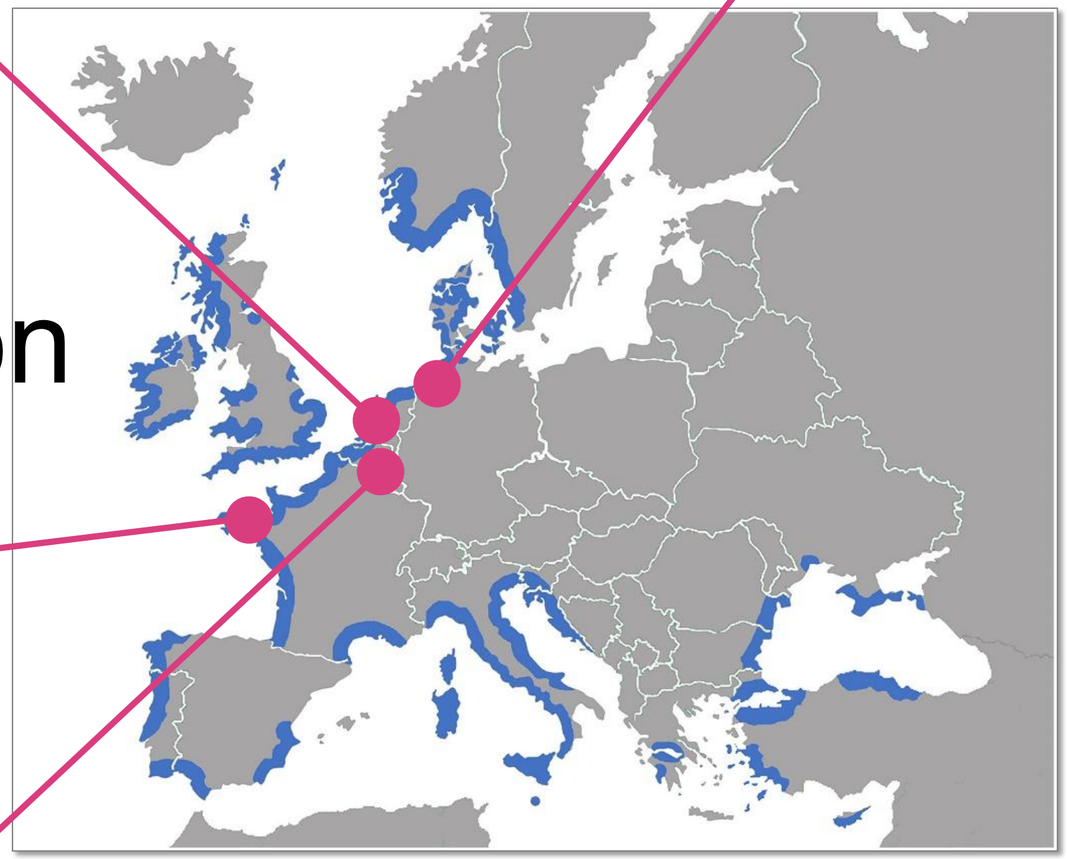
Europe: Naturalisation

- **Invasive Non-Native Species**
- **Legally naturalised in many EU countries**
- **Simplifies regulatory processes and unlocks benefits**

Presence irreversible, farming allowed
(Syvret et al., 2021)

Used in coastal defence (Fivash et al., 2021)

Aquaculture exempt from EU invasive species regulations
(Haubrock et al., 2023)



Distribution of the Pacific oyster *Magallana gigas* in European waters

Naturalised species, fully compatible with farming in protected areas

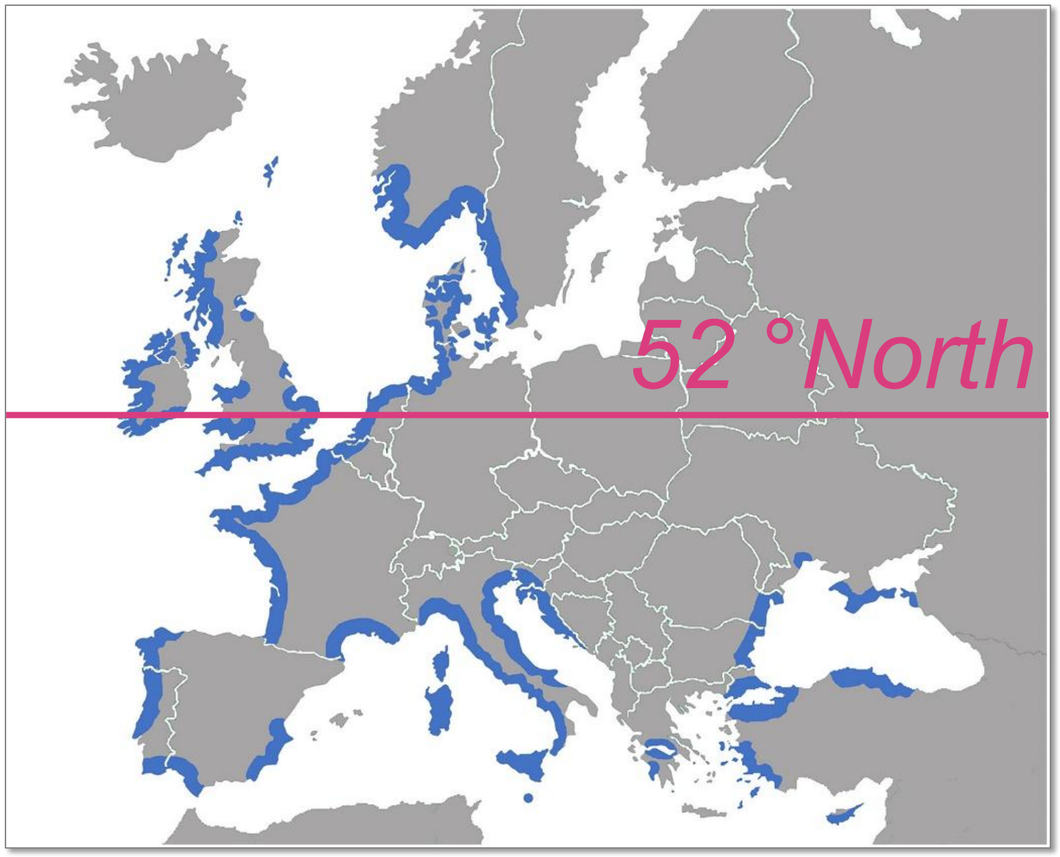
European Union: '…not of concern…'
(Brundu et al., 2022)

Hansen *et al*. (2023) Too late for regulatory management on Pacific oysters in European coastal waters? doi:10.1016/j.seares.2022.102331

Pacific oyster

England: Restriction

- **Invasive Non-Native Species**
- **Legally naturalised in many EU countries**
- **Simplifies regulatory processes and unlocks benefits**

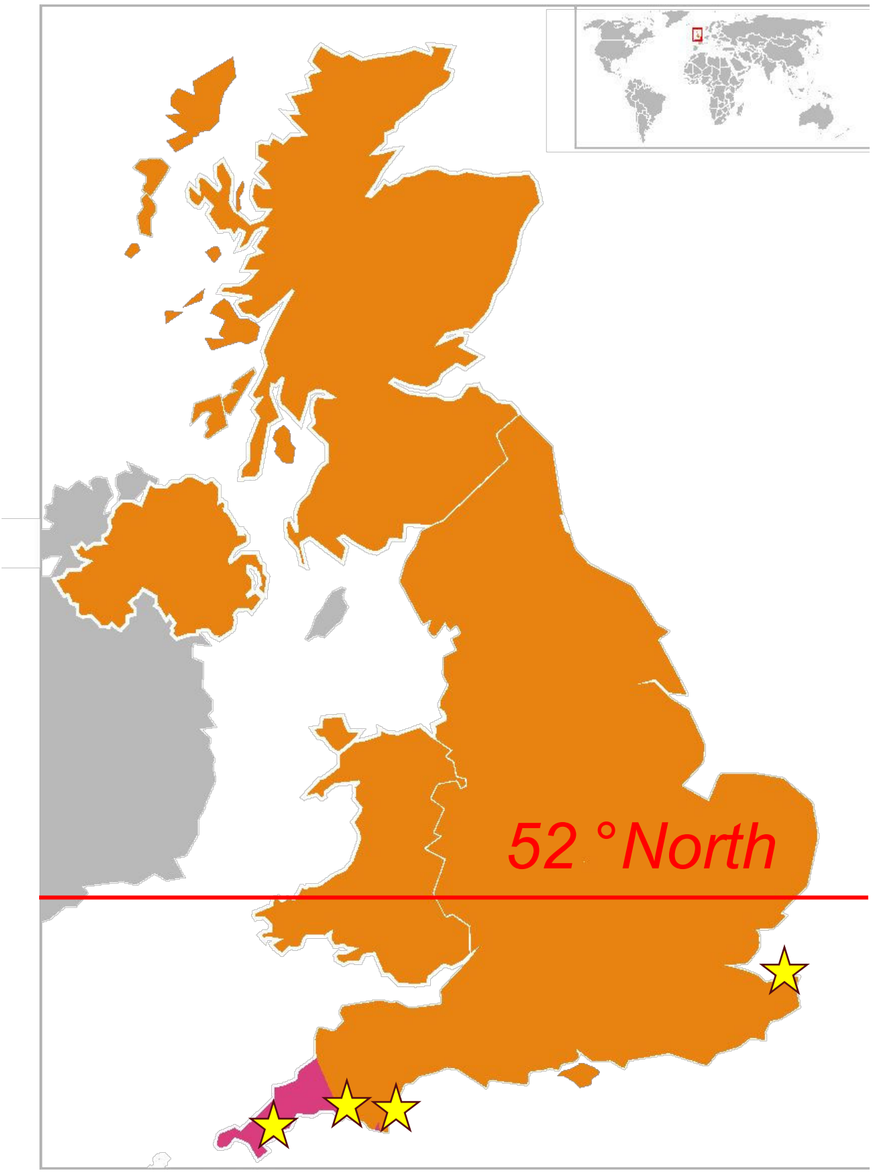


Distribution of the Pacific oyster *Magallana gigas* in European waters

Pacific oyster

Areas affected

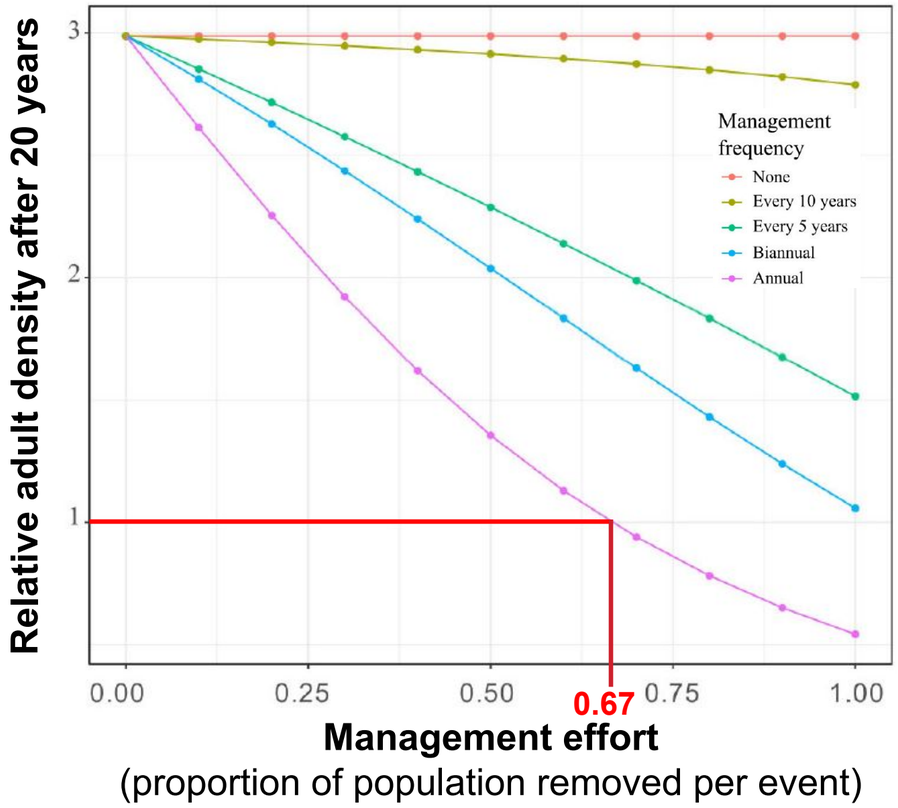
- **Landowners and regulators are restricting aquaculture**
- **Unfavourable status in four out of 178 MPAs** ★
- **Temporary local removal: dredging, hand-collection, lethal intervention**



Pacific oyster

Management model

- **Eradication is unachievable due to poor detection, poor access, poor containment**
- **With 67% removal annually, population size still the same after 20 years**



Teixeira Alves and Tidbury (2022) Invasive non-native species management under climatic and anthropogenic pressure: application of a modelling framework. doi:10.3391/mbi.2022.13.2.01

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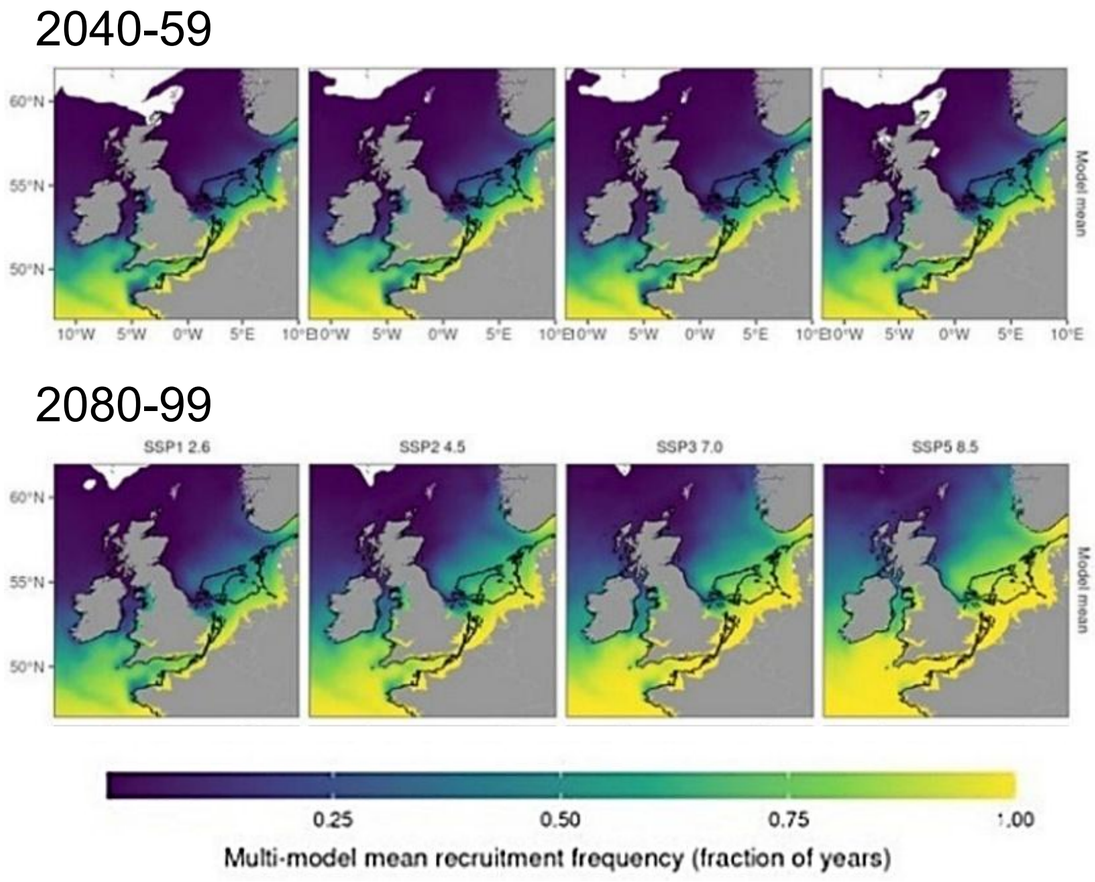
Pacific oyster

Climate change



- **Eradication is unachievable due to poor detection, poor access, poor containment**
- **Annual spawning facilitates substantial future northwards range expansion**
- **Native bivalve populations adversely affected**

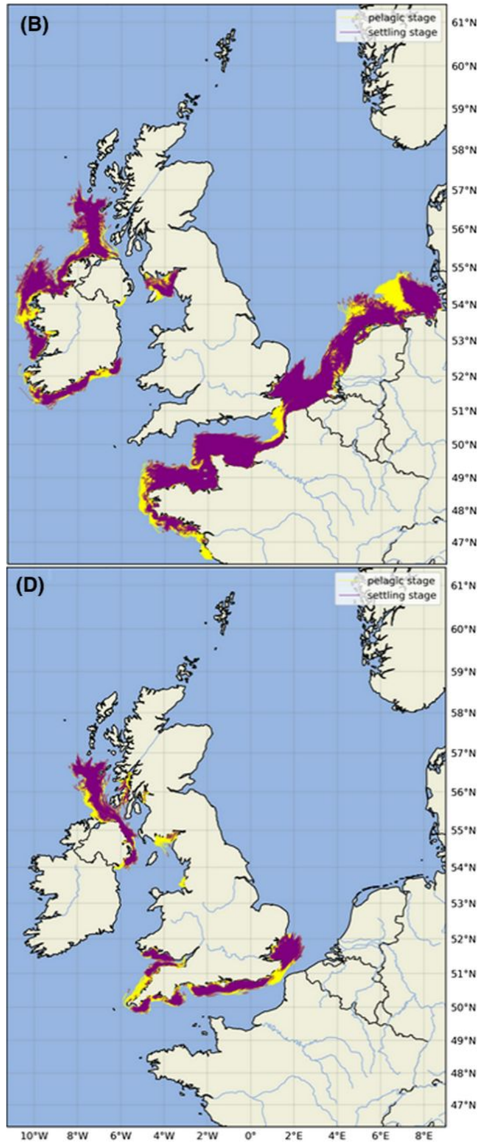
Annual spawning is moving northwards

Clubley *et al*. (2023) doi:10.1016/j.scitotenv.2023.162754; Wilson *et al*. (2024) doi:10.1016/j.ecoinf.2024.102537

Pacific oyster

Is aquaculture a source?

- **Eradication is unachievable due to poor detection, poor access, poor containment**
- **larval dispersal favours seascape connectivity with neighbouring populations**



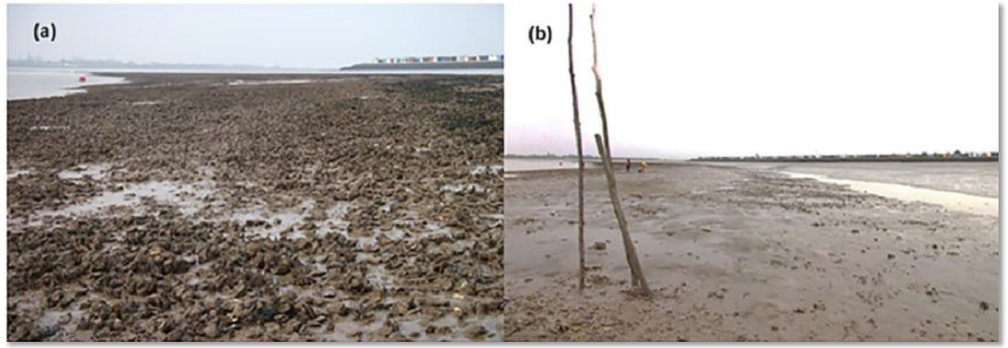
Windfarm spawning and populations outside the UK

secondary spread from wild spawning

Wood *et al*. (2021) doi:0.1007/s10530-021-02467-x

Pacific oyster

Realised impact – space & birds



Herbert *et al.* (2018) doi:10.1002/aqc.2938

- **Few large expansions – low risk**
- **Successful mitigations**
- **Seascape contribution – mud still dominates**
- **Birds: no population-level effects**
- **Bird foraging success increases**
- **Trophic change: effect limited to 50m**

Pacific oyster

Realised impact - biodiversity

Folmer *et al*., 2017

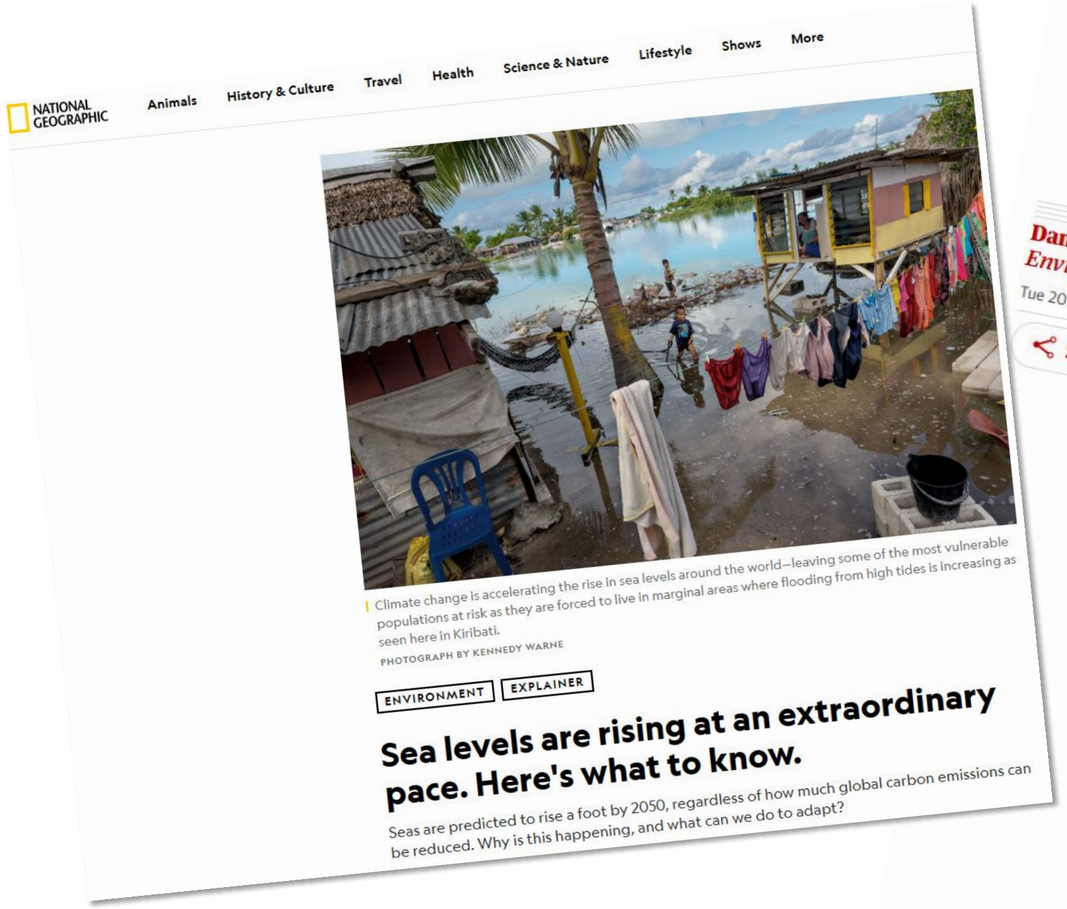
- **Wadden sea – coexistence with blue mussel** Markert *et al*. (2010)
- **Now recommend naturalised/acceptance.** Increased species richness, abundance and biomass
- **No evidence for competition with Native oyster** Zwerschke *et al*. (2016, 2018a, b); McGinley, Cameron *et al*. (2023)
- Some evidence for facilitation by Pacific oyster
- Expected – spatial separation: intertidal vs. subtidal
- Experimental – similar richness and increased abundance as for Native oyster

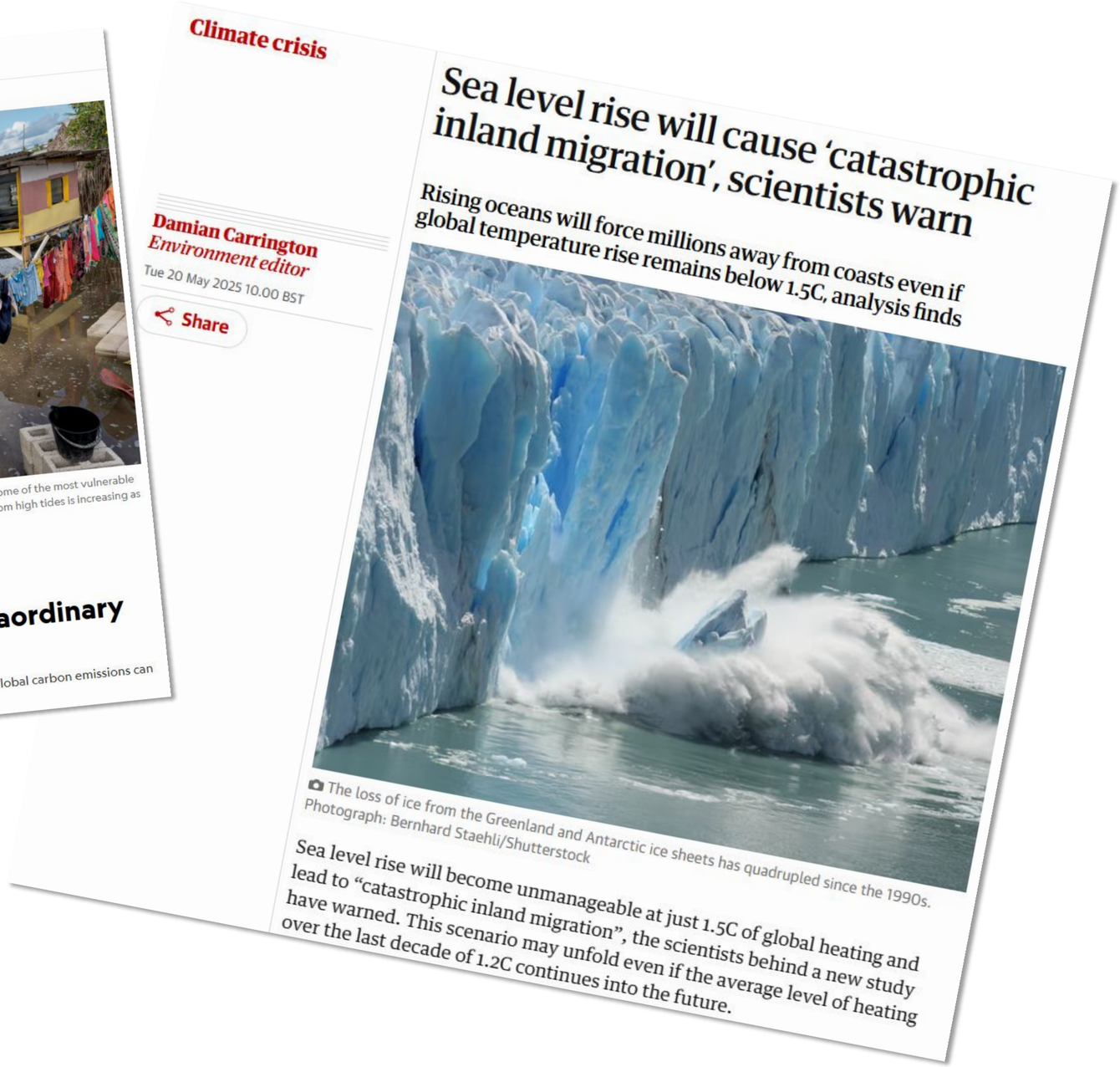
Pacific oyster

Benefits

- **Ecological, social and economic benefits**
- Increased nitrogen removal
- Annual turnover ~£10 million in 2022
- Oyster aquaculture in East of England: *M. gigas* >90% of shellfish business

Sea levels are rising

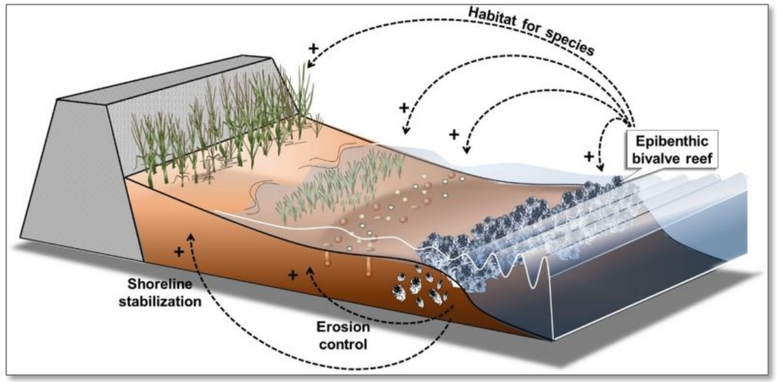




- **Coastal erosion**
- **Loss of infrastructure**

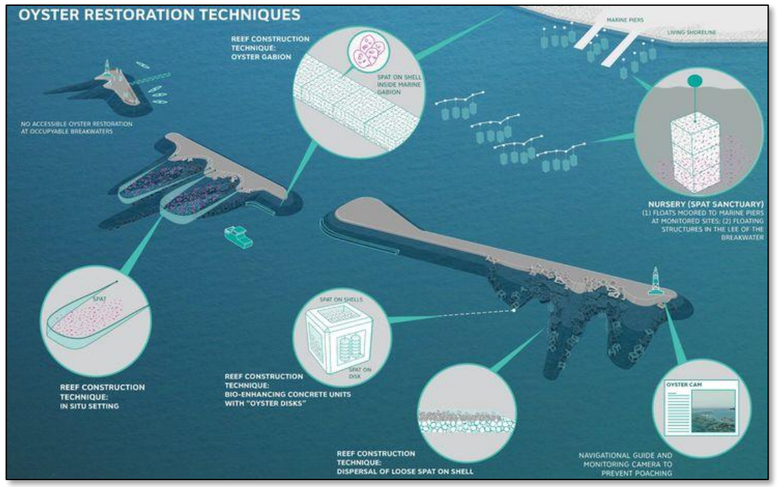
Pacific oyster

Benefits – coastal defence



‘Living Breakwaters’

- **Installation of oysters on and around coastal defence infrastructure**
- **Softening the blow of large waves, reducing flooding, preventing erosion**
- **Internationally considered**



https://www.billionoysterproject.org/

https://www.wivenhoegallery.com/richardallen

Soft-engineered coastal defence is

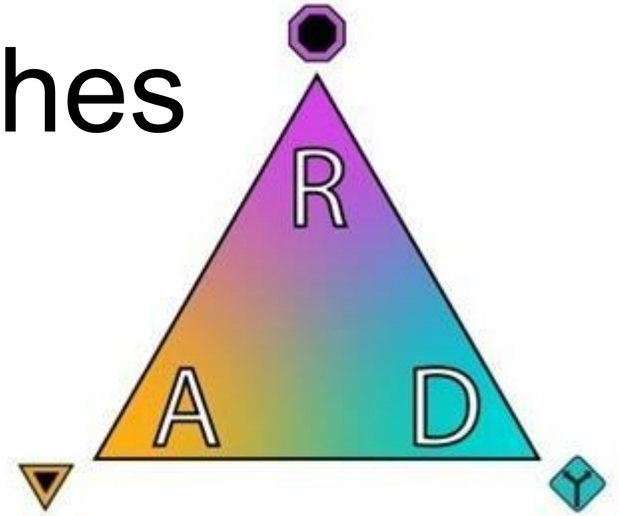
economically beneficial, natural and sustainable

Pacific oyster

Management approaches

- **‘Holding the line’ = futile and costly**
- **RAD Framework: Direct towards desirable pathway**
- **Managers strategically address ecosystem change**

RESIST: Where managers focus on **maintaining current or historical** ecosystem structure and function



ACCEPT: Where managers **do not intervene** and allow the ecosystem structure and function to emerge from ongoing transformations

DIRECT: Where managers **actively steer** the transformation towards a particular ecosystem structure and function

Schuurman et al. (2020). Natural Resource Report NPS/NRSS/CCRP/NRR—2020/ 2213; doi:10.36967/nrr-2283597

Pacific oyster

Conclusions

- **Proposed regulation likely to fail**
- **Pacific oysters naturalised in the UK**
- **Risks are low and mitigation works**
- **Benefits high and expanding with climate risks**

Pacific oyster

Recommendations 1/2

- ***M. gigas*** **legal naturalised status in the UK**
- **Adopt EU Adaptive Management approach**
- **Build benefits into Habitat Regulations Assessment**
- **Promote Aquaculture**

Pacific oyster

Recommendations 2/2

- **Mitigate wild spread where necessary**
- **Develop industry link for mitigation**
- **Revisit the Resist—Accept—Direct (RAD) Framework recommendation for *M. gigas***
- **Value benefits and roles of novel ecosystems that include naturalised non-native species**

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Thank you

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