Habitat associations and activity patterns of European lobster within an offshore wind farm

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ECOSTRUCTURE
Climate Change Adaptation through Ecologically Sensitive Coastal Infrastructure

The rise of offshore wind farms

Biden moves to expand offshore wind to Gulf of Mexico

Energy crisis: France bets on floating offshore wind energy

EU scrambles to keep up with UK in new wind farm push: 'Need more!'

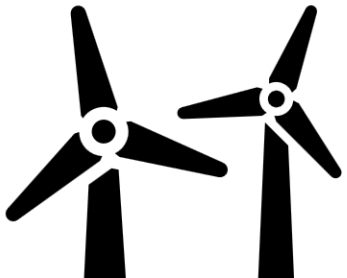
UK offshore windfarm capacity to triple in 'one of country's biggest steps towards net zero'

China leads world's biggest increase in wind power capacity

Victoria's Gippsland coast to become Australia's first offshore windfarm zone

Renewable energy: Scottish industry could triple in size by 2030, report reveals

The U.S. looks to rival Europe and Asia with massive offshore wind plan



Offshore wind farms in the UK

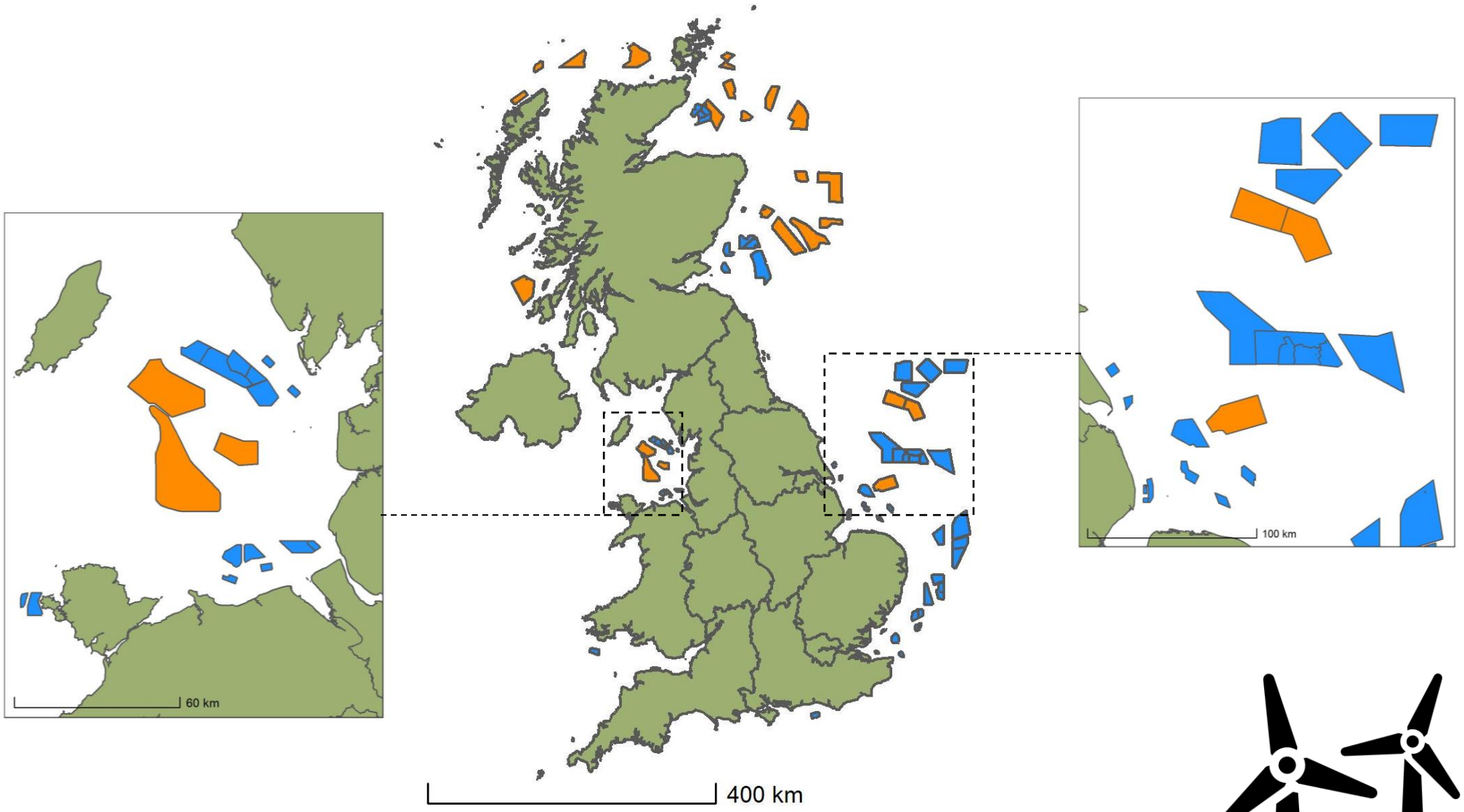


Figure 1: Operational (blue) and proposed (orange) offshore wind farms around the UK.

Impacts of offshore wind farms

Artificial Noise
- Pile driving
- Boat traffic

Sedimentation
- Pile driving
- Cable laying

Loss of flora & fauna
- Pile driving
- Cable laying

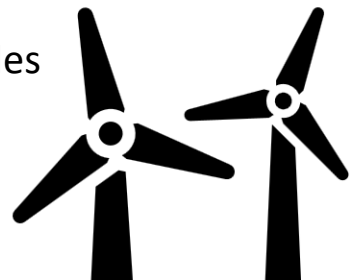
Construction Phase

Operational phase

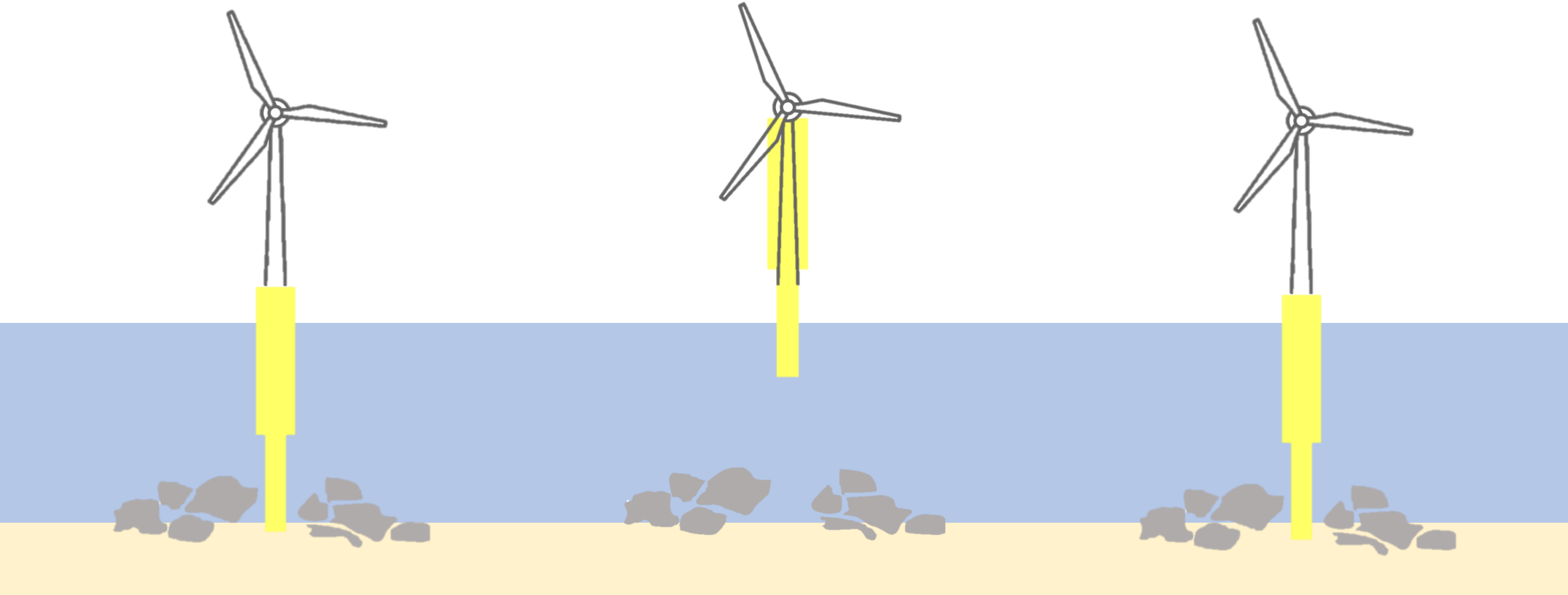
Artificial Noise
- Turbine operation
- Boat traffic

Habitat alteration
- Introduction of hard substrates

Electromagnetic fields
- EMF emitted from energy export cables



Impacts of offshore wind farms



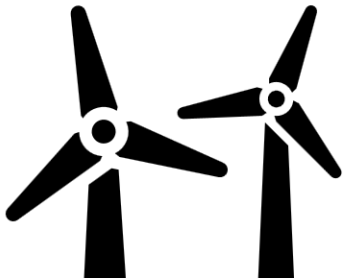
Impacts of offshore wind farms

1. Hard substrates introduced into sandy habitats

2. Hard substrates colonized by fouling organisms

3. Higher-tropic levels attracted to shelter and food availability

Artificial Reef-effect



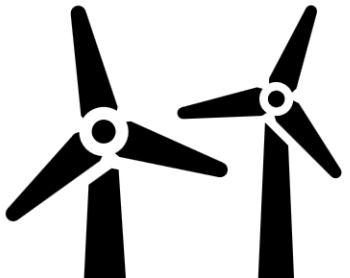
Study aims

How do lobsters make use of offshore wind farms?

Are lobsters resident to wind farms?

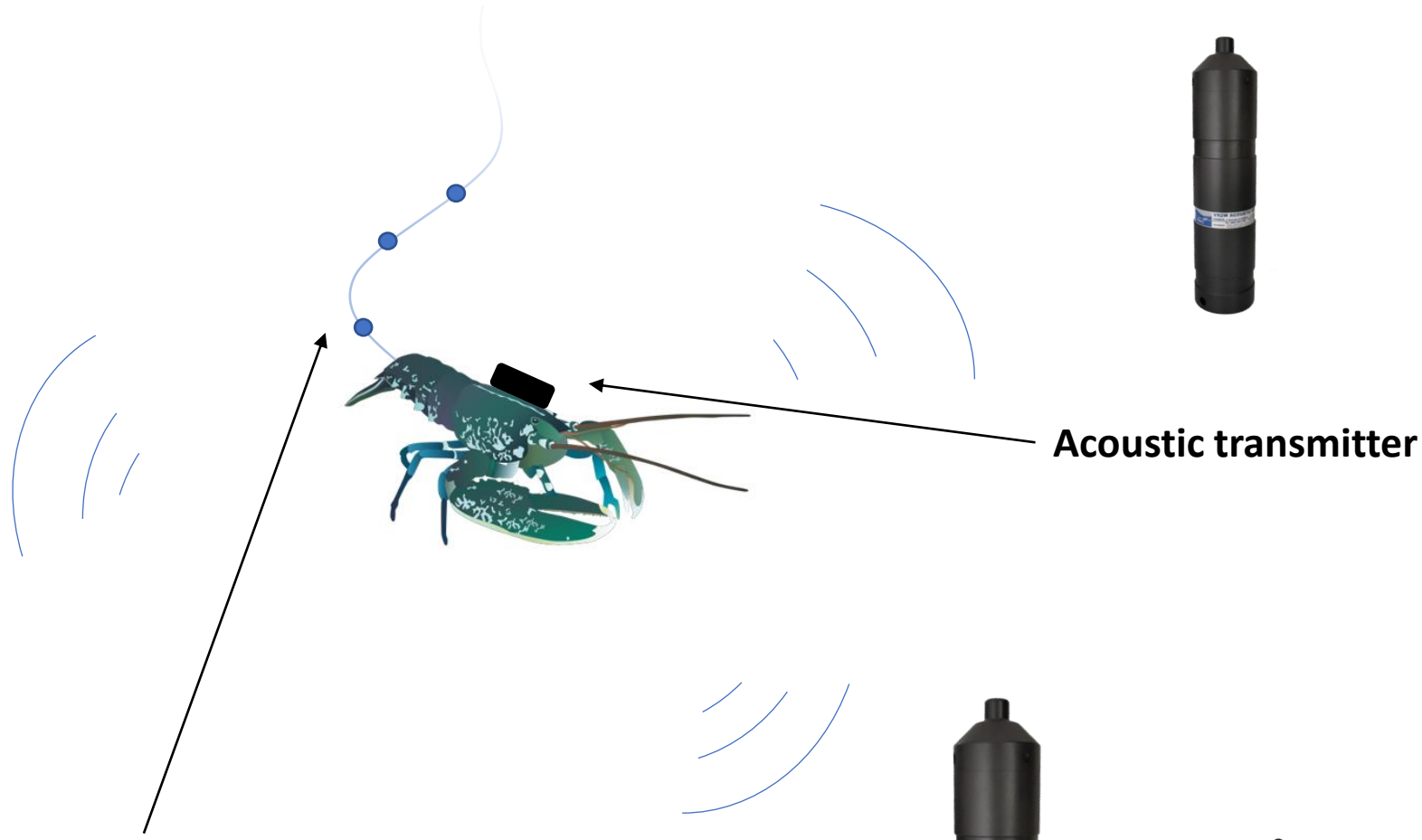
Where do lobsters spend time within wind farms?

Could lobsters within wind farms present potential fishing opportunities?



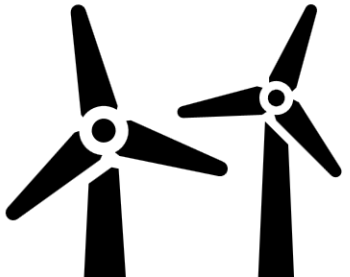
Acoustic telemetry

Acoustic receiver

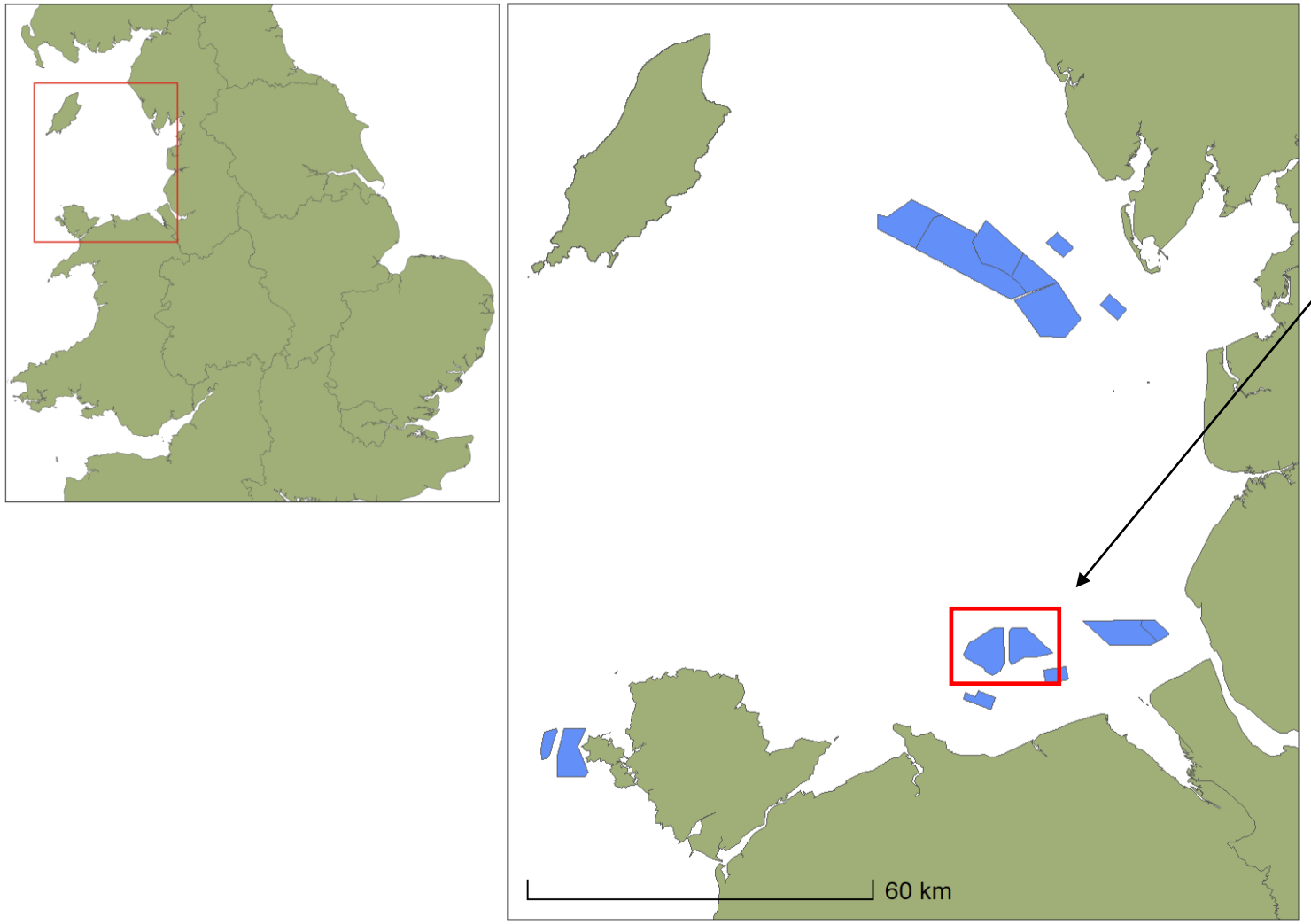


A series of CoA points produces a track

Acoustic transmitter



Study site



Gwynt y Môr wind farm

- Constructed between 2011 - 2015
- 160 turbines over 80km^2
- Power up to 400,000 homes per year
- Open to fishing activity

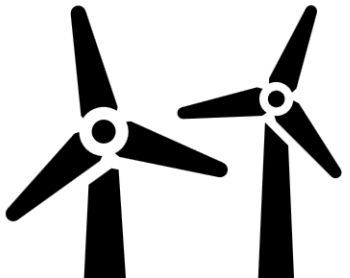
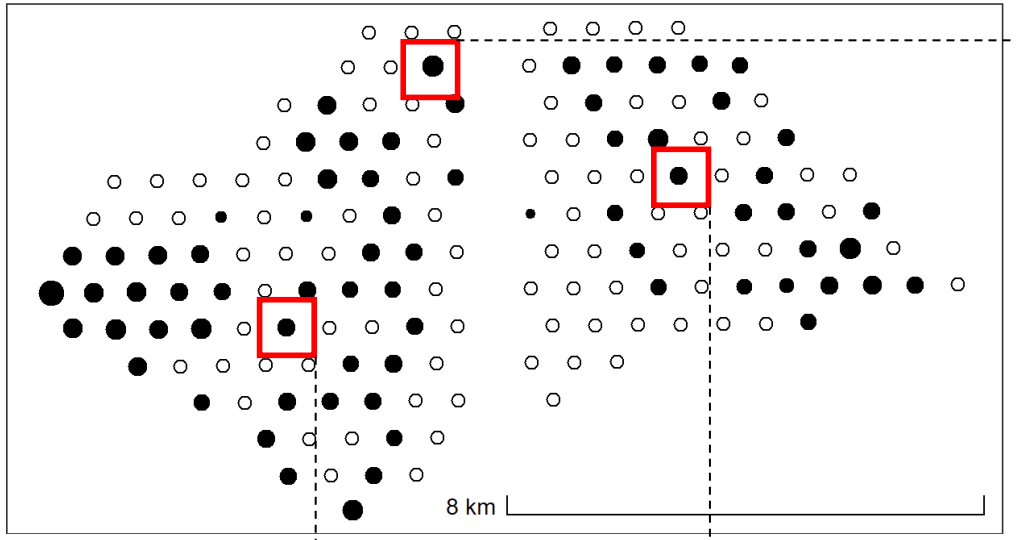


Figure 2: Location of Gwynt y Môr wind farm within Liverpool bay, Irish sea.

Study design



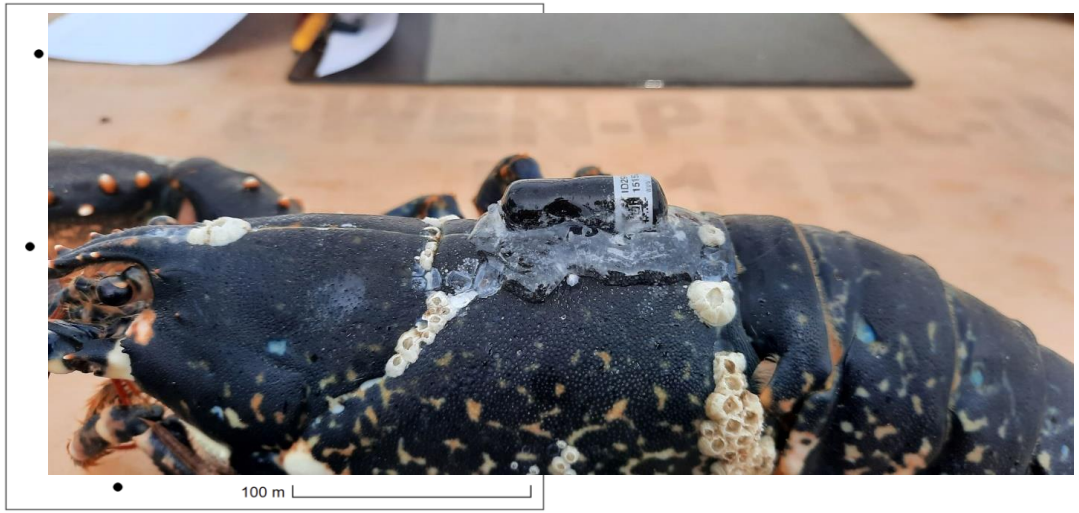
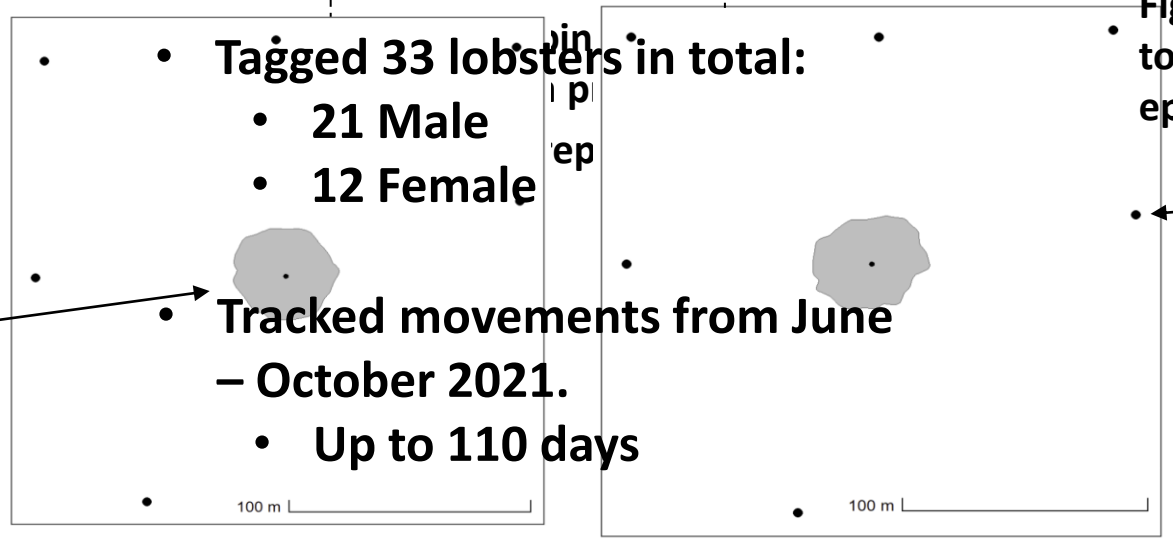


Figure 4: Innovasea V9 acoustic transmitter attached to carapace of European lobster (*H. gammarus*) using epoxy resin

- Tagged 33 lobsters in total:
  - 21 Male
  - 12 Female
- Tracked movements from June – October 2021.
  - Up to 110 days

Scour protection

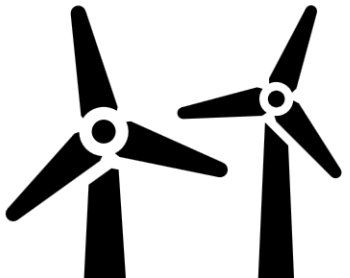
Receiver locations



Site 1

Site 2

Site 3



Detection summary

2,174,155

Total detections recorded

Mean detection per tagging site

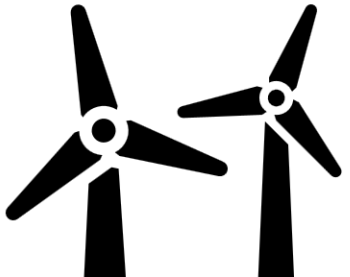
717,458

65,746

Mean detections per lobster

Mean daily detections per lobster

1034



Residency

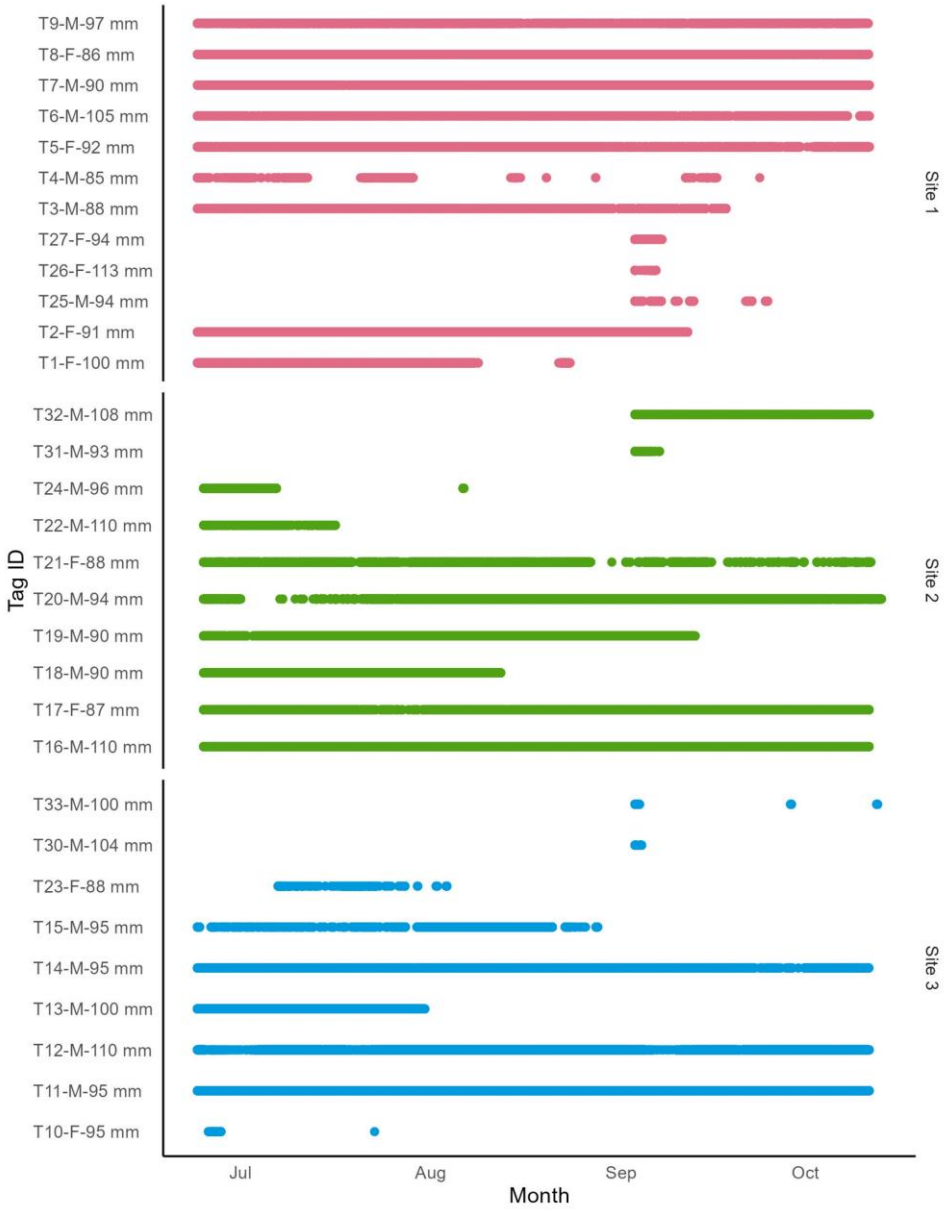
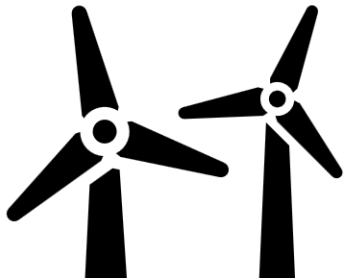


Figure 5: Overview of detections from all tagged lobsters. Tag labels (y-axis) = 'Tag ID – Sex – Carapace length'.

Thatcher *et al.*, (under review)

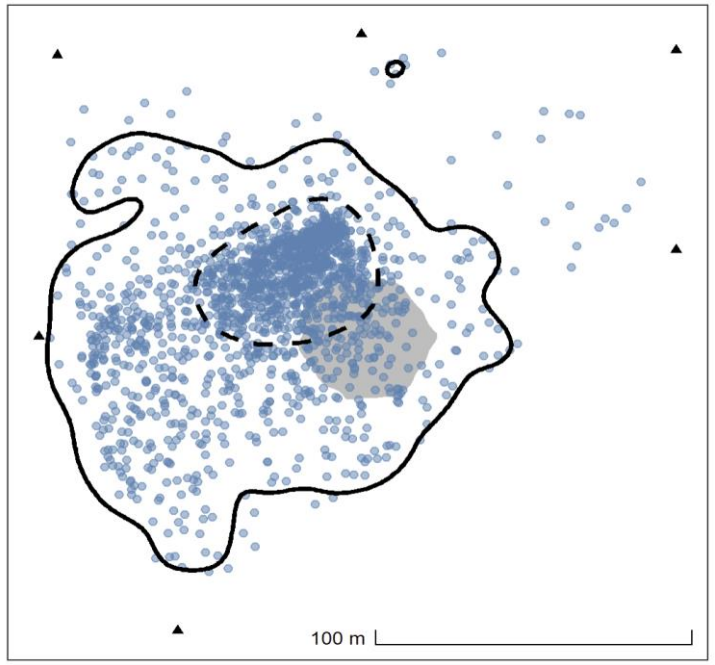
- **Mean proportion of days lobsters detected during study = 57%**
- **13 lobsters present at original tagging sites at the end of the study.**
- **Absence periods ranged from 1-29 days**

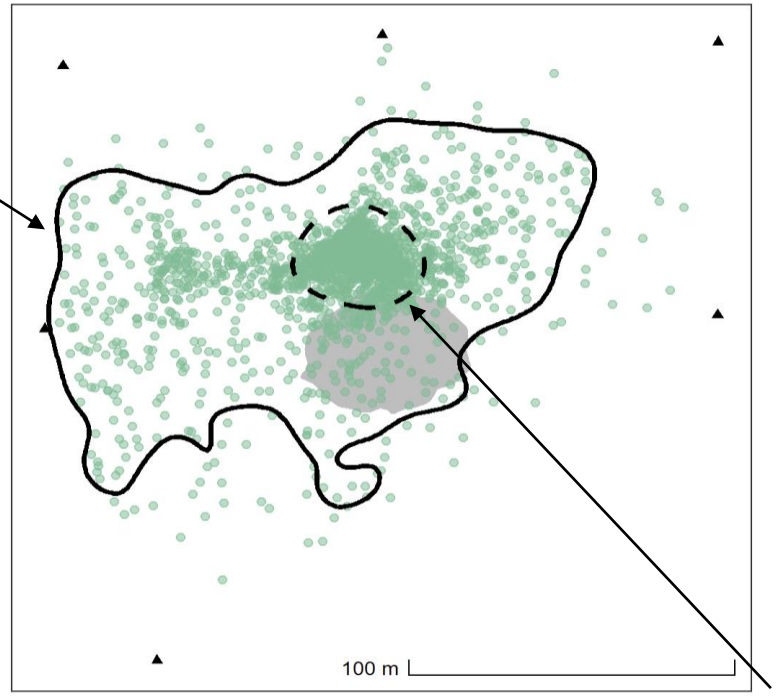


Habitat associations

Home-range

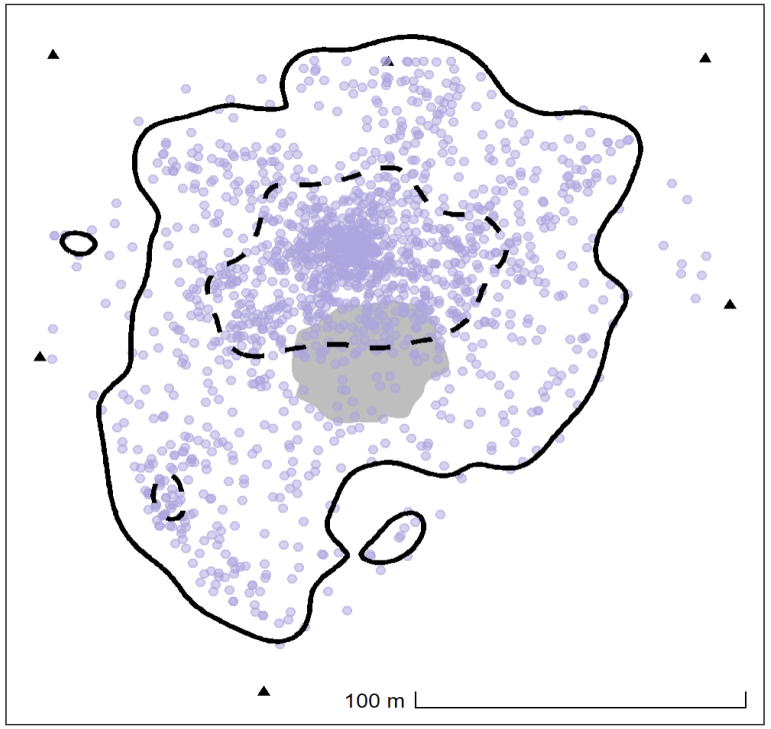
Site 1



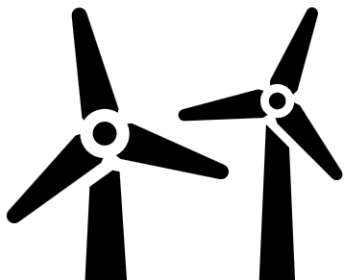


Site 2

Core territory



Site 3



Habitat associations

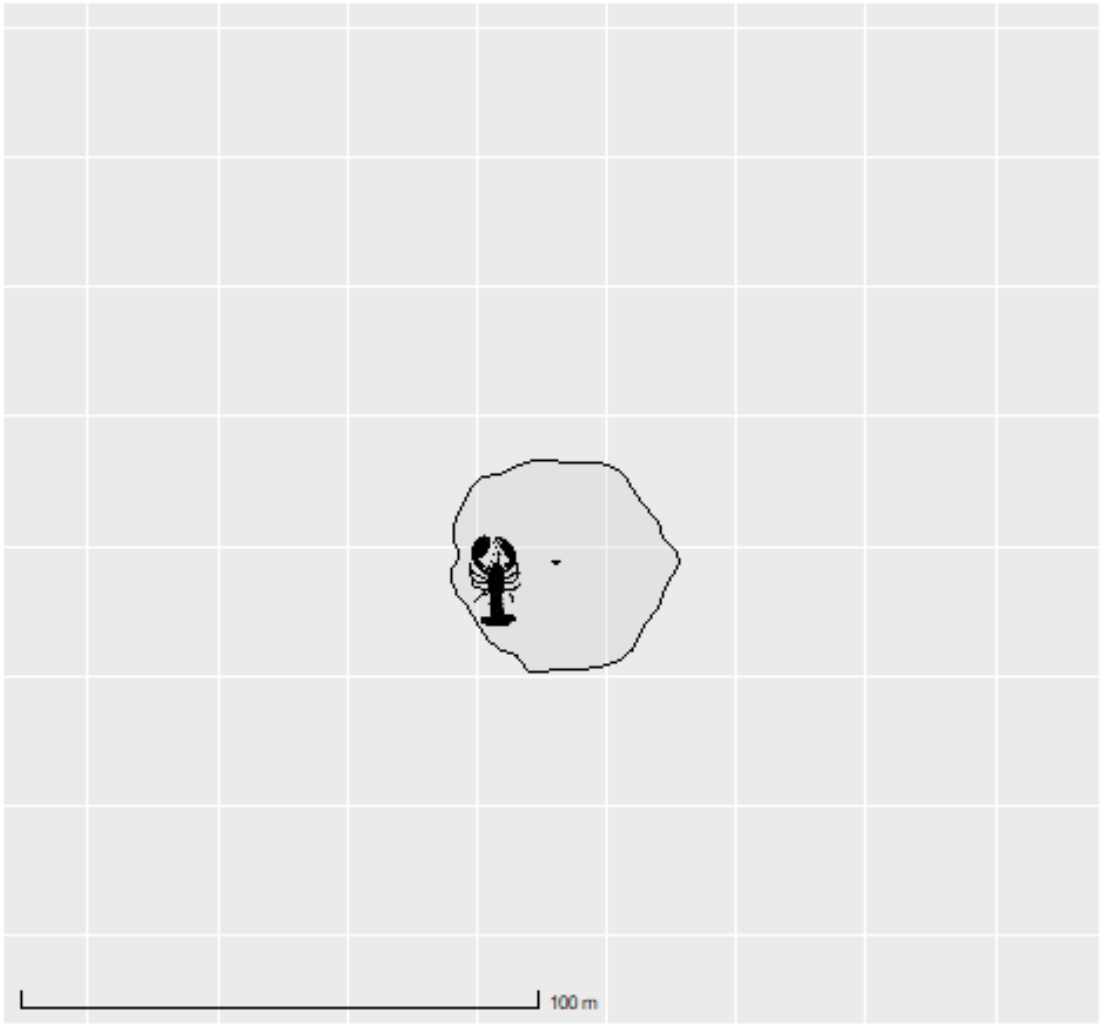


Figure 7: Lobster movement generated from CoA points over 110 days

Conclusions

1 Residency

- Lobsters likely to be resident within offshore windfarms where they display residency to particular turbines.

2 Habitat use

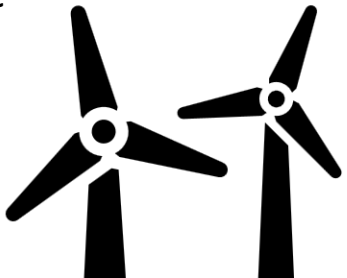
- Lobsters utilise both scour protection and original soft sediment.

3 Future work

- Investigate lobster interactions with areas where no scour protection is present.

4 Fishing opportunities

- Future developments that include scour protection are likely to present fishing opportunities.



Thank you

EU Funds: Ireland Wales Programme 2014-2020
Tionól Réigiúnach an Deiscirt Southern Regional Assembly
Cláir Chistí Eorpacha Struchtúrtha agus Infheistíochta na hÉireann 2014–2020
Cómhaoinithe ag Rialtas na hÉireann agus ag an Aontas Eorpach
UNDEB EWROPEAIDD EUROPEAN UNION
Llywodraeth Cymru Welsh Government
Cronfa Datblygu Rhanbarthol Ewrop European Regional Development Fund

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