

Evidence of predation events by marine mammals at offshore wind farms

Bicknell et al. (2026) Scientific Reports <https://doi.org/10.1038/s41598-026-65167-3>



PrePARED Output Summary No. 11

Background

Offshore wind turbine foundations and subsea infrastructure can attract and aggregate fish, altering the availability and distribution of food for marine predators. Marine mammals are protected throughout European waters and must be considered during wind farm consenting, yet most attention has focused on underwater noise and vessel traffic. Seals and harbour porpoise have been recorded using operational wind farms, but direct evidence of marine mammals feeding around the structures is limited and inferential.

What we did

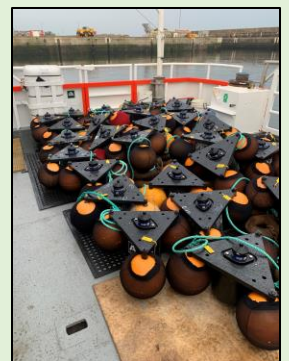
Acoustic telemetry was used to track the movements of two seabed associated gadoid fish, Atlantic cod (*Gadus morhua*) and haddock (*Melanogrammus aeglefinus*), within the Beatrice and Moray East offshore wind farms in the Moray Firth (North Sea), Scotland. These farms use “jacket” systems to fix turbines to the seabed rather than monopiles.

These farms are between 7.5 and 23 nautical miles offshore in water depths between ~35 and 60 metres. An array of 84 acoustic receivers was deployed ~50 metres from turbine “jacket” foundations, in five clusters across the two wind farms, and maintained from March 2022 until June 2025.

In 2022 and 2024, 21 cod and 196 haddock were caught by rod and line within the wind farms and fitted with internal acoustic tags that record temperature and depth. A sudden rise in tag temperature to above 30 °C was used to identify fish that had been likely eaten by marine mammals.

Acoustic Telemetry

This method is used to track the movements of marine animals (see doi.org/10.1016/j.rser.2024.115306). Tags (below left) deployed in fish emit coded signals that are recorded by underwater receivers (below right) for months or years, with advantages including; continuous long-term monitoring, fine-scale movement and residency data, and temperature and depth sensors that can reveal the fate of tagged animals, including predation.



Results

Of the tagged fish, 104 (15 cod and 89 haddock) were detected across at least 14 days. Six showed a rapid rise in tag temperature to above 30 °C, confirming predation by a marine mammal. All six were cod (40% of tagged cod), while no haddock were predated despite being more numerous. In four cases, predation occurred within 3 hours of a detection at a turbine receiver, placing it close to foundations.

(Tag temperature matches sea water, ~7–14 °C, inside a fish but rises towards ~37 °C inside a warm-blooded predator).

Results – Predation of cod Tag temperature through time (Figure. 1) for two example tagged cod, where an increase above 30 °C (red dashed line) confirmed likely predation by a marine mammal (dark blue = fish before predation, light blue = inside the predator). Detection locations (Figure. 2) for three tags following consumption, over (a) 4 days, (b) 6 days and (c) 24 hours (green cross = cod release location, red cross = first detection after predation, blue line = predator movement between turbine receivers).

Figure 1. Atlantic cod (*Gadus morhua*) tag temperature before and after predation

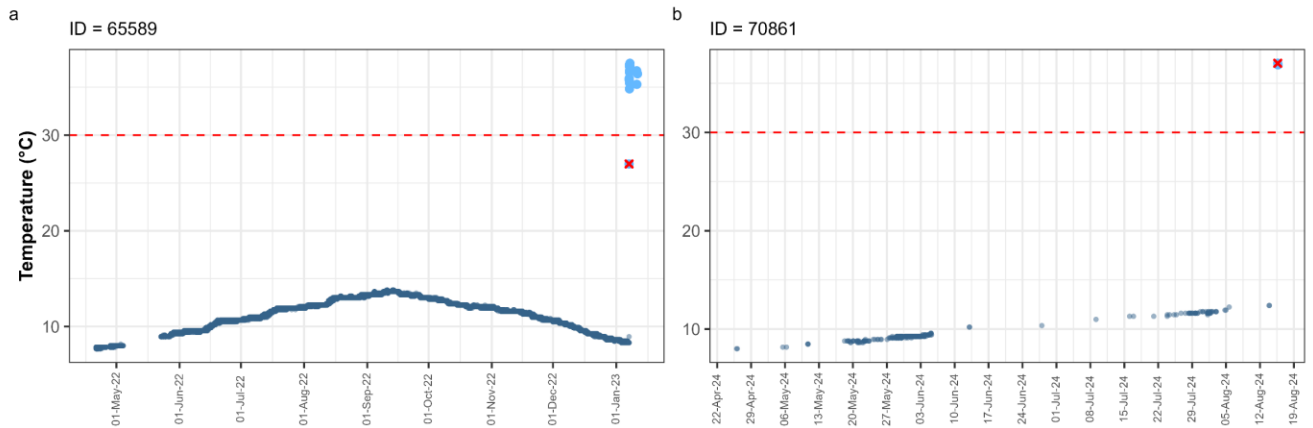
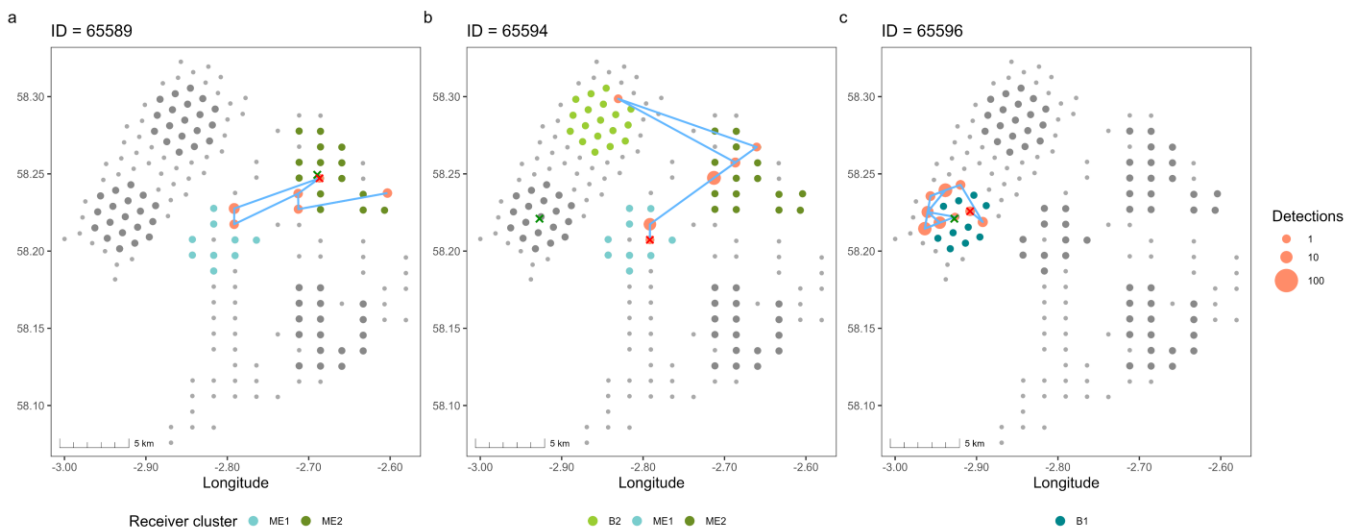


Figure 2. Marine mammal movement between turbine foundations after predation



Conclusions

This study provides the first direct evidence of marine mammals preying on fish at offshore wind turbine foundations. Tag depths and local diet studies suggest the predators were most likely harbour or grey seals, although harbour porpoise cannot be ruled out. One predator moved between several turbines in quick succession, suggesting foundations are targeted as foraging sites where prey aggregate. Since cod were eaten while the more numerous haddock were not, plus the cod had higher energy content (based on bomb calorimetry data collected from samples the area), it provides rare evidence of prey selection by a wild marine mammal. The consequences for predator and prey populations will need consideration with continued offshore wind development.

For more information see: Bicknell, A.W.J., Main, R., Gierhart, S., Thompson, P.M., Hastie, G., Wright, P.F.C. & Witt, M.J. (2026). Evidence of predation events by marine mammals at offshore wind farms. *Scientific Reports* 16, 28351.