

Science for Environment Policy

Seals avoid wind farms during the noisiest phase of construction

Wind farms are an important component of Europe's shift towards a greener energy supply, but they could potentially have an impact on marine ecosystems. This study provides the first measurements of the distribution of harbour seals in relation to the construction and operation of wind farms, and makes recommendations to minimise any potential harm, including breaks in the pile-driving phase of construction.

Since 2000, the EU has seen a surge in wind [energy](#) usage, with around [one third of all installed electricity-generating capacity](#)¹ designed to harness [wind power](#). As with any significant infrastructural development, it is important that scientists explore the wider ecological implications of this surge.

Apart from the long-term effects, both negative and positive, of a sizeable structure being built in the middle of an [ecosystem](#) — such as disturbances to local prey communities and potential reductions in ship traffic — the findings suggest that disruption caused by the construction of offshore wind farms should also be considered — specifically the [noise](#). Wind turbines are typically built using impact pile-driving, in which high-energy impact hammers ram hollow steel piles into the seabed to form a foundation, and this process produces intense bursts of sound. Marine mammals such as harbour seals are particularly sensitive to underwater sound, and owing to their protected status under the [Habitats Directive](#)², EU Member States have an obligation to designate Special Areas of Conservation (SAC) as part of the EU Natura 2000 network, and to apply necessary conservation measures to ensure their favourable conservation status. New developments may only be permitted if it is determined that the development, individually or in combination with other impacts, will not adversely affect the integrity of the site.

The researchers applied tags to harbour seals inhabiting an SAC in the southern North Sea so that their movements could be followed. The study focused on wind farms constructed near the mouth of The Wash — a bay and estuary in the south-east of the UK — which have the potential to disrupt seal activity in the area.

Using both the new tag data and historical data collected by the same means and in the same region prior to wind-farm construction, the researchers were able to quantify the differences in seal movement before and after construction, as well as more specifically during and in breaks in pile-driving. The team found no evidence of displacement during the construction period as a whole. However, they did note a significant displacement of seals during pile-driving, with effects up to 25 km from the centre of the wind farm.

The team note that future environmental assessments around Europe should consider the potential impacts, on seals and other marine mammals, of the short-term displacement that results from pile-driving. Specifically, they recommend consideration of the pile-driving schedule, especially in places where multiple wind farms are being constructed simultaneously, and mitigation methods such as bubble curtains to reduce sound levels. Releasing bubbles from an underwater compressor in order to form an air barrier in this way has been established as an effective way of reducing the acoustic impact of pile-driving on marine mammals^{3, 4}.

The harbour seal population in The Wash is currently in a healthy state, but the authors note that some proposed wind-farm sites, such as those off the east coast of Scotland, are in areas with already decreasing seal populations. Where the populations are more fragile, the additional stress of displacement might have more potential to affect the population, and this should be taken into consideration in environmental impact assessments and to inform mitigation strategies.



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1. www.ec.europa.eu/research/energy/eu/index_en.cfm?pg=research-arch-wind

2. [Council Directive 92/43/EEC on the conservation of natural habitats and of wild fauna and flora](#).

3. <http://onlinepubs.trb.org/onlinepubs/trnews/trnews262rpo.pdf>

4. [Lücke, K., Lepper, P. A., Blanchet, M.-A., Siebert, U. \(2011\) The use of an air bubble curtain to reduce the received sound levels for harbor porpoises \(Phocoena phocoena\). The Journal of the Acoustical Society of America, 130: 3406.](#)