ORIES - Offshore Renewable Impacts on Ecosystem Services

Evidence highlight series – *Marine Mammals*

Overview

Outcomes: There are 157 entries of evidence for the impact of OWF on marine mammals, arising from 56 studies (29 primary lit and 26 grey literature). Of these studies, 53 were within Europe (40 UK), and 3 were outside Europe (Canada, China, Taiwan).

Pressures: Pressures that cause the impact on marine mammals include: construction, decommissioning, operation, underwater noise and vessel traffic.

Ecosystem Services: For marine mammals, 100% of outcomes from offshore wind farms are classified under cultural Ecosystem Services. The reason for this is that experiential existence and bequest aspects of cultural services are the specific elements impacted for marine mammals.

Direction of impact: Overall, of the reported outcomes 64% show negative impacts on marine mammals, 5% are positive and 6% are inconclusive[1]. No impact[2] was reported for 25% of outcomes.

The proportion of negative impacts are as follows: construction 51%, decommissioning 67%, operational 77%, underwater noise 67%,vessel traffic 77%. Positive outcomes all relate to operational impacts, of which 3% relate to enhanced feeding opportunities for harbour porpoise. Focusing on primary literature, there are just 9 entries. However, all report no impact, therefore the overall outlook for Marine mammals is favorable in primary literature alone.

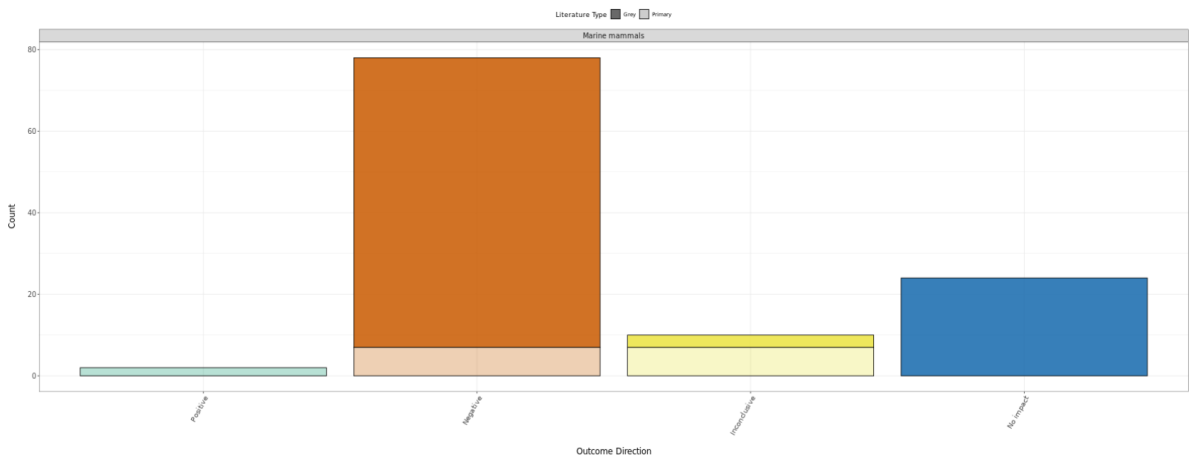

Figure 1: Total count of evidence for ecosystem service outcomes of offshore wind farms relating to marine mammals, from UK grey literature, and global primary literature.

Access the tool here - URL: https://ories.pml.space/

1 Inconclusive outcomes relate to those where they may have been a directional impact but it was not statistically significant, or the study produced conflicting results.

2 Studies reporting 'no impact' indicate scenarios that may support the development of offshore wind farms without detriment to the marine environment

Policy Headlines

Impact	Policy relevance
Abundance, density or % cover Decrease in population or abundance linked to construction/operational impacts (although unspecified whether these are temporary or permanent, or related to lower usage of the impact area alone). Some records relating to positive or no impact on population and abundance.	**EIA** regulations require assessment of impacts on marine mammals **Habitat Regulations (HRA)** – screening of LSE and determination of whether or not to include as Appropriate Assessment. **Conservation Act 1970 (as amended)** - Provides protection for seals, with closed seasons during which it is an offence to take or kill any seal except under licence (grey seal: 1 September to 31 December; harbour seal: 1 June to 31 August)
Behaviours (reproductive, avoidance, or migration) Marine mammals are potentially impacted by avoidance behaviour (barrier effect), with harbour porpoise, harbour seal, grey seal all cited as being impacted, but not in all reports. Grey literature reports potential impacts on dolphins, porpoises and seals.	**Habitats directive (HRA)** Harbour porpoises are trigger species for many North Sea SACs with implications for HRA
Condition, health or injury There are potential reported impacts to condition, health or injury on harbour seal, grey seal, harbour porpoise, with no impacts reported for minke whales and bottlenose dolphin and striped dolphin. A relatively large number of studies focussing on harbour porpoise with the primary impacts being from underwater noise, although 15 studies show no impact to condition, health or injury on harbour porpoise. There are relatively few (13) instances of negative impacts from vessel traffic as compared to those from underwater noise (40).	**Offshore electricity and noise regulations (2014)** **EIA** regulations require assessment of impacts on marine mammals. **European Protected Species (EPS)**: All cetaceans (whales, dolphins, and porpoises) are covered by a system of strict protection from injury, killing and disturbance JNCC. If an activity is likely to cause disturbance or injury to an EPS, a licence is required to legally undertake the activity **Energy Act 2023**: Delivers the UK government's Offshore Wind Environmental Improvement Package, introducing new powers to tailor Habitat Regulation Assessments, new strategic compensatory measures, and a new Marine Recovery Fund to help deliver these strategic measures This legislation creates a comprehensive framework requiring developers to assess, avoid, mitigate, and compensate for impacts on marine mammals throughout all phases of offshore wind farm development.
Predation, herbivory or diet composition	**EIAs** should consider the impact on prey species and feeding success of affected bird species for each development, or cumulative

Evidence is relatively sparse for these effects. Regarding impacts of suspended sediment, two studies indicate negative impacts on prey species from suspended sediment, with a further three studies showing direct impacts on marine mammals. Two studies point to a positive impact on the foraging behaviour of harbour porpoise.	effects if multiple developments occur within a localised area.
Habitat quality, quantity or extent: There is no direct evidence available relating to marine mammal habitat, although it could be inferred that habitat is reduced through the barrier effect.	**EIAs** should consider the sensitivity of different species to distribution drivers, such as preferred prey and habitat availability, and impacts from cumulative wind farms. The **Marine & Coastal Access Act 2009** requires that marine plans should include assessment of the potential range of marine mammals that could be impacted. **Marine Conservations Zones** (MCZs) may have additional designations for marine mammals and additional assessment requirements. **Special Areas of Conservation (SACs)**: Grey and harbour seal, harbour porpoise and bottlenose dolphin are species for which the designation of Special Areas of Conservation is required **Conservation of Offshore Marine Habitats and Species Regulations 2017** - applies to UK offshore waters beyond 12 nautical miles.

Background and methods

Drawing from global primary literature[3] (2002-2025) and grey literature[4] (2012-2022) from the UK, The ORIES evidence tool summarises environmental and social outcomes related to the construction, operation and decommissioning of offshore wind farms (OWF). ORIES provides a consolidated evidence base so that policymakers, practitioners, and researchers can see what's known, without duplicating effort. Outcomes are linked to relevant effects on biodiversity and ecosystem services, with either a positive, negative, neutral (no impact) or inconclusive categorization. The direction of the impact is based on that reported in the literature[5]. A single study or report may provide multiple outcomes (e.g. related to different species, pressures, hypotheses etc.), with each outcome recorded as a single data point. The grey literature reported here is not exhaustive but is representative of the literature available in the UK. The primary literature search was systematic and represents all global available literature published in English. For detailed methods see: *Szostek et al. 2024. Envir. Sci & Pol. 154:103693*.

3 Primary literature: Subject to strict peer-review processes, addresses specific research questions, is often (although not always) produced through research institutions and typically funded through research grants.
4 Grey Literature: Not formally peer-reviewed, information produced on all levels of government, academia, business and industry in electronic and print formats not controlled by commercial publishing.
5 If a statistically significant result was reported the direction of the effect reported in the study was included. For qualitative assessments the direction of impact described was included.

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