ORIES - Offshore Renewable Impacts on Ecosystem Services

Evidence highlight series – Seabirds

Overview

Outcomes: There are 363 entries of evidence for the impact of OWF on seabirds, arising from 80 studies (44 primary lit and 36 grey lit). Of these studies, 76 were within Europe (55 UK), and four were outside Europe (USA, Japan).

Pressures: Pressures that cause the impact on seabirds include: cable installation, vessel traffic, and general construction/ operation/ decommissioning impacts.

Ecosystem Services: For seabirds, 99% of outcomes from offshore wind farms are classified under Cultural Ecosystem Services because they are charismatic species with intrinsic conservation value. A single outcome related to ecological functions of habitat quality or quantity.

Direction of impact: Overall, of the reported outcomes 72% show negative impacts on seabirds, 3% are positive and 20% are inconclusive[1]. No impact[2] was reported in 5% of cases, relating to change in abundance, collision risk, avoidance behaviour, site integrity, prey availability, habitat quantity or quality. Focusing on primary literature only, the overall outlook for seabirds is more positive with 55% of outcomes reported as negative, 9% positive, 29% no impact and 8% inconclusive. This is partly because much of the grey literature includes Environmental Impact Assessments, which tend to highlight negative impacts in order to recommend appropriate mitigation.

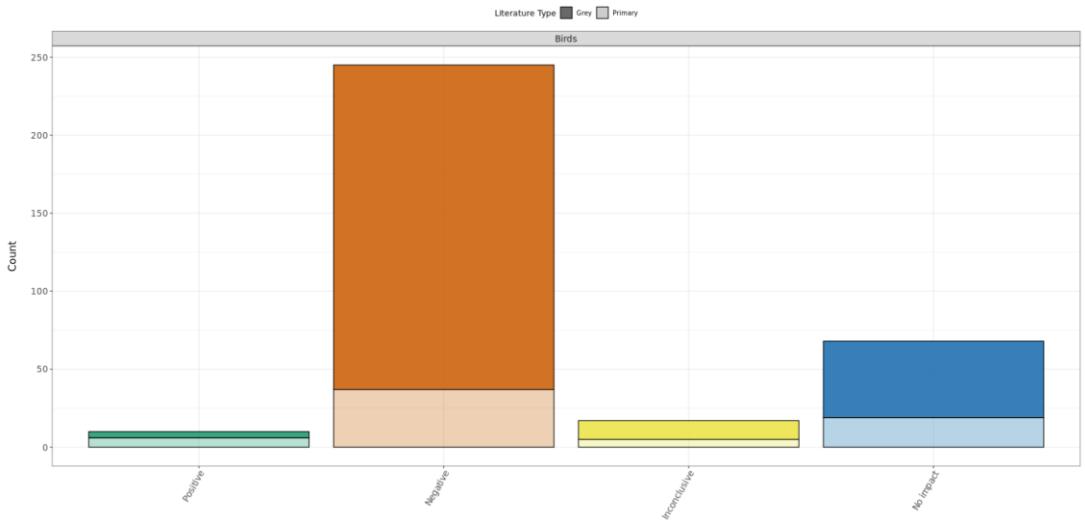

Figure 1: Total count of evidence for ecosystem service outcomes of offshore wind farms relating to seabirds, from UK grey and global primary literature.

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: Depending on the species, the presence of an OWF can lead to an increase, decrease or no change in bird density near/within the wind farm. Study scope varies between meso-scale (wind farms) and macro-scale (turbines). Species potentially negatively impacted include Puffin, Little gull, Kittiwake, Razorbill, Loons/Divers, Cormorant, Gannet, Herring gull, Guillemot.	**Environmental Impact Assessments** (EIA) are mandatory for OWF and must assess impacts on ornithological interests, be season and over the life-cycle of the OWF. Evidence for each species of seabird should be considered in a local context, such as site preference and proximity to important breeding or feeding grounds. **National Policy Statements** (NPS) EN-1 and EN-3 mandate detailed ornithology assessments, including cumulative impacts. **Priority species** of concern include Kittiwake, Gannet, Puffin, Razorbill, Guillemot, Tern.
Behaviour (reproductive, avoidance or migration): Seabirds can be attracted to, avoid or have no change in behaviour due to OWF. Where birds are attracted due to increased prey availability this could provide population benefits; however, as presence within a windfarm increases, so does the potential for collision with the turbine blades. Avoidance can increase energetic costs, and potential knock-on effects such as reduced health or alterations in species range.	**EIAs** should consider the sensitivity of different species to distribution drivers, such as preferred prey and habitat availability, and impacts from cumulative wind farms.
Range or distribution : An OWF can alter the range or distribution of seabirds, either through attraction by increased prey availability, or through avoidance behaviour. Avoidance can lead to displacement, or disruption to flight/feeding patterns, or migratory routes. There is uncertainty around the impacts on migratory patterns of birds by OWF, although impact on migration behaviour is reported for Eurasian Curlew. OWF and associated ship traffic can also cause profound changes in the distribution of loons/divers.	**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 must be considered in licensing and include nature conservation objectives. This should include assessment of the potential range of seabirds that could be impacted by an OWF. **Marine Conservations Zones** (MCZs) may have additional designations for seabirds and additional assessment requirements. **National Policy Statements** (NPS) EN-1 and EN-3 mandate detailed ornithology assessments, including displacement or barrier effects.
Condition, health, or injury : Many studies report a potential negative impact on bird health or injury due to collision risk with turbines. Bird populations that nest close to OWF are most susceptible to collision risk, although attraction/avoidance varies with	**EIA** regulations require assessment of impacts on ornithology. Protection of birds under the **Wildlife and Countryside Act** means that collision mortality must be assessed, disturbance

species. A high number of inconclusive outcomes reported for collision risk, demonstrates a gap in understanding of bird behaviour within wind farms, with a high reliance on modelling studies to estimate these parameters.	during construction must be managed and mitigation measures required. **National Policy Statements** (NPS) EN-1 and EN-3 mandate detailed ornithology assessments, including collision risk. Risks should be assessed when planning the location of new wind farms.
Habitat quality, quantity or extent: Activities during construction, operation and decommissioning can adversely impact important feeding habitats for seabirds. Displacing seabirds from key feeding grounds can lead to individual and population level impacts. OWF should be sited away from important bird feeding areas, or suitable mitigation options provided.	**Habitat Regulations Assessments** (HRAs) are required for **Special Protection Areas** (SPAs) to assess potential impacts and provide derogation if required. If adverse impacts on SPAs are found, compensation is required. **National Policy Statements** (NPS) EN-1 and EN-3 mandate detailed ornithology assessments, including displacement or barrier effects.
Predation, herbivory, or diet composition: The presence of OWF can lead to alterations in behaviour, impacts on prey species and reduction in feeding success in some species (e.g. Little Tern). Factors to consider from displacement include the distribution of specific prey species, or whether alternative prey are available within the range of the bird population.	**EIAs** should consider the impact on prey species and feeding success of affected bird species for each development, or cumulative effects if multiple developments occur within a localised area.

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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