

Key issue 10 - Potential displacement of marine birds due to the presence of wave and tidal energy converters and associated moorings / support structures

What are the relevant technologies and support structures?

The following technologies and support structures were identified during the assessment process to have the potential to significantly affect marine birds through the displacement of essential activities and should therefore, be subject to further investigation on a project specific basis.

| Relevant technologies and support structures | Relevant features, components or activities | Phase |
|--|--|-----------|
| Tidal technologies | | |
| Horizontal axis turbine Vertical axis turbine Reciprocating hydrofoils | <p>Visual disturbance <i>Only relevant for devices, mooring or support structures with surface-piercing components.</i></p> <p>Displacement of essential activities <i>The presence and operation of devices and associated mooring structures could potentially result in the displacement of birds out of the development site and surrounding area.</i></p> | Operation |
| Wave technologies | | |
| Oscillating water column (offshore) Oscillating water column (shoreline) Overtopping device (offshore) Overtopping device (shoreline) Attenuator Oscillating wave surge converter Point absorber | <p>Visual disturbance <i>Only relevant for devices, mooring or support structures with surface-piercing components.</i></p> | Operation |
| As visual disturbance plus Submerged pressure differential | <p>Displacement of essential activities <i>The presence and operation of devices and associated mooring structures could potentially result in the displacement of birds out of the development site and surrounding area.</i></p> | Operation |
| Support structures | | |
| Gravity / deadweight anchor and mooring lines Gravity base structure Monopile Rock anchors and mooring lines Drag embedment anchor and mooring lines | <p>Displacement of essential activities <i>The presence and operation of devices and associated mooring structures could potentially result in the displacement of birds out of the development site and surrounding area.</i></p> | Operation |
| Monopile | <p>Visual disturbance <i>Only relevant for devices, mooring or support structures with surface-piercing components.</i></p> | Operation |

What species / groups may be vulnerable?

The following species were identified during the assessment process as being particularly sensitive to displacement and should therefore, be considered further on a project specific basis.

| Relevant species / groups | | Possible consequences |
|---|---|--|
| Greater Scaup Common Eider Long-tailed Duck Black Scoter Surf Scoter Velvet Scoter Common Goldeneye Red-breasted Merganser Goosander Red-throated Diver Black-throated Diver Great Northern Diver Yellow-billed Diver Great Crested Grebe Red-necked Grebe Slavonian grebe Black-necked Grebe Northern Fulmar Cory's Shearwater Great Shearwater Sooty Shearwater Manx Shearwater Balearic Shearwater | European Storm-petrel Leach's Storm-petrel Northern Gannet Great Cormorant European Shag Red-necked Phalarope Black-headed Gull Mew Gull Lesser Black-backed Gull Herring Gull Great Black-backed Gull Black-legged Kittiwake Little Tern Sandwich Tern Common Tern Roseate Tern Arctic Tern Common Guillemot Razorbill Black Guillemot Little Auk Atlantic Puffin | <p>Displacement of essential activities <i>The impact of displacement will depend on the relative importance of the habitat, what essential activity is being displaced (breeding, foraging, moulting, resting, etc.) and the availability of suitable alternative habitat elsewhere. In some cases, displacement could be a temporary issue with behaviour patterns changing over time as birds habituate to the presence of devices.</i></p> <p>Visual disturbance <i>Potentially greater impact to species at coastal breeding sites if located in nearshore environment.</i></p> <p><i>Potential to affect foraging success if development site is within a key foraging area.</i></p> <p><i>May affect moulting sites if development is located within a key area used for moulting</i></p> |

Note: Although negative displacement impacts have been highlighted, there is the potential for birds to be attracted into the area around marine devices, to exploit new foraging opportunities that may arise if prey species of fish are found to gather around the structures.

What species / groups are affected by which technologies and support structures

The following table provides a summary of the assessment results for each species or habitats in combination with each technology & Moorings/Support structures listed above.

| | | | |
|---|---|----------------|---|
| Potentially significant at a 10MW scale | Unknown whether this will be significant at a 10 MW scale | Not Applicable | Assessed as not significant at a 10MW scale |
|---|---|----------------|---|

Displacement of essential activities and Visual Disturbance

| Common name | Technology & Moorings and Support structures | | | | | | | | | | | | | | | | | | | | | | | | | | | |
|--|---|--|------------------------------------|--|---|--|--|---|-------------------------------------|---|--|---|--------------------------------------|---|--|---|--------------------------------|--|---|--|---|--|---|--|--|--|--|--|
| | Horizontal axis turbine & Gravity/deadweight anchor and mooring lines | Horizontal axis turbine & Gravity base structure | Horizontal axis turbine & Monopile | Horizontal axis turbine & Rock anchors and mooring lines | Vertical axis turbine & Gravity/deadweight anchor and mooring lines | Vertical axis turbine & Gravity base structure | Vertical axis turbine & Rock anchors and mooring lines | Reciprocating hydrofoils & Gravity base structure | Reciprocating hydrofoils & Monopile | Oscillating water column (offshore) & Gravity/deadweight anchor and mooring lines | Oscillating water column (offshore) & Rock anchors and mooring lines | Oscillating water column (offshore) & Drag embedment anchor and mooring lines | Oscillating water column (shoreline) | Overtopping device (offshore) & Gravity/deadweight anchor and mooring lines | Overtopping device (offshore) & Rock anchors and mooring lines | Overtopping device (offshore) & Drag embedment anchor and mooring lines | Overtopping device (shoreline) | Attenuator & Gravity/deadweight anchor and mooring lines | Attenuator & Rock anchors and mooring lines | Attenuator & Drag embedment anchor and mooring lines | Oscillating wave surge converter & Gravity base structure | Point absorber & Gravity/deadweight anchor and mooring lines | Point absorber & Rock anchors and mooring lines | Point absorber & Drag embedment anchor and mooring lines | Submerged pressure differential & Gravity base structure | | | |
| Greater Scaup (Scaup) | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Common Eider | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Long-tailed Duck | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Black Scoter (Common Scoter) | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Surf Scoter | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Velvet Scoter | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Common Goldeneye | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Red-breasted Merganser | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Goosander | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Red-throated Diver | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Black-throated Diver | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Great Northern Diver | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Yellow-billed Diver (White-billed Diver) | | | | | | | | | | | | | | | | | | | | | | | | | | | | |

| | Technology & Moorings and Support structures | | | | | | | | | | | | | | | | | | | | | | | | | | | |
|------------------------------------|---|--|------------------------------------|--|---|--|--|---|-------------------------------------|---|--|---|--------------------------------------|---|--|---|--------------------------------|--|---|--|---|--|---|--|--|--|--|--|
| Common name | Horizontal axis turbine & Gravity/deadweight anchor and mooring lines | Horizontal axis turbine & Gravity base structure | Horizontal axis turbine & Monopile | Horizontal axis turbine & Rock anchors and mooring lines | Vertical axis turbine & Gravity/deadweight anchor and mooring lines | Vertical axis turbine & Gravity base structure | Vertical axis turbine & Rock anchors and mooring lines | Reciprocating hydrofoils & Gravity base structure | Reciprocating hydrofoils & Monopile | Oscillating water column (offshore) & Gravity/deadweight anchor and mooring lines | Oscillating water column (offshore) & Rock anchors and mooring lines | Oscillating water column (offshore) & Drag embedment anchor and mooring lines | Oscillating water column (shoreline) | Overtopping device (offshore) & Gravity/deadweight anchor and mooring lines | Overtopping device (offshore) & Rock anchors and mooring lines | Overtopping device (offshore) & Drag embedment anchor and mooring lines | Overtopping device (shoreline) | Attenuator & Gravity/deadweight anchor and mooring lines | Attenuator & Rock anchors and mooring lines | Attenuator & Drag embedment anchor and mooring lines | Oscillating wave surge converter & Gravity base structure | Point absorber & Gravity/deadweight anchor and mooring lines | Point absorber & Rock anchors and mooring lines | Point absorber & Drag embedment anchor and mooring lines | Submerged pressure differential & Gravity base structure | | | |
| Great Crested Grebe | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Red-necked Grebe | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Slavonian grebe | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Black-necked Grebe | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Northern Fulmar | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Cory's Shearwater | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Great Shearwater | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Sooty Shearwater | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Manx Shearwater | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Balearic Shearwater | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| European Storm-petrel | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Leach's Storm-petrel | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Northern Gannet | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Great Cormorant | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| European Shag | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Red-necked Phalarope | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Black-headed Gull | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Mew Gull (Common Gull) | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| (Western) Lesser Black-backed Gull | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| (Western) Herring Gull | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Great Black-backed Gull | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Black-legged Kittiwake | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Little Tern | | | | | | | | | | | | | | | | | | | | | | | | | | | | |

| | Technology & Moorings and Support structures | | | | | | | | | | | | | | | | | | | | | | | | | | |
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| Sandwich Tern | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Common Tern | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Roseate Tern | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Arctic Tern | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Common Guillemot | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Razorbill | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Black Guillemot | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Little Auk | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Atlantic Puffin | | | | | | | | | | | | | | | | | | | | | | | | | | | |

How could the issue be addressed on a project and site specific basis?

The following tables provide a series of suggested activities and recommendations that may be taken forward to address the effects of displacement of essential activities on marine birds for those technologies and/or support structure and species / habitats assessed as significant in the assessment. This information is not prescriptive and should be used as a platform for discussion on a project and site specific basis in order to develop an appropriate impact assessment strategy and monitoring programme for the project.

Single test deployments

Preliminary desk based studies

| Activity | Objective | Recommendation / comment |
|---|---|---|
| Establish from published sources and local knowledge whether the selected deployment area is known to be of particular importance for marine birds. | To establish a possible level of sensitivity to the proposed project and the specific technology proposed | Supplement published data with local knowledge where appropriate. |
| Impact assessment | To determine, based on baseline characterisation surveys, whether or not there are likely to be any potentially significant effects on the species identified | This should follow the normal project specific EIA procedures. |

Baseline characterisation surveys

| Activity | Objective | Recommendation / comment |
|-------------------------|-----------|--------------------------|
| No activity recommended | N/A | N/A |

Further desk based studies

| Activity | Objective | Recommendation / comment |
|-------------------------|-----------|--------------------------|
| No activity recommended | N/A | N/A |

Monitoring during and post installation

| Activity | Objective | Recommendation / comment |
|-------------------------|-----------|--|
| No activity recommended | N/A | It should be noted that any data gathered from single/test deployments regarding potential displacement, where conditions at the site are appropriate, may be useful for future impact assessment and consenting work. |

Demonstration arrays

Preliminary desk based studies

| Activity | Objective | Recommendation / comment |
|---|---|--|
| Establish from published sources and local knowledge whether the selected deployment area is known to be of particular importance for marine birds. | To establish a possible level of sensitivity to the proposed project and the specific technology proposed | Supplement published data with local knowledge where appropriate |
| Follow-up any significant sources of unpublished data | To ensure that all accumulated knowledge and understanding has been used | SNH, RSPB and local wildlife groups may all have data which could be useful. Care should be taken when accessing wildlife records since negative observations are often not collated. |
| Undertake impact assessment | To identify any particular areas of concern regarding the proposed development and to determine what/if further baseline characterisation is required (see below) | This should follow the normal project specific EIA procedures. |

Baseline characterisation surveys

| Activity | Objective | Recommendation / comment |
|------------------------------|--|--|
| Short term validation survey | To validate published sources of data To determine the sensitivity of the site | A short term validation survey should be completed during the breeding season for sites where the sensitivity is uncertain. Winter surveys should only be undertaken if there are known to be sensitive species present at that time of year. |
| Detailed baseline survey | To provide a better baseline knowledge, against which any change can be monitored To assess variability in bird distribution. | Only undertaken in seasons where significant bird populations are known to occur. |

Further desk based studies

| Activity | Objective | Recommendation / comment |
|-------------------|---|--|
| Impact assessment | To determine, based on baseline characterisation surveys, whether or not there are likely to be any potentially significant effects on the species identified | This should follow the normal project specific EIA procedures. |

Monitoring during and post installation

| Activity | Objective | Recommendation / comment |
|---|---|---|
| <p>Observations of bird behaviour around the structures</p> | <p>To establish whether birds are using the area around the devices as they did before deployment</p> | <p>Only undertaken in high sensitivity areas. Carry out a short term survey at the most sensitive time of year to establish if any displacement is taking place.</p> <p>It may be difficult to establish if birds have been displaced as foraging areas / key habitat locations may change from year to year.</p> <p>It may be difficult to establish what cues associated with the development have caused birds to be displaced.</p> <p>It may be difficult to establish where birds have been displaced to.</p> <p>If displacement can be shown to have occurred, it may be difficult to assess whether or not there are any resulting negative effects.</p> <p>A before-after-gradient (BAG) approach to such monitoring could help to determine whether it is the development itself that has caused the displacement.</p> |