# Morven North Offshore Wind Array Project

## Habitats Regulations Appraisal

### Volume 3, Annex 2.2: Long List of Species and Compensation Options

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# 1 Introduction

1.1.1.1 When it cannot be demonstrated that the predicted impacts from a plan or project, alone or in-combination with other reasonably foreseeable plans and projects, will not give rise to an adverse effect on site integrity on a United Kingdom (UK) Special Protection Area (SPA), the project can only progress if the relevant decision maker(s) show that there are no alternative solutions to the project and there is an imperative reason of overriding public interest. There will then be a duty on the competent authority to ensure that suitable and adequate compensation measures are secured to maintain the coherence of the UK SPA network for the qualifying features predicted to be negatively affected by impacts from the project alone.

1.1.1.2 In this report, the possible compensation measures that may be needed in order to secure consent for the Morven North Offshore Wind Array Project (hereafter "Morven North") and the Morven South Offshore Wind Array Project (hereafter "Morven South") are collated and presented. This report aims to generate a long list of possible compensation measures for each species, which formed the basis for consultation with stakeholders with the aim of developing a more detailed short-list of measures. This report was developed before the magnitude of predicted impacts were known, so this initial long list was based on the appropriate assessment undertaken for the Green Volt Offshore Wind Farm (OWF) by the Marine Directorate[1] as it was expected that the predicted impacts from Morven North and Morven South would be apportioned to similar SPAs and qualifying features as the Green Volt project, albeit with different predicted impacts. Additionally, the Report to Inform the Appropriate Assessment for the Ossian OWF was also used to inform the SPAs and qualifying features that may require compensation measures. It is important to note that, unlike the Green Volt OWF, for Ossian OWF the report was the one to inform the Habitat Regulations Appraisal (HRA) for that project and was not the final Appropriate Assessment by the Competent Authority. It is therefore possible that this list of SPA features (for Ossian OWF) below will change.

1.1.1.3 That assessment of impacts from the Green Volt OWF and Ossian OWF projects was unable to conclude the absence of an adverse effect on site integrity for the following SPA qualifying features:

- Buchan Ness to Collieston Coast SPA:
  - kittiwake (*Rissa tridactyla)*.
- East Caithness Cliffs SPA:
  - kittiwake;
  - razorbill (*Alca torda)*;
  - guillemot (*Uria aalge)*.
- North Caithness Cliffs SPA:
  - kittiwake.
- Forth Islands SPA:
  - kittiwake;
  - gannet (*Morus bassanus)*;
  - puffin (*Fratercula arctica)*.
- Fowlsheugh SPA:
  - kittiwake;
  - guillemot;
  - razorbill.
- Troup, Pennan and Lion's Heads SPA:

[1] https://marine.gov.scot/sites/default/files/240419_-_green_volt_-_eia_application_-_annex_b_-_appropriate_assessment.pdf

  - kittiwake.
- Flamborough and Filey Coast SPA:
  - kittiwake;
  - gannet.

1.1.1.4 As such, this report has focused on creating a long list of potential compensation measures for these species.

1.1.1.5 The derogation case for the Green Volt OWF proposed three compensation measures for these features:

- drainage management at a location in the East Caithness Cliff's SPA;
- disturbance reduction in the Troup, Pennan and Lion's Heads SPA;
- tree mallow removal in the Forth Islands SPA.

1.1.1.6 Drainage management was predicted to benefit kittiwake, guillemot, and razorbill. Disturbance reduction was predicted to benefit kittiwake, guillemot, razorbill, and gannet. Tree mallow removal was predicted to benefit puffin. It is notable that the measures proposed for gannet do not directly benefit gannets in the UK SPA network, as gannet is not a qualifying feature of the Troup, Pennan and Lion's Heads SPA, but are predicted to benefit the gannet meta-population and therefore maintain the coherence of the SPA network through natal dispersal into the SPA gannet population.

1.1.1.7 The derogation case for the Ossian offshore wind farm proposed two compensation measures:

- American mink (*Neogale vison)* control;
- seabird bycatch reduction in Portuguese waters.

1.1.1.8 American mink control was predicted to benefit razorbill and kittiwake. Seabird bycatch reduction was predicted to benefit razorbill and gannet.

# 2 Long list of compensation measures

2.1.1.1 The long list of measures considered the available evidence for each species. This focused on the reviews by Furness *et al.* (2013), Furness (2021) and Pizzolla *et al.* (2024). Pizzolla *et al.* (2024) reviewed available measures for seabirds that could be used as strategic measures for ScotWind projects, which included collated information on compensation measures from consented or application stage UK offshore wind projects, which were discussed with stakeholders.

## 2.2 Kittiwake

2.2.1.1 Furness *et al.* (2013) identified seven potential compensation measures that could be applied to kittiwake populations (Table 2.1). Two measures (closure of sandeel (Ammodytidae) and sprat (*Sprattus sprattus)* fisheries and artificial nesting structures) were considered highly likely to be effective with high confidence in that assessment. One measure (exclusion of great skuas (*Stercorarius skua)*) was considered to have a moderate likelihood of effectiveness with a moderate confidence in that assessment. The remaining measures were considered to have a low likelihood of effectiveness with a moderate confidence in that assessment. However, three of these (eradicate mink, feral cat eradication, and rat eradication) were each considered to have high likelihood of effectiveness from similar species, with a high confidence in that assessment. The feasibility of the measures only had a high likelihood of effectiveness for mink eradication (with a high confidence in that assessment) and this was low for both rat eradication and exclusion of foxes (with a low confidence in that assessment). Only closure of sandeel and sprat fisheries had a moderate likelihood in its practicality, albeit with a low confidence in that assessment. There was low likelihood in the effectiveness, with high confidence in that assessment, for the remaining measures. Most measures only applied at a few SPA colonies, with none applying at SPAs for artificial nesting structures, but closure of sandeel and sprat fisheries applied at most SPA populations.

**Table 2.1: Long list of potential compensation measures for kittiwake and their effectiveness/confidence in the success of their key elements (from Furness *et al.* (2013))**

| Compensation measure | Evidence of success for this species | Evidence from similar species | Feasibility | Practicality | Applies at SPA populations |
|---|---|---|---|---|---|
| Closure of sandeel and sprat fisheries in UK waters | High/High | High/Moderate | Moderate/Low | Moderate/Low | Yes/High |
| Eradicate Mink | Low/Moderate | High/High | High/High | Low/High | Few/High |
| Feral cat eradication | Low/Moderate | High/High | Moderate/High | Low/High | No/High |
| Rat eradication | Unknown/Moderate | High/High | Low/High | Low/High | Few/High |
| Exclusion of foxes | Low/Moderate | Low/High | Low/High | Low/High | Few/High |
| Exclusion of great skuas | Moderate/Moderate | Low/High | Moderate/High | Low/High | Few/High |
| Artificial structures for colonies | High/High | High/High | Moderate/High | Low/High | No/High |

2.2.1.2 Furness (2021) reviewed these measures and any new evidence to support them. This review stated that, "Since 2013, evidence that has become available continues to indicate that measures 3 to 7 [feral cat eradication, rat eradication, exclusion of foxes, exclusion of great skuas, artificial structures for colonies] are not likely to be suitable as compensation for impacts on kittiwake except possibly in a very few very limited locations".

2.2.1.3 Since the review by Furness (2021) sandeel fisheries in UK waters have been closed. This measure is only included in the long list as an existing measure that could be applied by the Appropriate Authority. Since the measure has already been undertaken, the feasibility and practicality of this measure should be scored as high. However, it's important to note that both Furness et al. (2013) and Furness (2021) included closure of sprat fisheries as a potential measure that could be applied to kittiwake, so this measure remains in the long list.

2.2.1.4 Furness (2021) noted that there may be "few very limited locations" for five of the measures (Mink eradication, feral cat eradication, rat eradication, fencing out foxes from colonies, and exclusion of great skuas). Thus, these are retained in the long list and will be assessed relative to the scale of the compensation measures that may be required once this has been estimated.

2.2.1.5 In their review of strategic measures for offshore windfarm projects in the Northeast (NE) and East (E) ScotWind regions, Pizzolla *et al.* (2024) short-listed three projects with the potential to be suitable for kittiwake populations were:

- provision of artificial nest sites;
- establish new colonies at suitable natural sites;
- seagrass restoration and recovery.

2.2.1.6 The first measure listed was also listed by Furness *et al.* (2013) and Furness (2021) and is a measure that has been applied for offshore wind farm projects in England.

2.2.1.7 The establishment of new colonies at natural sites for kittiwake was based on the use of decoys and old nests from other locations to attract kittiwakes to the Gateside kittiwake tower and the observation of social attraction in growing colonies in Alaska in the 1980s (Kildaw *et al.,* 2005).

2.2.1.8 Seagrass restoration was predicted to benefit seabirds, including kittiwake, by increasing the area of shelter, foraging and nursery habitat for forage fish.

2.2.1.9 While there have been suggestions that kittiwakes may be impacted by long line fisheries (as bycatch). However, Miles *et al.* (2020) found a very low take in the UK, so this measure has not been included in the long list of measures.

2.2.1.10 Thus, the proposed long list for kittiwake compensation measures are:

- application of closed sandeel fisheries as a compensation measure;
- closure of sprat fisheries in UK waters;
- provision of artificial structures for new kittiwake colonies;
- establish new colonies at suitable natural sites;
- mink eradication;
- feral cat eradication;
- rat eradication;
- fencing out foxes from colonies;
- exclusion of great skuas;
- seagrass restoration and recovery.

## 2.3 Guillemot

2.3.1.1 Furness *et al.* (2013) identified four potential compensation measures that could be applied to guillemot populations (Table 2.2). One measure (reduce oil spills) had a high likelihood of effectiveness, with a moderate confidence in this assessment. There was low likelihood of

effectiveness in the evidence for the other measures with low confidence in this assessment. However, of these two (closure of sandeel and sprat fisheries in UK waters and rat eradication) had a high likelihood of effectiveness from similar species, although confidence in this assessment was moderate for closure of sandeel and sprat fisheries in UK waters while rat eradication had a high confidence in the assessment. There was a high likelihood of feasibility for rat eradication (with a high confidence in the assessment), and this was low for reduction of oil spills (and a high confidence in that assessment). Closure of sandeel and sprat fisheries had a moderate likelihood of practicality (but with low confidence in the assessment), both in UK waters and in wintering areas. There was a moderate likelihood of practicality for rat eradication, with a high confidence. Rat eradication applied at a few SPA colonies, but closure of sandeel and sprat fisheries in UK waters and reduction of oil spills applied at most SPA populations.

**Table 2.2: Long list of potential compensation measures for guillemot and their effectiveness/confidence in the success of their key elements (from Furness *et al.* 2013)**

| Compensation measure | Evidence of success for this species | Evidence for similar species | Feasibility | Practicality | Applies at SPA populations |
|---|---|---|---|---|---|
| Closure of sandeel and sprat fisheries in UK waters | Low/Low | High/ Moderate | Moderate/Low | Moderate/Low | Yes/High |
| Closure of sandeel and sprat fisheries in wintering areas | Low/Low | Low/Low | Moderate/Low | Moderate/Low | Uncertain/High |
| Rat eradication | Low/Moderate | High/High | High/High | Moderate/High | Few/High |
| Reduce oil spills | High/ Moderate | Low/Low | Low/High | Low/High | Yes/High |

2.3.1.2 Furness (2021) reviewed these measures and any new evidence to support them. This review stated that, “Guillemot is one of the most intensively studied of all seabirds, and so the evidence base on this species has increased considerably”.

2.3.1.3 Since the review by Furness (2021) sandeel fisheries in UK waters have been closed. This measure is only included in the long list as an existing measure that could be applied by the Appropriate Authority. Since the measure has already been undertaken, the feasibility and practicality of this measure should be scored as high. However, it’s important to note that both Furness *et al.* (2013) and Furness (2021) include closure of sprat fisheries as a potential measure that could be applied to guillemot, so this measure remains in the long list.

2.3.1.4 While Furness *et al.* (2013) found low evidence of success from closure of sandeel and sprat fisheries further evidence reviewed by Furness (2021) suggested that guillemots switched from sandeel to sprats more than other species (Wanless *et al.,* 2018). So, there is recent evidence for the importance of sprats to guillemot populations.

2.3.1.5 More recent evidence on the effects of rat eradication showed that on some islands (Lundy *et al.,* 2019) this did increase guillemot populations, but on other islands (Canna *et al.,* 2019) the results were less obvious.

2.3.1.6 In their review of strategic measures for offshore windfarm projects in the Northeast (NE) and East (E) ScotWind regions, Pizzolla *et al.* (2024) short-listed four measures with the potential to be suitable compensation for guillemot populations were:

- mammalian predator control/management;
- establish new colonies at suitable natural sites;
- provision of artificial nest sites;
- seagrass restoration and recovery.

2.3.1.7 The first measure listed was also listed by Furness *et al.* (2013) and Furness (2021).

2.3.1.8 The establishment of new colonies at natural sites for guillemot was based on evidence from the re-establishment of breeding pairs in Maine (United States of America (USA)) using decoys and audio playback and in California (USA) using social attraction techniques.

2.3.1.9 Pizzolla *et al.* (2024) included artificial nest sites in their list on the basis of a single artificial colony in Norway, which is primarily a research study. This artificial colony is within an existing natural colony. The natural colony has been increasing in numbers of breeding birds, so nest sites were presumably limiting.

2.3.1.10 Seagrass restoration was predicted to benefit seabirds, including guillemot, by increasing the area of shelter, foraging and nursery habitat for forage fish.

2.3.1.11 Miles *et al.* (2020) noted that there were small scale impacts on guillemot populations in the UK from trawl fisheries bycatch and set net bycatch. These are very small scale (about 500 and 1,500 birds per annum respectively) impacts but are retained in the long list at present.

2.3.1.12 Thus, the proposed long list for guillemot compensation measures are:

- closure of sprat fisheries in all UK waters;
- closure of sandeel and sprat fisheries in guillemot wintering areas;
- eradication of terrestrial mammalian predators;
- establish new colonies at suitable natural sites;
- provision of artificial nest sites;
- seagrass restoration and recovery;
- trawl fisheries bycatch reduction;
- set net bycatch reduction.

## 2.4 Razorbill

2.4.1.1 Furness *et al.* (2013) identified four potential compensation measures that could be applied to razorbill populations (Table 2.3). All measures had low evidence of success for razorbill and with low confidence in success (except rat eradication, which was moderate). However, of these three (closure of sandeel and sprat fisheries in UK waters, rat eradication and reduce oil spills) had a high likelihood of effectiveness from similar species, although confidence in this assessment was moderate for closure of sandeel and sprat fisheries in UK waters while rat eradication had a high confidence in the assessment and reducing oil spills had a moderate confidence in the assessment. There was a high likelihood of feasibility for rat eradication (with a high confidence in the assessment), and this was low for reduction of oil spills (and a high confidence in that assessment). Closure of sandeel and sprat fisheries had a moderate likelihood of practicality (but with low confidence in the assessment), both in UK waters and in wintering areas. There was a moderate likelihood of practicality for rat eradication, with a high confidence. Rat eradication applied at a few SPA colonies, but closure of sandeel and sprat fisheries in UK waters and reduction of oil spills applied at most SPA populations.

**Table 2.3: Long list of potential compensation measures for razorbill and their effectiveness/confidence in the success of their key elements (from Furness *et al.* 2013)**

| Compensation measure | Evidence of success for this species | Evidence for similar species | Feasibility | Practicality | Applies at SPA populations |
|---|---|---|---|---|---|
| Closure of sandeel and sprat fisheries in UK waters | Low/Low | High/ Moderate | Moderate/Low | Moderate/Low | Yes/High |
| Closure of sandeel and sprat fisheries in wintering areas | Low/Low | Low/Low | Moderate/Low | Moderate/Low | Uncertain/High |
| Rat eradication | Low/Moderate | High/High | High/High | Moderate/High | Few/High |
| Reduce oil spills | Low/Low | High/Moderate | Low/High | Low/High | Yes/High |

2.4.1.2 Furness (2021) reviewed these measures and any new evidence to support them.

2.4.1.3 Since the review by Furness (2021) sandeel fisheries in UK waters have been closed. This measure is only included in the long list as an existing measure that could be applied by the Appropriate Authority. Since the measure has already been undertaken, the feasibility and practicality of this measure should be scored as high However, it's important to note that both Furness *et al.* (2013) and Furness (2021) include closure of sprat fisheries as a potential measure that could be applied to razorbill, so this measure remains in the long list.

2.4.1.4 While Furness *et al.* (2013) found low evidence of success from closure of sandeel and sprat fisheries further evidence reviewed by Furness (2021); "New evidence from Hentati-Sundberg *et al.* (2020) highlights the importance of maintaining sufficient prey densities in the vicinity of the colony, suggesting that fine-scale spatial fisheries management is necessary to maintain high seabird breeding success".

2.4.1.5 More recent evidence on the effects of rat eradication showed that on some islands (Lundy, Booker *et al.* (2019); Canna, Luxmoore *et al.* (2019)) this did increase razorbill populations.

2.4.1.6 In their review of strategic measures for offshore windfarm projects in the Northeast (NE) and East (E) ScotWind regions, Pizzolla *et al.* (2024) short-listed two measures with the potential to be suitable compensation for razorbill populations were:

- mammalian predator control / management;
- provision of artificial nest sites.

2.4.1.7 The first measure listed was also listed by Furness *et al.* (2013) and Furness (2021).

2.4.1.8 The establishment of new colonies at natural sites for razorbill was based on evidence from the re-establishment of breeding pairs in Greenland. However, this seems to have been an entirely un-aided return to the colony and so does not seem to offer much as a compensation measure for this species.

2.4.1.9 Pizzolla *et al.* (2024) included artificial nest sites in their list on the basis of a single artificial colony in Norway, which is primarily a research study. This artificial colony is within an existing natural colony. The natural colony has been increasing in numbers of breeding birds, so nest sites were presumably limiting. Nest boxes for razorbills were added, some of which were occupied by razorbills, though some became occupied by guillemots too.

2.4.1.10 Miles *et al.* (2020) noted that there were very small scale impacts on razorbill populations in the UK from set net bycatch. These are very small scale (about 40 to 250 birds per annum) impacts but are retained in the long list at present.

2.4.1.11 Thus, the proposed long list for razorbill compensation measures are:

- closure of sprat fisheries in all UK waters;
- closure of sandeel and sprat fisheries in razorbill wintering areas;
- eradication of terrestrial mammalian predators;
- provision of artificial nest sites;
- set net bycatch reduction.

## 2.5 Puffin

2.5.1.1 Furness *et al.* (2013) identified three potential compensation measures that could be applied to puffin populations (Table 2.4). All measures had a low likelihood of success, but with low confidence in this assessment. However, all these measures had a high likelihood of success from similar species, with moderate or high confidence in those assessments. There was high feasibility, with high confidence in that assessment, for rat eradication. Closure of sandeel and sprat fisheries had a moderate feasibility and practicality but with low confidence in those assessments. Rat eradication had a high feasibility in its and application, with a high confidence in the assessment, but moderate practicality with a high confidence in that assessment. Closure of sandeel and sprat fisheries applied to SPA populations, with a high confidence in that assessment. However, rat eradication only applied to some SPA populations, with a high confidence in that assessment.

**Table 2.4: Long list of potential compensation measures for puffin and their effectiveness/confidence in the success of their key elements (from Furness *et al.* 2013)**

| Compensation measure | Evidence of success for this species | Evidence for similar species | Feasibility | Practicality | Applies at SPA populations |
|---|---|---|---|---|---|
| Closure of sandeel and sprat fisheries in UK waters | Low/Low | High/ Moderate | Moderate/Low | Moderate/Low | Yes/High |
| Rat eradication | Low/Low | High/High | High/High | Moderate/High | Some/High |
| Reduce oil spills | Low/Low | High/ Moderate | Low/High | Low/High | Yes/High |

2.5.1.2 Furness (2021) reviewed these measures and any new evidence to support them. This review stated that, “strong efforts are already made to prevent oil spills, so that this was unlikely to be a practical option” for puffin.

2.5.1.3 Since the review by Furness (2021) sandeel fisheries in UK waters have been closed. This measure is only included in the long list as an existing measure that could be applied by the Appropriate Authority. Since the measure has already been undertaken, the feasibility and practicality of this

measure should be scored as high. However, it's important to note that both Furness et al. (2013) and Furness (2021) include closure of sprat fisheries as a potential measure that could be applied to puffins, so this measure remains in the long list.

2.5.1.4 While Furness *et al.* (2013) found low evidence of success from closure of sandeel and sprat fisheries further evidence reviewed by Furness (2021) suggested that puffin productivity on the Isle of May was higher when sandeel stock biomass was higher in the adjacent International Council for the Exploration of the Sea (ICES) area (Sandeel Area 4). Since Furness (2021) was published, Fayet et al. (2021) showed that sprat was often an important part of puffin diet, including in stable colonies, such as Skomer, Wales. Fayet *et al.* (2021) showed that prey availability was important in driving the productivity of puffin colonies in the north-east Atlantic, particularly close to colonies, so there is recent evidence for importance of sprats to puffin populations.

2.5.1.5 More recent evidence on the effects of rat eradication showed that on Lundy (Booker *et al.,* 2019), Canna (Luxmoore *et al.,* 2019) and Ailsa Craig (Zonfrillo, 2002 and Zonfrillo, 2007) eradication did result in increases in puffin populations. As a result, Furness (2021) concluded that, "There is, therefore, clear evidence that eradication of rats can be highly beneficial for puffin populations."

2.5.1.6 In their review of strategic measures for offshore windfarm projects in the Northeast (NE) and East (E) ScotWind regions, Pizzolla *et al.* (2024) short-listed six projects with the potential to be suitable for puffin:

- mammalian predator control / management;
- management of supporting habitats at colony;
- establishment of new colonies at suitable natural sites;
- seagrass restoration ;
- avian predator control;
- provision of artificial nest sites

2.5.1.7 The first measure listed was also listed by Furness *et al.* (2013) and Furness (2021).

2.5.1.8 The management of supporting habitats for puffin is only in relation to tree mallow as an invasive species on islands in the Firth of Forth. Since this has already been suggested as a measure for the Green Volt OWF, or as ongoing conservation measures, it is not considered further here.

2.5.1.9 There is a single example of establishing new colonies at natural sites provided for puffin. At Eastern Egg Rock Islands in Canada puffins were reestablished (following extirpation) by hand digging burrows, moving chicks from a different colony into those burrows, and hand feeding the chicks. The measure was finally successful 12 years after the first chicks were moved.

2.5.1.10 While Pizzolla *et al.* (2024) included artificial nest sites for puffin, this was part of the re-establishment of puffins at a previously occupied colony. This is not the same as providing artificial nest sites for adult birds to recruit to as an alternative to natural nesting locations. Thus, for this report this measure has not been included in the long list but is considered within the measure to establish new colonies at natural sites.

2.5.1.11 Thus, the proposed long list for puffin compensation measures are:

- closure of sprat fisheries in UK waters;
- eradication of terrestrial mammalian predators;
- establish new colonies at suitable natural sites.
- seagrass restoration;
- avian predator control.

## 2.6 Gannet

2.6.1.1 Furness *et al.* (2013) identified three potential compensation measures that could be applied to gannet populations (Table 2.5). One measure (end harvest of chicks) had a high likelihood of

success with a high confidence in that assessment. All remaining measures had a low likelihood of success, albeit this was concluded with low confidence. One of these measures (encourage establishment of new colonies) had a moderate likelihood of success from similar species, but with low confidence in that assessment. There was moderate feasibility in the establishment of new colonies, but with a low confidence in that assessment. There was low feasibility for the ending of the harvest of chicks and a high confidence in that assessment. Reducing fisheries bycatch had a low feasibility but low confidence in that assessment. All measures had practicality assessed as low, though there was only high confidence in that assessment of the ending of chick harvesting. The remaining two measures had low confidence in their practicality assessments. Ending the harvesting of chicks was likely to apply to SPA populations, as it only occurs within the North Rona and Sula Sgeir SPA, in the UK at least. There was a high confidence in that assessment. The other measures were assessed not to apply to SPA colonies with a high confidence.

**Table 2.5: Long list of potential compensation measures for gannet and their effectiveness/confidence in the success of their key elements (from Furness *et al.* 2013)**

| Compensation measure | Evidence of success for this species | Evidence for similar species | Feasibility | Practicality | Applies at SPA populations |
|---|---|---|---|---|---|
| End harvest of chicks | High/High | High/High | Low/High | Low/High | Yes/High |
| Encourage establishment of new colonies | Low/Low | Moderate/Low | Moderate/Low | Low/Low | No/High |
| Reduce bycatch in fisheries | Low/Low | Low/Low | Low/Low | Low/Low | No/High |

2.6.1.2 Furness (2021) reviewed these measures and any new evidence to support them. This review stated that, "There has been much work done since 2013 in relation to fisheries bycatch of seabirds that provides better evidence of benefits that could be achieved for gannets through fisheries modifications to reduce bycatch". In addition, Furness (2021) stated that, "there has also been recent evidence of change in gannet conservation status at some colonies outside the British Isles that may be relevant to predicting future population trends and ecology".

2.6.1.3 Ending the harvest of chicks from the North Rona and Sula Sgeir SPA was considered as part of the compensation measures for the Berwick Bank offshore wind farm (SSE Renewables, 2023) and this received some negative publicity from stakeholders (e.g. https://www.stornowaygazette.co.uk/business/guga-trade-off-would-be-ethically-wrong-4360448). It would seem, therefore, that this is unlikely to be a suitable measure. Furness (2021) noted that, "there are also harvests of gannet chicks at colonies in the Faroes and Iceland". Given that these colonies form part of a meta-population, it is possible that reducing harvesting from colonies in these countries could be used as compensation measures for projects in Scotland, as they could be used to maintain the coherence of the UK SPA network for gannets.

2.6.1.4 While Furness *et al.* (2013) found low evidence of success from the reduction in bycatch in fisheries, further evidence reviewed by Furness (2021) suggested that "annual bycatch of gannets by UK-registered fishing vessels is between 25 and 764 birds per year killed" (Northridge *et al.,* 2020). There was also new evidence reviewed by Furness (2021) that there is ongoing bycatch of gannets in fisheries off the Iberian peninsula in winter, which is likely to include birds from UK SPA colonies. In addition, it was noted that there may be a large illegal harvest of gannets off the coast of West Africa. A such it seems there is now some evidence that efforts to reduce bycatch and illegal harvesting of

UK breeding gannets while they are in their wintering range may be available as a suitable compensation measure. This approach is being suggested by the Ossian OWF.

2.6.1.5 Furness (2021) noted three further negative effects on gannet populations that could be explored as compensation measures:

1. in Norway, the increase and spatial expansion by white-tailed eagles *Haliaeetus albicilla* has resulted in declines in gannet populations as birds are harassed at their breeding colonies;
2. fishing pressure on pelagic fish stocks in areas important as foraging areas for gannets from Rouzic, France have been suggested as having negative effects on gannet populations;
3. exceptionally low productivity of gannets in eastern Canada has been linked to marine heat waves and intense thunderstorms resulting in birds becoming food stressed.

2.6.1.6 However, this third effect is beyond the scope of management other than through large scale strategic approaches to reduce the effects of climate change and increase resilience in gannet populations.

2.6.1.7 In their review of strategic measures for offshore windfarm projects in the Northeast (NE) and East (E) ScotWind regions, Pizzolla *et al.* (2024) short-listed three projects with the potential to be suitable for gannet populations:

- establish new colonies at suitable natural sites;
- provision of artificial nest sites;
- seagrass restoration and recovery.

2.6.1.8 Pizzolla *et al.* (2024) noted some limited evidence of gannets using artificial nest sites in France, Italy, Denmark, and England. If the evidence for this was considered sufficient by stakeholders, this may be a suitable small scale (and potentially scalable), measure.

2.6.1.9 While Furness *et al.* (2013) found that there was low evidence, feasibility, and practicality for the establishment of new colonies of gannet, Pizzolla *et al.* (2024) seem to suggest that this could be a suitable measure, albeit at a larger, strategic compensation, level. This was due to the likelihood that new colonies, if established, would eventually grow to become larger colonies.

2.6.1.10 Seagrass restoration was predicted by Pizzolla *et al.* (2024) to benefit seabirds, including gannet, by increasing the area of shelter, foraging and nursery habitat for forage fish.

2.6.1.11 Furness and Furness (2025) recently recommended seaweed farms as a potential compensation measure for breeding gannets. Gannets are known to incorporate seaweed into their nests and when there is low availability of natural materials often use plastics found in the marine environment. Furness and Furness (2025) cite Votier *et al.* (2011) showing that plastic being used as nesting material in nests in the gannet colony on Grassholm (south Wales), which resulted in the mortality of 33 to 109 birds per annum. Furness and Furness (2025) recommend that seaweed farming in the vicinity of gannet colonies could be a valuable measure to compensate for predicted impacts from offshore wind farms off the east coasts of Scotland and England.

2.6.1.12 Thus, the proposed long list for gannet compensation measures are:

- end harvest of chicks in Faeroe's and/or Iceland;
- reduce bycatch in fisheries;
- reduce illegal harvesting off West Africa;
- manage white-tailed eagles in proximity to gannet colonies;
- reducing fishing pressure on pelagic fish near gannet colonies;
- establish new colonies at suitable natural sites;
- provision of artificial nest sites;
- marine litter removal;
- seagrass restoration and recovery;
- seaweed farming.

## 2.7 Additional measures for small predicted impacts

2.7.1.1 Where predicted impacts from Morven North and Morven South alone may be very small, other measures may be suitable. The long list of potential additional measures are:

- disturbance from dive boats at St Abb's;
- scallop fishery gear change (dredging to potting on sandeel habitat);
- marine Protected Areas around seabird colonies.

### 2.7.2 Disturbance from dive boats

2.7.2.1 Disturbance has the potential to impact breeding seabirds though increased energy expenditure negatively affecting adult survival or through reduced productivity. Disturbance causing eggs or chicks to be left unattended can result in increased mortality through predation, weather or by conspecifics.

2.7.2.2 Recent evidence from St Abb's Head found a significant negative relationship between kittiwake nest success at the egg stage and the presence of boats (Diele and White 2018). No relationship was found between nest success, at either the egg stage or chick stage, and disturbance from cliff top human visitors.

2.7.2.3 This evidence suggests that closing the waters immediately below nesting kittiwake colonies has the potential to provide a useful compensation measure for predicted impacts at SPAs. Since the evidence shows the impact occurred at the egg phase and not at the chick phase, measures to prevent boats from using the waters immediately below the colony can be targeted to a short period of the year if deemed important (approximately mid-April to early June).

2.7.2.4 The only evidence that could be found on this impact was in relation to disturbance from boats at St Abb's Head to Fast Castle SPA. The source of evidence did not provide sufficient information to determine what scale of potential benefit to the kittiwake colony could result from seasonal closure of the waters below the colony to boats. However, while the kittiwake population at St Abb's has declined in recent decades and has not shown signs of recovery, perhaps suggesting that disturbance is having a limiting effect on the population. Further investigation of this may be necessary to determine whether removal of boat disturbance could be a useful measure, at least at St Abb's Head to Fast Castle SPA.

2.7.2.5 It is likely that boat activity affects kittiwake breeding success at other sites, as there is also concern about disturbance from water-based activities at the kittiwake colony at the Flamborough and Filey Coast SPA, so this form of compensation may be appropriate at a small number of sites.

### 2.7.3 Scallop fishery gear

2.7.3.1 Scallop fishing is mostly undertaken using dredges of the seabed. This method of fishing has the potential to damage spawning habitat of important seabird forage fish species, such as sandeels. A new method for trapping scallops using blue Light-Emitting Diode (LED) lights in modified crustacean pots has recently been described (Enever *et al.* 2022). Where overlap between scallop dredge fishing and important spawning habitat for forage fish can be shown, then compensation though adaptation of fishing gear from dredging to potting could be a method to benefit seabirds. However, it would be challenging to enumerate this benefit from an area of spawning habitat not being dredged to a number of seabirds in the UK SPA network. This measure has the potential to benefit the following seabird species:

- kittiwake;
- guillemot;
- razorbill;
- puffin.

### 2.7.4 Marine Protected Areas

2.7.4.1 The addition of a marine protected area around any offshore islands where rats are eradicated as compensation measure would likely increase the response from seabirds benefiting from rat eradication. This additional measure would also likely expand the range of species that would benefit from the compensation provided. The species likely to benefit from this measure may be:

- kittiwake;
- guillemot;
- razorbill;
- puffin.

2.7.4.2 Evidence of this as an additional benefit to seabirds on islands where rats have been removed is from the island of Lundy. Evidence suggests that the recovery of seabirds on Lundy has been larger and faster, at least for some species, than at other similar locations.

## 2.8 Measures on species not impacted

2.8.1.1 Measures that could benefit seabirds other than the species predicted to be potentially impacted by Morven North and Morven South could also be applied on a non-like-for-like basis. Furness *et al.* (2013) and Furness (2022) listed a further 22 compensation measures across 13 species (Table 2.6). At present these measures for these species could not be used as compensation for the predicted impacts from Morven North and Morven South (although amendments to the guidance on these matters is expected in spring 2026).

**Table 2.6: Compensation measures for seabird not predicted to be impacted by Morven North and Morven South (from Furness *et al.* 2013 and Furness 2022).**

| Compensation Measure | Red-throated diver (*Gavia stellata*) | Fulmar (*Fulmarus glacialis*) | Manx shearwater (*Puffinus puffinus*) | European storm petrel (*Hydrobates pelagicus*) | Leach's petrel (*Hydrobates leucorhous*) | Arctic skua (*Stercorarius parasiticus*) | Great skua | Lesser black-backed gull (*Larus fuscus*) | Herring gull (*Larus argentatus*) | Great black-backed gull (*Larus marinus*) | Sandwich tern (*Thalasseus sandvicensis* | Common tern (*Sterna Hirundo*) | Arctic tern (*Sterna paradisaea*) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Nesting rafts at breeding lochs | Y | | | | | | | | | | | | |
| Closure of sandeel and sprat fisheries close to wintering areas | Y | | | | | | | | | | | | |
| Closure of sandeel and sprat fisheries close to breeding areas | Y | | | | | | | | | | | | |
| Reducing disturbance by vessel activity | Y | | | | | | | | | | | | |
| Reducing the depletion of forage fish stocks by industrial fisheries | | Y | | | | | | | | | | | |
| Reducing bycatch | | Y | | | | | | | | | | | |

| Compensation Measure | Red-throated diver (*Gavia stellata*) | Fulmar (*Fulmarus glacialis*) | Manx shearwater (*Puffinus puffinus*) | European storm petrel (*Hydrobates pelagicus*) | Leach's petrel (*Hydrobates leucorhous*) | Arctic skua (*Stercorarius parasiticus*) | Great skua | Lesser black-backed gull (*Larus fuscus*) | Herring gull (*Larus argentatus*) | Great black-backed gull (*Larus marinus*) | Sandwich tern (*Thalasseus sandvicensis* | Common tern (*Sterna Hirundo*) | Arctic tern (*Sterna paradisaea*) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Reducing plastic pollution in the North Atlantic | | Y | | | | | | | | | | | |
| Eradication of invasive terrestrial predators | | | Y | Y | Y | | | | | | | | |
| Artificial nesting structures | | | | Y | | | | | | | | | |
| Provision of supplementary food to breeding pairs | | | | | | Y | | | | | | | |
| Closure of sandeel and sprat fisheries close to breeding areas | | | | | | Y | Y | | | | Y | | Y |
| Exclusion of great skuas from buffer zones around colonies | | | | | | Y | | | | | | | |

| Compensation Measure | Red-throated diver (*Gavia stellata*) | Fulmar (*Fulmarus glacialis*) | Manx shearwater (*Puffinus puffinus*) | European storm petrel (*Hydrobates pelagicus*) | Leach's petrel (*Hydrobates leucorhous*) | Arctic skua (*Stercorarius parasiticus*) | Great skua | Lesser black-backed gull (*Larus fuscus*) | Herring gull (*Larus argentatus*) | Great black-backed gull (*Larus marinus*) | Sandwich tern (*Thalasseus sandvicensis* | Common tern (*Sterna Hirundo*) | Arctic tern (*Sterna paradisaea*) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Reduction of fishery bycatch | | | | | | | Y | | | | | | |
| Mink eradication | | | | | | | | Y | Y | Y | | Y | |
| Fencing out foxes from colonies | | | | | | | | Y | Y | Y | Y | Y | |
| End culling (of large gulls) | | | | | | | | Y | Y | Y | | | |
| Rat eradication | | | | | | | | Y | Y | Y | | Y | |
| Stoat control/eradication | | | | | | | | | | | Y | Y | |
| Flood control at colonies | | | | | | | | | | | Y | | |
| Provision of nest platforms | | | | | | | | | | | | Y | |
| Exclusion of large gulls | | | | | | | | | | | | Y | |
| Tern terraces | | | | | | | | | | | | Y | Y |

## 2.9 Measures providing general ecological benefit

2.9.1.1 Some of the measures suggested in Pizzolla *et al.* (2024) are not likely to provide a measurable direct ecological benefit to a specific seabird species or population. These measures would likely benefit seabirds generally but could not be targeted at specific SPA or the SPA network. These measures are:

- oyster reef restoration;
- kelp bed extension;
- marine litter.

2.9.1.2 While Pizzola *et al.* (2024) stated that native oyster bed restoration could provide "'target' seabird species" compensation, they provide no evidence of direct benefits to any particular species nor evidence of any numerical prediction of increasing oyster reef indirectly benefitting seabird populations. However, it is apparent that oyster bed can provide habitat for fish that are prey of various seabird species and so restoring oyster bed would likely to be indirectly beneficial to seabirds.

2.9.1.3 Similarly, it is apparent that kelp beds provide habitat for forage fish, so could indirectly benefit seabirds. However, Pizzolla *et al.* (2024) do not provide evidence of a relationship between kelp bed increase and population size change of the seabird species of relevance to Morven North and Morven South. Pizzolla *et al.* (2024) do provide references to studies showing benefits to cormorant (*Phalacrocorax carbo*), shag (*Phalacrocorax aristotelis*) and eider (*Somateria mollissima*). These could provide not-like-for-like benefits.

2.9.1.4 Pizzolla *et al.* (2024) acknowledged that there was a "paucity of information regarding how effective the removal of marine litter will be" as a compensation measure for seabirds. However, there is evidence of negative effects on seabirds from marine litter ingestion and/or entanglement, so it would likely benefit seabird populations albeit to an unknown amount.

2.9.1.5 These three measures could not be used to show that the predicted impacts from Morven North and Morven South could be overcome. However, they could be additions to other proposed measures where there may be uncertainty in the efficacy and/or timing of measures being sufficiently effective.

# 3 Summary

3.1.1.1 The potential compensation measures that could be applied by Morven North and Morven South were identified into three broad categories: like-for-like measures, non-like-for-like measures and measures that provide a general ecological benefit to seabirds.

3.1.1.2 A total of 22 potential like-for-like compensation measures could be applied to maintain the coherence of the UK SPA network for the species assumed here to be potentially requiring measures as a result of predicted in-combination impacts from Morven North and Morven South (Table 3.1).

3.1.1.3 Twelve of these measures could be applied to kittiwake populations, eight to guillemot and razorbill populations, five to puffin populations, nine to gannet populations and four to fulmar populations.

**Table 3.1: Summary of long list of like-for-like compensation measures for Morven North and Morven South**

| Compensation Measure | Kittiwake | Guillemot | Razorbill | Puffin | Gannet |
|---|---|---|---|---|---|
| Closure of sprat fisheries in UK waters | Y | Y | Y | Y | N |
| Provision of artificial structures | Y | Y | Y | N | Y |
| Mink eradication | Y | N | N | N | N |
| Feral cat eradication | Y | N | N | N | N |
| Rat eradication | Y | Y | Y | Y | N |
| Fencing out foxes from colonies | Y | N | N | N | N |
| Exclusion of great skuas | Y | N | N | N | N |
| Establish new colonies at suitable natural sites | Y | Y | Y | Y | Y |
| Seagrass restoration and recovery. | Y | Y | N | N | Y |
| Disturbance from dive boats | Y | N | N | N | N |
| Scallop fishery gear | Y | Y | Y | Y | N |
| Marine Protected Areas | Y | Y | Y | Y | N |

| Compensation Measure | Kittiwake | Guillemot | Razorbill | Puffin | Gannet |
|---|---|---|---|---|---|
| Closure of sprat fisheries in wintering areas | N | Y | Y | N | N |
| End harvest of chicks | N | N | N | N | Y |
| Reduce bycatch in fisheries | N | N | Y | N | Y |
| Reduce illegal harvesting off West Africa | N | N | N | N | Y |
| Manage white-tailed eagles in proximity to gannet colonies | N | N | N | N | Y |
| Reduce fishing pressure on pelagic fish near gannet colonies | N | N | N | N | Y |
| Seaweed farming | N | N | N | N | Y |
| Reducing the depletion of forage fish stocks by industrial fisheries | N | N | N | N | N |
| Marine (plastic) Litter Removal | N | N | N | N | N |

3.1.1.4 A further 22 compensation measures across 13 species (Table 2.6) could be applied on a non-like-for-like basis on species that do not require compensation.

3.1.1.5 Three further measures could be applied to generally improve the marine environment (oyster reef restoration, kelp bed extension, and marine litter removal) for seabirds, including those species predicted to be adversely affected Morven North and Morven South.

3.1.1.6 Overall, the long-list has identified 46 potential measures that could be applied to provide compensation to seabirds. Some measures were specific to the species predicted to be impacted and these are the key measures that need to be considered. Amendments to the Habitats Regulations were laid in parliament in February 2026 and are due to come in to force in May 2026. These amendments allow for a hierarchy of compensation measures. At the time of writing the guidance has not been published. Some non-like-for-like measures could occur as a result of the same measure being applied to a site for other species (e.g. Manx shearwater could benefit from rat eradication on an island where it is applied for another species, such as puffin). These could

therefore be included as net gain measures, even if they cannot be considered as compensatory measures. The final three measures that would generally improve the marine environment for seabirds are likely to be important, but could not be used as a primary measure, as it is not possible to estimate the numerical benefit to specific seabird populations. However, these measures could be added to other measures to create greater certainty in the overall benefit to the UK SPA network that coherence of the network will be maintained.

3.1.1.7 The long list of measures outlined above formed the basis for consultation with stakeholders, following which a final short list was obtained.

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