# Written Representations for the Royal Society for the Protection of Birds

**Submitted for Deadline II**

**27 July 2016**

**Planning Act 2008 (as amended)**

**In the matter of:**

**Application by East Anglia THREE Limited for an Order Granting Development Consent for the East Anglia THREE Offshore Wind Farm**

**Planning Inspectorate Ref: EN010056**
**Registration Identification Ref: 10032142**

rspb giving nature a home

# 1. Introduction

1.1. These representations have been prepared with Dr McCluskie, whose qualifications and experience are provided in Annex 1.

## The RSPB

1.2. The Royal Society for the Protection of Birds (the RSPB) was set up in 1889. It is a registered charity incorporated by Royal Charter and is Europe's largest wildlife conservation organisation, with a membership of 1.16 million[1]. The principal objective of the RSPB is the conservation of wild birds and their habitats. The RSPB therefore attaches great importance to all international, EU and national law, policy and guidance that assist in the attainment of this objective. It campaigns throughout the UK and in international fora for the development, strengthening and enforcement of such law and policy. In so doing, it also plays an active role in the domestic processes by which development plans and proposals are scrutinised and considered, offering ornithological and other wider environmental expertise. This includes making representations to, and appearing at, public inquiries and hearings during the examination of applications for development consents.

## The RSPB's interest in offshore wind development

1.3. Faced with the threats of climate change to the natural world the RSPB considers that a low-carbon energy revolution is essential to safeguard biodiversity. However, inappropriately designed and/or sited developments can also cause serious and irreparable harm to biodiversity, and damage the public acceptability of the necessary low-carbon energy transition technologies.

1.4. The UK is of outstanding international importance for its breeding seabirds, including northern gannet for which the UK supports over 50% of its biogeographical populations. As with all Annex I and regularly migratory species, the UK has particular responsibility under the Birds Directive[2] to secure the conservation of this important seabird's population.

1.5. The available evidence suggests that the main risks of offshore wind farms for birds are collision, disturbance/displacement, barriers to movement e.g. migrating birds, or disruption of access to

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1 *RSPB Annual Review 2014-2015,* http://www.rspb.org.uk/about/run/annualreview/2015/index.html

2 Directive 2009/147/EC of the European Parliament and of the Council of 30 November 2009 on the conservation of wild birds (codified version) (the Birds Directive).

such as between the breeding areas and feeding areas, habitat change particularly with associated changes in food availability and the cumulative and in-combination effects of these across multiple wind farms.

1.6. Such impacts are avoidable, and the RSPB has spent considerable time working with stakeholders in the UK offshore wind industry to ensure that decisions about deployment of renewable energy infrastructure take account of environmental constraints and seek to avoid or minimise impacts wherever possible. The RSPB therefore strongly advocates the use of rigorous, participative environmental assessments to inform the development of projects.

## Summary of the RSPB's Position

1.7. The RSPB's primary concern about the East Anglia THREE proposal is its contribution to in-combination collision risk to gannets of the Flamborough and Filey Coast pSPA (FFC pSPA). We disagree with some of the parameters used by the Applicant in this assessment, and when collision risk is recalculated using our preferred parameters, find that the East Anglia THREE proposal contributes around 10% of the total in-combination collision mortality to this species. We are also concerned about the total cumulative collision risk to regional (North Sea) populations of kittiwakes and great black-backed gulls as addressed through the Environmental Impact Assessment (EIA). In order to address these concerns, we advocate a rise in the height of the turbines in order to reduce the percentage of birds flying at collision height and we present recalculations illustrating the level of reduction in collision mortality achievable through this approach.

# 2. Protected Sites and Species

## The Flamborough Head and Bempton Cliffs SPA and Flamborough and Filey Coast pSPA

2.1. The Flamborough Head and Bempton Cliffs SPA was designated under Article 4(2) of the Birds Directive as an SPA in 1993 due to the presence of 83,370 pairs of black-legged kittiwake (*Rissa tridactyla*), representing 4% of the Eastern Atlantic breeding population. In 2001 the UK SPA Review found that it also qualified under Article 4(2) as a site regularly supporting at least 20,000 seabirds, due to at the time of designation, the site regularly supported 305,784 individual seabirds including: puffin (*Fratercula arctica*), razorbill (*Alca torda*), guillemot (*Uria aalge*), herring Gull (*Larus argentatus*), Gannet (*Morus bassanus*), and Kittiwake. Kittiwake and the seabird assemblage are therefore the qualifying features of the SPA.

2.2. In January 2014, Natural England opened a formal consultation on proposals to extend the SPA and rename it as the Flamborough and Filey Coast SPA. The proposals comprise changes to the designated site boundary and changes to the numbers of qualifying species.

2.3. Natural England has also conducted a review of the seabird populations using contemporary data. A summary of Natural England's review of the ornithological interest of the pSPA is as follows with the key species set out in more detail in Table 2.1 below[3]:

> The application of SPA selection guidelines (JNCC 1999) to current data for this site confirm that it qualifies by regularly supporting internationally important numbers of breeding black-legged kittiwakes, northern gannet, common guillemot and razorbill and an assemblage of European importance of over 20,000 breeding seabirds. Black-legged kittiwake, northern gannet, common guillemot and razorbill are all main components of the assemblage and present in internationally important numbers. However, northern fulmar is also present in sufficient numbers to warrant being listed as main component species of the assemblage, since numbers exceed 2,000 individuals (10% of the minimum qualifying assemblage of 20,000 individuals). In addition, Atlantic puffin, herring gull, European shag *Phalacrocorax aristotelis* and great cormorant *Phalacrocorax carbo* are also part of the breeding seabird assemblage.

[3] *Proposed extension to Flamborough Head and Bempton Cliffs Special Protection Area and renaming as Flamborough and Filey Coast potential Special Protection Area,* Departmental Brief. Natural England, January 2014 at page 4.

**Table 2.1: Summary of Ornithological Interest of the pSPA**

| Species | Count (period) | % of subspecies or population (pairs) | Interest Type |
|---|---|---|---|
| **Original classification** | | | |
| Black-legged kittiwake *Rissa tridactyla* | 83,700 pairs (1987) | 4% Western Europe | Migratory |
| **Revised proposal** | | | |
| Black legged kittiwake *Rissa tridactyla* | 44,520 pairs 89,041 breeding adults (2008-2011) | 2% North Atlantic | Migratory |
| Northern gannet *Morus bassanus* | 8,469 pairs 16,938 breeding adults (2008-2012) | 2.6% North Atlantic | Migratory |
| Common guillemot *Uria aalge* | 41,607 pairs 83,214 breeding adults (2008-2011) | 15.6% (*Uria aalge albionis*) | Migratory |
| Razorbill *Alca torda* | 10,570 pairs 21,140 breeding adults (2008-2011) | 2.3% (*Alca torda islandica*) | Migratory |
| | **Count period** | **Average number of individuals** | |
| Seabird assemblage | 2008-2012 | 215,750 | |

2.4. Since this site was originally designated as a SPA, the national populations of both kittiwake and some assemblage species have suffered substantial declines. For example the UK breeding kittiwake population has reduced by 72%[4] (between 1986 and 2013). Within the SPA there has been a reduction from the 83,370 breeding pairs of kittiwakes (at time of designation, 1993) to an average of 44,520 breeding pairs between 2008 and 2011.

2.5. Attached to this written representation at Annex II is a more detailed description of both the SPA and the pSPA. Information on the two relevant species is also set out in Annex III.

[4] *State of the UK's Birds 2014*, http://www.rspb.org.uk/Images/state-of-the-uks-birds_tcm9-383971.pdf.

# 3. Legislation and Policy Background

## Introduction

3.1. Section 104 of the Planning Act 2008 provides that an application for development consent for energy infrastructure must be decided in accordance with the relevant National Policy Statement (NPS) except where in doing so it would lead to the UK:

- being in breach of its international obligations;
- be in breach of any statutory duty that applies to the Secretary of State;
- be unlawful;
- result in adverse impacts which would outweigh the benefits; or
- be contrary to regulations about how decisions are to be taken.

The suite of Energy NPSs set out the Government's approach to ensuring the security of energy supplies and the policy framework within which new energy infrastructure proposals are to be considered. The presumption in favour of granting consent, as identified in NPS EN-1, *Overarching National Policy Statement for Energy*, is subject to the tests set out in section 104 of the Planning Act (see paragraphs 4.1.2 and 1.1.2).

3.2. The international obligations and statutory duties include the Conservation of Habitats and Species Regulations 2010 (the Habitats Regulations)(paragraph 4.3.1) and the wider objective of protecting the most important biodiversity conservation interests (see section 5.3 generally). It notes the Habitats Regulations' statutory protection for important sites including Ramsar sites, listed under the Ramsar Convention[5], SPAs designated under the Birds Directive and Special Areas of Conservation (SACs) designated under the Habitats Directive[6].

3.3. NPS EN-1 also confirms that for the purposes of considering development proposals affecting them, as a matter of policy the Government wishes potential SPAs (pSPAs) to be considered in the same way as if they had already been classified. Listed Ramsar sites should also, as a matter of policy, receive the same protection (paragraph 5.3.9).

5 The Convention on Wetlands of International Importance 1971.
6 Council Directive 92/43/EEC on the conservation of natural habitats and of wild fauna and flora.

3.4. NPS EN-3, *National Policy Statement for Renewable Energy Infrastructure*, specifically identifies birds as a biodiversity concern to be taken into account (paragraph 2.6.59 and 2.6.68). Whilst it is stated that the designation of an area as a protected European site does not necessarily restrict the construction or operation of offshore wind farms (paragraph 2.6.69), the legislative requirements identified above are still to be met. The protection afforded by legislation, to which the 2008 Act and the NPSs refer, are addressed briefly below.

## The Birds and Habitats Directives

3.5. The Birds Directive requires the conservation of all species of naturally occurring birds in the wild state in the European territory of the Member States to which the Treaty applies. It applies to birds, their eggs, nests and habitats (Article 1).

3.6. The Directive imposes a requirement on Member States to maintain all wild bird populations at a level which corresponds in particular to ecological, scientific and cultural requirements, while taking account of economic and recreational requirements, or if necessary to restore the population of these species to that level (Article 2). They are also required to take the requisite measures to preserve, maintain or re-establish a sufficient diversity and area of habitats for all wild bird species, including the creation of protected areas (Article 3).

3.7. Article 4 provides particular protection for species listed in Annex I to the Directive and for regularly occurring migratory species due to the need for coherent protection in both their wintering and breeding areas to ensure their survival. These species are to be the subject of special conservation measures concerning their habitat in order to ensure their survival and reproduction in their area of distribution. Member States must classify in particular the most suitable territories in number and size as SPAs.

3.8. Article 7 of the Habitats Directive replaced the first sentence of Article 4 of the Birds Directive by applying the obligations in Articles 6(2)-(4) of the Habitats Directive to SPAs established under the Birds Directive. Those obligations require that:

> "2. Member States shall take appropriate steps to avoid, in the special areas of conservation, the deterioration of natural habitats and the habitats of species as well as

disturbance of the species for which the areas have been designated, in so far as such disturbance could be significant in relation to the objectives of this Directive.

3. Any plan or project not directly connected with or necessary to the management of the site but likely to have a significant effect thereon, either individually or in combination with other plans or projects, shall be subject to appropriate assessment of its implications for the site in view of the site's conservation objectives. In the light of the conclusions of the assessment of the implications for the site and subject to the provisions of paragraph 4, the competent national authorities shall agree to the plan or project only after having ascertained that it will not adversely affect the integrity of the site concerned and, if appropriate, after having obtained the opinion of the general public.

4. If, in spite of a negative assessment of the implications for the site and in the absence of alternative solutions, a plan or project must nevertheless be carried out for imperative reasons of overriding public interest, including those of a social or economic nature, the Member State shall take all compensatory measures necessary to ensure that the overall coherence of Natura 2000 is protected. It shall inform the Commission of the compensatory measures adopted."

3.9. Once designated SPAs and their species benefit from the requirement for plans and projects to be assessed in accordance with the above requirements.

3.10. The Natura 2000 Network is intended to be a coherent European ecological network including both SACs and SPAs that enables the natural habitat types and the species habitats concerned to be maintained or, where appropriate, restored, at a favourable conservation status in their natural range (Article 3(1) of the Habitats Directive).

3.11. The second sentence of Article 4(4) of the Birds Directive continues to provide that outside SPAs, Member States must strive to avoid pollution or deterioration of habitats. Article 13 further provides that application of measures taken pursuant to the Directive may not lead to deterioration in the present situation as regards the conservation of the wild bird species.

**The Conservation of Habitats and Species Regulations 2010 and Offshore Habitat Regulations 2007**

3.12. SACs and SPAs are protected as "European sites" in inshore waters (up to 12 nautical miles from the baselines) by the Conservation of Habitats and Species Regulations 2010 (as amended); and in offshore waters (i.e. from 12-200 nautical miles) by the Offshore Marine Conservation (Natural Habitats etc) Regulations (as amended)(Offshore Regulations). In each case the regulations transpose in a similar form Article 6 of the Habitats Directive, through regulations 61, 62 and 66 of the Habitats Regulations and regulations 25, 26 and 30 of the Offshore Regulations respectively.

3.13. The Habitats & Offshore Regulations set out the sequence of steps to be taken by the competent authority (here the Secretary of State) when considering authorisation for a project that may have an impact on a European site and its species before deciding to authorise that project. These are as follows:

a. Step 1: consider whether the project is directly connected with or necessary to the management of the SPA and its species. If not –
b. Step 2: consider, on a precautionary basis, whether the project is likely to have a significant effect on the SPA and its species, either alone or in combination with other plans or projects (the Likely Significance Test).
c. Step 3: make an appropriate assessment of the implications for the SPA and its species in view of its conservation objectives. There is no requirement or ability at this stage to consider extraneous (non-conservation e.g. economics, renewable targets, public safety etc) matters in the appropriate assessment.
d. Step 4: consider whether it can be ascertained that the project will not, alone or in combination with other plans or projects, adversely affect the integrity of the SPA and its species, having regard to the manner in which it is proposed to be carried out, and any conditions or restrictions subject to which that authorisation might be given (the Integrity Test).
e. Step 5: In light of the conclusions of the assessment, the competent authority shall agree to the project only after having ascertained that it will not adversely affect the integrity of the SPA, alone or in combination with other plans or projects.
f. Step 6: only if the competent authority is satisfied that, there being no alternative solutions, the plan or project must be carried out for imperative reasons of overriding public interest (which, subject to [regulation 62(2)], may be of a social or economic nature), they may agree to the plan or project notwithstanding a negative assessment of the implications for the European site.
g. Step 7: in the event of the imperative reasons of overriding public interest and alternative solutions tests being satisfied, the Secretary of State must secure that any necessary

compensatory measures are taken to ensure that the overall coherence of Natura 2000 is protected.

3.14. In relation to both inshore area and the offshore marine area, any competent authority must exercise its functions so as to secure compliance with the requirements of the Habitats Directive and the Birds Directive; and to take such steps as it considers appropriate to secure the preservation, maintenance and re-establishment of a sufficient diversity and area of habitat for wild birds, having regard to the requirements of Article 2 of the Birds Directive.[7]

**Principles of appropriate assessment**

3.15. The Habitats & Offshore Regulations are to be applied in accordance with the precautionary principle[8] such that a project is to be made subject to an appropriate assessment if it cannot be excluded, on the basis of objective information, that it will have a significant effect on that site and its species: the Waddenzee case.[9]

3.16. A plan or project may only be approved if the competent authority is convinced that it will not affect the integrity of the European site(s) and their species concerned. Waddenzee confirmed that where doubt remains as to the absence of adverse effects on the integrity of the site, approval should be refused[10] (subject to the considerations of alternative solutions, imperative reasons of overriding public interest and the provision of compensatory measures). Thus an appropriate assessment requires that all aspects of the project which could affect the site's conservation objectives must be identified in the light of the best scientific knowledge in the field.[11] The competent authority, "taking account of the conclusions of the appropriate assessment of the implications…for the site concerned, in the light of the conservation objectives, are to authorise such activity only if they have made certain that it will not adversely affect the integrity of the site. That is the case where no reasonable scientific doubt remains as to the absence of such effects"[12] (emphasis added).

[7] See regulation 9 of the Habitats Regulations and regulation 6 of the Offshore Regulations.
[8] See Article 191 of the Treaty on the Functioning of the European Union ("TFEU").
[9] CJEU Case-127/02; [2004] ECR-7405 at [45].
[10] [56]-[57].
[11] [61].
[12] [59].

3.17. European Commission guidance "Managing Natura 2000" advises[13] that "as regards the connotation or meaning of 'integrity', this can be considered as a quality or condition of being whole or complete. In a dynamic ecological context, it can also be considered as having the sense of resilience and ability to evolve in ways that are favourable to conservation. The 'integrity of the site' has been usefully defined as 'the coherence of the site's ecological structure and function, across its whole area, or the habitats, complex of habitats and/or populations of species for which the site is or will be classified'.[14] A site can be described as having a high degree of integrity where the inherent potential for meeting site conservation objectives is realised, the capacity for self-repair and self-renewal under dynamic conditions is maintained, and a minimum of external management support is required. When looking at the 'integrity of the site', it is therefore important to take into account a range of factors, including the possibility of effects manifesting themselves in the short, medium and long-term".[15]

3.18. As is clear from the requirements of the Habitats and Offshore Regulations that the assessment of integrity is to be considered by reference to the impact of the project alone and in combination with other plans and projects. As clearly set out in *Waddenzee*, para 61:

> **61** In view of the foregoing, the answer to the fourth question must be that, under Article 6(3) of the Habitats Directive, **an appropriate assessment of the implications for the site concerned of the plan or project implies that, prior to its approval, all the aspects of the plan or project which can, by themselves or in combination with other plans or projects, affect the site's conservation objectives must be identified in the light of the best scientific knowledge in the field**. The competent national authorities, taking account of the appropriate assessment of the implications of mechanical cockle fishing for the site concerned in the light of the site's conservation objectives, are to authorise such an activity only if they have made certain that it will not adversely affect the integrity of that site. That is the case where no reasonable scientific doubt remains as to the absence of such effects. (emphasis added)

## Environmental Impact Assessment

3.19. The Infrastructure Planning (Environmental Impact Assessment) Regulations 2009 (as amended) state that development consent cannot be granted for EIA development unless the decision-maker has taken into account environmental information including an environmental statement

[13] Paragraph 4.6.3.
[14] See ODPM Circular 6/2005 para. 20.
[15] See too the European Commission Guidance; Wind Energy Developments and Natura 2000, 2011, page 82-83, paragraph 5.5.3.

which describes the likely significant effects, including cumulative effects, of the development on the environment. This will include effects on all wild bird species whether SPA species or not.

3.20. NPS EN-3 acknowledges that offshore wind farms have the potential to impact on birds through collision with rotating blades, direct habitat loss, disturbance from construction activities, displacement during the operational phase (resulting in loss of foraging/roosting area) and impact on bird flight lines (i.e. barrier effect) and associated increased energy use by birds for commuting flights between roosting and foraging areas.[16] These potential impacts have been taken into account by the RSPB and its remaining concerns with the applications are set out below, in the context of the legislative provisions summarised above, in particular those relating to appropriate assessment.

[16] Paragraph 2.6.101; see paragraphs 2.6.100-110 and 2.6.58-71 generally. Effects on foraging areas outside an SPA are to be taken into account when assessing the effects on bird populations of the SPA: see *Hargreaves v Secretary of State for Communities and Local Government* [2011] EWHC 1999 (Admin), which concerned effects on pink-footed geese which commuted inland from their roosting sites in the SPA to feed on grain and winter cereal crops on fields adjacent to the proposed development site.

# 4. Offshore Ornithology

## In-combination Collision Risk to Gannets

4.1. The RSPB's principle concerns are with collision mortality to gannets of the FFC pSPA from the East Anglia THREE proposal (the Project) in-combination with other plans and projects, primarily with Hornsea offshore wind farm Projects 1 and 2[17]. At present the RSPB does not have confidence that potential adverse effects on the integrity of these protected sites and their species can be avoided. Should the DCO for Hornsea Project 2 not be granted, our concerns would be reduced significantly, however, the outcome for that proposal is unknown at this stage.

4.2. We are concerned that breeding season impacts from the East Anglia THREE proposal have been screened out as collisions during the breeding season are predicted to be less than ten and because the birds are considered likely to be non-breeders (Environmental Statement, document reference 6.1.13 (hereafter 'ES') Ch. 13, Para. 186-187). We do not agree that collisions will not exceed ten, primarily due to our disagreement with the use of a 98.9% avoidance rate (AR) during the breeding season and the assessment of the migration-free breeding season only (without coverage of the standard breeding season). We also do not agree that all birds present in the breeding season should be considered to be non-breeders and in any event should be included in the assessment as non-breeding adults and juveniles are all part of the pSPA's gannet population. These points are explained in detail below.

## Detailed concerns

### *Gannet Avoidance Rate*

4.3. Whilst the RSPB accept the SNCB's recently recommended amendment to the gannet AR (from 98% to 98.9%) for non-breeding birds, we do not agree that this figure should be applied to the breeding season due to the lack of available evidence relating to breeding birds. The reason for the difference between Natural England and the RSPB in their preferred avoidance rates for gannet is that the avoidance rate review carried out by the BTO[18] for gannet was almost entirely based on birds outside the breeding season. It would be expected that breeding gannets would

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[17] Hornsea Projects 1 and 2 together represent 24% of the breeding season in-combination collision mortality attributable to FFC pSPA / FHBC SPA

[18] Cook, A., Humphreys, E., Masden, E. & Burton, N. (2014) The avoidance rates of collision between birds and offshore turbines. BTO Research Report No. 656. http://www.gov.scot/resource/0046/00464979.pdf

behave differently from non-breeding birds, and recent work by Cleasby et al., (2015)[19], demonstrated that foraging birds flew higher, and were therefore at greater risk of collision, than commuting birds. In light of this recent evidence, and given that the BTO review was so heavily biased to non-breeding birds, while we accept the rate for non-breeding season, we prefer a lower, more precautionary rate for the breeding season. We therefore consider that an AR of 98% should be presented for the breeding season. The current SNCB advice[20] also highlights that due consideration should be given to uncertainty in collision risk estimates, including the use of confidence intervals around the avoidance rates and flight height estimates.

4.4. We note that avoidance rates have been altered retrospectively for other windfarms included in the in-combination assessment. As noted above, we do not agree with this change for birds present in the breeding season.

### *Use of migration-free breeding season*

4.5. The Applicant has presented collision risk figures for the migration-free breeding season rather than the standard breeding season. For gannet, this excludes March and September, which significantly reduces the number of predicted collisions. Gannets start arriving in January and establishing their nest sites in March. Whilst peak fledging is in August, some birds are still fledging in September, hence there is a strong argument for considering these months to be part of the breeding season. If figures for the migration-free breeding season are to be presented, we consider that it would be necessary to attribute birds in March and September to breeding and dispersal in order to ensure collision risk to breeding birds is not underestimated. We would therefore like to see in–combination mortality figures presented for the standard breeding season (alongside the migration-free breeding season, if required), as well as the autumn period, so that

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[19] Cleasby, I. R., Wakefield, E. D., Bearhop, S., Bodey, T. W., Votier, S. C. and Hamer, K. C. (2015), Three-dimensional tracking of a wide-ranging marine predator: flight heights and vulnerability to offshore wind farms. J Appl Ecol, 52: 1474–1482. http://onlinelibrary.wiley.com/doi/10.1111/1365-2664.12529/full

[20] As set out in their Joint Response from the Statutory Nature Conservation Bodies to the Marine Scotland Science Avoidance Rate Review 24th October 2014. Further, the Response details the need to take into account uncertainty, and the means to do this, including:

- presenting a range of collision mortality estimates using the lower and upper confidence limits of the generic modelled flight distribution
- presenting a range of collision mortality estimates reflecting the empirically derived range of uncertainty around the mean avoidance rate
- presentation and comparison of both site-specific and generic flight height data (including median and upper and lower confidence limits).

the contribution of the different seasons to total annual mortality can be determined and impacts on the FFC pSPA understood more clearly.

4.6. We also note that the Applicant has used the mortality figures for the migration-free breeding season for the Project's contribution to breeding season in-combination mortality. Given that the figures for other windfarms are likely to represent the standard breeding season, in our view the figures presented for East Anglia THREE should do the same.

### *Use of Band Options 1 and 2 in assessment*

4.7. Given the lack of evidence for the use of Band Basic model Option 1 in preference to Option 2 (or vice versa), our view is that the most precautionary figures should be used in the assessment in the absence of any biologically meaningful reason to prefer one over the other. In this case, this would require the use of the Band Basic model, Option 2. Option 2 also has the utility of having associated confidence intervals around the flight height estimates allowing for an indication of uncertainty to be made in the assessment, in line with the model guidance and the SNCB advice.

### *Rebuttal of reasons for regarding collision risk figures as overestimates*

4.8. The Environmental Statement repeatedly asserts that the collision risk figures presented for the Project are likely to be over-estimates. This is due to a number of points, some of which are of concern to us. Our rebuttal of these points is given below.

4.9. The Project's ES, Chapter 13, paragraph 174 refers to an APEM (2014) study of gannet behaviour at Greater Gabbard offshore windfarm. This study consisted of four survey flights between 30th October and 23rd November 2014, outside the breeding season. The study claims that gannet displayed an overall avoidance rate of 100% although a rate of 99.5% was proposed. Although the Applicant does not adopt this figure, paragraph 174 states that this study indicates that the collision risk for East Anglia THREE is overestimated by at least 50%, based on the current assessment with a 98.9% AR. While this report is welcome we note the following:

- It only represents a small survey period of less than a month
- It does not have any account of the behaviour of breeding gannets

- The reported change in gannet density, attributed by the authors to avoidance behaviour, was not significant.

As such the paper does not represent any evidence that would alter the current preferred avoidance rates.

4.10. The ES (in Ch. 13, paras. 175-177 and throughout) also refers to the findings of the nocturnal activity factor report by MacArthur Green (2015) (ES App.13.1 [doc. ref. 6.3.13(1)]) to justify the assertion that the collision risk figures are over-estimates. Nocturnal activity is one of a number of variables included in the Band model process, and recent work has indicated how important consideration of these variables is[21]. As such we welcome this review of nocturnal activity. However we would caution against the use of such a review to make overarching comments on the over-estimation of collision risk at all sites at all times of year. For example, the studies reviewed for non-breeding gannets are robust, and therefore the conclusions are useful. However for breeding gannets, the authors cite work by Warwick-Evans *et al.,*(2015)[22]. Again this is a robust study, but we would point out that this reported the highest levels of gannet activity between the hours of 0400 and 0600 in the morning, with a slightly lower peak between 0300 and 0400. Activity associated with foraging by plunge diving, when collision risk is greatest[23], was highest between 0500 and 0600 and between 1900 and 2000. The purpose of differentiating between night-time and daytime flight activity, as detailed in the Band model guidance, is simply to separate between times when surveys take place (daytime) and where they do not (night-time) and the flight activity factor applied is a correction for this. While the Applicant does not present timings for when the aerial surveys were carried out, it is unlikely they carried out surveys so far from shore between 0300 and 0600, and between 1900 and 2000, and as such the results for gannet could omit a large part of flight activity and therefore produce a potentially serious underestimation of collision risk.

4.11. As such, while a review one of the input variables to the Band modelling process is welcome, it is not possible to draw the overly simplistic conclusion that modelled rates of collision mortality are over-estimates. We would also note that in a recent sensitivity analysis of the influence of the

[21] Masden, E.A. (2015) Developing an avian collision risk model to incorporate variability and uncertainty.
[22] Warwick-Evans, V., Atkinson, P.W., Gauvain, R.D., Robinson, L.A., Arnould, J.P.Y. & Green, J.A. (2015). Time-in-area represents foraging activity in a wide-ranging pelagic forager. Marine Ecology Progress Series, 527, 233-246.
[23] Cleasby et al. 2015

different input parameters on the estimation of collision mortality by the Band CRM, the nocturnal activity factor was relatively low in comparison with other variables, such as bird density and flight speed.

4.12. The ES in Ch. 13, para. 186 asserts that birds present within the Project footprint during the breeding season are likely to be non-breeders due to their distance from colonies. Whilst we note the Project area is just outside the mean maximum foraging range for gannet, it is well within the maximum foraging range. Indeed recent gannet tracking has recorded a foraging trip of a breeding adult of 1680 miles.[24] However, non-breeding adults which are part of SPA populations may be present and should be considered as they could breed in future.

4.13. Regarding the in-combination assessment specifically, the Applicant states that many of the collision estimates have been calculated for larger windfarms than have been built and therefore total mortality is overestimated. This is an acceptable point for windfarms where the DCO has been amended and therefore there is legal certainty regarding the reduction, but where windfarms still have their original DCOs, it is not appropriate to do anything less than assess the full extent of those DCOs when considering in-combination/cumulative effects.

## Effect on contribution to in-combination mortality of the FFC pSPA gannets

4.14. The Applicant does not assess in-combination collision risk for the breeding season or spring migration separately as East Anglia THREE alone mortality is considered unlikely to contribute to in-combination impacts. The annual figures and those for autumn migration only are presented. The RSPB have recalculated the Project alone mortality and the Project's contribution to in-combination mortality using our preferred parameters (as explained in under 'Detailed concerns' above). Using the standard breeding season, a breeding season AR of 98% and Band Option 2, Project alone mortality rises from 7 (as reported by the Applicant) to 31. This equates to a 10.3% contribution to total in-combination mortality (see Table 1). We therefore do not agree that the Project's contribution to in-combination breeding season mortality can be screened out.

[24] https://www.theguardian.com/environment/2016/jul/07/gone-fishing-gannet-makes-record-breaking-1700-mile-trip

**Table 1. Gannet mortality and Counterfactuals of Population Size (CPS) using EA3 and RSPB preferred parameters.** CPS is the percentage difference between median population sizes with and without the development, after 25 years (the lifetime of the project). It represents the decrease in population.

| | **Standard breeding season (Mar-Sep)** | | **Migration-free breeding season (Apr-Aug)** | |
|---|---|---|---|---|
| | **Mortality** | **CPS (%)** | **Mortality** | **CPS** |
| CR, project alone, attributed to FFC pSPA Option 1 98.9% AR | 12 | 1.3 | 7 (EA3 reported figure) | 0.8 |
| CR, project alone, attributed to FFC pSPA, Option 2 98% AR | 31 (RSPB preferred figure) | 3.3 | 16 | 1.7 |
| In-combination CR, attributed to FFC pSPA converted to 98% AR | 300.2 | 27.9 | n/a | |
| % in-combination CR attributable to EA3 based on RSPB preferred figure | 10.3% | | | |

## Conclusions on Gannets

4.15. The Applicant concludes that an adverse effect on the integrity of the FFC pSPA and its species will not result from in-combination collision mortality. If the Applicant's figures were substantiated, we may agree, however we disagree with some of the key parameters used in the gannet assessment, as explained above. If Hornsea Project 2 is consented, we consider that in-combination mortality will be at a level that would result in an adverse effect on the integrity of on FFC pSPA and its species and that it would not be possible to consent other projects, including East Anglia THREE, with impacts on these sites.

## Raising turbine height

4.16. The RSPB considers that the potential for adverse effects on gannets (and kittiwakes – as discussed below) arising out of the East Anglia THREE proposal could be significantly reduced through elevating the lower swept area of the wind turbines through a rise in hub height. This would have the effect of reducing the percentage of birds flying at collision height and hence reduce collision risk (as illustrated in the calculations set out below in Table 2) and therefore reduce any potential in-combination effects arising out of the East Anglia THREE proposals.

**Table 2. Potential reduction (due to change in blade height) in breeding season collision risk to gannets of the FFC pSPA**

| Blade height | Project alone mortality (birds per year)[a] | Total in-combination mortality (birds per year)[bc] | East Anglia THREE contribution to in-combination mortality[d] (%) |
|---|---|---|---|
| Current proposal 22-176m | 31 | 300.2 | 10.3 |
| 27-181m | 18 | 287.2 | 6.3 |
| 32-186m | 12 | 281.2 | 4.3 |

[a] figures are based on the RSPB preferred parameters (98% avoidance rate for breeding season, Band Option 2 and the standard breeding season of March – September)
[b] figures converted from 98.9% to 98% avoidance rate
[c] note that total in-combination mortality is also correspondingly reduced with the change in turbine specifications
[d] on the basis that Hornsea Project 2 receives consent.

## Cumulative Collision Risk to Kittiwakes

4.17. The RSPB are also concerned about the level of mortality to which kittiwakes are likely to be subject as a result of cumulative collision mortality. We are concerned that breeding season impacts have been screened out from further assessment as collisions due to East Anglia THREE are less than ten and birds within the Project area are considered likely to be non-breeders. We do not agree that collisions will not exceed ten, primarily due to the assessment of the migration-free breeding season only (without coverage of the standard breeding season). These concerns are explained in detail below. We are also concerned about the Project's contribution to cumulative mortality during the autumn and spring migration seasons, as explained further below.

4.18. We also support Natural England's position (para. 4.1.6.2 in their Relevant Representations [doc. RR-003]) that levels of in-combination collision mortality to kittiwakes of the FFC pSPA / FHBC SPA are such that adverse effects on integrity cannot be ruled out. However, we also acknowledge their point that this Project's contribution is sufficiently small as to not materially alter the significance of the in-combination mortality figure or the likelihood of adverse effects on integrity arising. Our comments below therefore focus on the cumulative mortality assessment.

## Detailed concerns

### *Use of migration-free kittiwake breeding season*

4.19. The Applicant has presented collision risk figures for the migration-free breeding season rather than the standard breeding season. For kittiwake, this excludes March-April and August, which significantly reduces the number of collisions. The first kittiwakes arrive at the colony in February, with most birds back by March and remaining until August, hence there is a strong argument for considering March, April and August to be part of the breeding season. If figures for the migration-free breeding season are to be presented, we consider that it would be necessary to attribute birds in March-April and August to breeding and dispersal in order to ensure collision risk to breeding birds is not underestimated. We would therefore like to see cumulative mortality figures presented for the standard breeding season (alongside the migration-free breeding season, if required), as well as the autumn period, so that the contribution of the different seasons to total annual mortality can be determined.

4.20. We also note that the Applicant has used the mortality figures for the migration-free breeding season for the Project's contribution to breeding season cumulative mortality. Given that the figures for most other windfarms are likely to represent the standard breeding season, in our view the figures presented for East Anglia THREE should do the same.

### *Use of Band Basic model, Options 1 and 2 for kittiwakes*

4.21. Given the lack of evidence for the use of Band Basic model, Option 1 in preference to Option 2 (or vice versa), our view is that the most precautionary figures should be used in the assessment where there is no biologically meaningful reason to prefer one over the other. In this case, this would require the use of Band Basic model, Option 2. Option 2 also has the utility of having associated confidence intervals around the flight height estimates allowing for an indication of uncertainty to be made in the assessment, in line with the model guidance and the SNCB advice.

### *Rebuttal of reasons for regarding collision risk figures as overestimates*

4.22. The Environmental Statement repeatedly asserts that the collision risk figures presented for the Project are likely to be over-estimates. This is due to a number of points, some of which are of concern to us. Our rebuttal of these points is given below.

4.23. The ES (in Ch. 13, paras.175-177 and throughout) also refers to the findings of the nocturnal activity factor report by MacArthur Green (2015) (ES App. 13.1) to justify the assertion that the CR figures are over-estimates. Nocturnal activity is one of a number of variables included in the Band model process, and recent work has indicated how important consideration of these variables is[25]. As such we welcome this review. However in this recent work *(Ibid*), a sensitivity analysis of the influence of the different input parameters on the estimation of collision mortality by the Band CRM, the nocturnal activity factor was relatively low in comparison with other variables, such as bird density and flight speed. That flight speed is one of the most important input variables was also highlighted by SNH in guidance[26]. As a part of her analysis, Masden (2015) used RSPB FAME data, from the tracking of 427 kittiwake both near and offshore to derive a flight speed of 7.26ms$^{-1}$. For their modelling, the applicant has used the flight speed reported by Pennycuik (1987)[27], who used an ornithodolite to measure 18 nearshore flights, giving a flight speed of 13.1ms$^{-1}$. As shown by the SNH guidance[28] lower flight speeds result in a considerably greater collision mortality estimate, and so in the context of this input variable, the Applicant could be considered to be presenting an under-estimation of collision mortality, not only for this project but for the other projects considered in the in combination assessment.

4.24. The review also does not include contextual ecological information. For example an important aspect of kittiwake seasonal behaviour is that they depend on a greater proportion of plankton in

[25] Masden, E.A. (2015) Developing an avian collision risk model to incorporate variability and uncertainty.
[26] http://www.snh.gov.uk/docs/A1440818.pdf
[27] Pennycuick, C. J. "Flight of auks (Alcidae) and other northern seabirds compared with southern Procellariiformes: ornithodolite observations."*Journal of Experimental Biology* 128.1 (1987): 335-347.
[28] http://www.snh.gov.uk/docs/A1440818.pdf

their diet in the winter[29]. As many plankton undergo a diurnal vertical migration, in other words migrate to closer to the water surface at night, it would be expected for kittiwake to forage to some extent during the night in the winter. The paper cited by the Applicant in their review, Orben *et al*., (2015)[30] only examined kittiwakes foraging in the North Pacific, and it is likely that birds foraging in the vicinity of the project will demonstrate different behaviours.

4.25. The ES in Ch. 13, para. 186 asserts that birds present within the Project footprint during the breeding season are likely to be non-breeders due to their distance from colonies. We agree that the Project footprint is outside the maximum foraging range for kittiwake from FFC pSPA/FHBC SPA and, if present, breeding birds are likely to be in low numbers. However, non-breeding adults which are part of pSPA/SPA population or the regional population may be present and should be considered as they could breed in future.

4.26. The Applicant states that many of the collision estimates for other windfarms have been calculated for larger windfarms than have been built and therefore total mortality is overestimated. This is an acceptable point for windfarms where the DCO has been amended and therefore there is legal certainty regarding the reduction, but where windfarms still have their original DCOs, it is not appropriate to do anything less than assess the full extent of those DCOs when considering in-combination/cumulative effects.

### *Procedural points regarding use of PVA and PBR in CRM*

4.27. The Applicant refers to a Potential Biological Removal (PBR) produced by Smart Wind for a similar kittiwake population to the autumn Biologically Defined Minimum Population Scale (BDMPS) (ES Ch. 13, para. 303). This found that the smallest seasonal threshold is greater than predicted annual mortality. The Applicant also refers to the PBR produced by Natural England for the Dogger Bank Creyke Beck project (ES Ch. 13, para. 304) and, in relation to the FFC pSPA/FHBC SPA kittiwake populations, to PBRs produced for Hornsea Projects 1 and 2 (Information for the Habitats Regulations Assessment [doc. ref. 5.4], paras. 424-425).

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[29] Karnovsky, Nina J., et al. "Seasonal changes in diets of seabirds in the North Water Polynya: a multiple-indicator approach." *Marine Ecology Progress Series* 357 (2008).
[30] Orben, Rachael A., et al. "North or south? Niche separation of endemic red-legged kittiwakes and sympatric black-legged kittiwakes during their non-breeding migrations." *Journal of Biogeography* 42.2 (2015): 401-412.

4.28. The RSPB supports Natural England's advice[31] and does not accept that PBR is appropriate to assess additional mortality effects on protected sites species' populations through collision or displacement.

4.29. PBR was originally designed to detect "overharvesting of exploited animal populations and unsustainable additional mortality of other kinds... It is important to understand the basic purpose of the PBR method. It attempts to identify the level of additional mortality that will lead to the extinction or substantial reduction of the population, but it does not explicitly estimate how population size will change over a period of time as a result of an intervention... PBR calculations do not provide an estimate of how large the difference between the population with and without the intervention is expected to be... [and] appropriately conducted PBR calculations provide a means to identify levels of additional mortality caused by an intervention that would almost certainly result in the decline of the population of interest to extinction or, at best to low levels. By contrast, the objectives of SPA protection of a site usually require the maintenance of populations of those species for which the site was designated close to the population levels at designation, or in some cases to restore populations.

4.30. "These are very different objectives to that implicit in the use of PBR, which is to reduce the risk of extinction or population reduction to a low level. The avoidance of extinction or population reduction to a low level are not sufficient as objectives for sites specially selected and designated to protect the populations they hold. Hence, the use of PBR as a test of the expected impact of a project on the integrity of an SPA is inappropriate. An adequate test requires that the expected

[31] As set out in NE's relevant representations - 4.1.2.1. Natural England does not advocate the use of PBR modelling when PVA modelling is available. Natural England has previously considered PBR outputs for assessing population impacts in cases where up to date PVA models have not been available at an appropriate population scale... However, the use of PBR on its own, as the means of assessing population impacts on seabird populations presents a number of issues. Therefore, Natural England advises that wherever possible, the population-level impacts of predicted mortality from developments should be assessed using PVA models as these allow the effects of factors such as population trends and varying demographic parameters to be explicitly investigated in terms of their effect on the population trajectory. PVA models also allow relative comparisons of population level effects with and without the additional mortality to be considered in a way that is not possible with PBR."

NE goes on to highlight in its RR on page 3 of its Appendix, that use of PBR is one of its five main concerns "Natural England does not advocate the use of PBR modelling when PVA modelling is available. Natural England has previously considered PBR outputs for assessing population impacts in cases where up to date PVA models have not been available at an appropriate population scale1. However, the use of PBR on its own, as the means of assessing population impacts on seabird populations presents a number of issues. Therefore, Natural England advises that wherever possible, the population-level impacts of predicted mortality from developments should be assessed using PVA models as these allow the effects of factors such as density dependence, population trends and varying demographic parameters to be explicitly investigated in terms of their effect on the population trajectory. PVA models also allow relative comparisons of population level effects with and without the additional mortality to be considered in a way that is not possible with PBR.

population size of species of interest is projected with and without the anticipated effects of the project. PBR does not, and is not designed to, specify the expected difference between the size of the population of the species of interest with and without the project."[32].

4.31. The RSPB contends that the most robust method in the context of this proposal, and other similar schemes, is Population Viability Analysis (PVA). PVA enables comparison of the change in population size with and without the project, after several years, thereby presenting an indication of the magnitude of change attributable to the proposal.

4.32. The Applicant also reports on a PVA for the kittiwakes' regional population (ES Ch. 13, para. 305), although they only refer to density dependent outputs. This indicates that after 25 years, the kittiwake population is likely to reduce by 3.3-4.5% as a result of total cumulative mortality. The density independent outputs are presented in Fig. 7, ES App. 13.4 [doc. ref. 6.3.13 (4)] and summarised in Table 3, below. These indicate a potential decrease in the BDMPS population of 10.3% over 25 years.

4.33. Density dependence occurs when the population growth rate or demographic rates vary causally with population size. When population density is high, increased competition for resources – food, nest sites, mates etc, tends to slow or halt population growth whilst at lower population density, competition tends to be reduced, leading to increases in population growth rates. At very low population density, individuals may be less able to find mates; this is inverse density dependence. Density independence is where there is no link between demographic rates and population size.

4.34. Whilst the RSPB welcomes the Applicant's PVA, we support Natural England's position (in para. 4.1.4.2 of their Relevant Representations) that only the version of this measure from the density independent model is robust because results from versions that include density dependence are sensitive to the assumptions made about its strength. The true strength of density dependence is unknown for these seabird populations, hence the use of 'recovery factors' has been prompted by these uncertainties. "The values used for these recovery factors are based upon judgment. There

[32] From the RSPB's Hornsea Project One written representations Annex - Professor Green's Critique of methods used to assess the effect of additional mortality on bird population size

has been no empirical validation of their safety by observation of the effects on population size of known additional mortality rates from any source in any bird species."[33] .

4.35. Density independence is therefore the precautionary approach and so should be considered. We advise presenting a range of scenarios, incorporating a number with various levels of density dependence, alongside the density independent outputs.

4.36. The RSPB has also previously requested that outputs from the PVA are presented in the form of counterfactuals of population size. These indicate the percentage difference between the population with or without additional mortality, at the end of the lifetime of the wind farm and are a robust and informative metric. We therefore welcome the presentation of PVA outputs in this form.

## Contribution to seasonal cumulative mortality

4.37. The Applicant does not assess cumulative collision risk for the breeding season separately as East Anglia THREE alone mortality is considered unlikely to contribute to cumulative impacts. The annual figures and those for spring and autumn migration only are presented. A PVA was carried out by the Applicant examining the population scale effects of these mortalities on the regional North Sea population, using the BDMPS. The outputs of this modelling were presented in the ES (Ch.13, para. 305). While the modelling included assessment against annual, spring migration and autumn migration populations, only the effects on the larger autumn migration population are presented, with no justification provided. Using the Applicant's own calculations, and an in combination annual mortality of 3752 (from Table 1.1. Information for the Habitats Regulations Assessment, Volume 5, Erratum Correction to Kittiwake In Combination Collision Mortality) from Annex 2 of ES App. 13.4, the effects on the three BDMPS are given in Table 3 below, expressed as the Counterfactual of Population Size, the RSPBs preferred metric[34] . Even using the Applicant's preferred autumn migration population, there would be a decrease in 10.3% in the regional population as a consequence of cumulative impacts over the lifetime of the project, and using the spring population this would be 12.8%. The approach of using any BDMPS population for PVA is

[33] Green, R. E., Langston, R. H., McCluskie, A., Sutherland, R., & Wilson, J. D. (2016). Lack of sound science in assessing wind farm impacts on seabirds. *Journal of Applied Ecology*.
[34] Green, R. E., Langston, R. H., McCluskie, A., Sutherland, R., & Wilson, J. D. (2016). Lack of sound science in assessing wind farm impacts on seabirds. *Journal of Applied Ecology*. http://onlinelibrary.wiley.com/doi/10.1111/1365-2664.12731/full

novel, and requires greater explanation and consideration as to whether it is actually biologically meaningful. For example, the models assume a closed population whereas the BDMPS populations are almost by definition not discrete units. Such explanation and consideration is not included in any of the documentation submitted. We consider that Natural England's proposed methods for examining impacts on the regional population has merit (Natural England's Relevant Representation Para. 4.1.4.3 / App. 1 paras. 56-58 [RR-003]) and requires greater exploration.

**Table 3. Cumulative impacts on Kittiwake presented as Counterfactual of Population Size (CPS) after 25 years for North Sea regional populations for the assessed annual cumulative mortality of 3752.** CPS is the percentage difference between predicted median population sizes with and without the development, after 25 years (the lifetime of the project) using the density independent model. It represents the decrease in population attributable to in-combination mortality.

| Population | Annual | Autumn | Spring |
|---|---|---|---|
| CPS (%) | 10.3 | 9.3 | 12.8 |

4.38. In addition, the RSPB have recalculated the Project alone mortality and the Project's contribution to cumulative mortality using our preferred parameters (as explained in the 'Detailed concerns' section above). Project alone mortality rises from 8 (as reported by the Applicant using the migration-free breeding season and Band Basic model, Option 1) to 23 (using the RSPB's preferred standard breeding season and Band Basic model, Option 2), and therefore in our view should not be screened out of the assessment. This equates to a 2.58% contribution to total breeding season cumulative mortality (see Table 4). For the autumn and spring migration seasons, the Project's contribution is 6.78% and 4.29% respectively based on Band Basic model, Option 2.

**Table 4. Kittiwake mortality using EA3 and RSPB preferred parameters.**

| | Std breeding (Mar-Aug) | Mig-free breeding (May-Jul) | Autumn migration (Aug-Dec) | Spring migration (Jan-Apr) |
|---|---|---|---|---|
| Collision mortality, project alone, Option 1 98.9% AR | 20 | 8 (EA3 reported figure) | 90 | 49 |
| Collision mortality, project alone, Option 2 98.9% AR | 23 (RSPB preferred figure) | 9 | 104 | 57 |
| Cumulative collision mortality (Option 1 or 2, 98.9% AR) | 891.8 (standard or migration-free breeding season) | | 1533.5 | 1327.3 |
| % cumulative collision mortality attributable to EA3 based on RSPB preferred figure | 2.58% | | 6.78% | 4.29% |

## Conclusions on kittiwakes

4.39. The Applicant concludes that an adverse effect on the integrity of FFC pSPA/FHBC SPA will not result from in-combination collision mortality and that effects on the regional population will be of only minor to moderate significance. Although we acknowledge that East Anglia THREE's contribution is relatively small, we have some concerns about levels of cumulative (and in-combination) impacts. We note that the rise in turbine height advocated for gannets above would also be beneficial in reducing potential impacts on kittiwakes still further. Details are set out below.

## Raising turbine height

4.40. As described for gannets above, the RSPB considers that the potential for impacts on kittiwakes arising out of the East Anglia THREE proposal could also be reduced through elevating the lower swept area of the wind turbines through a rise in hub height. This would have the effect of reducing the percentage of birds flying at collision height and hence reduce collision risk (as illustrated in the calculations set out below in Table 5) and therefore reduce the Project's contribution to any potential cumulative and in-combination effects.

**Table 5. Potential reduction (due to change in blade height) in breeding season collision risk to kittiwakes (at the regional population scale)**

| | Std breeding (Mar-Aug) | Mig-free breeding (May-Jul) |
|---|---|---|
| CR, project alone, Option 2 98.9% AR, 22-176m | 23 | 9 |
| CR, project alone, Option 2 98.9% AR, 27-181m | 14 | 6 |
| CR, project alone, Option 2 98.9% AR, 32-186m | 8 | 3 |

## Cumulative Collision risk to Great Black-backed Gull

4.41. The RSPB consider that cumulative mortality to great black-backed gull is reaching levels that may be of concern. The Applicant refers to the use of PBR for this species in the decision for Rampion offshore windfarm and concludes that there will be no long term impact. We support the advice of Natural England on its use[35] and given these concerns with the use of PBR, also recommend that a PVA is developed in order to properly assess impacts on this population.

4.42. It should be noted that our advice regarding a rise in turbine height would also be of benefit for great black-backed gull, and would therefore be likely to reduce East Anglia THREE's contribution to this species' cumulative mortality.

[35] As set out in its Relevant Representations paragraph 4.1.5.1. "The total cumulative effects on great black-backed gulls from collision mortality equates to 16.4% of baseline mortality for the largest BDMPS (non-breeding in Furness (2015)) and 6.38% of baseline mortality for the biogeographic population. Therefore, Natural England advises further consideration through population modelling. We note that the outputs of PBR modelling from Rampion are presented. However, Natural England advises the use of PVA modelling...."

## 5. Comments on the draft DCO – provisions for post-construction monitoring

5.1. The In Principle Monitoring Plan - Offshore [doc. 8.12] sets out proposals for post-construction monitoring focused on kittiwake and gannet which aims to "substantiate, within reason, macro (and where possible meso) industry standard avoidance rates used in the East Anglia THREE environmental statement." This is secured through condition 19 of Schedule 10 and 11 of the draft Deemed Marine Licences within the draft DCO [doc. 3.1].

5.2. The RSPB welcomes the Applicant's inclusion of offshore monitoring within its proposals as the current lack of empirical evidence of the scale of impact on bird populations from offshore wind farms means the high levels of uncertainty in the conclusions of predicted population level impacts used for the decision making process remain. Post consent monitoring will help address and reduce these uncertainties for future deployment of offshore renewables.

5.3. To provide this required empirical evidence monitoring must include both strategic monitoring at a large spatial scale (eg biogeographic, regional or country-level) and project level monitoring, although there will be significant overlap between activities needed to deliver these elements. An RSPB key priority is securing the long term protection and conservation of the internationally important seabird populations found in UK waters.

5.4. The resources required must be made available for this monitoring and should be directed to two main tasks, surveillance (to observe and react to population scale impacts) and targeted monitoring (aimed at investigating focused questions, understanding impacts and their mitigation (and whether that migration is effective) and informing future planning).

5.5. It is crucial that the questions to be answered are clearly defined from the start. This will allow debate as to the practicality of different means of answering the questions and in particular:

- **Focus effort to make efficient use of limited resources.** A tailored approach is required to single out specific species and/or impacts. This is in preference to generic monitoring across all receptors;
- **Ensure change can be detected.** Power analysis should be undertaken to gauge level of effort against likelihood of detecting an effect; and

- **Align methodologies to gain consistency and comparability.** Consistency of approach will build the empirical dataset and enable analysis at regional and bio-geographic scales to detect population level effects. Seeking early dialogue between developers, government, agencies and stakeholders (including the RSPB) is recommended to define approaches.

## Strategic Monitoring

5.6. In those instances where the expected impact is collision (and therefore direct mortality), monitoring, notably of breeding adults, should be possible through annual colony counts. More detailed information about individual mortality events may be provided for example by regular abundance estimates through the breeding season (which would be akin to observing nest desertions in productivity monitoring).

5.7. In those instances where displacement or barrier effects from the windfarm footprint and buffers zones are expected, the population level impact will derive from poorer foraging success and reduced breeding productivity, through for example reduced clutch sizes or fledging success. Productivity monitoring will therefore be required for these populations.

## Project Level Monitoring

5.8. Beyond strategic monitoring, project level monitoring is needed to understand the impact pathways, test hypotheses that have been used in planning decisions, such as avoidance and collision rates, to seek approaches to mitigate impacts and to improve marine planning for future applications.

5.9. Novel approaches may be required to address these questions. As a first step there must be discussion, justification and decisions made on the study objectives and the most appropriate methods of data collection. These approaches themselves will likely require testing and validation. Operators with suitable expertise will be required to deliver the most effective studies.

5.10. The focal issues and species have been identified during baseline data collection. The main topics for post-construction monitoring and research are collision risk and displacement/barrier effects. Studies will benefit from before/after comparison, whilst data collection during construction is also helpful to identify whether construction per se is the cause of observed changes and whether effects persist during the operational phase. Reference site(s) help to interpret any changes observed in the wind farm. Gradient studies enable assessment of the effects of increasing distance away from wind turbines.

5.11. Post-construction studies need to be of sufficient duration to permit the distinction between short-term and longer-term effects attributable to the presence of the wind farm. Reviews at pre-determined time intervals will enable decisions to be taken with respect to any necessary refinements of the study methods (bearing in mind the problems associated with changing methodology), as well as reviewing the results and whether there are indications of adjustments in behaviour.

5.12. The RSPB will be discussing these requirements further with the Applicant and we request that a Scientific Steering Group is established to determine the details of the monitoring methods, but we wish to highlight at this stage that monitoring cannot be regarded as a mitigation measure since it has no ability to reduce or offset possible adverse effect on the SPA/pSPA nor their species.

# 6. Overall Conclusion and Recommendations

6.1. The RSPB are concerned that, based on CRM using our preferred parameters, East Anglia THREE contributes around 10% of the total in-combination collision mortality to gannets of FFC pSPA. We are also concerned about the total cumulative collision risk to regional populations of kittiwakes and great black-backed gulls.

6.2. We recommend a rise in the height of the turbines (as advocated by Natural England in Appendix 1 para. 62 of their Relevant Representations) of 10m in order to reduce the percentage of birds flying at collision height. For gannet, this would have the effect of reducing East Anglia THREE's contribution to in-combination collision mortality to gannets from 10.3% to 4.3%, and would reduce kittiwake collisions (at the regional scale) from 23 to 8.

6.3. We also recommend the following changes to the assessment approach:

- use of 98% AR for gannet breeding season CRM
- assessment based on the standard breeding season for gannet and kittiwake
- use of the most precautionary Band Option in CRM (of Options 1 and 2) for gannet and kittiwake
- use of PVA (rather than PBR) to assess impacts on populations, using density independent outputs as the worst case scenario

# Annex I - Qualifications and Experience of the RSPB's Experts

## Dr. Aly McCluskie

Dr. Aly McCluskie is a Senior Conservation Scientist with the RSPB, based at the RSPB's Scottish Headquarters in Edinburgh. He holds a BSc (Hons) and a PhD in otter marine ecology both from the University of Glasgow. He has worked in consultancy (Natural Research Ltd, 5 years) and for the RSPB (8 years) as well as working freelance, largely examining the potential ornithological impacts of renewable energy developments. His main role within the RSPB is providing scientific support to caseworkers, with particular regard to the impacts of marine developments. He holds an honorary lectureship at the University of Glasgow, has sat on several scientific steering groups, including the recent avoidance rate review, has presented papers to a variety of international conferences, and has co-authored peer-reviewed scientific papers and reports.

# Annex II - The Flamborough and Bempton Cliffs SPA and the Flamborough and Filey Coast potential SPA

## 1. Flamborough and Bempton Cliffs SPA

### Designation

1.1 Flamborough Head projects into the North Sea from the Yorkshire Coast rising to 135m on the Bempton Cliffs. It was designated under Article 4(2) of the Birds Directive as an SPA in 1993 due to the presence of 83,370 pairs of black-legged kittiwake (*Rissa tridactyla*), representing 4% of the Eastern Atlantic breeding population at the time of survey (1987).

1.2 In 2001, the UK SPA Review found the site also qualified under Article 4(2) as a site regularly supporting at least 20,000 seabirds. At the time of designation, the site regularly supported 305,784 individual seabirds including: puffin (*Fratercula arctica*), razorbill (*Alca torda*), guillemot (*Uria aalge*), herring Gull (*Larus argentatus*), Gannet (*Morus bassanus*), and Kittiwake.

### Conservation Objectives

1.3 On 29 May 2012, Natural England published revised Conservation Objectives for the SPA, and subsequently revised them on 30 June 2014[36]. These are:

> *With regard to the SPA and the individual species and/or assemblage of species for which the site has been classified ("the Qualifying Features" listed below), and subject to natural change;*
>
> ***Ensure that the integrity of the site is maintained or restored as appropriate, and ensure that the site contributes to achieving the aims of the Wild Birds Directive, by maintaining or restoring:***
>
> - *The extent and distribution of the habitats of the qualifying features*
> - *The structure and function of the habitats of the qualifying features*
> - *The supporting processes on which the habitats of the qualifying features rely*
> - *The populations of the qualifying features, and,*
> - *The distribution of the qualifying features within the site.*

[36] Available here: http://publications.naturalengland.org.uk/publication/5400434877399040 (accessed 12 July 2015).

*This document should be read in conjunction with the accompanying Supplementary Advice document, which provides more detailed advice and information to enable the application and achievement of the Objectives set out above.*

***Qualifying Features:***

*A188 Rissa tridactyla; Black-legged kittiwake (Breeding)*

## 2. Flamborough and Filey Coast pSPA

2.1 In January 2014, Natural England opened a formal consultation on proposals to extend the existing SPA and rename it as the Flamborough and Filey Coast SPA. The proposals comprise changes to the designation boundary and review of the qualifying species. Further details are provided in the following sections.

**Designation Proposals**

2.2 The pSPA proposals comprise three key boundary changes:

2.2.1 A proposed terrestrial extension running from the cliffs at Filey Brigg north-west to Cunstone Nab, which is being considered to incorporate important breeding areas for seabird that currently fall outside the existing SPA.

2.2.2 Marine extensions out to 2km from the seabird colonies which are proposed, due to the importance of these waters to breeding seabirds.

2.2.3 Modification of the landward boundary to ensure that the features of the pSPA remain protected into the future.

2.3 Natural England has also conducted a review of the seabird populations using contemporary data. This concluded that the pSPA, including the proposed seaward and landward extensions qualifies under Article 4(2) of the Birds Directive because:

2.3.1 The site regularly supports more than 1% of the biogeographical population of four regularly occurring migratory species (black-legged kittiwake *Rissa tridactyla*, northern gannet *Morus bassanus*, common guillemot *Uria aalge* and razorbill *Alca torda*). Therefore the site qualifies for SPA designation in accordance to the SPA selection guidelines.

2.3.2 The site regularly supports an assemblage of more than 20,000 breeding seabirds. Therefore the site qualifies for SPA designation in accordance to the SPA selection guidelines.

2.3.3 Several species components of the pSPA assemblage qualify for a generic seaward extension of the SPA (northern fulmar *Fulmarus glacialis* and northern gannet *Morus bassanus* for a generic 2km seaward extension; common guillemot *Uria aalge* and razorbill *Alca torda* for a generic 1 km seaward extension).

2.4 Natural England's summary of the ornithological interest of the pSPA is therefore as follows with the key species are set out in more detail in Table 1 below[37].

2.5 The application of SPA selection guidelines (JNCC 1999) to current data for this site confirm that it qualifies by regularly supporting internationally important numbers of breeding black-legged kittiwakes, northern gannet, common guillemot and razorbill and an assemblage of European importance of over 20,000 breeding seabirds. Black-legged kittiwake, northern gannet, common guillemot and razorbill are all main components of the assemblage and present in internationally important numbers. However, northern fulmar is also present in sufficient numbers to warrant being listed as main component species of the assemblage, since numbers exceed 2,000 individuals (10% of the minimum qualifying assemblage of 20,000 individuals). In addition, Atlantic puffin, herring gull, European shag *Phalacrocorax aristotelis* and great cormorant *Phalacrocorax carbo* are also part of the breeding seabird assemblage.

**Table 1: Summary of Ornithological Interest of the Flamborough and Filey Coast pSPA**

| **Species** | **Count (period)** | **% of subspecies or population (pairs)** | **Interest Type** |
|---|---|---|---|
| **Original classification** | | | |
| Black-legged kittiwake<br>*Rissa tricactyla* | 83,700 pairs<br>(1987) | 4%<br>Western Europe | Migratory |
| **Revised proposal** | | | |
| Black legged kittiwake | 44,520 pairs | 2% | Migratory |

[37] Natural England's *Proposed extension to Flamborough Head and Bempton Cliffs Special Protection Area and renaming as Flamborough and Filey Coast Special Protection Area*, Departmental Brief, January 2014 at page 4.

| | | | |
|---|---|---|---|
| *Rissa tridactyla* | 89,041 breeding adults (2008-2011) | North Atlantic | |
| Northern gannet *Morus bassanus* | 8,469 pairs 16,938 breeding adults (2008-2012) | 2.6% North Atlantic | Migratory |
| Common guillemot *Uria aalge* | 41,607 pairs 83,214 breeding adults (2008-2011) | 15.6% (*Uria aalge albionis*) | Migratory |
| Razorbill *Alca torda* | 10,570 pairs 21,140 breeding adults (2008-2011) | 2.3% (*Alca torda islandica)*) | Migratory |
| | **Count period** | **Average number of individuals** | |
| Seabird assemblage | 2008-2012 | 215,750 | |

**Black-legged Kittiwake Population Declines**

2.6 Since this site achieved SPA status, the UK kittiwake population has experienced severe declines and has fallen by 55%[38] (between 1986 and 2011). This has been reflected within the SPA with a reduction in numbers from the 83,370 breeding pairs upon which classification of the site was based in 1993 (supported by counts of 80,180 pairs in 1979 and 85, 395 pairs in 1987) to an average of 44,520 breeding pairs between 2008 and 2011.

2.7 In 2001, the UK SPA Review's site account for the SPA reiterated the 83,370 breeding pairs of kittiwake, and also identified an assemblage feature comprising 305,784 individual seabirds including: puffin *Fratercula arctica*, razorbill *Alca torda*, guillemot *Uria aalge*, herring gull *Larus argentatus*, gannet *Morus bassanus*, kittiwake *Rissa tridactyla*. Since that time, the numbers of some of the species included within the assemblage features have also declined (e.g. herring gull fell by 24% and recordings of puffin at the SPA indicate reductions in that population: Seabird Colony Register 1987 recorded 7,000 puffins whereas Seabird Colony Register 2000 recorded only 2,615 puffins).

[38] *State of the UK's Birds 2012*, http://www.rspb.org.uk/Images/SUKB_2012_tcm9-328339.pdf.

2.8 In the context of such steep and national declines, and the requirements of the Birds and Habitats Directives (as summarised below), the RSPB has expressed concern about the consideration of contemporary data alone in relation to both kittiwake and the assemblage feature, for it would lead to the designation of a site at population levels that have declined from previous levels. This decline must also be taken into account when considering the effect of this Project, for it emphasises the sensitivity of the SPA and pSPA to adverse impacts from development outside these areas. The data above clearly illustrate the ongoing population declines currently being experienced by kittiwake in particular, and the implications of these for not only nature conservation site designation, but also impact assessment for plans and projects.

# Annex III – The SPA Species of Concern

## 1. Gannet

### Population and distribution

The Gannet breeds on both sides of the Atlantic Ocean between approximately Norway in the north and the equator in the south[39]. Most recent estimates of the European population range between 300,000 and 310,000 breeding pairs[40], with European colonies accounting for 75 –94% of the species' range[39]. The most recent estimate of the breeding population of gannets in Britain was 218,546 nesting pairs[41] representing 59% of the world population[42].

### Breeding on the Flamborough and Filey Coast

The SPA is the only gannetry in England and in 2015 supported 12,494 occupied nests[43], concentrated in an approximately 5km stretch of cliff[44]. Within this area is the RSPB's Bempton Cliffs Reserve. This SPA population accounts for approximately 3.3% of the North Atlantic biogeographic population[45]. These latest data reflect the ongoing increases in the gannet breeding population at the SPA and the welcome proposals to designate the Flamborough and Filey Coast SPA in part for breeding gannet.

The steady rate of increase in this area, since its colonisation in the 1960s, has become more rapid since 2000. The potential for further growth is considerable in view of the large number of non-breeding immature birds associated with the colony; 1,470 in 2009, and 798 in 2012[46]. This contrasts with the situation across Britain and Ireland as a whole, where the rate of population growth dropped to 1.33% per year during 1995-2005, from the previously recorded 2% per year, consistent with the expectation that the rate of increase would plateau[47].

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39 BirdLife International, 2014. *IUCN Red List for birds*. Downloaded from http://www.birdlife.org on 4 February 2014

40 Bufield, I. & Van Bommel, F. 2004. *Birds in Europe: Population Estimates, Trends and Conservation Status.* BirdLife International, Cambridge, UK.

41 Baker, H., Stroud, D., Aebischer, N.J., Cranswick, P.A., Gregory, R.D, McSorley, C.A., Noble, D.G., Rehfisch, M.M. 2006. *Population estimates of birds in Great Britain and the United Kingdom.* British Birds 99:25-44.

42 Mitchell, P.I., Newton, S.F., Ratcliffe, N., Dunn, T.E., 2004. *Seabird Populations of Britain and Ireland.* Poyser, London

43 Apparently Occupied Nests (AON) is a standard census unit used to estimate the number of pairs of colonially nesting bird species, which includes most seabirds. AON is one way to estimate the number of breeding pairs.

44 There were also approximately 2,500 non-breeders on potential nest sites.

45 A biogeographic population is defined by JNCC as a group of birds which breed in a particular location (or group of locations), breed freely within the group and rarely breed or exchange individuals with other groups.

46 Langston, R., Teuten, E. & Butler, A., 2013. *Foraging ranges of northern gannets Morus bassanus in relation to proposed offshore wind farms in the North Sea: 2010-2012.* RSPB Report to DECC, December 2013.

47 WWT Consulting, 2012. SOSS-04 *Gannet Population Viability Analysis. Demographic data, population model and outputs.*

2010 to 2012 were good breeding seasons at the SPA, with breeding productivity per active occupied nest of 0.82 in 2010, 0.83 in 2011, and 0.85 in 2012, compared with 0.86 in 2009[46].

Adult gannets return to the colony from January onwards, with the majority of adults back by March. The earliest egg laying date is at the end of March, most egg laying occurring in April. The fledging peak is in August, decreasing through September. Defining the breeding season is not an exact science as there is overlap, with some birds returning to the colony whilst others remain on wintering grounds. The period from the start of April until the end of September coincides with the main breeding activity of egg-laying, incubation, and chick-rearing. Prior to that time, birds commute between feeding and nesting sites on a more irregular basis, whilst defending their nest location.

**Migration and non-breeding season**

The British gannet population is partially migratory, with significant variation in migratory strategy depending on age and breeding colony. Migration is particularly strong among first year birds, but there is substantial variation in migratory patterns with birds of all plumage states (ages) occurring in all parts of the range throughout the year, showing a degree of dispersive movement away from breeding colonies[48]. Most adults depart the breeding colony at the SPA in late September/early October. A period of dispersal within the North Sea follows before onward migration to wintering grounds, ultimately to the south of the UK.

Ringing data show that juveniles mostly winter in areas from the Bay of Biscay to the subtropical and tropical waters off West Africa[47,48,49]. It was previously believed that distance travelled from the breeding colony reduced with age so that, by adulthood (5 years and older), most birds from East coast colonies remained in the North Sea[47,48]. However, the recent tracking studies from Bempton Cliffs have shown a more complicated picture.

Adult gannets, at FHBC SPA, were fitted with battery-powered, Platform Terminal Transmitters (PTTs), which transmit data via the Argos satellite, at FHBC in 2010 (n=14 birds), 2011 (n=13) and 2012 (n=15).

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Wildfowl and Wetlands Trust (consulting) Ltd, Slimbridge.

48 Wernham, C., Toms, M., Marchant, J., Clark., J. Siriwardena, G. and Baillie, S. [Eds], 2002. *The Migration Atlas: Movements of the Birds of Britain and Ireland.* T & AD Poyser, London.

49 Snow, D.W., and Perrins, C.M., 1998. *The Birds of the Western Palearctic, Concise Edition.* Oxford University Press, Oxford.

Breeding gannets are central place foragers[50]. Consequently, their foraging ranges are likely to be most constrained when provisioning growing chicks, although they can still cover large distances during this period[46]. As central-place foragers during the breeding season, gannets (and other seabirds) have to return to their nest – the central place – regularly and so interception of frequent foraging trips by offshore wind turbines may present more of a collision hazard than for migrating birds on passage, especially if the turbines coincide with foraging areas where plunge-diving gannets will occur at rotor-swept height. Conversely, if the birds display a high degree of avoidance of wind turbines when making frequent foraging trips during the breeding season, there is a concern that gannets may be effectively displaced from suitable foraging areas. Whilst gannets have greater foraging flexibility than many other seabirds, there are potential implications for breeding productivity if their feeding areas are constrained. FHBC has had high levels of breeding productivity in recent years and, as described above, is the only gannet colony in England. The UK has a special responsibility for gannets as it hosts over 50% of the world's breeding northern gannets.

Satellite tags were used because of the logistical difficulties associated with the Bempton colony, thereby enabling data capture without need for further entry into the gannet colony. Data from satellite tags do not readily permit the distinction of foraging from other behaviours. However, trip endpoints represent a conservative but standardised indication of foraging locations, and were distributed throughout the area of active use.

Distance to colony was the over-riding factor influencing the distribution of gannet locations, with the highest density closest to the colony, where outgoing and returning birds mix with those active around colony. Activity closer to the colony includes "maintenance" behaviours such as bathing, preening, resting, and communicating, as well as some feeding. Densities diminish with increased distance offshore, but include foraging flights and feeding behaviour. Plunge-diving to feed is one of the behaviours that increases collision risk, especially where there are feeding aggregations.

Immature birds associate with the breeding colonies during the breeding season increasingly after their first year, particularly at age 3-4yrs. Although not as tied to the colony as adult birds, they are still

[50] Gremillet, D., Pichegru, L., Siorat, F., & Georges, J.-Y. 2006. *Conservation implications of the apparent mismatch between population dynamics and foraging effort in French northern gannets from the English Channel*. Marine Ecological Progress Series 319: 15-25.

central place foragers, returning regularly[51]. Recent studies also indicate sexual segregation in foraging behaviour at sea by breeding adult gannets. There are observed consistent differences in their isotopic signatures indicating dietary segregation, including a likely higher proportion of fishery discards (thus boat following) in the diets of breeding males, which also foraged closer inshore than females[52]. Further studies have confirmed the greater association with fisheries vessels by males than females[53]. There are different implications of accounting for boat following than assumption of equivalent effect across all birds irrespective of sex (or age etc). No such sexual segregation was apparent during the non-breeding season, nor among non-breeding, immature (2-4yrs) gannets.

Post-breeding locations were obtained for 18 of the satellite tracked gannets from the SPA[46], albeit only very limited data were obtained from four birds in 2010. All adult gannets had left the SPA by early October, including satellite tracked individuals, and the latest date for which data were received from any tag was 24 November 2012, for a bird that migrated to Western Sahara. It has been suggested that these shifts in migratory patterns reflect changes in North Sea fishing practices, including reduced discards, while fishing fleets off West Africa have grown with discards remaining high[47].

While tracking data described above show a general southerly movement for British breeding gannets, numbers of wintering adult gannets in the North Sea remain comparable to those nesting on the British East coast[47] due to inward movements from more Northerly colonies. However, the origins of these birds is variable, with ringing data demonstrating the presence of Norwegian breeding gannets in the North Sea during winter[4848] and tracking of Icelandic birds showing Autumn passage through the North Sea on route to African waters[47].

There is therefore a need to distinguish breeding season versus non-breeding/ winter season in assessing the potential cumulative effects of multiple offshore wind farms, in UK waters and beyond. From October especially, there is considerable overlap of gannets from different breeding colonies[54].

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[51] Votier, S. C., Grecian, W. J., Patrick, S., & Newton, J. 2010. *Inter-colony movements, at sea behaviour and foraging in an immature seabird: results from GPS-PTT tracking, radio-tracking and stable isotope analysis.* Mar Biol DOI 10.1007/s00227-010-1563-9.

[52] Stauss, C., S. Bearhop, T. W. Bodey, S. Garthe, C. Gunn, W. J. Grecian, R. Inger, M. E. Knight, J. Newton, S. C. Patrick, R. A. Phillips, J. J. Waggitt, & S. C. Votier. 2012. *Sex-specific foraging behavior in northern gannets Morus bassanus: incidence and implications.* Mar Ecol Prog Ser 457: 151-162.

[53] Votier, S. C., Bicknell, A., Cox, S. L., Scales, K. L. & Patrick, S. C. 2013. *A bird's eye view of discard reforms: bird-borne cameras reveal seabird/fishery interactions.* PLoS ONE 8(3) e57376, DOI: 10.1371/journal.pone.0057376.

[54] Fort, J., Pettex, E., Tremblay, Y., Lorentsen, S.-H., Garthe, S., Votier, S., Baptiste Pons, J., Siorat, F., Furness, R. W., Grecian, W. J., Bearhop, S., Montevecchi, W. A. & Gremillet, D. 2012. *Meta-population evidence of oriented chain migration in*

Post-breeding, dispersal of gannets from the Bass Rock (Forth Islands SPA), was recorded to the north and south, from gannets fitted with geolocation data loggers in 2002 and 2003. Of 20 tracked birds that wintered south of the UK, eight travelled north from the Bass Rock, around the north of Scotland and south down the west coast of Britain and Ireland, whilst 12 headed south and through the English Channel[55]. A further geolocation study in 2008 resulted in seven of the 21 recovered loggers indicating this northward migration route and 14 took the southward route[47,56,] along the east coast of the UK. Just one of the satellite tracked post-breeding gannets from FHBC was recorded taking the northerly route via the north of Scotland (Annex IV, Figure 3) before heading south via the west of Britain[57]. On the northward migration in spring, results from the same Bass Rock studies[55,56,58,] indicated that three of the 20 geolocators fitted in 2002 and 2003 returned via the English Channel and six via the west coast and around the north of Scotland[44], compared with five and 16 of the 21 geolocation loggers fitted in 2008[56,58], respectively. This diverse pattern of migration increases the potential for interaction with multiple wind farms.

Arguably, potential impacts on migratory gannets may be of lesser concern than risk to breeding gannets because the birds are no longer constrained by central place foraging (see below for further explanation), and so generally more widely dispersed at lower density. There are also indications of a high degree of flight avoidance by migratory gannets around the Egmond aan Zee[59] and Horns Rev[60] offshore wind farms, although in the case of Horns Rev, no gannets were recorded in the wind farm area prior to or post-construction. These well designed and executed studies relate to inshore wind farms and the results may not be applicable to breeding gannets.

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*northern gannets (Morus bassanus).* Frontiers in Ecology and the Environment 10:237-242.

55 Kubetzki, U., Garthe, S., Fifield, D., Mendel, B., & Furness, R. W. 2009. *Individual migratory schedules and wintering areas of northern gannets*. Marine Ecological Progress Series 391: 257-265.

56 Garthe, S., Kubetzki, U., Furness, R.W., Huppop, O., Fifield, D., Montevecchi, W.A. & Votier, S.C. 2010. *Zugstrategien und Winterokologie von Basstolpeln im Nord-Atlantik. Vogelwarte* 48:367. Cited in WWT Consulting et al. 2012

57 Langston, R. H. W. & Teuten, E. 2012. *Foraging ranges of northern gannets Morus bassanus in relation to proposed offshore wind farms in the North Sea*: 2011. RSPB report to DECC, DECC URN: 12D/315, London.

58 Meraz Hernando, J.F., 2011. *Seabird ecology in relation to fisheries.* PhD thesis, University of Glasgow.

59 Krijgsveld, K. L., Fijn, R. C., Japink, M., van Horssen, P. W., Heunks, C., Collier, M., Poot, M. J. M., Beuker, D. & Dirksen, S. 2011. Effect studies offshore wind farm Egmond aan Zee: Final report on fluxes, flight altitudes, and behaviour of flying birds. NoordzeeWind report nr WEZ_R_231_T1_20111114_flux&flight. Bureau Waardenburg report nr 10-219 to Nordzeewind, Culemborg, The Netherlands. Final report November 2011. http://www.noordzeewind.nl/wpcontent/uploads/2012/03/OWEZ_R_231_T1_20111114_2_fluxflight.pdf, last accessed 25 June 2012.

60 Petersen, I. K., Christensen, T. K., Kahlert, J., Desholm, M. & Fox, A. D. 2006. *Final results of bird studies at the offshore wind farms of Nysted and Horns Rev, Denmark.* NERI report commissioned by DONG energy and Vattenfall A/S. National Environmental Research Institute, Ministry of the Environment, Denmark.

### Foraging

Gannets range widely over continental shelf areas (ES, Chapter 5, paragraph 5.6.150, page 5-73), taking chiefly fish between 2.5 and 30.5cm[49], but with foraging concentrated over areas of high marine productivity[48]. It is known that gannets fly and plunge dive from between 10 and 50m, or even higher: elevations within the rotor swept height of offshore turbines[59, 61]. Gannets' gregarious breeding habits are reflected in their foraging, where plunge-diving birds exhibit a marked attraction to others[49]. However, tracking studies of gannets at multiple breeding colonies around the UK in 2010-2011 indicate strong spatial segregation of foraging areas with little if any overlap between areas used by adjacent colonies[62].

## 2. Kittiwake

### Population and distribution

The black-legged kittiwake is a widespread breeding species, nesting through the northern Pacific and Atlantic Oceans[39]. It is a colonial breeding seabird and occurs discontinuously along the shores of north-west Europe, from the coasts of Portugal and Galicia (north-west Spain) in the south, through Brittany (France), Ireland and Britain, Iceland and along Scandinavian coasts to the Kola Peninsula. It is predominantly a coastal species, but with some inland and island colonies. In the UK, Kittiwakes occur on most coasts, although there are few colonies on the south and east coasts of England.

The European breeding population is estimated to be over 2.1 million pairs[40]. The breeding population in Great Britain is estimated to be 366,832 pairs[41], representing on its own about 17% of the North Atlantic biogeographic population[63]. The number of black-legged kittiwakes breeding in England is estimated to be 76,281 pairs[42].

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[61] Nelson, J. B. 1978. *The Gannet.* T & A D Poyser, Berkhamsted.

[62] Wakefield, E. D., Bodey, T. W., Bearhop, S., Blackburn, J., Colhoun, K., Davies, R., Dwyer, R. G., Green, J., Gremillet, D., Jackson, A. L., Jessopp, M. J., Kane, A., Langston, R. H. W., Lescroel, A., Murray, S., Le Nuz, M., Patrick, S. C., Peron, C., Soanes, L., Wanless, S., Votier, S. C., Hamer K. C. 2013. *Space Partitioning Without Territoriality in Gannets.* Science 341: 68-70.

[63] AEWA, 2012. *African-Eurasian Waterbird Agreement 2012: Report on the Conservation Status of Migratory Waterbirds in the Agreement Area*. Fifth Edition. AEWA, Bonn.

**Breeding on the Flamborough and Filey Coast**

This SPA represents the only English SPA supporting black-legged kittiwake numbers of international importance, but is a typical breeding colony in terms of its habitat of sheer cliffs[64]. Between 2008 and 2011 the SPA, including the proposed extension, supported an average of 44,520 pairs of black-legged kittiwakes, which represents 2% of the North Atlantic biogeographic population[63], but also a substantial decline from historical population levels. At the time of designation the SPA's kittiwake population was 83,370 pairs. Black-legged kittiwakes nest throughout the extended area that the pSPA covers, with the main concentrations around Bempton Cliffs and Breil Newk. The intertidal chalk platforms are also used as roosting sites at low water by juvenile kittiwakes in particular.

There is considerable overlap between the breeding and non-breeding seasons for kittiwake, especially bearing in mind that failed breeders may be joining non-breeders any time during the months that successful breeders are still based at the colony. Most adult kittiwakes are back at the colony by March, with the first birds returning in February, so February is both breeding and non-breeding season, depending on individuals. Most chicks have fledged by mid to late July.

**Migration and non-breeding season**

The kittiwake is sometimes reported as a non-migratory species or one that disperses as opposed to migrating. However, during the wintering season birds of the Atlantic subspecies *tridactyla* vacate the breeding grounds and become truly oceanic[48] but, as gannets do, initially post-breeding adults disperse from the colony before embarking on long-distance migration.

There is extensive sharing of wintering areas among Atlantic populations, with the majority of adults from all parts of the European breeding range (except the western British Isles) migrating across the Atlantic. Ringing and geolocation studies have shown that shelf areas in Western Europe and around the Labrador Sea are important for wintering adult kittiwakes but that a very large part of the Atlantic population winters in offshore areas west of the Mid-Atlantic Ridge [48,65,66,67,68,69].

64 Natural England, 2014. *Proposed extension to Flamborough Head and Bempton Cliffs Special Protection Area and renaming as Flamborough and Filey Coast potential Special Protection Area (pSPA).* Departmental Brief. Natural England, January 2014.

65 Frederiksen, M., Moe, B., Daunt, F., Phillips, R.A., Barrett, R.T., Bogdanova, M.I., Boulinier, T., Chardine, J.W., Chastel, O., Chivers, L,S., Christensen-Dalsgaard, S., Clement-Chastel, C., Colhoun, K., Freeman, R., Gaston, A.J., Gonzalez-Solis, J., Goutte, A., Gremillet, D., Guilford, T., Jensen, G.H., Krasnov, Y., Lorentsen, S.-H.R.A., Mallory, M.L., Newell, M., Olsen, B., Shaw, D., Steen, H., Strom, H., Systad, G.H., Thorarinsson, T.L., Anker-Nilssen, T., 2012. *Multicolony tracking reveals the winter distribution of a pelagic seabird on an ocean basin scale.* Diversity and Distributions 18: 530-542.

## Foraging

When not attending the nesting platform, kittiwakes loaf on the sea below the cliffs and forage up to 120 km offshore (mean foraging range of 24.8 ± 12.1 km, with highest confidence of assessment)[70], although the FAME data indicate kittiwakes regularly forage considerably further, up to 231km[71]. They generally feed on small shoaling fish, particularly sand eels, but also herrings and sprats. During the breeding season kittiwakes can also forage on intertidal crustaceans and molluscs. They are regarded as mainly surface feeders, but can also plunge-dive to approximately 1 m[72].

High densities can be present in areas of high productivity, such as cold water upwellings, fronts between water masses and sandbanks (e.g. Flamborough Front). Foraging birds are often associated with flocks of common guillemot and razorbill, which when pursuing prey underwater can drive fish to the surface where kittiwakes can access them.

Tracks from GPS data loggers deployed, by the RSPB, on kittiwakes at the SPA in 2010-2014, show considerable overlap in areas used in different years by kittiwakes from the SPA. Birds tracked from Filey (within the pSPA), in 2014, covered a larger area of sea than was recorded for the kittiwakes from the SPA in 2010-2012. It is not known whether this difference persists in other years. These tracking data cannot be used to prove a negative, i.e. that birds do not use certain locations, but they provide an indication of areas they definitely do use. The sinuous sections of tracks from the GPS data collected indicate foraging behaviour being conducted on these longer journeys.

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66 Bogdanova, M.I., Daunt, F., Newell, M., Phillips, R.A., Harris, M.P. & Wanless, S., 2011. *Seasonal interactions in the blacklegged kittiwake, Rissa tridactyla: links between breeding performance and winter distribution.* Proceedings of the Royal Society B: Biological Sciences, 278, 2412–2418.

67 Gonza´lez-Solı's, J., Croxall, J.P., Oro, D. & Ruiz, X., 2007. *Trans-equatorial migration and mixing in the wintering areas of a pelagic seabird.* Frontiers in Ecology and the Environment, 5, 297–301.

68 Bonlokke, J., Madsen, J.J., Thorup, K., Pedersen, K.T., Bjerrum, M. & Rahbek, C., 2006. *Dansk trækfugleatlas (The Danish Bird Migration Atlas)*, Rhodos, Humlebak, Denmark.

69 Bakken, V., Runde, O. & Tjorve, E., 2003. *Norsk ringmerkingsatlas (Norwegian Bird Ringing Atlas), Vol. 1.* Stavanger Museum, Stavanger, Norway.

70 Thaxter, C. B., B. Lascelles, K. Sugar, A. S. C. P. Cook, S. Roos, M. Bolton, R. H. W. Langston, and N. H. K. Burton. 2012. *Seabird foraging ranges as a preliminary tool for identifying candidate Marine Protected Areas.* Biological Conservation 156: 53–61.

71 Future of the Atlantic Marine Environment (FAME), a collaborative project involving the RSPB, http://www.rspb.org.uk/ourwork/projects/details/255106-future-of-the-atlantic-marine-environment-fame-, www.fameproject.eu/en/.

72 Hatch, S.A., Robertson, G.J. & Baird, P.H., 2009. *Black-legged Kittiwake (Rissa tridactyla).The Birds of North America Online.* Cornell Lab of Ornithology, Ithaca, NY. Retrieved from the Birds of North America Online: http://bna.birds.cornell.edu/bna/species/092doi:10.2173/bna.92. Accessed 17 February 2014.