ARRAY ENVIRONMENTAL IMPACT ASSESSMENT

OFFSHORE ORNITHOLOGY EIA CONSULTATION 1: SUPPLEMENTARY INFORMATION

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GLOSSARY

Term	Definition
Avoidance	Probability that a bird takes successful evasive action to avoid collision with a wind turbine.
Collision Risk	Risk of a bird lethally colliding with a wind turbine within a wind farm.
Collision Risk Model	A model that calculates collision risk for a species within a wind farm based on a set of wind farm and bird species specific parameters. Collision risk models can be run deterministically or stochastically.
Ornithology	Ornithology is a branch of zoology that concerns the study of birds.
SEAPOP (SEAbird POPulations)	A long-term monitoring and mapping programme for Norwegian seabirds that was established in 2005.
Parameter	Parameters are the input elements of a model that together affect the output of a model. In collision risk models, examples of parameters are the number of wind turbines and the length of the bird.

ACRONYMS

Acronym	Description
CEF	Cumulative Effects Framework
CRM	Collision Risk Modelling
DAS	Digital Aerial Surveys
HPAI	Highly Pathogenic Avian Influenza
ORD	Offshore Renewable Developments
UK	United Kingdom

1. AUK ABUNDANCES AND PRODUCTIVITY

1. On 10 October 2023, NatureScot provided a response to the Ossian Array (hereafter referred to as the 'Array') Digital Aerial Survey (DAS) report issued 31 August 2023. It was noted that "*There is a marked increase in guillemot numbers in year 2, with a total of 10,867 birds in 2021 and 24,808 in 2022. Puffin and razorbill show a similar pattern, although these species are recorded in lower numbers overall. This is especially noticeable in July and August*". NatureScot highlighted concern in the "*low numbers of auks, especially guillemots, recorded for the July/August auk dispersal period in 2021, relative to 2022, and consider that the 2021 results may not provide representative data*" owing to the "*the auk wreck of Autumn 2021, which began with initial strandings in August on the East coast of Britain*"

2. Following NatureScot's recommendation to address this issue, NIRAS have carried out an internal review of guillemot, razorbill and puffin abundances recorded in recent DAS of proposed developments in United Kingdom (UK) North Sea waters in order to determine whether the DAS data collected for Ossian falls within the variations in auk data collected between years for other projects, or whether it is an anomaly. Please note that some of these data used within this review are confidential and yet not available in the public domain, and therefore NIRAS are unable to name the developments or share the full review document.

3. All DAS included in this review were conducted between 2010 and 2022. Most projects have carried out 24 consecutive months of DAS, though one project had three years of survey data available (but non-consecutive). As NatureScot's concern related to a discrepancy in July and August data, NIRAS' review considered only the months of July to September. This corresponds to the end of the breeding season and the start of the migratory/non-breeding season for the species considered.

4. Figure 1.1 (also included in the slides) illustrates the findings of this review, with similar patterns observed for the other species. Many developments found significant differences (1,000s of birds) between the first and second year of surveys. Similarly, many developments found significant differences between months within the same year, but with differing patterns between years. Using "Project A" as an example, in the first year of surveys, guillemot abundances were highest in August, followed by July, with lowest counts in September. In the second year of surveys, the July and August counts were both reduced from the previous year, whilst the September count had increased dramatically, exceeding both the July and August counts.

5. The degree of inter- and intra-annual variation recorded in the Array DAS is entirely within the degree of variation recorded by other projects' DAS.

6. No other project has linked the recorded intra- or inter-annual variation to population level events. When considering the calendar year in which each DAS was undertaken, there is again no clear pattern; in a given year/month, some projects will have recorded high abundances whilst others will have recorded low abundances. This is further indicative that the variation recorded is not the result of population-level changes.

7. For the Array, the auk abundance estimates do not appear to fit the suggestion that the results were disrupted by the "auk wreck" that was reported in the autumn of 2021 (SEAPOP, 2022; Fullick *et al.*, 2022). Looking at guillemot (Figure 1.1), the July 2021 count was far lower than the July 2022 count, but the July 2021 count preceded the auk wreck. The September 2021 survey occurred at the peak of the reported auk wreck, and yet this count was higher than the September 2022 count. If the auk wreck led to a population-level decline, then this may be expected to have led to lower counts in surveys following the auk wreck, but instead the peak and average abundance estimates for all three auk species (guillemot, razorbill and puffin) were higher in the second year of surveys (July to September 2022) than the first year (July to September 2021).

8. It is further noted that productivity data from the Isle of May (extracted from the relevant Isle of May National Nature Reserve Annual Reports) found no significant difference in chick hatching dates, fledging dates, or overall productivity between the 2021 and 2022 breeding seasons (Outram and Steel, 2023; Steel and Greetham, 2023). This further indicates no population-level effects that could have caused the observed variation in the Array DAS.

9. It is therefore considered that the difference between Year 1 and Year 2 auk observations is the result of normal variation, and is consistent with observations recorded for numerous other projects. A minimum of 24 months of DAS is recommended for baseline characterisation for offshore wind farm projects in order to capture this natural variation.

10. For auks, this natural variation is likely to be driven by a number of factors including weather conditions, human activity offshore, and prey availability and distribution.

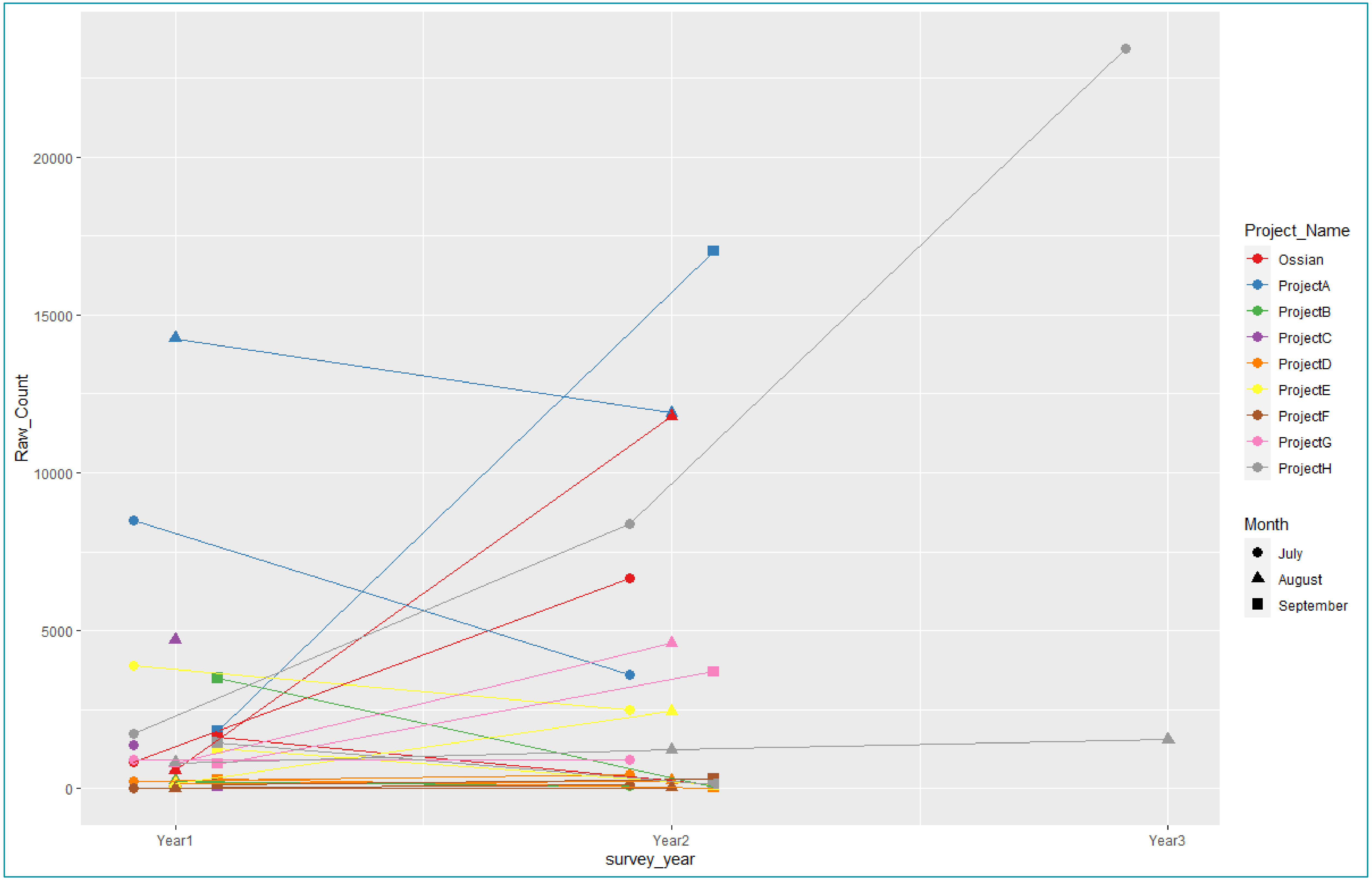

Figure 1.1 Illustrative Findings from Auk Abundance Review

2. SEABORD

11. There are a number of practical and theoretical concerns regarding running SeabORD to assess displacement.

12. Currently, the link to access the SeabORD tool download and guidance does not appear to be functional, leading to an error message. This has been tested by several members of staff using different machines/browsers and internet connections. This link can be found at https://www.webarchive.org.uk/wayback/archive/20181002061834/https://www.gov.scot/Topics/marine/marineenergy/mre/current/SeabORD (linked from https://data.marine.gov.scot/dataset/finding-out-fate-displaced-birds).

13. The SeabORD tool only allowed the user to upload a maximum of five Offshore Renewable Developments (ORDs). The number of built and proposed ORDs in the Forth and Tay region exceeds this. Only including Ossian in the tool would produce an inaccurate result, as it would not reflect the change in distribution and flight paths of birds resulting from other ORDs.

14. As has been reported elsewhere, there remain concerns about some aspects of the biological realism of the SeabORD model and the sensitivity to certain underlying parameters and assumptions (e.g. APEM, 2022a; Pentland Floating Wind Farm, 2022; Searle *et al*.,, 2021). The model is (necessarily) a significant simplification of a complex system. Even within the limitations of the model framework, the results are dependent on numerous decisions and parameters specified by the tool's developers. Whilst some of this is underpinned by evidence, the evidence itself will have limitations, for example being based on a specific geographic region or limited time period. Furthermore, some of the model approach is not underpinned by empirical evidence but purely by expert opinion, which is a highly fallible approach (as reported by Sutherland & Burgman, 2015).

15. Some studies have found the mortality predicted by SeabORD is broadly in line with that predicted using the matrix approach (e.g. Pentland Floating Wind Farm, 2022). This is used to argue that the results are robust. However, relatively few studies have attempted to directly quantify the additional mortality as a result of displacement from ORDs based on empirical data. For auks, studies that have done so were recently reviewed for Hornsea Four (APEM, 2022b and references. therein). This Hornsea Four review concluded that these auk studies tend to indicate that the standard recommendations for displacement and mortality rates for use in the matrix model produce higher estimates of mortality than are supported by actual observations of colonies. To the best of our knowledge no such direct comparison has been undertaken for SeabORD, but to the extent that SeabORD and the matrix approach reach similar conclusions, this would indicate that SeabORD also overestimates mortality.

16. Previous users have also reported extensive practical limitations when attempting to run the current version of SeabORD. For example, when conducted for Berwick Bank (HiDef, 2022), the authors reported difficulty carrying out the calibration steps, unexplained error messages, extended run times and unexplained instances of failed runs. In order to run the tool, HiDef (2022) had to apply a scaling factor (i.e. run the tool with colony population reduced by a fixed percentage) and then scale the predicted mortalities back up again. However, that approach assumes predicted impacts scale linearly with population size and it is acknowledged by the tool's developers that this assumption is unlikely to be true (Searle, K. 2022, *pers. comm*. cited in HiDef, 2022).

17. We understand an updated version of SeabORD is being developed with a view to its integration into the Cumulative Effects Framework (CEF). We understand that this updated version may address some of the concerns outlined above, although it will not contain any major modifications to the underpinning biological model and therefore will not address all concerns regarding the sensitivity or biological realism. However, this revised tool is not yet available and we do not expect it to be available in the timescales required to be used for the Ossian application.

18. Given all the above difficulties and concerns, we do not feel that running the current version of SeabORD, even if we were able to obtain a copy, is proportionate. There would be a significant amount of uncertainty in the results and we would be relying on the results of the matrix approach to validate the outputs. We therefore feel that the matrix approach alone is sufficient, provided proper consideration is given to the inherent limitations and uncertainty of using that approach.

3. HIGHLY PATHOGENIC AVIAN INFLUENZA

19. Highly Pathogenic Avian Influenza (HPAI) is a significant concern regarding both baseline data and implications for assessment. The current outbreak of HPAI affecting seabirds began in late 2021 and heavily impacted seabirds during the 2022 and 2023 breeding seasons.

20. The site-specific DAS were conducted between March 2021 and February 2023, and therefore are likely to include data impacted by HPAI.

21. Regional baseline populations used for assessment purposes are based on colony counts from the 2021 breeding season or earlier. Therefore, these regional baseline populations are assumed to be prior to any impact from the current outbreak of HPAI.

22. In order to reduce the spread of HPAI, certain elements of field research were suspended during the 2022 breeding season. This may reduce the quantitative data available on the impact of HPAI in that breeding season. Limited data from the 2023 breeding season is available and this will be reviewed to qualitatively consider the evidence regarding the impact of HPAI.

23. Currently, there is no formal guidance from NatureScot or any other Statutory Nature Conservation Body on how to incorporate the impacts of HPAI into assessment.

24. In the absence of formal guidance or quantitative data that would be required to alter the approach to assessment, our proposed approach would be to carry out the assessment as normal, and then provide further qualitative consideration of HPAI based on the available evidence and how that may affect the conclusions drawn.

4. COLLISION RISK MODELLING

25. For the avoidance of doubt, we will base our assessment on the Collision Risk Modelling (CRM) parameters recommended by NatureScot for each species.

26. However, we would like to make it clear that we do not fully agree with all such parameters. As will be detailed in the CRM report, we believe there is an argument for using alternative flight speeds and avoidance rates to those recommended by NatureScot. However, we also acknowledge that the avoidance rate calculation is dependent on the input parameters used, and therefore adjusting the flight speed used would require re-calculation of the avoidance rates in order to be fully accurate.

27. We will be presenting alternative CRM scenarios using alternative parameters. However, these will solely be used to highlight the potential uncertainty in the CRM results and provide context to the results produced using NatureScot's preferred parameters. Where the alternative parameters yield significantly different results, this may indicate an assessment that warrants further investigation.

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