

1. Notes on further correspondence and advice to Seagreen from MS and SNH

1. Following the submission of the Seagreen (2018) Environmental Impact Assessment Report (EIAR), post application comments were received from SNH on 2 November 2018 and Marine Scotland Science (MSS) and Marine Scotland Licensing and Operations Team (MSLOT), collectively referred to as Marine Scotland (MS), on 28 November 2018. This correspondence, including a response from the RSPB, is available at http://marine.gov.scot/sites/default/files/all_responses_redacted.pdf
2. Based on the above, Seagreen agreed to submit an Addendum in order to provide the clarification and further information required. The scope of the Addendum was outlined in a written document which, in summary, proposed that the assessment of gannet, kittiwake and razorbill should be reviewed for Forth Islands SPA and kittiwake and razorbill for Fowlsheugh SPA. The scope is provided in the attached file:

LF000009-CST-OF-RPT-0009 Addendum Scope for the Optimised Seagreen Project
18Dec2018.pdf.

3. During the preparation of the Addendum, a number of inconsistencies were noted in the Seagreen (2018) EIAR data analysis and the scope of the Addendum was therefore extended to include St Abb's Head to Fast Castle SPA for kittiwake, guillemot and razorbill plus guillemot and puffin at Forth Islands SPA and guillemot at Fowlsheugh SPA.
4. To maintain dialogue about the progress of the Addendum and to deal with any queries as they arose, a series of teleconferences was held between Seagreen and MS/SNH between December 2018 and February 2019. Summary details of these teleconferences are provided in Chapter 2 of this Addendum, Section 2: Consultation. This Annex provides copies of all further written advice provided to Seagreen by MS/SNH as a result of these discussions.
5. The following files are attached:
 - 23_01_2019 Addendum Scope - MSS Comments.pdf.
Email from MS to Seagreen summarising MSS and SNH comments on the scope of the Addendum.
 - 11_01_2019 SNH email re Addendum scope.
Email from SNH to MSLOT providing SNH comments on the scope of the Addendum.
 - 15_01_2019 MS comments on PVA incremental modelling
Email from MS to Seagreen advising on the incremental changes in background mortality to include in PVA modelling included in the Addendum
 - 12_02_2019 MS response re use of July 2017 medians.doc.
Email from MS to Seagreen advising on the use of median values for the Seagreen July 2017 bird density data.

- 26_02_2019_SNH_Consideration of using MMFR and 1 SD to add Razorbill to SeaGreen addendum assessment.
Email from SNH to Seagreen summarising advice on the use of mean-maximum foraging range +1 standard deviation and whether razorbill at St Abb's Head to Fast Castle SPA should be included in the Addendum assessment.

Project Title	Seagreen Wind Energy Ltd
Document Reference Number	LF000009-CST-OF-RPT-0009

Ornithology Addendum Scope and Note on Use of July 2017 Data

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SCOPE OF THE ADDENDUM FOR THE OPTIMISED SEAGREEN PROJECT

1. Introduction

In September 2018 applications for the optimised Seagreen projects were submitted to the Marine Scotland Licensing and Operations Team (MSLOT), including the Seagreen 2018 Environmental Impact Assessment Report (EIAR). This contained the ornithology EIA (Chapter 8) and the ornithology Habitats Regulations Assessment (HRA) (Chapter 16). For the avoidance of doubt, where this document refers to the EIAR it includes both the ornithology EIA and HRA.

Subsequently Seagreen has received consultation responses on these applications from:

- Marine Scotland Science (MSS) dated 28 November 2018;
- Scottish Natural Heritage (SNH) dated 2 November 2018; and
- Royal Society for the Protection of Birds (RSPB) dated 8 November 2018.

The comments relating to ornithology are summarised in Annex 1.

To address these comments Seagreen proposes to undertake a revised assessment to be submitted in the format of an Addendum to the above EIAR. Following discussions with SNH and Marine Scotland (MS) at teleconferences on 28 November 2018 and 6 December 2018 respectively, it was recommended by MS that the scope of the Addendum should be submitted for comment. The scope is therefore provided below.

2. Species to be included

The Addendum would provide a revised assessment for three key seabird species only: Northern gannet, hereafter gannet *Morus bassanus*, black-legged kittiwake, hereafter kittiwake *Rissa tridactyla* and razorbill *Alca torda*. This is because the SNH response dated 2nd November 2018 agreed that there was sufficient evidence in the 2018 Seagreen EIAR to conclude no significant effects in EIA terms and no adverse effects on any other species at any Special Protection Area (SPA) from the Seagreen projects alone or in-combination.

As agreed during discussions with MS and SNH, the assessment will focus specifically on the operational period. This is because impacts on these three species during construction and decommissioning were assessed as not significant.

For the other key species included in the 2018 EIAR, namely: herring gull, guillemot and puffin, narrative and reasoning will be provided to explain why they have not been included in the Addendum with cross reference to the location of relevant information in the Seagreen 2018 EIAR. This will facilitate future in-combination assessment.

3. Inclusion of 2017 data

During the breeding season 2017, Seagreen undertook additional boat-based surveys of the Phase 1 area including the Project Alpha and Project Bravo sites (hereby referred to as the 'Seagreen site'), and a 2 km buffer. The rationale for inclusion of this data will be explained at relevant points in this scope.

The surveys recorded an exceptional 'multi-species foraging event' in July 2017 resulting in extremely high densities, particularly of kittiwake, guillemot and razorbill within the Seagreen site. In some senses this data could be viewed as an 'outlier' therefore the 2018 EIAR presented displacement (but not collision) assessments with and without this data. SNH noted in their consultation response, and during subsequent discussion, that there was inconsistent use of these data in the EIAR. Therefore, for consistency, Seagreen proposes that the Addendum would include environmental impact assessment of collision effects in the same way i.e. both with and without the July 2017 data.

In terms of population modelling, it has yet to be decided whether impacts would be modelled with or without the July 2017 data. Seagreen's preference is to exclude the July 2017 data from the PVA and HRA assessment. A short paper is attached at Annex 2 providing its reasoning. Seagreen seeks further advice on this matter from MS and SNH.

4. Displacement

There were no specific comments on the displacement assessment in the consultation responses received and, as required, the bird densities for assessment included those on the water and those in flight. However, Seagreen notes, that unadjusted flight densities appear to have been used in the EIAR. As explained in the 2018 EIAR, Seagreen's method of surveying birds in flight used radial snapshots as opposed to the more common box snapshots. Radial snapshots result in higher estimated densities and it was therefore agreed with MS and SNH during pre-submission consultation meetings that Seagreen's densities of birds in flight should be adjusted to make them comparable with those of other Firth of Forth projects. A revised displacement assessment for razorbill and kittiwake will therefore include adjusted densities for birds in flight. It should be noted that no displacement assessment was required for gannet.

5. Collision risk modelling

The assessment of collision will be revised for gannet and kittiwake to include full discussion of the results of both option 1 and option 2 of the Band (2012) collision risk model. Differences in the option 1 and option 2 results in the Seagreen (2018) Appendices compared with those in the EIAR noted by MS in their consultation response are due to the application of the density adjustment factor described above. The way this adjustment factor has been applied will be clearly explained in the Addendum.

Seagreen is currently considering whether to include outputs from MS's stochastic CRM (McGregor et al., 2018) alongside outputs of the Band (2012) CRM as this has been described as potentially useful context by SNH and RSPB (A. McCluskie, Pers. Comm.). However, this would be provided as additional information and assessment would be based on the outputs of the Band model.

Amendments to CRM will be undertaken by ECON as per the 2018 EIAR.

6. Age classes

Impacts/effects will be broken down by age class as requested in the MSLOT Scoping Opinion (2017).

7. PVA

The 2018 Seagreen EIAR based its population modelling on the outputs of the Band option 1 collision estimates and/or displacement effects where appropriate. As noted in the SNH and MS responses, the scoping opinion advised that option 2 should be used. The Addendum will therefore take forward option 2 collision estimates in the population modelling.

Revised population modelling will be carried out for all three species and, for kittiwake, modelling will be undertaken separately for collision and displacement and again for collision and displacement combined as required by the Scoping Opinion.

The generic population modelling for each species will be carried out at intervals more appropriate to the levels of impact as follows:

Forth Islands

- Gannet – Mortality range 0-1,500 @ 25 bird increments
- Kittiwake – Mortality range 0-150 @ 20 bird increments
- Razorbill – Mortality range 0-100 @ 10 bird increments

Fowlsheugh

- Kittiwake – Mortality range 0-300 @ 20 bird increments
- Razorbill – Mortality range 0-100 @ 10 bird increments

St Abb's to Fast Castle

- Kittiwake – Mortality range 0-50 @ 10 bird increments

Specific runs will be carried out for each effect for the Seagreen projects alone and in-combination.

Work will be carried out by DMP Statistical Solutions as before.

8. HRA

Revised Habitats Regulations Appraisals will be carried out for all three species at the SPAs listed above. Razorbill at St Abb's is excluded from consideration as Seagreen is significantly beyond the foraging range of breeding birds. (Razorbill mean maximum foraging range is 48.5 km (Thaxter et al., 2012) and the Seagreen site lies at a distance of approximately 68 km from St Abb's).

9. In combination assessment

In-combination assessment will be carried out as required by the Scoping Opinion for:

- Seagreen and the 2014 Neart Na Gaoithe and Inch Cape projects as consented; and
- Seagreen and the 2018 Neart Na Gaoithe (as consented) and Inch Cape (as per application).

Other regional projects will be assessed qualitatively.

For gannet and kittiwake only, non-breeding season effects will be considered at the North Sea scale.

10. Appendices to the Addendum

Relevant Appendices will be updated as necessary.

The Addendum will also include the Appendices (10Ai to 10Avi) to Appendix 10A of Chapter 10 Marine Mammals of the 2018 optimised Project EIA. These are the Appendices to Chapter 13 Marine Mammals of the 2012 Offshore Environmental Statement and were omitted from the electronic version of the 2018 EIA provided for upload to the MSLOT website. The Annexes were included in the hard copies issued and in the CDs issued at the time of the application.

ANNEX 1: Summary of key consultee responses to the EIAR relating to ornithology from SNH, MSS and RSPB

Consultee	Summary of response
Scottish Natural Heritage (SNH)	The impact assessment methods, in particular, incorporation of additional survey data... do not follow the advice in the scoping opinion.
SNH	The use of Option 1 to assess collision risk does not follow the advice in the scoping opinion i.e. to use Option 2. Site specific flight heights (Option 1) may reflect flight behaviour in the development area better than generic flight heights (Option 2). We would welcome further discussion on the use of site specific data and option 1 and how it may be presented alongside option 2 to enable a common comparison across all the Forth and Tay developments.
SNH	The impact assessment methods, in particular,choice of Collision Risk Modelling options and outputs taken forward into the PVA modelling....do not follow the advice in the scoping opinion.
SNH	The impact assessment methods, in particularpresentation of PVA metrics do not follow the advice in the scoping opinion. The metrics are counterfactual of population size (CPS), counterfactual of population growth rate (CPG) and centile match of end point of the un-impacted population (Centile). Whilst the CPS measures lie in the range that we would expect, the CPG and Centile measures are either neutral or positive. This is counter-intuitive and raises some doubts over their reliability and leads us to have reduced confidence in the metric results.
SNH	The in combination assessment includes all North Sea wind projects and does not identify the combined impacts of the Forth and Tay proposals as requested.
SNH	<p>PVA models run at increments of 50 bird mortalities and presents two complications:</p> <p>There is a lack of detail on which increments have been used to derive the PVA metrics. This reduces our ability to interpret the impacts.</p> <p>This scale of increments is not suitable for all species i.e. an incremental scale more relevant to the scale of the predicted impact would aid interpretation of the population level effects.</p>

<p>Marine Scotland Science (MSS)</p>	<p>There are discrepancies between the collision mortality estimates presented in the CRM appendix (Appendix 8a of EIA report volume 3) and those summarised in the EIA Ornithology Chapter (Chapter 8 of EIA). The developer should explain why these numbers differ.</p>
<p>MSS</p>	<p>The CRM options taken forward to the PVA and presented in the HRA are using option 1 for gannet and kittiwake (e.g. table 16.40 of chapter 16 of EIA) which goes against the Scoping Opinion (advised option 2, see CRM section above). This along with the apparent misinterpretation of the PVA modelling results (above), and of not following the Scoping opinion on advised developments to be used for in combination assessment mean that it is not possible to confidently assess impacts on the SPA populations according to the requirements of the Scoping Opinion</p>
<p>Royal Society for the Protection of Birds (RSPB)</p>	<p>There is a lack of empirical data to inform the displacement assessment and the estimated effects should be treated with caution. All the auk populations at these SPAs are experiencing relatively stable or increasing trends, however the scale of impact in addition to the high degree of uncertainty in the assessment is concerning</p>
<p>RSPB</p>	<p>This ‘test’ (comparison to SPA population size at citation) contradicts the previous statements by dismissing the importance of considering the counterfactual metrics when interpreting impacts, whilst also suggesting additional adverse pressures arising from a new project are acceptable despite an internationally protected site being in unfavourable condition and failing its conservation objectives. The test is based on whether the projected change will result in the future impacted population being lower than the cited population and requires a prediction of absolute population size</p>
<p>RSPB</p>	<p>Additional survey data was gathered during 2017, which we welcome, and high densities of birds were observed during the July 2017 count. The assessment suggests these observed numbers are ‘atypical’ and for these reasons the July 2017 records are not included in the in-combination assessment for collision risk. Similarly, for the assessment of displacement two outputs are presented, one with and one without inclusion of this data set.</p> <p>There’s no justification for concluding these high densities are an anomaly and the full data- set should be included in the environmental assessment, including the in-combination assessment</p>

	<p>Seabird at sea distributions are highly variable and collectively there is insufficient data to determine whether observed at sea distributions of seabirds is normal or abnormal. Site surveys are undertaken once a month over a two-day period each time, which represents approximately 7% of available survey days per year. To dismiss counts for not being representative against such a small data-set is unfounded and not suitably precautionary</p>
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ANNEX 2: Note on treatment of July 2017 data

NOTE: all data are taken from the optimised Seagreen project Ornithology Technical Report (OTR). This document formed part of the 2018 EIAR Volume 3, Appendix 8A. Document reference number lf009-env-ma-rpt-0023.

During the breeding season 2017, Seagreen undertook additional boat-based surveys of the Phase 1 area including the Project Alpha and Project Bravo sites and a 2 km buffer. This was to supplement and update the data collected over the two years between 2009 and 2011.

During the July 2017 survey, exceptionally high numbers of birds were recorded within both the Seagreen Alpha and Seagreen Bravo sites during a multi-species foraging event (e.g. Scott et al., 2010) including kittiwakes, guillemots, razorbills as well as marine mammals species (Seagreen 2018, Appendix 8A, para. 5.3.7). Figures 28 and 53 of the Seagreen 2018 OTR have been reproduced at the end of these notes to indicate how exceptional these densities were compared to those of other monthly surveys for kittiwake and razorbill. Gannet numbers were not significantly affected by the event.

Smaller foraging associations have been recorded within the Seagreen site (e.g. for the 2017 surveys these are noted in Seagreen (2018), Appendix 8A para 5.3.32), and also within other Firth of Forth sites such as Inch Cape in 2011 (e.g. Inch Cape (2018), Appendix 11A, para 76). However, the intensity of the July 2017 event was unprecedented, resulting in very high densities of birds on the water, particularly auks and kittiwake. Whilst this clearly reflects occasional events within the sites, multi-species foraging associations such as this are generally regarded as short-lived, lasting between 'minutes' (Scott et al., 2010) and hours. The Scott et al., (2010) paper, writing about the waters of the North Sea on the east coast of Scotland, also notes that such:

'multiple species foraging events are spectacular to view, and indeed many a dramatic nature documentary has been produced that focuses just on these events. However, our data strongly suggest that these events are rare in this geographic region and that most species will have separate foraging habitats most of the time'.

Based on the above, the assumption that the July 2017 data reflect a situation that continued for the whole monthly period is clearly erroneous and their incorporation into the monthly averages for EIA and HRA would misrepresent the general situation. For example, when the July 2017 densities of kittiwake and razorbill recorded within the optimised Seagreen project are compared to densities estimated by other authors for this part of the North Sea during the breeding season (Tables 1 and 2 below), they are clearly extremely high. Furthermore, although these studies pre-date the Seagreen surveys by some years, they were collected at times when the kittiwake population was considerably greater than currently and the razorbill population not dissimilar (JNCC, 2018), once again highlighting the exceptional nature of the July 2017 observations.

As noted in the OTR, the peak populations derived from these densities would mean that, for kittiwake, 34% of breeding birds from all colonies within foraging range would have been present within the sites. For razorbill, the numbers would be equivalent to all breeding birds from Fowlsheugh and Forth Islands SPA combined. This seems unlikely given that tracking data, for example, razorbill from Isle of May (Forth Islands SPA) (See OTR Figure 52 reproduced below) do not support such intense usage of the Seagreen site during the breeding period. Given that at this time many birds were recorded as present with large chicks it is possible that the aggregation included adults and fledglings from colonies beyond the Firth of Forth and potentially also non-breeding birds dispersing from more northerly colonies.

Having considered the above, Seagreen proposes that the displacement and collision estimates taken forward for PVA modelling for SPAs with connectivity to the optimised Seagreen project should exclude the July 2017 data. The remaining 2017 data would be included for all other estimates.

Table 1: Kittiwake mean densities (ind/km²) recorded in the region of the optimised Seagreen project during the breeding season by a range of authors (Seagreen data from 2018 OTR Table 21 page 75 and 2012 OTR Table 6.11. Note that the 2012 report does not include a 2 km buffer)

	Seagreen		Stone et al.	Skov et al.
	2009-2011	2009-2011 +2017	1995	1995
			Western North Sea	Aberdeen Bank including Firth of Forth
Alpha	3.2	20.7	0.41-4.54	12.1
Bravo	2.2	10.7		
Alpha + Bravo	N/A	15.26		

Table 2: Razorbill mean densities (ind/km²) recorded in the region of the optimised Seagreen project during the breeding season by a range of authors (Seagreen data from 2018 OTR Table 33 page 113 and 2012 OTR Table 6.39. Note that the 2012 report does not include a 2 km buffer)

	Seagreen		Stone et al.	Skov et al.		Camphuysen
	2009-2011	2009-2011 +2017	1995	1995		2005
			Western North Sea	Moray Firth	Scalp Bank	Firth of Forth (unspecified parts)
Alpha	6	17.3	1	6.1	7.1	2-10+
Bravo	2.9	11.3				
Alpha + Bravo	N/A	14.2				

References

- Band, B. (2012). *Using a collision risk model to assess bird collision risk for offshore windfarms. Strategic Ornithological Support Services (SOSS), Project SOSS-02*. British Trust for Ornithology, Thetford, UK: 37pp.
- Camphuysen, C.J. (2005). Seabirds at sea in summer in the northwest North Sea. *British Birds* 98, 2-19.
- Inch Cape Offshore Ltd. (2018) *Inch Cape Offshore Wind Farm Revised Design EIA Report*. Available at: <http://marine.gov.scot/data/inch-cape-offshore-windfarm-revised-design-eia-report>
- JNCC. 2016. *Seabird Population Trends and Causes of Change: 1986-2015 Report* (<http://jncc.defra.gov.uk/page-3201>). Joint Nature Conservation Committee. Updated September 2016.
- McGregor, R.M., King, S., Donovan, C. R., Caneco, B. and Webb A. (2018) *A Stochastic Collision Risk Model for Seabirds in Flight*. Report for Marine Scotland Available at: <https://www.gov.scot/Topics/marine/marineenergy/mre/current/StochasticCRM>
- Scott, B.E., Sharples, J., Ross, O.N., Wang, J., Pierce, G.J. & Camphuysen, C.J. (2010) Sub-surface hotspots in shallow seas: fine-scale limited locations of top predator foraging habitat indicated by tidal mixing and sub-surface chlorophyll. *Mar Ecol Prog Ser* 408: 207-226- 226 <https://www.int-res.com/abstracts/meps/v408/p207-226/>
- Seagreen (2018) *Seagreen Alpha and Bravo Revised Design EIA Report*. Available at: <http://marine.gov.scot/ml/seagreen-phase-1-offshore-windfarm-project>
- Skov, H. Durinck, J. Leopold, M.F. & Tasker, M.L. (1995). *Important Bird Areas for seabirds in the North Sea*. BirdLife International, Cambridge, UK; 156pp
- Stone, C.J., Webb, A., Barton, C., Ratcliffe, N., Reed, T.C, Tasker, M.L, Camphuysen, C.J. & Pienkowski, M.W. (1995). *An atlas of seabird distribution in north-west European waters*. Joint Nature Conservation Committee, Peterborough, UK: 326pp.
- Thaxter, C.B., Lascelles, B., Sugar, K., Cook, A.S.C.P., Roos, S., Bolton, M., Langton, R.H.W. and Burton, N.H.K. (2012). Seabird foraging ranges as a preliminary tool for identifying candidate Marine Protected Areas. *Biological Conservation* 156; 53-61.

Figures extracted from the optimised Seagreen OTR.

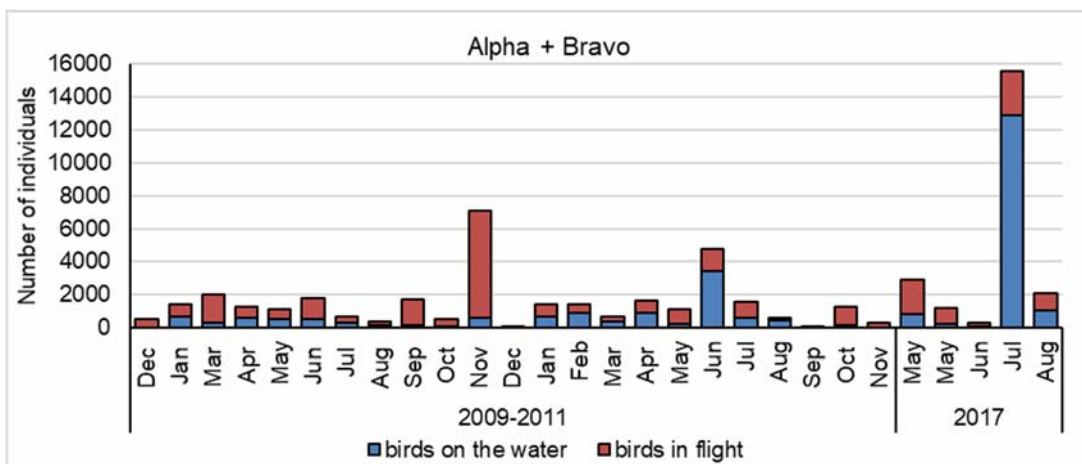
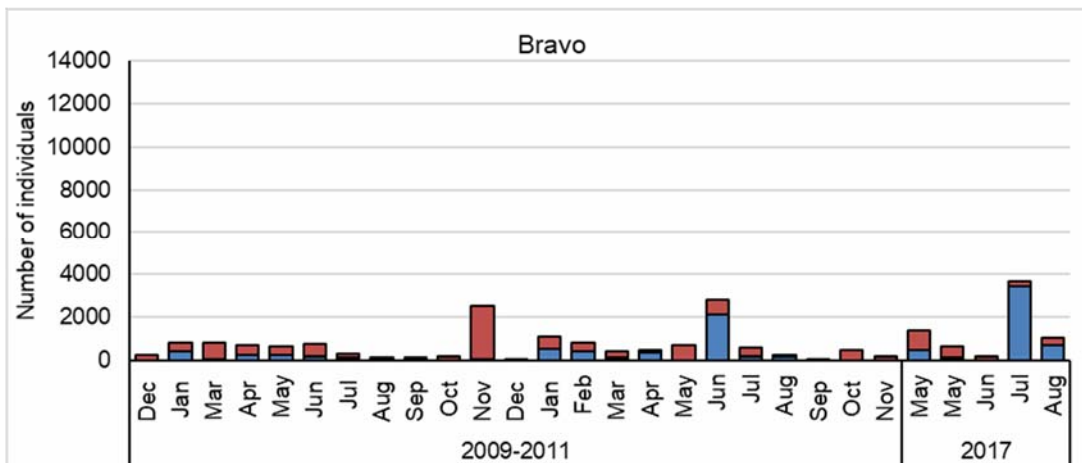
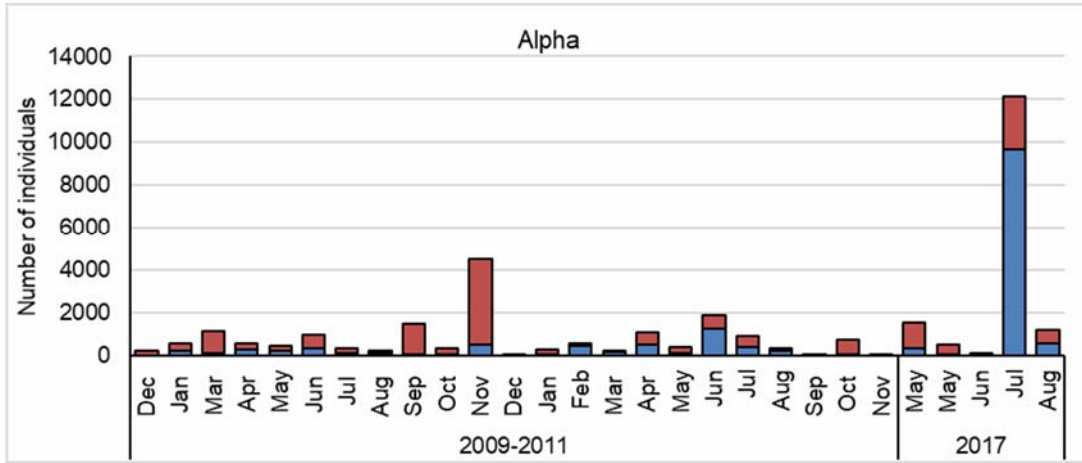


Figure 28: Black-legged Kittiwake population estimates (number of individuals) in Alpha, Bravo and Alpha and Bravo combined by month from boat-based surveys. Estimates are derived from the density of snapshots of birds in flight combined with distance-corrected density of birds on the water from line transect. (Extracted from Seagreen OTR page 74).

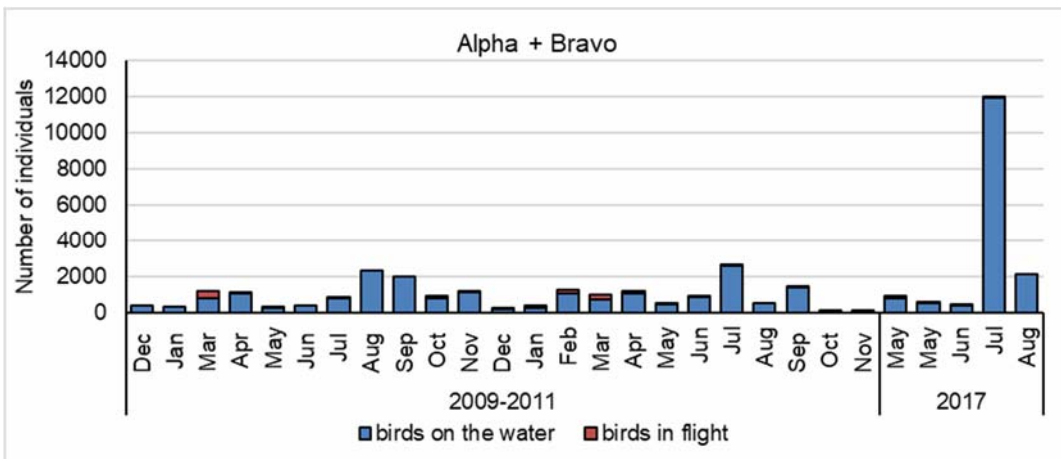
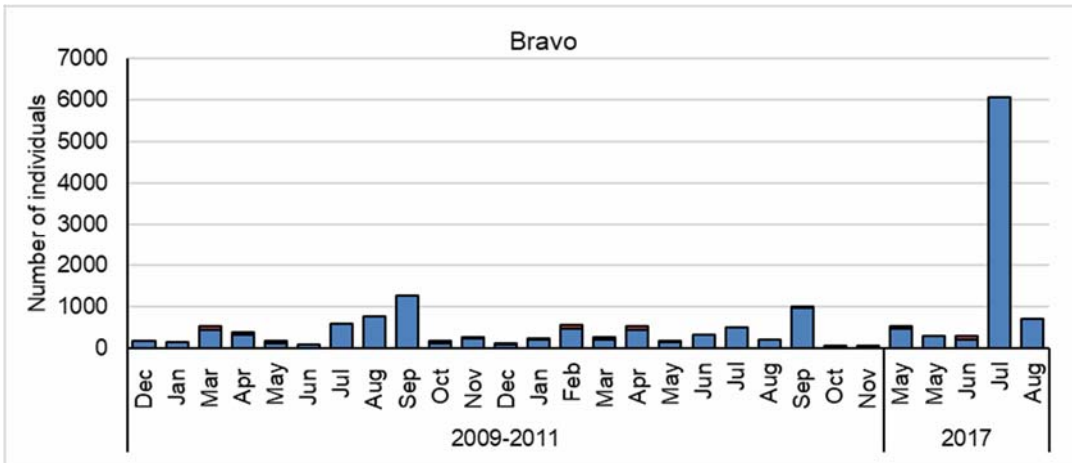
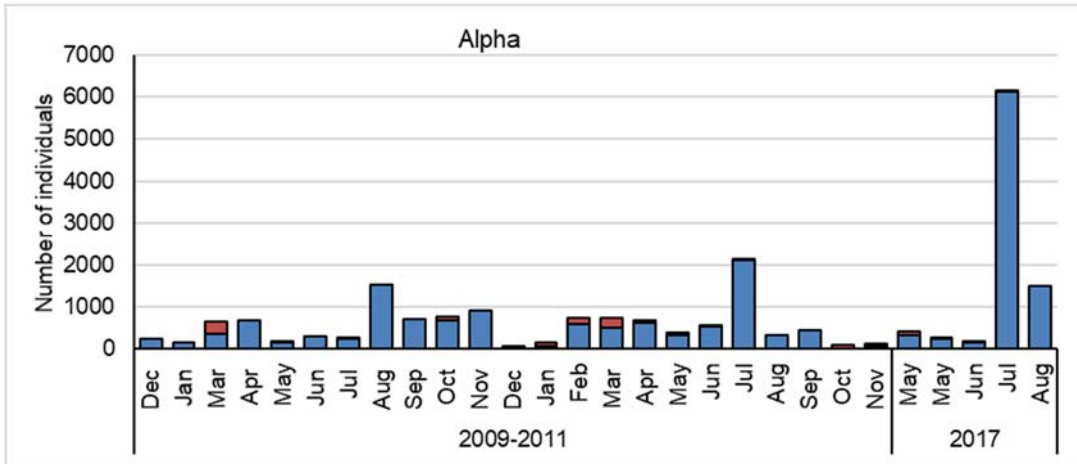


Figure 53: Razorbill population estimates (number of individuals) by month from boat-based surveys of Alpha and Bravo. Estimates are derived from density from snapshots of birds in flight combined with distance corrected density of birds on the water from line transect. (Extracted from page 112 Seagreen OTR)

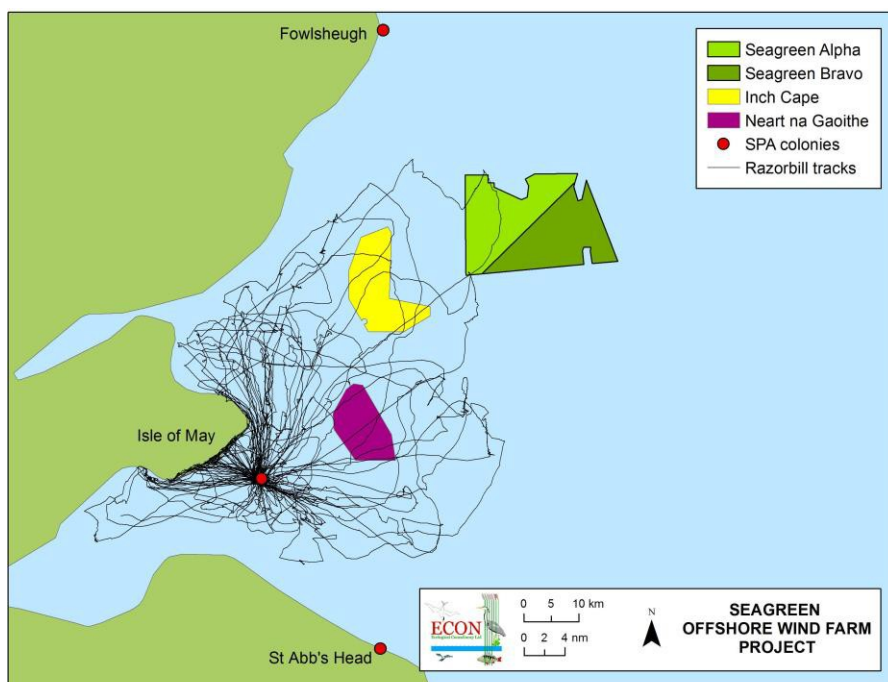


Figure 52: Tracks of breeding Razorbills fitted with GPS tags from Isle of May ($n = 18$) in 2010 as redrawn following Daunt *et al.* (2011a). (Extracted from page 110 Seagreen OTR).

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Licensing Operations Team
Marine Scotland
375 Victoria Road
Aberdeen
AB11 9DB

SEAGREEN ALPHA AND BRAVO – ADDENDUM SCOPE – ORNITHOLOGY COMMENTS

Marine Scotland Science has reviewed the submitted addendum scope and has provided the following comments.

MSS have reviewed Seagreen's Addendum Scope together with the attached note on use of the 2017 ornithology survey data (dated 18th December 2018). MSS also reviewed the SNH consultation response (dated 11th January 2019). In addition to these documents MSS have attended two meetings with Seagreen on 6th December 2018 and 10th January 2019 (the second including SNH) to discuss the scope of the proposed Addendum. MSS previously submitted separate written advice on PVA modelling to be used in the addendum (early January 2019).

Species to include

The species to be further assessed are northern gannet, black-legged kittiwake, and razorbill. In addition to these three species the addendum will include narrative and reasoning explaining why other species are not included and cross referencing the location of relevant information for those species in the Seagreen 2018 EIAR. This is in agreement with advice given during earlier meetings with both MSS and SNH, thus MSS are content with this approach.

Use of 2017 survey data

Additional breeding season boat-based ornithology surveys of the Seagreen site undertaken during 2017 included unusually high number of several species during July 2017. Seagreen state that this is an exceptional event proposing to provide collision risk modelling (CRM) outputs with and without this data included (as was previously done for displacement in the 2018 EIAR). Seagreen's preference is then to use the assessed impacts without the July 2017 data for population viability analysis (PVA) and Habitat Regulations Appraisal (HRA). Seagreen provide a useful note giving context on the observations during July 2017 (Annex 2 to Addendum Scope).

In agreement with SNH, MSS advise that assessment for razorbill include mortality estimates with and without the July 2017 data included, but that PVA and HRA exclude the July 2017 survey data.

As SNH stated it is likely that elevated numbers of razorbill and guillemot in late summer (late July and August) include adults accompanying dependent young. This may be a particularly vulnerable period for chicks and adults as birds may be flightless (moult in adults and not fully developed plumage in chicks) and dependent chicks could be separated from their parents. Consideration of mitigation to reduce possible disturbance by vessel and construction traffic of post-breeding adults with chicks (relevant to guillemot and razorbill) during July and August may be relevant.

For kittiwake, MSS advise following the approach advised by SNH (consultation response dated 11th January 2019). That is to use the July 2017 data for CRM but for displacement of kittiwake use median rather than mean densities (thus reducing the influence of the high density observed during July 2017). SNH's consultation response provided a helpful review of at sea densities of kittiwake previously observed in the Forth and Tay region which helps in reaching an opinion on appropriate use of the 2017 survey data.

As for SNH, we emphasise that the advice above is for a unique situation and that survey data should usually be used in full.

Displacement

MSS agree with Seagreen and SNH that razorbill and kittiwake aerial densities (birds in flight) should be adjusted for the survey method (radial snapshots).

Collision risk modelling (CRM)

CRM results for kittiwake and gannet should be presented for both option 1 and option 2 as originally requested in the Scoping Opinion (paragraph 9.4.6, http://marine.gov.scot/sites/default/files/00524860_1.pdf) with outputs from option 2 used for assessment. Outputs from the Band Model using the stochastic CRM would be useful to have presented but are not required.

Age class

MSS are content with suggested approach.

PVA

For kittiwake PVA is required for collision alone and for collision and displacement combined (displacement alone is not required).

Otherwise MSS are content with the suggested approach. In common with SNH we note that the actual predicted impacts should be modelled as well as impacts in increments.

HRA

MSS are content with the SPA sites and species combinations to be included, and the decision to exclude razorbill for St Abb's Head SPA, the SPA being beyond mean maximum foraging range for the species.

In combination assessment

MSS agree with the suggested approach.

Hopefully these comments are helpful to you. If you wish to discuss any matters further contact the MSS Renewables in-box MS_Renewables@scotland.gsi.gov.uk.

Yours sincerely

[Redacted]

[Redacted]

Marine Scotland Science

[Redacted]

Sent: 11 January 2019 09:40

[Redacted]

[Redacted]

Subject: RE: Seagreen scope for the addendum

Thank you for consulting SNH on the proposed approach from Seagreen on how they intend to provide additional information and assessment within their proposed addendum. We have had several meetings with Seagreen and we welcome ongoing dialogue as they develop this additional assessment work. Please find below our comments on the document – Ornithology Addendum Scope and Note on the Use of July 2017 Data 18 December 2018:

1. Species to be included in assessment

SNH agree that the following three species only should be further assessed:

- Northern gannet (*Morus bassanus*),
- Black-legged kittiwake, (*Rissa tridactyla*) and
- Razorbill (*Alca torda*)

2. Inclusion of 2017 July data

As requested, Seagreen have provided their rationale for the consideration of data gathered in 2017, including the data collected in July 2017, which due to its values, requires further consideration in its use.

The standard approach when assessing multiyear data is to use a monthly-mean value of bird density. If there were a large number of replicates of monthly counts then a single, outlying count would not have such great influence on the mean value, and simultaneously be more obvious as an outlier. Unfortunately, there are only 3 repeated counts for the month of July and that of July 2017 is by far the larger for both Kittiwake and Razorbill.

One issue is that the count in July 2017 was undertaken in late July, whereas the July counts in 2010 and 2011 were undertaken in early July. This has particular significance with respect to the number of auks recorded.

Razorbill

In similar surveys for Scottish east coast floating wind farm developments (Kincardine and Hywind) elevated numbers of razorbill and guillemot were recorded in late July or early August surveys, associated with adults accompanied by dependent, but recently fledged young. In those cases we suggested that the elevated densities derived from those surveys were not used as breeding season estimates, and suggest that the same approach, for Razorbill, is followed here.

Therefore while we expect to see the mortality estimates for displacement of razorbill in the breeding season both including and excluding the July 2017 survey density, we recommend that the population models use the mortality estimate excluding the July 2017 density.

Kittiwake

The Forth and Tay region is expected to hold some of the highest densities of Kittiwake around the UK coast in the breeding season. Breeding success for Kittiwake at the Isle of May was good in 2017, normally at the end of July it would be expected that Kittiwake would still be provisioning young at the nest, and so continue to operate as a central place forager. The survey results indicate that foraging conditions were good on the Alpha and Bravo development area during the July 2017 survey, but how exceptional the aggregation of Kittiwake observed is not clear. The report argues that this type of high density of birds (and marine mammals) would be expected to last only minutes or hours, and so inclusion within the monthly estimate would incorrectly inflate that estimate.

It would appear that the survey area was very attractive during that time and probably pulled in birds from colonies further that the mean maximum foraging range (mmfr)¹. As St Abbs Head to Fast Castle SPA and Buchanness to Collieston Coast SPA lie just outside the mmfr ^[1](but are within the mmfr + 1SD which is reported as 83.3km in Thaxter *et al* 2012) it would seem possible that birds from these colonies may also have contributed birds, and should be considered in the apportioning of impacts.

We have reviewed other sources of estimates of at sea densities of birds such as Stone *et al* 1995 and Skov *et al* 1995 as well as other Forth and Tay development survey results. These sources indicate considerably lower estimates than that recorded in the July 2017 surveys.

Stone *et al* 1995 - estimate range 0.41 - 4.54 birds /km², although the highest value of 4.54 birds /km² is the July value (the range 0.41-4.54 is the annual range), and the Western North Sea area covers all the North Sea from the Norfolk Coast to Peterhead, and a considerable distance offshore.

Skov *et al* 1995 provides a more targeted estimate of density for the Aberdeen Bank including the Firth of Forth, which is 12.1 birds per km². This is closer, but still well below the estimate of 15.26 birds/km² calculated from the Seagreen surveys including July 2017, although the Skov value is an 'average' density from April to September.

Inch Cape EIA Report 2014 - Inch Cape development site (surveyed in 2011 and 2012) also show a July peak, with inflight density of 5.68 birds/km² in July 2011 (ICOL ES).

Although the combined Alpha and Bravo densities without the July 2017 value is not given in the table, the estimates for Alpha (3.2 birds /km²) and Bravo (2.2 birds/km²) are considerably lower than those presented in Stone *et al* 1995 and Skov *et al* 1995.

Between 1995 and 2017 there have been documented declines in Kittiwake colony sizes. It would follow that densities of birds observed at sea during the breeding season would also be expected to be considerably reduced. To have recorded densities well in excess of those estimated from survey data prior to 1995 does support the idea that an unusual event occurred.

In small samples an extreme outlier has a large influence on a mean value. The density of Kittiwake estimated in July 2017 is an outlier in the limited data available, but it is not clear how extreme. Densities of birds in flight only (used in collision estimation) are less extreme; we therefore recommend using the July 2017 survey data in those estimates.

The total density (of birds in flight and on water) is the higher value, particularly as a large proportion of birds were not in flight. We consider that using a median value (median values do not have a standard deviation, but a median absolute deviation can be calculated), rather than a mean value for the July densities would take some account of the fact that a large number of birds were observed, but would reduce the influence of the highest value.

Our advice on the use of the July 2017 survey data is a response to a unique situation, and our opinion is that survey data should normally be used in full where it has been obtained, and removing individual elements of survey should not be accepted other than in exceptional circumstances where inclusion would clearly be misleading.

3. Displacement

For the inflight densities it was agreed that the radial snapshot densities of birds in flight should be reduced. This is what we expect to see used in the EIAR addendum for the revised kittiwake (and razorbill) assessments.

4. Collision Risk,

We had requested that both option 1 and option 2 results should be presented. There is strong evidence that the flight height distribution observed in the Seagreen footprint differs from that of the generic flight heights of Johnston to a significant degree. Within the Forth and Tay, we request that all developers produce option 2 assessments to assist us in our consideration of in combination impacts and the relative impacts being assigned to each development, for this reason it is important that option 2 results are presented by Seagreen.

We will however also consider carefully the outputs using option 1 for the development alone for the above reasons. We also consider that outputs from the stochastic Band Model using the MS Shiny App could be generated and would be reviewed, but we will be able to assess impacts based on the basic Band model outputs only if this is presented.

5. Age Class

This is in line with the original scoping opinion and as and as such we agree with this approach.

6. Population Viability Analysis

We agree with the finer resolution of the PVA increments as outlined:

- Gannet – 25 birds (Forth Islands).
- Kittiwake – 20 birds (Forth Islands and Fowlsheugh)
- 10 birds (St Abb's Head to Fastcastle)
- Razorbill – 10 birds (Forth Islands and Fowlsheugh)

Our understanding is that the actual predicted impact will also be modelled, but we request that this is confirmed.

7. HRA

Information is to be provided to help inform the appropriate assessment. We agree with the suggestion to exclude Razorbill (St Abb's Head SPA) from further consideration under HRA.

8. In combination assessment

We agree with the approach to be taken outlined in section 9 and the projects to be considered.

^[1] mmfr – mean-maximum foraging range as in Thaxter et al 2012

We had a useful catch up call with both MS and Seagreen yesterday and we advised that we would be submitting our comment to MS LOT today. Please advise us when final comments which incorporate the comments from MSS have been sent onto Seagreen and if possible we would be grateful to receive a copy.

Many thanks [Redacted]

[Redacted]

Scottish Natural Heritage | Battleby | Redgorton | Perth | PH1 3EW | t: 01738 458674

marineenergy@nature.scot

Dualchas Nàdair na h-Alba | Battleby | Ràth a Ghoirtein | Peairt | PH1 3EW

nature.scot – *Connecting People and Nature in Scotland* – [@nature_scot](https://twitter.com/nature_scot)

From: [Redacted]
Sent: 15 January 2019 13:36
To: [Redacted]
Cc: [Redacted]
[Redacted]
Subject: Seagreen query for MSS - Response

Advice from MSS on incremental PVA modelling for Seagreen addendum

MSS concur with SNH's view (as stated by Seagreen in their email to LOT dated 12/12/2018) that it is useful to include PVA models with incremental levels of impact, these providing useful context for interpreting scenario specific PVAs. MSS thus recommend that incremental PVA models are included in the Seagreen addendum.

MSS have reviewed Seagreen's query regarding how the incremental changes in background mortality for each species should be modelled in PVA. Previously the incremental models were ran with additional mortality apportioned to age classes according to the stable age structure of the population. Seagreen queried whether this approach is appropriate noting that the age class structure in the Firth of Forth and North Sea differ from that found from the PVA stable age structure.

The Scoping Opinion

(<https://www2.gov.scot/Topics/marine/Licensing/marine/scoping/SeagreenPhase1-2017/SO-15092017>) provided guidance on how impacts should be apportioned to age classes (see section 9.5.7). For the relevant species this advised the following:

Gannet and kittiwake breeding: apportioned to age classes using proportions derived from site survey data.

Gannet and kittiwake non-breeding: Apportioned to age classes using proportions derived from site survey data, if not available using PVA stable age structure.

Razorbill breeding and non-breeding: Apportion to age classes using proportions from PVA stable age structure.

The Scoping Opinion also included advice on PVA (section 9.6), however that did not provide specific guidance on how impacts may be modelled in incremental PVA models.

MSS advise that the incremental PVA models should follow the apportioning to age class guidance given in the Scoping Opinion (summarised above). As such, site specific survey data should be used for species and season combinations where advised. If site specific age-class structure data are unavailable then the stable age-structure from PVA should be used.

[Redacted]

Marine Scotland - Marine Planning & Policy

Scottish Government | Marine Laboratory | 375 Victoria Road | Aberdeen | AB11 9DB

[Redacted]

| General Queries: +44 (0)300 244 5046

[Redacted]

| Website: <http://www.gov.scot/Topics/marine/Licensing/marine>

[Redacted]
Licensing Operations Team
Marine Scotland
375 Victoria Road
Aberdeen
AB11 9DB

SEAGREEN - SEAGREEN ALPHA & BRAVO WIND FARM SITES - E-MAIL QUERY - ADVICE REQUEST - ORNITHOLOGY

Marine Scotland Science has reviewed the submitted request and has provided the following comments.

MSS have reviewed the two queries from Seagreen together with the accompanying supporting document (a spreadsheet comparing approaches to using at sea kittiwake density data). Note, MSS had not seen SNH's response when preparing this advice. MSS may consider revising this advice after having considered SNH's response.

- Question: Please could SNH/MSS confirm which method should be used for the kittiwake displacement assessment?
MSS advise that using method 2 would be most appropriate for displacement. This would still be reasonably precautionary as the seasonal max for 2017 would be calculated after accounting for unusually high numbers in July 2017 by taking the median for all years that month (median of July for 2010, 2011, and 2017). The mean maximum would then be calculated for the breeding season as usual (mean of the seasonal max for 2010, 2011, and the adjusted 2017).
- Question: Seagreen assumes that unadjusted July 2017 densities should be used in the calculation of monthly mean densities for CRM. Please could SNH/MSS confirm
MSS advise that median density is used for July for collision risk modelling and means for other months. This would keep consistency with the approach suggested for displacement.

Hopefully these comments are helpful to you. If you wish to discuss any matters further contact the MSS Renewables in-box at MS_Renewables@gov.scot

Yours sincerely

[Redacted]

Marine Scotland Science

12 February 2019

SNH Advice on the consideration of using mean-maximum foraging range when assessing impacts to Razorbill from Seagreen Alpha and Bravo projects.

February 2019

Background

During 2018, SNH was consulted on the EIA Reports accompanying applications for the three large Forth and Tay wind farm project applications (Neart na Gaoithe, Inch Cape and Seagreen Alpha and Bravo).

Consideration has been given to both the ornithological impacts from the projects on their own as well as in combination across all three 'Forth and Tay' projects. For Kittiwake and Gannet, wider scale assessment in the non-breeding season has also been undertaken.

Following submission of the SNH advice on the Seagreen EIA report and application in September 2018, Seagreen have indicated their intention to provide updated ornithological assessment which will be submitted as an addendum in 2019.

Following scoping discussions to inform this addendum SNH requested that mean-maximum foraging range (mmfr) should incorporate the standard deviation of the mean value to address impacts colonies beyond the mean-maximum range, but closer than the maximum range as reported in Thaxter *et al.* 2012.

Upon receipt of this advice Seagreen proposed not to include impacts to Razorbill at St Abb's Head to Fast Castle SPA, citing inconsistency with advice and assessment of the other applications in the region.

This note provides our final advice on this matter as requested at the meeting between Seagreen, MS and SNH on 14th February.

Summary Assessment

Our advice is that we do not consider that it is necessary to include the St Abb's to Fastcastle SPA colony for razorbill in the assessment of the impacts in the Seagreen addendum.

Further assessment

In the appropriate assessment¹ of the Neart na Gaoithe application the apportioning indicates that the proportion of impacts on razorbill assigned to the three SPAs from each of the three wind farms in the breeding season is shown in the table below.

Wind Farm	Proportion of Razorbill impacts assigned to SPAs	Forth Islands proportion	Fowlsheugh Proportion	St Abb's Head to Fast Castle proportion
Neart na Gaoithe	0.922	0.708	0.076	0.137
Inch Cape	0.679	0.239	0.374	0.067
Seagreen A+B	0.719	0.104	0.564	0.051

The majority of impacts are assigned to Forth Islands and Fowlsheugh, with much smaller proportion of impacts to St Abb's Head to Fast Castle from all three developments.

¹ <http://marine.gov.scot/data/neart-na-gaoithe-offshore-windfarm-revised-design-appropriate-assessment-2018>

The proportion of impacts assigned to St Abb's Head to Fastcastle SPA from Seagreen is just over 5%.

The non-breeding season assessment uses a regional population based on the size of colonies within the mmfr. For Seagreen this is stated to be 41,009 birds (Seagreen HRA section 8.253). As the population of Razorbill at St Abb's Head to Fast Castle SPA is 5815 individual adults (SNH advice, 30th Nov 2017 – appendix A (ii)), this would be the equivalent of 14% of the population. The winter mortality is assigned on the basis of straightforward proportion of the population.

Using the 2018 application figures for Seagreen – noting there may be some changes to these in any addendum, we have considered the issue further. The estimate in the EIA Report Appendix 8c is that 35 adult razorbill will be lost due to displacement mortality (Ornithology Chapter section 8.332) with the Seagreen project site. In the non-breeding season it is estimated that 6 birds per annum will be lost due to displacement.

Combining the apportioned percentages with the estimated displacement mortality suggests that approximately 2.5 birds per year would be expected to be lost from the St Abb's to Fast Castle SPA. This is the equivalent of 0.04% of the colony. According to Horswill and Robinson (2015) the adult survival of Razorbill is 0.895. Therefore the predicted loss of 2.5 birds is an equivalent of a 0.04% increase in the adult mortality rate (the mortality rate would then be 0.8945 or 0.895 to the same decimal places), and below the threshold of 0.2% stated in the project Scoping Opinion.

Foraging Ranges

Recent tracking of Razorbill has shown that the maximum range is greater than calculated in Thaxter *et al.* 2012.

The maximum foraging range for Razorbill reported in Wakefield *et al.* 2017 is 305km, although it should be noted that the median range was 13.2km. Investigation of this data revealed that the Northern Isles has a large influence on the data. The median range in the Northern Isles was 62.7 km (with an interquartile range of 39-87km). We therefore accept that the connectivity of Razorbill from St Abb's Head to Fast Castle SPA with the Seagreen development is low. Given the small impact likely to be apportioned to this colony and the evidence of the strength of the connectivity, we advise that it is not necessary to provide detailed assessment for Razorbill from this colony.

Conclusion

- 1) St Abb's Head to Fast Castle SPA lies beyond the distance from Seagreen Alpha and Bravo described by the mean maximum foraging range of Razorbill as defined in Thaxter *et al.* 2012.
- 2) Although more recent tracking information suggests that foraging ranges used by razorbill can be considerably greater than that described in Thaxter, this is based on information from areas other than the Forth and Tay.
- 3) The estimated level of mortality that would be assigned to the St Abb's Head to Fast Castle following SNH apportioning guidance is small. It is below a level that would require detailed assessment.

Following this further consideration, despite the fact that numbers presented in the HRA and EIA documents are likely to be revised for the addendum, we agree with the Seagreen position that it is not necessary to include impacts to Razorbill at St Abb's Head to Fast Castle SPA from this development proposal in the new assessment.