Non-Breeding Season Apportioning approach

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Marine Ornithology Advisor, SNH
What is being covered?

- SNH advice on the calculation of impacts to SPA birds outside the breeding season.
- How movements of birds from breeding areas are addressed in such assessment.

Request – awareness of any new papers likely to come out in near future or any issues being discussed in the background on any widely used references.
How are non-breeding impacts assigned to Scottish breeding colonies?

Different species have slightly different approaches, but the overriding principle is that birds mix evenly and freely within the non-breeding range.

Regardless of impact source, the approach is similar. Movement outside the breeding season is the most influential factor in the approach.
For Non-Breeding Season Apportioning

Example for gannet and kittiwake - References


Smartwind (2015) - Hornsea Project 2 Clarification Note – Apportioning of predicted gannet mortality to the Flamborough and Filey Coast pSPA population


MacArthur Green (2016a) East Anglia THREE Information for Habitats Regulations Assessment.

MacArthur Green (2016b) Updated CRM for birds following the East Anglia One reduction

Updates
2017-2019, Royal Haskoning, Cumulative Ornithological Collision Risk Database. Updated 2019 data


SNH (2018) Recommended periods for seabird seasons
For Non-Breeding Season Apportioning

Gannet (Forth Islands SPA) step through

Step 1

Assess the contribution of the focal colony to the passage of gannet through the wind farm. In this example the focal colony is the Forth Islands SPA (Bass Rock) and the wind farms of interest are East Anglia One (EA1) and Beatrice.

The main assumption is that birds from all populations and colonies are at equal risk of collision if passage route passes a wind farm.
For Non-Breeding Season Apportioning
Gannet (Forth Islands SPA) step through

**Step 1**
Assess the contribution of the focal colony to the passage of gannet through the wind farm.

In a real case many wind farms would be assessed and the impacts aggregated. Here we look at one north of the colony and one south of the colony.

Calculations of number of birds heading north and south from update to Furness 2015.

<table>
<thead>
<tr>
<th></th>
<th>Autumn</th>
<th>Spring</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total ‘connectivity’</td>
<td>Beatrice</td>
<td></td>
</tr>
<tr>
<td>Beatrice</td>
<td>297969</td>
<td>334804</td>
</tr>
<tr>
<td>Numbers of Bass Rock</td>
<td>101258</td>
<td>199778</td>
</tr>
<tr>
<td>gannet passing</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total ‘connectivity’</td>
<td>East Anglia One</td>
<td></td>
</tr>
<tr>
<td>EA1</td>
<td>397723</td>
<td>200502</td>
</tr>
<tr>
<td>Numbers of Bass Rock</td>
<td>172412</td>
<td>73891</td>
</tr>
<tr>
<td>gannet passing</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Proportion of gannet</td>
<td>Beatrice</td>
<td></td>
</tr>
<tr>
<td>passing Beatrice that</td>
<td>33.9%</td>
<td>59.7%</td>
</tr>
<tr>
<td>originate from Bass</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Rock</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Proportion of birds</td>
<td>EA 1</td>
<td></td>
</tr>
<tr>
<td>passing EA 1 that</td>
<td>43.3%</td>
<td>36.9%</td>
</tr>
<tr>
<td>originate from Bass</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Rock</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
For Non-Breeding Season Apportioning

Gannet (Forth Islands SPA) step through

**Step 2**
Extract seasonal collision estimates for wind farms.

The number of collisions from wind farms in North Sea UK waters have been provided in support of various applications, for example Hornsea 2 (Smartwind 2015) – although see TCE update.

In the table below we have extracted the values for EA1 and Beatrice taken from Table 1.11 in Appendix N of the Hornsea 2 application.

<table>
<thead>
<tr>
<th>Wind Farm</th>
<th>Autumn collisions</th>
<th>Spring collisions</th>
<th>Band model option</th>
</tr>
</thead>
<tbody>
<tr>
<td>Beatrice</td>
<td>48.8</td>
<td>9.5</td>
<td>1</td>
</tr>
<tr>
<td>East Anglia One</td>
<td>124.5</td>
<td>4.7</td>
<td>2</td>
</tr>
</tbody>
</table>

Non-breeding season collisions predicted for gannet at Beatrice and EA1
For Non-Breeding Season Apportioning

Gannet (Forth Islands SPA) step through

Step 3

3(i) Calculate the number of collisions in period/s outside the breeding season for as-built scenarios, rather than the original consented application. As-built values are taken from the Crown Estate ‘headroom’ estimates in MacArthur Green (2017).

The Crown Estate ‘Headroom’ spreadsheet (MacArthur Green 2017) applied a 0.6069 adjustment to the CRM estimate to convert from the total application (consented) estimates to the as built estimates.

<table>
<thead>
<tr>
<th></th>
<th>Autumn</th>
<th>Spring</th>
<th>Non-breeding total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Beatrice application</td>
<td>48.8</td>
<td>9.5</td>
<td>58.3</td>
</tr>
<tr>
<td>Beatrice as built (*0.6069)</td>
<td>29.6</td>
<td>5.8</td>
<td>35.4</td>
</tr>
</tbody>
</table>

Application and As built estimates of collisions for Beatrice Wind Farm
For Non-Breeding Season Apportioning

Gannet (Forth Islands SPA) step through

Step 3

3(ii) Apportion the number of non-breeding period collisions to the Forth Islands SPA, according to age class, by adjusting the as-built collision estimates by the proportion of Forth Islands SPA birds estimated to be connected to the wind farm during non-breeding period/s.

The total collisions attributed to Forth Islands SPA (Bass Rock) for each period are adjusted by the proportion of each age and the proportional representation of the colony within the ‘connected’ population.

Each cell in the table below shows the calculation of number of collisions x age class proportion x colony representation proportion.

<table>
<thead>
<tr>
<th></th>
<th>Adult</th>
<th>Immature</th>
<th>Juvenile</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Beatrice</td>
<td>29.6<em>0.55</em>0.34 = 5.5</td>
<td>29.6<em>0.26</em>0.34 = 2.6</td>
<td>29.6<em>0.19</em>0.34 = 1.9</td>
<td>10</td>
</tr>
<tr>
<td>Autumn</td>
<td>5.8<em>0.55</em>0.60 = 1.9</td>
<td>5.8<em>0.45</em>0.60 = 1.6</td>
<td>n/a</td>
<td>3.5</td>
</tr>
<tr>
<td>Spring</td>
<td>90.1<em>0.55</em>0.43 = 21.3</td>
<td>90.1<em>0.26</em>0.43 = 10.1</td>
<td>90.1<em>0.19</em>0.43 = 7.4</td>
<td>38.8</td>
</tr>
<tr>
<td>EA1</td>
<td>3.6<em>0.55</em>0.37 = 0.7</td>
<td>3.6<em>0.45</em>0.37 = 0.6</td>
<td>-</td>
<td>1.3</td>
</tr>
</tbody>
</table>
For Non-Breeding Season Apportioning

Gannet (Forth Islands SPA) step through

Step 3

3(iii) Seasonal definitions adjusted to reflect SNH defined non-breeding period durations.

The autumn post breeding period in Furness (2015) is 12 weeks from September to November. SNH recommendation is to use the period from October to December. As this is also a 12 week period no further adjustment is required.

In Spring, the East Anglia THREE appendix 3 and the BDMPS report (MacArthur Green 2017) uses a 16 week period – December to March, whereas the SNH recommended period is January to mid-March – equivalent to a 10 week period. A proportionate recalculation based on relative length of time in the two periods is required. We therefore recommend that 10/16 or 0.625 * the number of collisions assigned to ‘spring’ in the MacArthur Green 2017 document is the final value required.

<table>
<thead>
<tr>
<th></th>
<th>Autumn collisions</th>
<th>Spring collisions</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Adult</td>
<td>Immature</td>
</tr>
<tr>
<td>Beatrice</td>
<td>5.5</td>
<td>2.6</td>
</tr>
<tr>
<td>EA1</td>
<td>21.3</td>
<td>10.1</td>
</tr>
<tr>
<td>SUM</td>
<td>26.8</td>
<td>12.7</td>
</tr>
</tbody>
</table>

The assumption is that collisions happen at the same rate throughout the period.
For Non-Breeding Season Apportioning

Gannet (Forth Islands SPA) step through

**Step 4**

Steps 1 to 3 then repeated for all wind farms identified for consideration in cumulative impact assessment/in-combination effects.

Sum all collision estimates for a non-breeding period/s cumulative impact total.

The proportion of birds passing wind farms south of Bass Rock and North of Bass Rock, is the same for any wind farm to the south or north so Step 1 calculation is the same.
For Non-Breeding Season Apportioning
Kittiwake – variation in approach

Step 1
Assess the contribution of the focal colony to the number of birds within the described population scale which contains the wind farm of interest. In this case the focal colony is Forth Islands SPA (Bass Rock) and the wind farms of interest are Beatrice and EA1. The non-breeding season (BDMPS) is an area covering the whole North Sea.

Direction of migration is not differentiated for kittiwake (yet)

Step 2
Extract seasonal collision estimates for East Anglia 1 and Beatrice

Scottish Natural Heritage
Dualchas Nàdair na h-Alba
nature.scot
For Non-Breeding Season Apportioning
Kittiwake – difference to approach

**Step 3(i)**
Calculate the number of collisions in period/s outside the breeding season for as-built scenarios (‘updated’) taken from the Crown Estate spreadsheet ‘headroom’ estimates in MacArthur Green (2017).

**Step 3(ii)**
Apportion the number of non-breeding period collisions to the Forth Islands SPA, according to age class, by adjusting the as-built/new scenario collision estimates by the proportion of Forth Islands SPA birds estimated to be within the BDMPS region during non-breeding period/s, following Furness 2015.
For Non-Breeding Season Apportioning

Kittiwake – difference to approach

Step 3(iii)

Where seasonal definitions differ between SNH guidance and the Crown Estate ‘headroom’ report, recalculate collision estimates to account for any difference in the defined non-breeding period durations assuming a flat rate of collisions across the whole time period.

Step 4

Repeat for all wind farms identified for consideration in cumulative impact assessment/in combination effects. Sum all collision estimates for a non-breeding period/s cumulative impact total.
For Non-Breeding Season Apportioning Large Auks – Displacement

The area occupied by non-breeding auks from the focal colony may be different from regions used in the Furness (2015) report.

Figure 2. Guillemot attendance on the Isle of May in autumn 2015 as monitored by the Scottish Seabird Centre’s webcam. (a) The length of time after dawn that birds were present on the ledges; open circles indicate days when departure times were not known. (b) Maximum counts of birds in the field of view of one camera; diamonds indicate days when birds were present but not counted.
For Non-Breeding Season Apportioning
Large Auks – Displacement, another difference to approach

Auk mortality due to displacement is assessed by the sncb ‘matrix method’ for all wind farms.

Steps 1 - 4 then follow same pattern as for gannet and kittiwake, but for guillemot only a restricted winter area is used. Defined by mean-maximum +1SD of breeding season foraging range. Colonies within that area freely mix.

MS seabORD software could be used to support or replace matrix assessment.

Evidence on non-breeding season movement of auks being gathered from EOWDC and SEATRACK collaborations.
For Non-Breeding Season Apportioning

Large Auks – Displacement, another difference to approach

Razorbill appear to winter further from the colony and are less often present at the colony early in winter

Use of larger region (Furness 2015 BDMPS) more suitable for razorbill
Thank you