Apportioning predicted impacts during the breeding season

Tom Evans
Purpose of apportioning

- For HRA purposes we need to estimate how a proposed offshore wind farm may impact specific seabird populations from SPA sites.
- Collision and displacement mortality usually calculated based on number of birds observed at sea during base-line surveys – where do those birds originate from?

E.g. what proportion of collision mortality calculated for kittiwake at wind farm X originate from Handa SPA?
SNH Guidance Note

- SNH interim guidance note (updated November 2018) sets out alternative approaches and key principles
- Two broad approaches:
  - Theoretical approaches, incorporating population sizes and generic foraging range data
  - Empirical approaches, using data on site specific foraging distributions

https://www.nature.scot/interim-guidance-apportioning-impacts-marine-renewable-developments-breeding-seabird-populations
SNH Apportioning Method

- Theoretical approach
- Include colonies within foraging range (mean max foraging range)
- Distance is by sea
- Apportioning weights colonies by:
  - Distance by sea
  - Colony size
  - Proportion of area within foraging range accessible by sea

Straight-line (circle) versus area accessible by sea (blue) for gannet from Bass Rock (230 km range)

https://www.nature.scot/interim-guidance-apportioning-impacts-marine-renewable-developments-breeding-seabird-populations
SNH Apportioning Method

Weight = \frac{\text{Colony Population}}{\text{Sum of Populations}} \times \frac{\text{Sum of Distance}^2}{\text{Colony Distance}^2} \times \frac{1}{\frac{\text{Colony Sea Proportion}}{\text{Sum of 1/Sea Proportions}}}

https://www.nature.scot/interim-guidance-apportioning-impacts-marine-renewable-developments-breeding-seabird-populations
MSS Apportioning Method

• Empirical approach using colony specific foraging distributions modelled from GPS tracking data, from Wakefield et al. (2017)

• Available for four species only:
  – Kittiwake
  – Guillemot
  – Razorbill
  – Shag

Foraging distribution for kittiwake form Handa SPA
MSS Apportioning Method

Proportion of birds within a footprint that originate from the colony of interest =
Proportion of colony utilization distribution within footprint area * colony population size

Foraging distribution for kittiwake form Handa SPA
MS Apportioning Tool

- Developed R based tool to implement both the SNH Apportioning Method and the MSS Apportioning Method
- Requires some basic R knowledge to run
- To be published soon (March/April 2020)
MS Apportioning Tool

- Following this report Adam Butler and colleagues suggested alternative semi-empirical approaches for apportioning that used mean and maximum foraging ranges but that don’t require detailed tracking distributions, these could be developed for many of the species included in Thaxter et al. 2012 and Woodward et al. 2019
Seabird Sensitivity Mapping Tool for Scotland
Kate Searle, Adam Butler, Deena Mobbs, Maria Bogdanova, James Waggitt, Peter Evans, Mark Rehfisch, Roger Buisson & Francis Daunt

Fast, user-friendly tool to estimate the sensitivities of key seabird species to Offshore Renewable Developments (ORDs)

- maps for rapid visual assessment of overall sensitivity
- footprint-specific results for individual development sites
- Incorporates the MS Apportioning Tool as a module
- inputs to other assessment tools

**Stage:** Phase 1 complete, scoping for phase 2