CALEDONIA
Offshore Wind Farm

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Volume 8 Additional Information

Appendix 16: Ornithology Population Viability Assessment (PVA) Technical Report (Caledonia OWF)

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OCEAN WINDS

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Table of Contents

List of Tables

Acronyms and Abbreviations

BDMPS	Biologically Defined Minimum Population Scale
BTO	British Trust for Ornithology
CPGR	Counterfactual Population Growth Rate
CPS	Counterfactual Population Size
EIA	Environmental Impact Assessment
EIAR	Environmental Impact Assessment Report
HRA	Habitat Regulations Appraisal
JNCC	Joint Nature Conservation Committee
MD-LOT	Marine Directorate – Licensing Operations Team
OWF	Offshore Wind Farm
PVA	Population Viability Analysis
SMP	Seabird Monitoring Programme
SPA	Special Protection Area
WCS	Worst Case Scenario
WTG	Wind Turbine Generator

1 Introduction

1.1 Background

1.1.1.1 This appendix provides background information, sets out the methodology for, and presents the results of the updated Population Viability Analysis (PVA) for the proposed Caledonia Offshore Wind Farm (OWF), hereafter referred to as the 'Proposed Development (Offshore)', located in the Moray Firth, Scotland. This document forms part of the addendum package submitted in response to the Marine Directorate – Licensing Operations Team (MD-LOT) request for Additional Information.

1.1.1.2 Background to the Proposed Development (Offshore) and the consent applications for Caledonia North and Caledonia South are presented within the Environmental Impact Assessment Report (EIAR) of the original consent application (Volume 1, Chapter 5: Proposed Development Phasing) and summarised within the covering addendum document (Volume 8: Caledonia Offshore Wind Farm EIAR and HRA Addendum).

1.1.1.3 PVA has been modelled separately for the Proposed Development (Offshore), Caledonia North (Volume 8, Appendix 17: Ornithology Population Viability Assessment (PVA) Technical Report (Caledonia North)), and Caledonia South (Volume 8, Appendix 18: Ornithology Population Viability Assessment (PVA) Technical Report (Caledonia South)) where necessary to estimate the effect that the OWF may have upon ornithological populations alone and in-combination with other plans and projects.

1.1.1.4 The predicted mortalities for Caledonia North, Caledonia South and the Proposed Development (Offshore) have been presented as a worst-case scenario (WCS) (i.e., with respect to collision risk, the largest number of Wind Turbine Generators (WTGs) considered within the design envelope for the Proposed Development (Offshore)). The Proposed Development (Offshore) WCS is based on the maximum number of WTGs (bottom-fixed and floating) that could be constructed, rather than an addition of Caledonia North and Caledonia South, as to base the design on this assumption would overestimate potential impacts. For more information on the project design scenarios, refer to Volume 1, Chapter 3: Proposed Development Description (Offshore) and Volume 1, Chapter 5: Proposed Development Phasing of the EIAR.

1.2   Population Viability Analysis (PVA)

1.2.1.1   Marine renewable energy developments potentially impact seabirds through impact pathways such as displacement and barrier effects as a result of the presence of wind turbines and collision with turbine blades. These processes impact seabirds at an individual level but also have the potential to affect the productivity of a population, and/or increase baseline mortality within a population.

1.2.1.2   For breeding seabirds, 'distributional responses' include both barrier effects and displacement (NatureScot, 2023[1]). The use of 'displacement' for this report therefore includes habitat displacement effects as well as barrier effects.

1.2.1.3   The effects of OWF developments on a population can be estimated through the use of PVA modelling at an individual project level or in-combination. PVA provides a robust framework using demographic parameters to predict population changes and project these changes over a set period using statistical models. Different scenarios can be modelled to compare unimpacted 'baseline' scenarios that are assumed to follow a 'natural' growth rate, with 'impact' scenarios including development impacts by altering demographic parameters. Comparisons between the baseline and impacted models can indicate the level of impact that an OWF development will have on a population and how this may impact the conservation objectives of Special Protection Area (SPA) colonies within the affected area.

1.2.1.4   The greatest potential risks that seabird populations face from OWFs are mortalities caused by turbine blade collisions or displacement and barrier effects associated with wind turbine presence. Cumulative effects resulting from negative individual-level impacts have the potential to cause reductions in productivity or an increased baseline mortality within a population. The Habitat Regulations Appraisal (HRA) includes the assessment of these potential effects with respect to individual SPA colonies and the wider population.

1.2.1.5   The PVA was undertaken using the PVA tool developed by UKCEH and BioSS under contract to Natural England and JNCC (Searle *et al*., 2019[2]), which was accessed via the 'Shiny App' interface or online portal. PVA was modelled for bird species and populations that are qualifying features of the designated sites in line with the approach outlined below.

2 Method

2.1 Overview

2.1.1.1 This section sets out the PVA process conducted for the HRA for the Proposed Development (Offshore). The results from the Environmental Impact Assessment (EIA) of collision risk impact were apportioned for potential effects in accordance with NatureScot Guidance and the impacts were assessed within Volume 8, Appendix 4: Ornithology Additional Information Report (Caledonia OWF). A detailed methodology can be found in the apportionment appendix; Volume 8, Appendix 10: Ornithology Apportioning Technical Report (Caledonia OWF).

2.1.1.2 The threshold recommended for use of Proposed Development (Offshore) alone-level PVA is when a predicted impact is sufficiently large to result in a change of 0.02% in the adult survival rate of a qualifying feature (NatureScot, 2023[1]). Further to this, as agreed in consultation with NatureScot (consultation meetings dated 04 June 2025 and 07 August 2025), PVA for SPA qualifying features is only required to be re-run as part of assessment updates where the difference in the impacted adults apportioned to an SPA annually between submission impacts and updated impacts are greater than 0.5 of a bird (including increases and decreases). The guidance threshold recommended for use of in-combination-level PVA is where impacts exceeded both the threshold for assessment alone (0.02 percentage point change in adult survival rate) (NatureScot, 2023[1]) and where the project alone annual contribution to in-combination mortalities are greater than 0.2 (in line with NatureScot advice given to previous projects such as GreenVolt and Cenos OWFs).

2.1.1.3 The PVA was conducted using the Seabird PVA tool interfaced through the online 'Shiny App' which is a user-friendly online platform. The PVA tool developed by Natural England (Searle *et al*., 2019[2]) uses functions within the nepva R package to carry out the modelling and analysis.

2.2 Modelling Approach

2.2.1.1 All PVA models were undertaken using the 'Simulation' run type. Simulation runs are used to simulate population trajectories based on the specified demographic parameters, initial population sizes and scenarios.

2.2.1.2 A deterministic model translates the demographic parameters provided into actual numbers and provides a simplistic model, which can be used to generate average trends. Due to the lack of stochasticity, a deterministic model will produce the same result every time the simulation is run. In situations where little is known about how the population size has varied, or how the scale of impact may vary, running a deterministic model may

provide a more practical assessment of the population and how it may be impacted.

2.2.1.3 A stochastic model produces probabilistic outputs to account for the impact of environmental and demographic stochasticity. Environmental stochasticity describes the effects random variation in factors such as weather can have on a population and is modelled by the incorporation of randomly generated values for the probability of survival from one-time step to the next. Demographic stochasticity refers to the effect of random variation in population structure on demographic rates and is modelled by generating random numbers of surviving individuals for any given survival probability. Demographic stochasticity can usually be ignored for populations greater than 100 individuals, however including demographic stochasticity will not cause any penalty when simulating larger populations (WWT Consulting, 2012[3]).

2.2.1.4 All PVA modelling in this report was undertaken with the Beta/Gamma model for environmental and demographic stochasticity. The number of simulations runs were set to 5,000 and were ran for the expected lifespan of the Proposed Development (Offshore) (35 years only) as agreed in consultation with NatureScot (consultation meetings dated 04 June 2025 and 07 August 2025).

2.2.1.5 Additional "burn-in" time of ten years were included in each model which were then removed from the outputs. These dropped modelled years are often more variable in their estimates of population numbers due to potential initial population structure instability (i.e., an in balance of immature-matures). After several years, the modelled structure becomes stable which is the most appropriate time to take outputs. This is informed by internal model parameterisation developed during the burn-in period.

2.2.1.6 Demographic processes such as growth, survival, productivity and recruitment are density-dependent, as their rates change in relation to the number of individuals in a population. Density dependence can be described as either compensatory or depensatory (Begon et al., 2005[4]). Compensation is characterised by demographic changes that cause a stabilising effect on a populations long-term average. Depensation acts to further decrease the rate of population growth in declining populations and can delay the rate of recovery. This is typically exhibited in populations that have been significantly depleted in size and is caused by a reduction in the benefits associated with conspecific presence.

2.2.1.7 Density dependence is self-evident in the natural environment, as without it, populations would grow exponentially. For seabird populations, the mechanisms as to how this operates are largely uncertain, or where known this is evidently highly variable. If density dependence is mis-specified in a PVA, the modelled prediction may be unreliable. Therefore, it is more typical to use density independent models for seabird assessments, despite the lack of biologically realistic density dependence. As such, density

independent models lack any means by which a population can recover once it has been reduced beyond a certain point, they are therefore appropriate for impact assessment purposes on the grounds of precaution (i.e., another source of precaution in the assessment process) (Ridge *et al*., 2019[5]). Conversely, this also means that population projections can trend in as exponential function with no effective carrying capacity. As the populations in this assessment show highly varying trends with some in decline or poor data status, it is deemed density dependent methods are not appropriate for this assessment. Density independent models have therefore been used.

2.3   PVA Demographic Parameters

2.3.1.1   The option to use pre-set demographic parameters or custom values is available in the PVA Tool Shiny App. National or regional demographic parameters for each species within the tool were obtained from Horswill and Robinson (2015[6]) (Table 2-1).

2.3.1.2   Where SPA-specific productivity rates were not available, the most relevant values from Horswill and Robinson (2015[6]) were used. For specific SPAs where breeding success and colony count data were available these were used to calculate average productivity rates (and associated standard deviations).

2.3.1.3   Survival rates vary between age classes, with 0-1 representing birds under the age of one year, class 1-2 representing birds under the age of two etc. Adults are grouped, as survival rates tend to be consistent at maturity despite actual age.

2.3.1.4   The age at first breeding and maximum brood size per pair parameters were selected from the pre-formulated values within the PVA Tool (Searle *et al*., 2019[2]).

2.3.1.5   Populations sizes based on the most recent count information were extracted from the Seabird Monitoring Programme (SMP) online database to allow assessment of predicted impacts on the most recent population estimate (Table 2-1). Colony counts for East Caithness Cliffs SPA were derived from Burnell *et al*. (2023[7]), and Forth Islands SPA colony counts take into account the 2021 estimated Bass Rock drone count of 81,000 AOS (Harris *et al*., 2021[8]), as requested by NatureScot within consultation meetings regarding NatureScot representations following submission (04 June 2025 and 07 August 2025).

Table 2-1: Summary of SPA demographic parameters selected for PVA species (Source: Horswill and Robinson (20156) and SMP colony counts).

| Species | Colony | SMP Count of Colony Breeding Adults | Productivity Rate ± SD | Mean Adult Survival Rate + SD | Mean Immature Age Class | | | | | |
					0 – 1 Survival Rate + SD	1 – 2 Survival Rate + SD	2 – 3 Survival Rate + SD	3 – 4 Survival Rate + SD	4 – 5 Survival Rate + SD	5 – 6 Survival Rate + SD
Kittiwake	East Caithness Cliffs SPA	48,958	0.690 ± 0.296	0.854 ± 0.051	0.790 ± <0.001	0.854 ± 0.051	0.854 ± 0.051	0.854 ± 0.051	0.854 ± 0.051	-
	Troup, Pennan and Lion's Heads SPA	27,344								
	Buchan Ness to Collieston Coast SPA	27,094								
Guillemot	East Caithness Cliffs SPA	199,992	0.629 ± 0.174	0.939 ± 0.015	0.560 ± 0.001	0.792 ± 0.001	0.917 ± 0.001	0.917 ± 0.001	0.939 ± 0.001	0.939 ± 0.570
	North Caithness Cliffs SPA	62,102								
	Troup, Pennan and Lion's Heads SPA	47,719								
	Copinsay SPA	1,312								

| Species | Colony | SMP Count of Colony Breeding Adults | Productivity Rate ± SD | Mean Adult Survival Rate + SD | Mean Immature Age Class | | | | | |
					0 – 1 Survival Rate + SD	1 – 2 Survival Rate + SD	2 – 3 Survival Rate + SD	3 – 4 Survival Rate + SD	4 – 5 Survival Rate + SD	5 – 6 Survival Rate + SD
	Hoy SPA	16,345								
	Marwick Head SPA	12,800								
	Calf of Eday SPA	7,402								
	West Westray SPA	43,035								
	Rousay SPA	7,921								
Razorbill	East Caithness Cliffs SPA	40,373	0.570 ± 0.247	0.895 ± 0.067	0.630 ± 0.209	0.630 ± 0.209	0.630 ± 0.209	0.895 ± 0.067	0.895 ± 0.067	-
	North Caithness Cliffs SPA	12,329								
	Troup, Pennan and Lion's Heads SPA	8,801								

Species	Colony	SMP Count of Colony Breeding Adults	Productivity Rate ± SD	Mean Adult Survival Rate + SD	Mean Immature Age Class					
					0 – 1 Survival Rate + SD	1 – 2 Survival Rate + SD	2 – 3 Survival Rate + SD	3 – 4 Survival Rate + SD	4 – 5 Survival Rate + SD	5 – 6 Survival Rate + SD
Gannet	Fair Isle SPA	11,184	0.710 ± 0.049	0.919 ± 0.042	0.424 ± 0.045	0.829 ± 0.026	0.891 ± 0.019	0.895 ± 0.019	0.895 ± 0.042	-
	Forth Islands SPA	162,000								
	Hermaness, Saxa Vord and Valla Field SPA	39,606								
Puffin	North Caithness Cliffs SPA	6,766	0.617 ± 0.151	0.906 ± 0.083	0.709 ± 0.001	0.709 ± 0.001	0.709 ± 0.001	0.760 ± 0.001	0.805 ± 0.001	-
	Hoy SPA	722								
	Sule Skerry and Sule Stack SPA	95,484								
	Fair Isle SPA	13,332								
	Foula SPA	12,705								
Great black-backed gull	Copinsay SPA	97	1.139 ± 0.533	0.885 ± 0.022	0.798 ± 0.092	0.834 ± 0.034	0.834 ± 0.034	0.834 ± 0.034	0.834 ± 0.034	-

2.4   Impacts Assessed

2.4.1.1   The impact predicted from the Proposed Development (Offshore) were parameterised as 'relative harvest' (the increase in baseline mortality rate as a result of the impact rather than the overall impact in terms of numbers of birds annually), as per the PVA guidance.

2.4.1.2   Each PVA simulation run included a baseline scenario that was paired with an impact scenario. The baseline scenario estimated population changes based on the baseline mortality rate, and the impact scenario estimated population change with the additional predicted mortality due to distributional response effects. The additional mortality was calculated as a proportion of the initial population and applied to the adult age class only.

2.4.1.3   For the species and relevant seasons in scope for assessment, a range of impact levels have been modelled based on the Guidance approach and Applicant approach shown in Table 2-2.

2.4.1.4   Each impact scenario includes additional predicted population-level mortality due to distributional responses. This increased mortality affects the survival rate, thereby predicting the impact magnitude on the population under different scenarios. The model used relative harvest, calculated based on the predicted mortalities apportioned to the designated site and initial regional population size.

2.4.1.5   As agreed in consultation with NatureScot, a macro-avoidance rate of 70% has been applied to gannet densities during the non-breeding season (October – early-March). During the breeding season (mid-March to September), the monthly in-flight densities have not been adjusted for macro-avoidance. This has been presented as the Guidance Approach. As per the Applicant Approach a macro-avoidance rate of 70% has been applied to all months. For further details see Section 6.7.2 of Volume 2, Chapter 6: Offshore Ornithology of the EIAR.

Table 2-2: Displacement and mortality rates used in the Matrix-based Method for the NatureScot Guidance Approach and the Applicant Approach.

Species	Displacement Rate	Mortality Rate – Breeding Season	Mortality Rate – Non-breeding Season
Guidance Approach			
Guillemot, Razorbill and Puffin	60%	3% and 5%	1% and 3%
Kittiwake	30%	1% and 3%	1% and 3%
Gannet	70%	1% and 3%	1% and 3%
Applicant Approach			
Guillemot and Razorbill and Puffin	50%	1%	1%
Kittiwake	Not Assessed		
Gannet	70%	1%	1%

2.4.1.6   It should be noted that the Applicant has decided to include the Year 1 August count (2,093 individuals) in the non-breeding season rather than during the breeding season for puffin. This is due to the Year 1 August abundance being considered to reflect migration rather than individuals present in the breeding season. The mean seasonal peaks for puffin have also been presented with the August count included in the breeding season as per the Guidance Approach. Further details are provided in Volume 7B, Appendix 6-2: Offshore Ornithology Distributional Responses Technical Report.

3 HRA Results

3.1 Overview

3.1.1.1 The outputs from the PVA Tool including the counterfactuals of population size and growth rate are presented for the species and relevant seasons for each colony requiring PVA. Three sets of outputs are presented for each species:

- Proposed Development (Offshore) alone using Guidance and Applicant Approach where relevant;

- In-combination impacts including all projects where information is available, plus the Proposed Development (Offshore); and

- In-combination impacts including all projects excluding consented projects that have made a commitment to compensation, plus the Proposed Development (Offshore) (in this instance commitment to compensation refers to projects which have been awarded consent on the basis that any and all adverse effects on seabirds at a HRA-level would be fully compensated).

3.2 East Caithness Cliffs SPA: Proposed Development (Offshore) Alone

3.2.1 Guillemot

Table 3-1: PVA results using Seabird PVA Tool for annual impacts to guillemot apportioned to the East Caithness Cliffs SPA from the Proposed Development (Offshore) showing distributional responses Project alone outputs.

Approach	Scenario	Mortality Rate Relative to the Population	Density Independent Counterfactual Metric (35 years)			
			Median Growth Rate ($\pm$SD)	Decrease in CGR (%)	Median Pop. Size ($\pm$SD)	Decrease in CPS (%)
Guidance	(60%, 3%; 60%, 1%)	0.000589	0.999 (<0.001)	0.067	0.976 (0.005)	2.359
Guidance	(60%, 5%; 60%, 3%)	0.001046	0.999 (<0.001)	0.118	0.958 (0.005)	4.158

3.2.2 Razorbill

Table 3-2: PVA results using Seabird PVA Tool for annual impacts to razorbill apportioned to the East Caithness Cliffs SPA from the Proposed Development (Offshore) showing distributional responses Project alone outputs.

Approach	Scenario	Mortality Rate Relative to the Population	Density Independent Counterfactual Metric (35 years)			
			Median Growth Rate ($\pm$SD)	Decrease in CGR (%)	Median Pop. Size ($\pm$SD)	Decrease in CPS (%)
Guidance	(60%, 3%; 60%, 1%)	0.000301	1.000 (0.001)	0.034	0.988 (0.044)	1.238
Guidance	(60%, 5%; 60%, 3%)	0.000502	0.999 (0.001)	0.061	0.978 (0.045)	2.156

3.2.3 Kittiwake

Table 3-3: PVA results using Seabird PVA Tool for annual impacts to kittiwake apportioned to the East Caithness Cliffs SPA from the Proposed Development (Offshore) showing distributional responses and collision combined Project alone outputs.

Approach	Scenario	Mortality Rate Relative to the Population	Density Independent Counterfactual Metric (35 years)			
			Median Growth Rate ($\pm$SD)	Decrease in CGR (%)	Median Pop. Size ($\pm$SD)	Decrease in CPS (%)
Guidance	(30%, 1%)	0.000306	1.000 (<0.001)	0.035	0.987 (0.018)	1.268
Guidance	(30%, 3%)	0.000367	1.000 (<0.001)	0.042	0.985 (0.019)	1.541

3.3 East Caithness Cliffs SPA: In-combination

3.3.1 Guillemot

Table 3-4: PVA results using Seabird PVA Tool for annual impacts apportioned to the East Caithness Cliffs SPA guillemot population showing distributional responses in-combination outputs for the two in-combination scenarios outlined in Section 2.4.

Approach	Scenario	In-combination scenario	Mortality Rate Relative to the Population	Density Independent Counterfactual Metric (35 years)			
				Median Growth Rate (±SD)	Decrease in CGR (%)	Median Pop. Size (±SD)	Decrease in CPS (%)
Applicant	(50%, 1%)	All Projects (plus the Proposed Development (Offshore))	0.001732	0.998 (<0.001)	0.195	0.932 (0.005)	6.771
Guidance	(60%, 3%; 60%, 1%)	All Projects (plus the Proposed Development (Offshore))	0.004492	0.995 (<0.001)	0.505	0.833 (0.005)	16.674
Guidance	(60%, 5%; 60%, 3%)	All Projects (plus the Proposed Development (Offshore))	0.008649	0.990 (<0.001)	0.972	0.703 (0.004)	29.662

Approach	Scenario	In-combination scenario	Mortality Rate Relative to the Population	Density Independent Counterfactual Metric (35 years)			
				Median Growth Rate (±SD)	Decrease in CGR (%)	Median Pop. Size (±SD)	Decrease in CPS (%)
Applicant	(50%, 1%)	All Projects excluding consented projects committed to compensation (plus the Proposed Development (Offshore))	0.001553	0.998 (<0.001)	0.175	0.939 (0.005)	6.111
Guidance	(60%, 3%; 60%, 1%)	All Projects excluding consented projects committed to compensation (plus the Proposed Development (Offshore))	0.004201	0.995 (<0.001)	0.473	0.843 (0.005)	15.673
Guidance	(60%, 5%; 60%, 3%)	All Projects excluding consented projects committed to compensation (plus the Proposed Development (Offshore))	0.007927	0.991 (<0.001)	0.891	0.724 (0.004)	27.561

3.3.2 Razorbill

Table 3-5: PVA results using Seabird PVA Tool for annual impacts apportioned to the East Caithness Cliffs SPA razorbill population showing distributional responses in-combination outputs for the two in-combination scenarios outlined in Section 2.4.

Approach	Scenario	In-combination Scenario	Mortality Rate Relative to the Population	Density Independent Counterfactual Metric (35 years)			
				Median Growth Rate (±SD)	Decrease in CGR (%)	Median Pop. Size (±SD)	Decrease in CPS (%)
Applicant	(50%, 1%)	All Projects (plus the Proposed Development (Offshore))	0.001572	0.998 (0.001)	0.188	0.934 (0.038)	6.576
Guidance	(60%, 3%; 60%, 1%)	All Projects (plus the Proposed Development (Offshore))	0.003517	0.996 (0.001)	0.422	0.859 (0.040)	14.143
Guidance	(60%, 5%; 60%, 3%)	All Projects (plus the Proposed Development (Offshore))	0.007290	0.991 (0.001)	0.870	0.730 (0.036)	26.972
Applicant	(50%, 1%)	All Projects excluding consented projects committed to compensation (plus the Proposed Development (Offshore))	0.001410	0.998 (0.001)	0.169	0.941 (0.039)	5.910

Approach	Scenario	In-combination Scenario	Mortality Rate Relative to the Population	Density Independent Counterfactual Metric (35 years)			
				Median Growth Rate ($\pm$SD)	Decrease in CGR (%)	Median Pop. Size ($\pm$SD)	Decrease in CPS (%)
Guidance	(60%, 3%; 60%, 1%)	All Projects excluding consented projects committed to compensation (plus the Proposed Development (Offshore))	0.003258	0.996 (0.001)	0.390	0.869 (0.040)	13.086
Guidance	(60%, 5%; 60%, 3%)	All Projects excluding consented projects committed to compensation (plus the Proposed Development (Offshore))	0.006643	0.992 (0.001)	0.793	0.750 (0.036)	24.980

3.3.3 Kittiwake

Table 3-6: PVA results using Seabird PVA Tool for annual impacts apportioned to the East Caithness Cliffs SPA kittiwake population showing distributional responses and collision combined in-combination outputs for the two in-combination scenarios outlined in Section 2.4.

Approach	Scenario	In-combination Scenario	Mortality Rate Relative to the Population	Density Independent Counterfactual Metric (35 years)			
				Median Growth Rate (±SD)	Decrease in CGR (%)	Median Pop. Size (±SD)	Decrease in CPS (%)
Guidance	(30%, 1%)	All Projects (plus the Proposed Development (Offshore))	0.005856	0.993 (<0.001)	0.691	0.779 (0.015)	22.113
Guidance	(30%, 3%)	All Projects (plus the Proposed Development (Offshore))	0.008686	0.990 (<0.001)	1.026	0.690 (0.014)	31.038
Guidance	(30%, 1%)	All Projects excluding consented projects committed to compensation (plus the Proposed Development (Offshore))	0.003620	0.996 (<0.001)	0.428	0.857 (0.016)	14.304
Guidance	(30%, 3%)	All Projects excluding consented projects committed to compensation (plus the Proposed Development (Offshore))	0.005989	0.993 (<0.001)	0.708	0.775 (0.015)	22.547

3.4　　　　North Caithness Cliffs SPA: Proposed Development (Offshore) Alone

3.4.1　　　Guillemot

Table 3-7: PVA results using Seabird PVA Tool for annual impacts to guillemot apportioned to the North Caithness Cliffs SPA from the Proposed Development (Offshore) showing distributional responses Project alone outputs.

Approach	Scenario	Mortality Rate Relative to the Population	Density Independent Counterfactual Metric (35 years)			
			Median Growth Rate (±SD)	Decrease in CGR (%)	Median Pop. Size (±SD)	Decrease in CPS (%)
Guidance	(60%, 3%; 60%, 1%)	0.000277	1.000 (<0.001)	0.031	0.989 (0.010)	1.091
Guidance	(60%, 5%; 60%, 3%)	0.000526	0.999 (<0.001)	0.059	0.979 (0.010)	2.105

3.4.2 Puffin

Table 3-8: PVA results using Seabird PVA Tool for annual impacts to puffin apportioned to the North Caithness Cliffs SPA from the Proposed Development (Offshore) showing distributional responses Project alone outputs.

Approach	Scenario	Mortality Rate Relative to the Population	Density Independent Counterfactual Metric (35 years)			
			Median Growth Rate (±SD)	Decrease in CGR (%)	Median Pop. Size (±SD)	Decrease in CPS (%)
Guidance	(60%, 5%; 60%, 3%)	0.000215	1.000 (0.002)	0.035	0.989 (0.073)	1.147

Note, this table presents the Guidance Approach for puffin, whereby the Year 1 August abundance has been incorporated as part of the breeding season (Further details are provided in Volume 7B, Appendix 6-2: Offshore Ornithology Distributional Responses Technical Report).

3.4.3   Razorbill

Table 3-9: PVA results using Seabird PVA Tool for annual impacts to razorbill apportioned to the North Caithness Cliffs SPA from the Proposed Development (Offshore) showing distributional responses Project alone outputs.

Approach	Scenario	Mortality Rate Relative to the Population	Density Independent Counterfactual Metric (35 years)			
			Median Growth Rate (±SD)	Decrease in CGR (%)	Median Pop. Size (±SD)	Decrease in CPS (%)
Guidance	(60%, 5%; 60%, 3%)	0.000200	1.000 (0.002)	0.022	0.991 (0.073)	0.854

3.5 North Caithness Cliffs SPA: In-combination

3.5.1 Guillemot

Table 3-10: PVA results using Seabird PVA Tool for annual impacts apportioned to the North Caithness Cliffs SPA guillemot population showing distributional responses in-combination outputs for the two in-combination scenarios outlined in Section 2.4.

Approach	Scenario	In-combination Scenario	Mortality Rate Relative to the Population	Density Independent Counterfactual Metric (35 years)			
				Median Growth Rate (±SD)	Decrease in CGR (%)	Median Pop. Size (±SD)	Decrease in CPS (%)
Applicant	(50%, 1%)	All Projects (plus the Proposed Development (Offshore))	0.000444	0.999 (<0.001)	0.050	0.982 (0.009)	1.810
Guidance	(60%, 3%; 60%, 1%)	All Projects (plus the Proposed Development (Offshore))	0.001108	0.999 (<0.001)	0.125	0.938 (0.010)	6.186
Guidance	(60%, 5%; 60%, 3%)	All Projects (plus the Proposed Development (Offshore))	0.002173	0.998 (<0.001)	0.245	0.883 (0.009)	11.748
Applicant	(50%, 1%)	All Projects excluding consented projects committed to compensation (plus the Proposed Development (Offshore))	0.000356	1.000 (<0.001)	0.041	0.985 (0.009)	1.465
Guidance	(60%, 3%; 60%, 1%)	All Projects excluding consented projects committed to compensation (plus the Proposed Development (Offshore))	0.000968	0.999 (<0.001)	0.110	0.945 (0.010)	5.465

Approach	Scenario	In-combination Scenario	Mortality Rate Relative to the Population	Density Independent Counterfactual Metric (35 years)			
				Median Growth Rate (±SD)	Decrease in CGR (%)	Median Pop. Size (±SD)	Decrease in CPS (%)
Guidance	(60%, 5%; 60%, 3%)	All Projects excluding consented projects committed to compensation (plus the Proposed Development (Offshore))	0.001821	0.998 (<0.001)	0.205	0.900 (0.009)	9.969

3.5.2 Razorbill

Table 3-11: PVA results using Seabird PVA Tool for annual impacts apportioned to the North Caithness Cliffs SPA razorbill population showing distributional responses in-combination outputs for the two in-combination scenarios outlined in Section 2.4.

Approach	Scenario	In-combination Scenario	Mortality Rate Relative to the Population	Density Independent Counterfactual Metric (35 years)			
				Median Growth Rate (±SD)	Decrease in CGR (%)	Median Pop. Size (±SD)	Decrease in CPS (%)
Applicant	(50%, 1%)	All Projects (plus the Proposed Development (Offshore))	0.000444	0.999 (0.001)	0.055	0.980 (0.050)	1.963
Guidance	(60%, 3%; 60%, 1%)	All Projects (plus the Proposed Development (Offshore))	0.000683	0.999 (0.002)	0.077	0.973 (0.072)	2.744
Guidance	(60%, 5%; 60%, 3%)	All Projects (plus the Proposed Development (Offshore))	0.001749	0.998 (0.002)	0.210	0.927 (0.070)	7.256
Applicant	(50%, 1%)	All Projects excluding consented projects committed to compensation (plus the Proposed Development (Offshore))	0.000376	1.000 (0.001)	0.046	0.984 (0.050)	1.633
Guidance	(60%, 3%; 60%, 1%)	All Projects excluding consented projects committed to compensation (plus the Proposed Development (Offshore))	0.000575	0.999 (0.002)	0.070	0.975 (0.074)	2.503
Guidance	(60%, 5%; 60%, 3%)	All Projects excluding consented projects committed to compensation (plus the Proposed Development (Offshore))	0.001477	0.998 (0.002)	0.181	0.938 (0.069)	6.209

3.5.3 Puffin

Table 3-12: PVA results using Seabird PVA Tool for annual impacts apportioned to the North Caithness Cliffs SPA puffin population showing distributional responses in-combination outputs for the two in-combination scenarios outlined in Section 2.4.

Approach	Scenario	In-combination Scenario	Mortality Rate Relative to the Population	Density Independent Counterfactual Metric (35 years)			
				Median Growth Rate ($\pm$SD)	Decrease in CGR (%)	Median Pop. Size ($\pm$SD)	Decrease in CPS (%)
Guidance	(60%, 3%; 60%, 1%)	All Projects (plus the Proposed Development (Offshore))	0.004581	0.995 (0.002)	0.549	0.821 (0.064)	17.950
Guidance	(60%, 5%; 60%, 3%)	All Projects (plus the Proposed Development (Offshore))	0.007696	0.991 (0.002)	0.916	0.719 (0.056)	28.146
Guidance	(60%, 3%; 60%, 1%)	All Projects excluding consented projects committed to compensation (plus the Proposed Development (Offshore))	0.004524	0.995 (0.002)	0.543	0.822 (0.064)	17.844
Guidance	(60%, 5%; 60%, 3%)	All Projects excluding consented projects committed to compensation (plus the Proposed Development (Offshore))	0.007584	0.991 (0.002)	0.900	0.723 (0.057)	27.749
Note, this table presents the Guidance Approach for puffin, whereby the Year 1 August abundance has been incorporated as part of the breeding season (Further details are provided in Volume 7B, Appendix 6-2: Offshore Ornithology Distributional Responses Technical Report).							

3.5.4 Kittiwake

Table 3-13: PVA results using Seabird PVA Tool for annual impacts apportioned to the North Caithness Cliffs SPA kittiwake population showing distributional responses and collision in-combination outputs for the two in-combination scenarios outlined in Section 2.4.

Approach	Scenario	In-combination Scenario	Mortality Rate Relative to the Population	Density Independent Counterfactual Metric (35 years)			
				Median Growth Rate (±SD)	Decrease in CGR (%)	Median Pop. Size (±SD)	Decrease in CPS (%)
Guidance	(30%, 1%)	All Projects (plus the Proposed Development (Offshore))	0.003481	0.996 (<0.001)	0.414	0.861 (0.027)	13.913
Guidance	(30%, 3%)	All Projects (plus the Proposed Development (Offshore))	0.004615	0.995 (<0.001)	0.546	0.821 (0.026)	17.938
Guidance	(30%, 1%)	All Projects excluding consented projects committed to compensation (plus the Proposed Development (Offshore))	0.001555	0.998 (<0.001)	0.183	0.936 (0.029)	6.412
Guidance	(30%, 3%)	All Projects excluding consented projects committed to compensation (plus the Proposed Development (Offshore))	0.002528	0.997 (<0.001)	0.301	0.897 (0.027)	10.314

3.6 Troup, Pennan and Lion's Heads SPA: In-combination

3.6.1 Guillemot

Table 3-14: PVA results using Seabird PVA Tool for annual impacts apportioned to the Troup, Pennan and Lion's Heads SPA guillemot population showing distributional responses in-combination outputs for the two in-combination scenarios outlined in Section 2.4.

Approach	Scenario	In-combination Scenario	Mortality Rate Relative to the Population	Density Independent Counterfactual Metric (35 years)			
				Median Growth Rate ($\pm$SD)	Decrease in CGR (%)	Median Pop. Size ($\pm$SD)	Decrease in CPS (%)
Applicant	(50%, 1%)	All Projects (plus the Proposed Development (Offshore))	0.001027	0.999 (<0.001)	0.115	0.959 (0.010)	4.074
Guidance	(60%, 3%; 60%, 1%)	All Projects (plus the Proposed Development (Offshore))	0.001960	0.998 (<0.001)	0.221	0.923 (0.010)	7.657
Guidance	(60%, 5%; 60%, 3%)	All Projects (plus the Proposed Development (Offshore))	0.004425	0.995 (<0.001)	0.497	0.835 (0.009)	16.457
Applicant	(50%, 1%)	All Projects excluding consented projects committed to compensation (plus the Proposed Development (Offshore))	0.000493	0.999 (<0.001)	0.055	0.980 (0.011)	1.977

Approach	Scenario	In-combination Scenario	Mortality Rate Relative to the Population	Density Independent Counterfactual Metric (35 years)			
				Median Growth Rate ($\pm$SD)	Decrease in CGR (%)	Median Pop. Size ($\pm$SD)	Decrease in CPS (%)
Guidance	(60%, 3%; 60%, 1%)	All Projects excluding consented projects committed to compensation (plus the Proposed Development (Offshore))	0.000978	0.999 (<0.001)	0.110	0.961 (0.010)	3.867
Guidance	(60%, 5%; 60%, 3%)	All Projects excluding consented projects committed to compensation (plus the Proposed Development (Offshore))	0.000362	0.998 (<0.001)	0.242	0.916 (0.010)	8.386

3.6.2 Razorbill

Table 3-15: PVA results using Seabird PVA Tool for annual impacts apportioned to the Troup, Pennan and Lion's Heads SPA razorbill population showing distributional responses in-combination outputs for the two in-combination scenarios outlined in Section 2.4.

Approach	Scenario	In-combination Scenario	Mortality Rate Relative to the Population	Density Independent Counterfactual Metric (35 years)			
				Median Growth Rate (±SD)	Decrease in CGR (%)	Median Pop. Size (±SD)	Decrease in CPS (%)
Applicant	(50%, 1%)	All Projects (plus the Proposed Development (Offshore))	0.000733	0.999 (0.002)	0.087	0.969 (0.081)	3.074
Guidance	(60%, 3%; 60%, 1%)	All Projects (plus the Proposed Development (Offshore))	0.001268	0.998 (0.002)	0.151	0.948 (0.088)	5.196
Guidance	(60%, 5%; 60%, 3%)	All Projects (plus the Proposed Development (Offshore))	0.003026	0.996 (0.002)	0.359	0.879 (0.082)	12.088
Applicant	(50%, 1%)	All Projects excluding consented projects committed to compensation (plus the Proposed Development (Offshore))	0.000569	0.999 (0.002)	0.073	0.976 (0.082)	2.377

Approach	Scenario	In-combination Scenario	Mortality Rate Relative to the Population	Density Independent Counterfactual Metric (35 years)			
				Median Growth Rate ($\pm$SD)	Decrease in CGR (%)	Median Pop. Size ($\pm$SD)	Decrease in CPS (%)
Guidance	(60%, 3%; 60%, 1%)	All Projects excluding consented projects committed to compensation (plus the Proposed Development (Offshore))	0.000886	0.999 (0.002)	0.102	0.965 (0.088)	3.549
Guidance	(60%, 5%; 60%, 3%)	All Projects excluding consented projects committed to compensation (plus the Proposed Development (Offshore))	0.002253	0.997 (0.002)	0.257	0.912 (0.085)	8.751

3.6.3 Kittiwake

Table 3-16: PVA results using Seabird PVA Tool for annual impacts apportioned to the Troup, Pennan and Lion's Heads SPA kittiwake population showing distributional responses and collision combined in-combination outputs for the two in-combination scenarios outlined in Section 2.4.

Approach	Scenario	In-combination Scenario	Mortality Rate Relative to the Population	Density Independent Counterfactual Metric (35 years)			
				Median Growth Rate (±SD)	Decrease in CGR (%)	Median Pop. Size (±SD)	Decrease in CPS (%)
Guidance	(30%, 1%)	All Projects (plus the Proposed Development (Offshore))	0.005901	0.993 (<0.001)	0.699	0.777 (0.020)	22.278
Guidance	(30%, 3%)	All Projects (plus the Proposed Development (Offshore))	0.007258	0.991 (<0.001)	0.859	0.733 (0.019)	26.706
Guidance	(30%, 1%)	All Projects excluding consented projects committed to compensation (plus the Proposed Development (Offshore))	0.003443	0.996 (<0.001)	0.407	0.864 (0.021)	13.646
Guidance	(30%, 3%)	All Projects excluding consented projects committed to compensation (plus the Proposed Development (Offshore))	0.004583	0.995 (<0.001)	0.543	0.822 (0.020)	17.817

3.7 Copinsay SPA: Proposed Development (Offshore) Alone

3.7.1 Great Black-backed Gull

Table 3-17: PVA results using Seabird PVA Tool for annual impacts to great black-backed gull apportioned to the Copinsay SPA from the Proposed Development (Offshore) showing collision Project alone outputs.

Approach	Scenario	Mortality Rate Relative to the Population	Density Independent Counterfactual Metric (35 years)			
			Median Growth Rate (±SD)	Decrease in CGR (%)	Median Pop. Size (±SD)	Decrease in CPS (%)
Guidance	Collision	0.000737	0.999 (0.007)	0.089	0.968 (0.298)	3.235

3.7.2 Guillemot

Table 3-18: PVA results using Seabird PVA Tool for annual impacts to guillemot apportioned to the Copinsay SPA from the Proposed Development (Offshore) showing distributional responses Project alone outputs.

Approach	Scenario	Mortality Rate Relative to the Population	Density Independent Counterfactual Metric (35 years)			
			Median Growth Rate (±SD)	Decrease in CGR (%)	Median Pop. Size (±SD)	Decrease in CPS (%)
Guidance	(60%, 3%; 60%, 1%)	0.000188	1.000 (0.001)	0.024	0.994 (0.065)	0.622
Guidance	(60%, 5%; 60%, 3%)	0.000378	1.000 (0.001)	0.045	0.984 (0.065)	1.577

3.8 Copinsay SPA: In-combination

3.8.1 Great Black-backed Gull

Table 3-19: PVA results using Seabird PVA Tool for annual impacts apportioned to the Copinsay SPA great black-backed gull population showing collision in-combination outputs for the two in-combination scenarios outlined in Section 2.4.

Approach	Scenario	In-combination Scenario	Mortality Rate Relative to the Population	Density Independent Counterfactual Metric (35 years)			
				Median Growth Rate ($\pm$SD)	Decrease in CGR (%)	Median Pop. Size ($\pm$SD)	Decrease in CPS (%)
Guidance	Collision	All Projects (plus the Proposed Development (Offshore))	0.045582	0.946 (0.010)	5.403	0.135 (0.055)	86.545
Guidance	Collision	All Projects excluding consented projects committed to compensation (plus the Proposed Development (Offshore))	0.044860	0.947 (0.009)	5.337	0.139 (0.056)	86.102

3.8.2 Guillemot

Table 3-20: PVA results using Seabird PVA Tool for annual impacts apportioned to the Copinsay SPA guillemot population showing distributional responses in-combination outputs for the two in-combination scenarios outlined in Section 2.4.

Approach	Scenario	In-combination Scenario	Mortality Rate Relative to the Population	Density Independent Counterfactual Metric (35 years)			
				Median Growth Rate (±SD)	Decrease in CGR (%)	Median Pop. Size (±SD)	Decrease in CPS (%)
Guidance	(60%, 3%; 60%, 1%)	All Projects (plus the Proposed Development (Offshore))	0.003334	0.996 (0.001)	0.375	0.873 (0.059)	12.672
Guidance	(60%, 5%; 60%, 3%)	All Projects (plus the Proposed Development (Offshore))	0.008308	0.991 (0.001)	0.939	0.713 (0.050)	28.745
Guidance	(60%, 5%; 60%, 3%)	All Projects excluding consented projects committed to compensation (plus the Proposed Development (Offshore))	0.000378	1.000 (0.001)	0.046	0.984 (0.065)	1.562

3.9 Hoy SPA: In-combination

3.9.1 Great Black-backed Gull

Table 3-21: PVA results using Seabird PVA Tool for annual impacts apportioned to the Hoy SPA great black-backed gull population showing collision in-combination outputs for the two in-combination scenarios outlined in Section 2.4.

Approach	Scenario	In-combination Scenario	Mortality Rate Relative to the Population	Density Independent Counterfactual Metric (35 years)			
				Median Growth Rate (±SD)	Decrease in CGR (%)	Median Pop. Size (±SD)	Decrease in CPS (%)
Guidance	Collision	All Projects (plus the Proposed Development (Offshore))	0.001909	0.998 (0.002)	0.219	0.923 (0.089)	7.728
Guidance	Collision	All Projects excluding consented projects committed to compensation (plus the Proposed Development (Offshore))	0.001780	0.998 (0.002)	0.209	0.929 (0.091)	7.137

3.9.2 Guillemot

Table 3-22: PVA results using Seabird PVA Tool for annual impacts apportioned to the Hoy SPA guillemot population showing distributional responses in-combination outputs for the two in-combination scenarios outlined in Section 2.4.

Approach	Scenario	In-combination Scenario	Mortality Rate Relative to the Population	Density Independent Counterfactual Metric (35 years)			
				Median Growth Rate (±SD)	Decrease in CGR (%)	Median Pop. Size (±SD)	Decrease in CPS (%)
Guidance	(60%, 3%; 60%, 1%)	All Projects (plus the Proposed Development (Offshore))	0.000270	1.000 (<0.001)	0.030	0.989 (0.019)	1.084
Guidance	(60%, 5%; 60%, 3%)	All Projects (plus the Proposed Development (Offshore))	0.000549	0.999 (<0.001)	0.061	0.978 (0.018)	2.185
Guidance	(60%, 3%; 60%, 1%)	All Projects excluding consented projects committed to compensation (plus the Proposed Development (Offshore))	0.000248	1.000 (<0.001)	0.028	0.990 (0.019)	0.982
Guidance	(60%, 5%; 60%, 3%)	All Projects excluding consented projects committed to compensation (plus the Proposed Development (Offshore))	0.000485	0.999 (<0.001)	0.053	0.981 (0.018)	1.926

3.9.3 Puffin

Table 3-23: PVA results using Seabird PVA Tool for annual impacts apportioned to the Hoy SPA puffin population showing distributional responses in-combination outputs for the two in-combination scenarios outlined in Section 2.4.

Approach	Scenario	In-combination Scenario	Mortality Rate Relative to the Population	Density Independent Counterfactual Metric (35 years)			
				Median Growth Rate (±SD)	Decrease in CGR (%)	Median Pop. Size (±SD)	Decrease in CPS (%)
Guidance	(60%, 3%; 60%, 1%)	All Projects (plus the Proposed Development (Offshore))	0.001900	0.998 (0.006)	0.218	0.923 (0.224)	7.654
Guidance	(60%, 5%; 60%, 3%)	All Projects (plus the Proposed Development (Offshore))	0.005204	0.994 (0.006)	0.628	0.795 (0.199)	20.482
Guidance	(60%, 3%; 60%, 1%)	All Projects excluding consented projects committed to compensation (plus the Proposed Development (Offshore))	0.001447	0.998 (0.006)	0.184	0.938 (0.230)	6.250
Guidance	(60%, 5%; 60%, 3%)	All Projects excluding consented projects committed to compensation (plus the Proposed Development (Offshore))	0.003872	0.995 (0.006)	0.468	0.847 (0.207)	15.347
Note, this table presents the Guidance Approach for puffin, whereby the Year 1 August abundance has been incorporated as part of the breeding season (Further details are provided in Volume 7B, Appendix 6-2: Offshore Ornithology Distributional Responses Technical Report).							

3.10   Buchan Ness to Collieston Coast SPA: Proposed Development (Offshore) Alone

3.10.1   Guillemot

Table 3-24: PVA results using Seabird PVA Tool for annual impacts to guillemot apportioned to the Buchan Ness to Collieston Coast SPA from the Proposed Development (Offshore) showing distributional responses Project alone outputs.

Approach	Scenario	Mortality Rate Relative to the Population	Density Independent Counterfactual Metric (35 years)			
			Median Growth Rate (±SD)	Decrease in CGR (%)	Median Pop. Size (±SD)	Decrease in CPS (%)
Guidance	(60%, 5%; 60%, 3%)	0.000327	1.000 (<0.001)	0.036	0.987 (0.011)	1.287

3.11 Buchan Ness to Collieston Coast SPA: In-combination

3.11.1 Guillemot

Table 3-25: PVA results using Seabird PVA Tool for annual impacts apportioned to the Buchan Ness to Collieston Coast SPA guillemot population showing distributional responses in-combination outputs for the two in-combination scenarios outlined in Section 2.4.

Approach	Scenario	In-combination Scenario	Mortality Rate Relative to the Population	Density Independent Counterfactual Metric (35 years)			
				Median Growth Rate (±SD)	Decrease in CGR (%)	Median Pop. Size (±SD)	Decrease in CPS (%)
Applicant	(50%, 1%)	All Projects (plus the Proposed Development (Offshore))	0.001904	0.998 (<0.001)	0.213	0.926 (0.011)	7.406
Guidance	(60%, 3%; 60%, 1%)	All Projects (plus the Proposed Development (Offshore))	0.003645	0.996 (<0.001)	0.409	0.811 (0.010)	18.885
Guidance	(60%, 5%; 60%, 3%)	All Projects (plus the Proposed Development (Offshore))	0.008214	0.991 (<0.001)	0.923	0.623 (0.008)	37.669
Applicant	(50%, 1%)	All Projects excluding consented projects committed to compensation (plus the Proposed Development (Offshore))	0.000572	0.999 (<0.001)	0.064	0.977 (0.011)	2.274

Approach	Scenario	In-combination Scenario	Mortality Rate Relative to the Population	Density Independent Counterfactual Metric (35 years)			
				Median Growth Rate (±SD)	Decrease in CGR (%)	Median Pop. Size (±SD)	Decrease in CPS (%)
Guidance	(60%, 3%; 60%, 1%)	All Projects excluding consented projects committed to compensation (plus the Proposed Development (Offshore))	0.000878	0.999 (<0.001)	0.099	0.951 (0.012)	4.887
Guidance	(60%, 5%; 60%, 3%)	All Projects excluding consented projects committed to compensation (plus the Proposed Development (Offshore))	0.002250	0.997 (<0.001)	0.253	0.879 (0.011)	12.116

3.11.2 Kittiwake

Table 3-26: PVA results using Seabird PVA Tool for annual impacts apportioned to the Buchan Ness to Colliestone Coast SPA kittiwake population showing distributional responses in-combination outputs for the two in-combination scenarios outlined in Section 2.4.

Approach	Scenario	In-combination Scenario	Mortality Rate Relative to the Population	Density Independent Counterfactual Metric (35 years)			
				Median Growth Rate (±SD)	Decrease in CGR (%)	Median Pop. Size (±SD)	Decrease in CPS (%)
Guidance	(30%, 1%)	All Projects (plus the Proposed Development (Offshore))	0.004041	0.995 (<0.001)	0.478	0.841 (0.020)	15.862
Guidance	(30%, 3%)	All Projects (plus the Proposed Development (Offshore))	0.005270	0.994 (<0.001)	0.623	0.798 (0.019)	20.166
Guidance	(30%, 1%)	All Projects excluding consented projects committed to compensation (plus the Proposed Development (Offshore))	0.002004	0.998 (<0.001)	0.237	0.918 (0.022)	8.183
Guidance	(30%, 3%)	All Projects excluding consented projects committed to compensation (plus the Proposed Development (Offshore))	0.002808	0.997 (<0.001)	0.332	0.887 (0.021)	11.281

3.12 Marwick Head SPA: In-combination

3.12.1 Guillemot

Table 3-27: PVA results using Seabird PVA Tool for annual impacts apportioned to the Marwick Head SPA guillemot population showing distributional responses in-combination outputs for the two in-combination scenarios outlined in Section 2.4.

Approach	Scenario	In-combination Scenario	Mortality Rate Relative to the Population	Density Independent Counterfactual Metric (35 years)			
				Median Growth Rate (±SD)	Decrease in CGR (%)	Median Pop. Size (±SD)	Decrease in CPS (%)
Guidance	(60%, 3%; 60%, 1%)	All Projects (plus the Proposed Development (Offshore))	0.000237	1.000 (<0.001)	0.028	0.990 (0.021)	0.992
Guidance	(60%, 5%; 60%, 3%)	All Projects (plus the Proposed Development (Offshore))	0.000524	0.999 (<0.001)	0.059	0.979 (0.020)	2.113
Guidance	(60%, 3%; 60%, 1%)	All Projects excluding consented projects committed to compensation (plus the Proposed Development (Offshore))	0.000201	1.000 (<0.001)	0.022	0.992 (0.021)	0.772
Guidance	(60%, 5%; 60%, 3%)	All Projects excluding consented projects committed to compensation (plus the Proposed Development (Offshore))	0.000416	1.000 (<0.001)	0.047	0.983 (0.020)	1.667

3.13 Calf of Eday SPA: In-combination

3.13.1 Guillemot

Table 3-28: PVA results using Seabird PVA Tool for annual impacts apportioned to the Calf of Eday SPA guillemot population showing distributional responses in-combination outputs for the two in-combination scenarios outlined in Section 2.4.

Approach	Scenario	In-combination Scenario	Mortality Rate Relative to the Population	Density Independent Counterfactual Metric (35 years)			
				Median Growth Rate ($\pm$SD)	Decrease in CGR (%)	Median Pop. Size ($\pm$SD)	Decrease in CPS (%)
Guidance	(60%, 5%; 60%, 3%)	All Projects (plus the Proposed Development (Offshore))	0.000298	1.000 (<0.001)	0.034	0.988 (0.011)	1.212
Guidance	(60%, 5%; 60%, 3%)	All Projects excluding consented projects committed to compensation (plus the Proposed Development (Offshore))	0.000245	1.000 (<0.001)	0.028	0.990 (0.011)	1.016

3.14 Rousay SPA: In-Combination

3.14.1 Guillemot

Table 3-29: PVA results using Seabird PVA Tool for annual impacts apportioned to the Rousay SPA guillemot population showing distributional responses in-combination outputs for the two in-combination scenarios outlined in Section 2.4.

Approach	Scenario	In-combination Scenario	Mortality Rate Relative to the Population	Density Independent Counterfactual Metric (35 years)			
				Median Growth Rate (±SD)	Decrease in CGR (%)	Median Pop. Size (±SD)	Decrease in CPS (%)
Guidance	(60%, 5%; 60%, 3%)	All Projects (plus the Proposed Development (Offshore))	0.000327	1.000 (<0.001)	0.038	0.986 (0.027)	1.387
Guidance	(60%, 5%; 60%, 3%)	All Projects excluding consented projects committed to compensation (plus the Proposed Development (Offshore))	0.000240	1.000 (<0.001)	0.028	0.990 (0.027)	0.975

3.15 West Westray SPA: In-combination

3.15.1 Guillemot

Table 3-30: PVA results using Seabird PVA Tool for annual impacts apportioned to the West Westray SPA guillemot population showing distributional responses in-combination outputs for the two in-combination scenarios outlined in Section 2.4.

Approach	Scenario	In-combination Scenario	Mortality Rate Relative to the Population	Density Independent Counterfactual Metric (35 years)			
				Median Growth Rate (±SD)	Median Growth rate (±SD)	Decrease in CGR (%)	Median Pop. Size (±SD)
Guidance	(60%, 5%; 60%, 3%)	All Projects (plus the Proposed Development (Offshore))	0.000355	1.000 (<0.001)	0.040	0.985 (0.011)	1.466
Guidance	(60%, 5%; 60%, 3%)	All Projects excluding consented projects committed to compensation (plus the Proposed Development (Offshore))	0.000279	1.000 (<0.001)	0.032	0.989 (0.011)	1.148

3.15.2 Razorbill

Table 3-31: PVA results using Seabird PVA Tool for annual impacts apportioned to the West Westray SPA razorbill population showing distributional responses in-combination outputs for the two in-combination scenarios outlined in Section 2.4.

Approach	Scenario	In-combination Scenario	Mortality Rate Relative to the Population	Density Independent Counterfactual Metric (35 years)			
				Median Growth Rate (±SD)	Decrease in CGR (%)	Median Pop. Size (±SD)	Decrease in CPS (%)
Guidance	(60%, 3%; 60%, 1%)	All Projects (plus the Proposed Development (Offshore))	0.000770	0.999 (0.004)	0.086	0.969 (0.140)	3.102
Guidance	(60%, 5%; 60%, 3%)	All Projects (plus the Proposed Development (Offshore))	0.002067	0.998 (0.004)	0.249	0.912 (0.130)	8.755
Guidance	(60%, 3%; 60%, 1%)	All Projects excluding consented projects committed to compensation (plus the Proposed Development (Offshore))	0.000672	0.999 (0.004)	0.088	0.967 (0.140)	3.319
Guidance	(60%, 5%; 60%, 3%)	All Projects excluding consented projects committed to compensation (plus the Proposed Development (Offshore))	0.001788	0.998 (0.004)	0.221	0.925 (0.140)	7.544

3.15.3 Kittiwake

Table 3-32: PVA results using Seabird PVA Tool for annual impacts apportioned to the West Westray SPA kittiwake population showing distributional responses and collision combined in-combination outputs for the two in-combination scenarios outlined in Section 2.4.

Approach	Scenario	In-combination Scenario	Mortality Rate Relative to the Population	Density Independent Counterfactual Metric (35 years)			
				Median Growth Rate (±SD)	Decrease in CGR (%)	Median Pop. Size (±SD)	Decrease in CPS (%)
Guidance	(30%, 1%)	All Projects (plus the Proposed Development (Offshore))	0.007765	0.991 (0.001)	0.914	0.718 (0.033)	28.186
Guidance	(30%, 3%)	All Projects (plus the Proposed Development (Offshore))	0.010399	0.988 (0.001)	1.229	0.640 (0.030)	35.988
Guidance	(30%, 1%)	All Projects excluding consented projects committed to compensation (plus the Proposed Development (Offshore))	0.002938	0.997 (0.001)	0.346	0.882 (0.038)	11.787
Guidance	(30%, 3%)	All Projects excluding consented projects committed to compensation (plus the Proposed Development (Offshore))	0.005277	0.994 (0.001)	0.622	0.798 (0.036)	20.151

3.16   Sule Skerry and Sule Stack SPA: Proposed Development (Offshore) Alone

3.16.1   Guillemot

Table 3-33: PVA results using Seabird PVA Tool for annual impacts to guillemot apportioned to the Sule Skerry and Sule Stack SPA from the Proposed Development (Offshore) showing distributional responses Project alone outputs.

Approach	Scenario	Mortality Rate Relative to the Population	Density Independent Counterfactual Metric (35 years)			
			Median Growth rate ($\pm$SD)	Decrease in CGR (%)	Median Pop. Size ($\pm$SD)	Decrease in CPS (%)
Guidance	(60%, 5%; 60%, 3%)	0.000211	1.000 (<0.001)	0.024	0.991 (0.019)	0.854

3.17 Sule Skerry and Sule Stack SPA: In-combination

3.17.1 Guillemot

Table 3-34: PVA results using Seabird PVA Tool for annual impacts apportioned to the Sule Skerry and Sule Stack SPA guillemot population showing distributional responses in-combination outputs for the two in-combination scenarios outlined in Section 2.4.

Approach	Scenario	In-combination Scenario	Mortality Rate Relative to the Population	Density Independent Counterfactual Metric (35 years)			
				Median Growth Rate (±SD)	Decrease in CGR (%)	Median Pop. Size (±SD)	Decrease in CPS (%)
Applicant	(50%, 1%)	All Projects (plus the Proposed Development (Offshore))	0.001572	0.998 (<0.001)	0.177	0.938 (0.018)	6.186
Guidance	(60%, 5%; 60%, 3%)	All Projects (plus the Proposed Development (Offshore))	0.005502	0.994 (<0.001)	0.619	0.729 (0.016)	27.131
Guidance	(60%, 5%; 60%, 3%)	All Projects excluding consented projects committed to compensation (plus the Proposed Development (Offshore))	0.009275	0.990 (<0.001)	1.042	0.586 (0.013)	41.365

3.17.2 Puffin

Table 3-35: PVA results using Seabird PVA Tool for annual impacts apportioned to the Sule Skerry and Sule Stack SPA puffin population showing distributional responses in-combination outputs for the two in-combination scenarios outlined in Section 2.4.

Approach	Scenario	In-combination Scenario	Mortality Rate Relative to the Population	Density Independent Counterfactual Metric (35 years)			
				Median Growth Rate (±SD)	Decrease in CGR (%)	Median Pop. Size (±SD)	Decrease in CPS (%)
Guidance	(60%, 5%; 60%, 3%)	All Projects (plus the Proposed Development (Offshore))	0.000316	1.000 (<0.001)	0.036	0.987 (0.019)	1.309
Guidance	(60%, 5%; 60%, 3%)	All Projects excluding consented projects committed to compensation (plus the Proposed Development (Offshore))	0.000241	1.000 (<0.001)	0.027	0.990 (0.019)	1.003
Note, this table presents the Guidance Approach for puffin, whereby the Year 1 August abundance has been incorporated as part of the breeding season (Further details are provided in Volume 7B, Appendix 6-2: Offshore Ornithology Distributional Responses Technical Report).							

3.17.3   Gannet

Table 3-36: PVA results using Seabird PVA Tool for annual impacts apportioned to the Sule Skerry and Sule Stack SPA gannet population showing distributional responses and collision combined in-combination outputs for the two in-combination scenarios outlined in Section 2.4.

Approach	Scenario	In-combination Scenario	Mortality Rate Relative to the Population	Density Independent Counterfactual Metric (35 years)			
				Median Growth Rate (±SD)	Decrease in CGR (%)	Median Pop. Size (±SD)	Decrease in CPS (%)
Applicant*	(70%, 1%)	All Projects (plus the Proposed Development (Offshore))	0.000695	0.999 (<0.001)	0.082	0.971 (0.028)	2.934
Guidance **	(70%, 1%)	All Projects (plus the Proposed Development (Offshore))	0.001575	0.998 (<0.001)	0.188	0.934 (0.027)	6.552
Guidance**	(70%, 3%)	All Projects (plus the Proposed Development (Offshore))	0.002203	0.997 (<0.001)	0.261	0.910 (0.027)	9.037
Guidance**	(70%, 3%)	All Projects excluding consented projects committed to compensation (plus the Proposed Development (Offshore))	0.000391	1.000 (<0.001)	0.048	0.983 (0.029)	1.709

* The Applicant Approach has been presented, with the macro-avoidance rate of 70% applied to the predicted mortalities in all months.

** It should also be noted that as agreed in consultation a macro-avoidance rate of 70% has been applied to gannet densities during the non-breeding season. During the breeding season, the monthly in-flight densities have not been adjusted for macro-avoidance. This approach has been presented as the Guidance Approach.

3.18 Fowlsheugh SPA: In-combination

3.18.1 Kittiwake

Table 3-37: PVA results using Seabird PVA Tool for annual impacts apportioned to the Fowlsheugh SPA kittiwake population showing distributional responses and collision combined in-combination outputs for the two in-combination scenarios outlined in Section 2.4.

Approach	Scenario	In-combination Scenario	Mortality Rate Relative to the Population	Density Independent Counterfactual Metric (35 years)			
				Median Growth Rate (±SD)	Decrease in CGR (%)	Median Pop. Size (±SD)	Decrease in CPS (%)
Guidance	(30%, 1%)	All Projects (plus the Proposed Development (Offshore))	0.005023	0.994 (<0.001)	0.595	0.807 (0.017)	19.340
Guidance	(30%, 3%)	All Projects (plus the Proposed Development (Offshore))	0.006547	0.992 (<0.001)	0.773	0.756 (0.016)	24.393
Guidance	(30%, 1%)	All Projects excluding consented projects committed to compensation (plus the Proposed Development (Offshore))	0.002309	0.997 (<0.001)	0.273	0.906 (0.019)	9.395
Guidance	(30%, 3%)	All Projects excluding consented projects committed to compensation (plus the Proposed Development (Offshore))	0.003275	0.996 (<0.001)	0.386	0.870 (0.018)	13.045

3.19   Cape Wrath SPA: In-combination

3.19.1   Puffin

Table 3-38: PVA results using Seabird PVA Tool for annual impacts apportioned to the Cape Wrath SPA puffin population showing distributional responses in-combination outputs for the two in-combination scenarios outlined in Section 2.4.

Approach	Scenario	In-combination Scenario	Mortality Rate Relative to the Population	Density Independent Counterfactual Metric (35 years)			
				Median Growth Rate (±SD)	Decrease in CGR (%)	Median Pop. Size (±SD)	Decrease in CPS (%)
Guidance	(60%, 3%; 60%, 1%)	All Projects (plus the Proposed Development (Offshore))	0.000537	0.999 (0.008)	0.063	0.978 (0.319)	2.174
Guidance	(60%, 5%; 60%, 3%)	All Projects (plus the Proposed Development (Offshore))	0.000905	0.999 (0.008)	0.116	0.969 (0.308)	3.110
Guidance	(60%, 3%; 60%, 1%)	All Projects excluding consented projects committed to compensation (plus the Proposed Development (Offshore))	0.000423	1.000 (0.008)	0.047	0.986 (0.314)	1.377
Guidance	(60%, 5%; 60%, 3%)	All Projects excluding consented projects committed to compensation (plus the Proposed Development (Offshore))	0.000712	0.999 (0.008)	0.066	0.976 (0.310)	2.429
Note, this table presents the Guidance Approach for puffin, whereby the Year 1 August abundance has been incorporated as part of the breeding season (Further details are provided in Volume 7B, Appendix 6-2: Offshore Ornithology Distributional Responses Technical Report).							

3.20 Fair Isle SPA: In-combination

3.20.1 Guillemot

Table 3-39: PVA results using Seabird PVA Tool for annual impacts apportioned to the Fair Isle SPA guillemot population showing distributional responses in-combination outputs for the two in-combination scenarios outlined in Section 2.4.

Approach	Scenario	In-combination Scenario	Mortality Rate Relative to the Population	Density Independent Counterfactual Metric (35 years)			
				Median Growth Rate (±SD)	Decrease in CGR (%)	Median Pop. Size (±SD)	Decrease in CPS (%)
Guidance	(60%, 5%; 60%, 3%)	All Projects (plus the Proposed Development (Offshore))	0.000481	0.999 (<0.001)	0.053	0.981 (0.015)	1.880

3.20.2 Puffin

Table 3-40: PVA results using Seabird PVA Tool for annual impacts apportioned to the Fair Isle SPA puffin population showing distributional responses in-combination outputs for the two in-combination scenarios outlined in Section 2.4.

Approach	Scenario	In-combination Scenario	Mortality Rate Relative to the Population	Density Independent Counterfactual Metric (35 years)			
				Median Growth Rate (±SD)	Decrease in CGR (%)	Median Pop. Size (±SD)	Decrease in CPS (%)
Applicant	(50%, 1%)	All Projects (plus the Proposed Development (Offshore))	0.000515	0.999 (0.001)	0.061	0.978 (0.052)	2.178
Guidance	(60%, 3%; 60%, 1%)	All Projects (plus the Proposed Development (Offshore))	0.001361	0.998 (0.001)	0.160	0.943 (0.051)	5.727
Guidance	(60%, 5%; 60%, 3%)	All Projects (plus the Proposed Development (Offshore))	0.002606	0.997 (0.001)	0.312	0.894 (0.049)	10.608
Applicant	(50%, 1%)	All Projects excluding consented projects committed to compensation (plus the Proposed Development (Offshore))	0.000366	1.000 (0.001)	0.041	0.985 (0.054)	1.538
Guidance	(60%, 3%; 60%, 1%)	All Projects excluding consented projects committed to compensation (plus the Proposed Development (Offshore))	0.000970	0.999 (0.001)	0.116	0.959 (0.051)	4.053

Approach	Scenario	In-combination Scenario	Mortality Rate Relative to the Population	Density Independent Counterfactual Metric (35 years)			
				Median Growth Rate (±SD)	Decrease in CGR (%)	Median Pop. Size (±SD)	Decrease in CPS (%)
Guidance	(60%, 5%; 60%, 3%)	All Projects excluding consented projects committed to compensation (plus the Proposed Development (Offshore))	0.001859	0.998 (0.001)	0.222	0.924 (0.050)	7.566

Note, this table presents the Guidance Approach for puffin, whereby the Year 1 August abundance has been incorporated as part of the breeding season (Further details are provided in Volume 7B, Appendix 6-2: Offshore Ornithology Distributional Responses Technical Report).

3.20.3 Gannet

Table 3-41: PVA results using Seabird PVA Tool for annual impacts apportioned to the Fair Isle SPA gannet population showing distributional responses and collision combined in-combination outputs for the two in-combination scenarios outlined in Section 2.4.

Approach	Scenario	In-combination Scenario	Mortality Rate Relative to the Population	Density Independent Counterfactual Metric (35 years)			
				Median Growth Rate (±SD)	Decrease in CGR (%)	Median Pop. Size (±SD)	Decrease in CPS (%)
Applicant*	(70%, 1%)	All Projects (plus the Proposed Development (Offshore))	0.000395	1.000 (<0.001)	0.046	0.983 (0.030)	1.674
Guidance**	(70%, 1%)	All Projects (plus the Proposed Development (Offshore))	0.000477	0.999 (<0.001)	0.057	0.980 (0.031)	1.986
Guidance**	(70%, 3%)	All Projects (plus the Proposed Development (Offshore))	0.001090	0.999 (<0.001)	0.130	0.954 (0.030)	4.583
Applicant*	(70%, 1%)	All Projects excluding consented projects committed to compensation (plus the Proposed Development (Offshore))	0.000351	1.000 (<0.001)	0.040	0.986 (0.031)	1.435
Guidance**	(70%, 1%)	All Projects excluding consented projects committed to compensation (plus the Proposed Development (Offshore))	0.000421	0.999 (<0.001)	0.050	0.982 (0.030)	1.784

Approach	Scenario	In-combination Scenario	Mortality Rate Relative to the Population	Density Independent Counterfactual Metric (35 years)			
				Median Growth Rate ($\pm$SD)	Decrease in CGR (%)	Median Pop. Size ($\pm$SD)	Decrease in CPS (%)
Guidance**	(70%, 3%)	All Projects excluding consented projects committed to compensation (plus the Proposed Development (Offshore))	0.000868	0.999 (<0.001)	0.102	0.963 (0.031)	3.691

* The Applicant Approach has been presented, with the macro-avoidance rate of 70% applied to the predicted mortalities in all months.

** It should also be noted that as agreed in consultation a macro-avoidance rate of 70% has been applied to gannet densities during the non-breeding season. During the breeding season, the monthly in-flight densities have not been adjusted for macro-avoidance. This approach has been presented as the Guidance Approach.

3.21 Foula SPA: In-combination

3.21.1 Puffin

Table 3-42: PVA results using Seabird PVA Tool for annual impacts apportioned to the Foula SPA puffin population showing distributional responses in-combination outputs for the two in-combination scenarios outlined in Section 2.4.

Approach	Scenario	In-combination Scenario	Mortality Rate Relative to the Population	Density Independent Counterfactual Metric (35 years)			
				Median Growth Rate (±SD)	Decrease in CGR (%)	Median Pop. Size (±SD)	Decrease in CPS (%)
Applicant	(50%, 1%)	All Projects (plus the Proposed Development (Offshore))	0.000489	0.999 (0.001)	0.059	0.978 (0.053)	2.209
Guidance	(60%, 3%; 60%, 1%)	All Projects (plus the Proposed Development (Offshore))	0.000597	0.999 (0.001)	0.072	0.975 (0.053)	2.471
Guidance	(60%, 5%; 60%, 3%)	All Projects (plus the Proposed Development (Offshore))	0.001739	0.998 (0.001)	0.208	0.928 (0.051)	7.187
Applicant	(50%, 1%)	All Projects excluding consented projects committed to compensation (plus the Proposed Development (Offshore))	0.000356	1.000 (0.001)	0.043	0.984 (0.053)	1.612

Approach	Scenario	In-combination Scenario	Mortality Rate Relative to the Population	Density Independent Counterfactual Metric (35 years)			
				Median Growth Rate ($\pm$SD)	Decrease in CGR (%)	Median Pop. Size ($\pm$SD)	Decrease in CPS (%)
Guidance	(60%, 3%; 60%, 1%)	All Projects excluding consented projects committed to compensation (plus the Proposed Development (Offshore))	0.000435	0.999 (0.001)	0.054	0.981 (0.053)	1.943
Guidance	(60%, 5%; 60%, 3%)	All Projects excluding consented projects committed to compensation (plus the Proposed Development (Offshore))	0.001258	0.999 (0.001)	0.146	0.948 (0.052)	5.158
Note, this table presents the Guidance Approach for puffin, whereby the Year 1 August abundance has been incorporated as part of the breeding season (Further details are provided in Volume 7B, Appendix 6-2: Offshore Ornithology Distributional Responses Technical Report).							

3.22   North Rona and Sula Sgeir SPA: In-combination

3.22.1   Gannet

Table 3-43: PVA results using Seabird PVA Tool for annual impacts apportioned to the North Rona and Sula Sgeir SPA gannet population showing distributional responses and collision combined in-combination outputs for the two in-combination scenarios outlined in Section 2.4.

Approach	Scenario	In-combination Scenario	Mortality Rate Relative to the Population	Density Independent Counterfactual Metric (35 years)			
				Median Growth Rate (±SD)	Decrease in CGR (%)	Median Pop. Size (±SD)	Decrease in CPS (%)
Guidance*	(70%, 3%)	All Projects (plus the Proposed Development (Offshore))	0.000381	1.000 (<0.001)	0.046	0.984 (0.024)	1.598
Guidance*	(70%, 3%)	All Projects excluding consented projects committed to compensation (plus the Proposed Development (Offshore))	0.000306	1.000 (<0.001)	0.035	0.987 (0.024)	1.263
* As agreed in consultation a macro-avoidance rate of 70% has been applied to gannet densities during the non-breeding season. During the breeding season, the monthly in-flight densities have not been adjusted for macro-avoidance. This approach has been presented as the Guidance Approach.							

3.23 Forth Islands SPA: In-combination

3.23.1 Puffin

Table 3-44: PVA results using Seabird PVA Tool for annual impacts apportioned to the Forth Islands SPA puffin population showing distributional responses in-combination outputs for the two in-combination scenarios outlined in Section 2.4.

Approach	Scenario	In-combination Scenario	Mortality Rate Relative to the Population	Density Independent Counterfactual Metric (35 years)			
				Median Growth Rate ($\pm$SD)	Decrease in CGR (%)	Median Pop. Size ($\pm$SD)	Decrease in CPS (%)
Applicant	(50%, 1%)	All Projects (plus the Proposed Development (Offshore))	0.000892	0.999 (<0.001)	0.106	0.962 (0.015)	3.770
Guidance	(60%, 3%; 60%, 1%)	All Projects (plus the Proposed Development (Offshore))	0.002076	0.998 (<0.001)	0.246	0.915 (0.014)	8.468
Guidance	(60%, 5%; 60%, 3%)	All Projects (plus the Proposed Development (Offshore))	0.004199	0.995 (<0.001)	0.496	0.836 (0.013)	16.403
Applicant	(50%, 1%)	All Projects excluding consented projects committed to compensation (plus the Proposed Development (Offshore))	0.000708	0.999 (<0.001)	0.085	0.970 (0.015)	3.000

Approach	Scenario	In-combination Scenario	Mortality Rate Relative to the Population	Density Independent Counterfactual Metric (35 years)			
				Median Growth Rate ($\pm$SD)	Decrease in CGR (%)	Median Pop. Size ($\pm$SD)	Decrease in CPS (%)
Guidance	(60%, 3%; 60%, 1%)	All Projects excluding consented projects committed to compensation (plus the Proposed Development (Offshore))	0.001727	0.998 (<0.001)	0.205	0.929 (0.014)	7.097
Guidance	(60%, 5%; 60%, 3%)	All Projects excluding consented projects committed to compensation (plus the Proposed Development (Offshore))	0.003407	0.996 (<0.001)	0.403	0.865 (0.014)	13.542
Note, this table presents the Guidance Approach for puffin, whereby the Year 1 August abundance has been incorporated as part of the breeding season (Further details are provided in Volume 7B, Appendix 6-2: Offshore Ornithology Distributional Responses Technical Report).							

3.23.2   Gannet

Table 3-45: PVA results using Seabird PVA Tool for annual impacts apportioned to the Forth Islands SPA gannet population showing distributional responses and collision combined in-combination outputs for the two in-combination scenarios outlined in Section 2.4.

Approach	Scenario	In-combination Scenario	Mortality Rate Relative to the Population	Density Independent Counterfactual Metric (35 years)			
				Median Growth Rate ($\pm$SD)	Decrease in CGR (%)	Median Pop. Size ($\pm$SD)	Decrease in CPS (%)
Applicant*	(70%, 1%)	All Projects (plus the Proposed Development (Offshore))	0.001898	0.998 (<0.001)	0.224	0.922 (0.008)	7.769
Guidance**	(70%, 1%)	All Projects (plus the Proposed Development (Offshore))	0.004004	0.995 (<0.001)	0.474	0.843 (0.007)	15.718
Guidance**	(70%, 3%)	All Projects (plus the Proposed Development (Offshore))	0.005843	0.993 (<0.001)	0.692	0.779 (0.007)	22.111
Applicant*	(70%, 1%)	All Projects excluding consented projects committed to compensation (plus the Proposed Development (Offshore))	0.001465	0.998 (<0.001)	0.173	0.939 (0.008)	6.066
Guidance**	(70%, 1%)	All Projects excluding consented projects committed to compensation (plus the Proposed Development (Offshore))	0.003087	0.996 (<0.001)	0.366	0.876 (0.008)	12.358

Approach	Scenario	In-combination Scenario	Mortality Rate Relative to the Population	Density Independent Counterfactual Metric (35 years)			
				Median Growth Rate ($\pm$SD)	Decrease in CGR (%)	Median Pop. Size ($\pm$SD)	Decrease in CPS (%)
Guidance**	(70%, 3%)	All Projects excluding consented projects committed to compensation (plus the Proposed Development (Offshore))	0.004483	0.995 (<0.001)	0.531	0.825 (0.007)	17.453

* The Applicant Approach has been presented, with the macro-avoidance rate of 70% applied to the predicted mortalities in all months.

** It should also be noted that as agreed in consultation a macro-avoidance rate of 70% has been applied to gannet densities during the non-breeding season. During the breeding season, the monthly in-flight densities have not been adjusted for macro-avoidance. This approach has been presented as the Guidance Approach.

3.23.3 Kittiwake

Table 3-46: PVA results using Seabird PVA Tool for annual impacts apportioned to the Forth Islands SPA kittiwake population showing distributional responses and collision combined in-combination outputs for the two in-combination scenarios outlined in Section 2.4.

Approach	Scenario	In-combination Scenario	Mortality Rate Relative to the Population	Density Independent Counterfactual Metric (35 years)			
				Median Growth Rate (±SD)	Decrease in CGR (%)	Median Pop. Size (±SD)	Decrease in CPS (%)
Guidance	(30%, 1%)	All Projects (plus the Proposed Development (Offshore))	0.004533	0.995 (<0.001)	0.531	0.825 (0.028)	17.502
Guidance	(30%, 3%)	All Projects (plus the Proposed Development (Offshore))	0.006219	0.993 (<0.001)	0.734	0.767 (0.026)	23.291
Guidance	(30%, 1%)	All Projects excluding consented projects committed to compensation (plus the Proposed Development (Offshore))	0.002022	0.998 (<0.001)	0.241	0.917 (0.031)	8.288
Guidance	(30%, 3%)	All Projects excluding consented projects committed to compensation (plus the Proposed Development (Offshore))	0.003212	0.996 (<0.001)	0.378	0.873 (0.029)	12.750

3.24 Noss SPA: In-combination

3.24.1 Gannet

Table 3-47: PVA results using Seabird PVA Tool for annual impacts apportioned to the Noss SPA gannet population showing distributional responses and collision combined in-combination outputs for the two in-combination scenarios outlined in Section 2.4.

Approach	Scenario	In-combination Scenario	Mortality Rate Relative to the Population	Density Independent Counterfactual Metric (35 years)			
				Median Growth Rate (±SD)	Decrease in CGR (%)	Median Pop. Size (±SD)	Decrease in CPS (%)
Applicant*	(70%, 1%)	All Projects (plus the Proposed Development (Offshore))	0.000537	0.999 (<0.001)	0.064	0.977 (0.020)	2.268
Guidance**	(70%, 1%)	All Projects (plus the Proposed Development (Offshore))	0.000615	0.999 (<0.001)	0.074	0.974 (0.021)	2.626
Guidance**	(70%, 3%)	All Projects (plus the Proposed Development (Offshore))	0.001452	0.998 (<0.001)	0.172	0.940 (0.020)	6.034
Applicant*	(70%, 1%)	All Projects excluding consented projects committed to compensation (plus the Proposed Development (Offshore))	0.000479	0.999 (<0.001)	0.056	0.980 (0.020)	1.959

Approach	Scenario	In-combination Scenario	Mortality Rate Relative to the Population	Density Independent Counterfactual Metric (35 years)			
				Median Growth Rate ($\pm$SD)	Decrease in CGR (%)	Median Pop. Size ($\pm$SD)	Decrease in CPS (%)
Guidance**	(70%, 1%)	All Projects excluding consented projects committed to compensation (plus the Proposed Development (Offshore))	0.000531	0.999 (<0.001)	0.065	0.977 (0.021)	2.283
Guidance**	(70%, 3%)	All Projects excluding consented projects committed to compensation (plus the Proposed Development (Offshore))	0.001284	0.998 (<0.001)	0.154	0.946 (0.021)	5.372

* The Applicant Approach has been presented, with the macro-avoidance rate of 70% applied to the predicted mortalities in all months.

** It should also be noted that as agreed in consultation a macro-avoidance rate of 70% has been applied to gannet densities during the non-breeding season. During the breeding season, the monthly in-flight densities have not been adjusted for macro-avoidance. This approach has been presented as the Guidance Approach.

3.25 St Abbs Head to Fast Castle SPA: In-combination

3.25.1 Kittiwake

Table 3-48: PVA results using Seabird PVA Tool for annual impacts apportioned to the St Abbs Head to Fast Castle SPA kittiwake population showing distributional responses and collision combined in-combination outputs for the two in-combination scenarios outlined in Section 2.4.

Approach	Scenario	In-combination Scenario	Mortality Rate Relative to the Population	Density Independent Counterfactual Metric (35 years)			
				Median Growth Rate (±SD)	Decrease in CGR (%)	Median Pop. Size (±SD)	Decrease in CPS (%)
Guidance	(30%, 1%)	All Projects (plus the Proposed Development (Offshore))	0.022287	0.974 (0.001)	2.637	0.382 (0.016)	61.782
Guidance	(30%, 3%)	All Projects (plus the Proposed Development (Offshore))	0.028284	0.967 (0.001)	3.345	0.294 (0.013)	70.617
Guidance	(30%, 1%)	All Projects excluding consented projects committed to compensation (plus the Proposed Development (Offshore))	0.001872	0.998 (<0.001)	0.224	0.923 (0.032)	7.690
Guidance	(30%, 3%)	All Projects excluding consented projects committed to compensation (plus the Proposed Development (Offshore))	0.002896	0.997 (<0.001)	0.342	0.884 (0.032)	11.582

3.26 Hermaness, Saxa Vord and Valla Field SPA: In-combination

3.26.1 Gannet

Table 3-49: PVA results using Seabird PVA Tool for annual impacts apportioned to the Hermaness, Saxa Vord and Valla Field SPA gannet population showing distributional responses and collision combined in-combination outputs for the two in-combination scenarios outlined in Section 2.4.

Approach	Scenario	In-combination Scenario	Mortality Rate Relative to the Population	Density Independent Counterfactual Metric (35 years)			
				Median Growth Rate (±SD)	Decrease in CGR (%)	Median Pop. Size (±SD)	Decrease in CPS (%)
Applicant*	(70%, 1%)	All Projects (plus the Proposed Development (Offshore))	0.000693	0.999 (<0.001)	0.082	0.971 (0.016)	2.919
Guidance **	(70%, 1%)	All Projects (plus the Proposed Development (Offshore))	0.000753	0.999 (<0.001)	0.088	0.969 (0.016)	3.118
Guidance**	(70%, 3%)	All Projects (plus the Proposed Development (Offshore))	0.001853	0.998 (<0.001)	0.219	0.924 (0.016)	7.586
Applicant*	(70%, 1%)	All Projects excluding consented projects committed to compensation (plus the Proposed Development (Offshore))	0.000623	0.999 (<0.001)	0.074	0.974 (0.016)	2.640

Approach	Scenario	In-combination Scenario	Mortality Rate Relative to the Population	Density Independent Counterfactual Metric (35 years)			
				Median Growth Rate ($\pm$SD)	Decrease in CGR (%)	Median Pop. Size ($\pm$SD)	Decrease in CPS (%)
Guidance**	(70%, 1%)	All Projects excluding consented projects committed to compensation (plus the Proposed Development (Offshore))	0.000660	0.999 (<0.001)	0.077	0.973 (0.016)	2.718
Guidance**	(70%, 3%)	All Projects excluding consented projects committed to compensation (plus the Proposed Development (Offshore))	0.001650	0.998 (<0.001)	0.195	0.932 (0.016)	6.803
* The Applicant Approach has been presented, with the macro-avoidance rate of 70% applied to the predicted mortalities in all months.							
** It should also be noted that as agreed in consultation a macro-avoidance rate of 70% has been applied to gannet densities during the non-breeding season. During the breeding season, the monthly in-flight densities have not been adjusted for macro-avoidance. This approach has been presented as the Guidance Approach.							

3.27 Flamborough and Filey Coast SPA: In-combination

3.27.1 Gannet

Table 3-50: PVA results using Seabird PVA Tool for annual impacts apportioned to the Flamborough and Filey Coast SPA gannet population showing distributional responses and collision combined in-combination outputs for the two in-combination scenarios outlined in Section 2.4.

Approach	Scenario	In-combination Scenario	Mortality Rate Relative to the Population	Density Independent Counterfactual Metric (35 years)			
				Median Growth Rate (±SD)	Decrease in CGR (%)	Median Pop. Size (±SD)	Decrease in CPS (%)
Guidance*	(70%, 1%)	All Projects (plus the Proposed Development (Offshore))	0.008645	0.990 (<0.001)	1.023	0.690 (0.014)	30.961
Guidance*	(70%, 3%)	All Projects (plus the Proposed Development (Offshore))	0.013723	0.984 (<0.001)	1.625	0.554 (0.012)	44.564
Guidance*	(70%, 1%)	All Projects excluding consented projects committed to compensation (plus the Proposed Development (Offshore))	0.008559	0.990 (<0.001)	1.014	0.693 (0.014)	30.710
Guidance*	(70%, 3%)	All Projects excluding consented projects committed to compensation (plus the Proposed Development (Offshore))	0.013580	0.984 (<0.001)	1.609	0.558 (0.012)	44.228
* As agreed in consultation a macro-avoidance rate of 70% has been applied to gannet densities during the non-breeding season. During the breeding season, the monthly in-flight densities have not been adjusted for macro-avoidance. This approach has been presented as the Guidance Approach.							

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