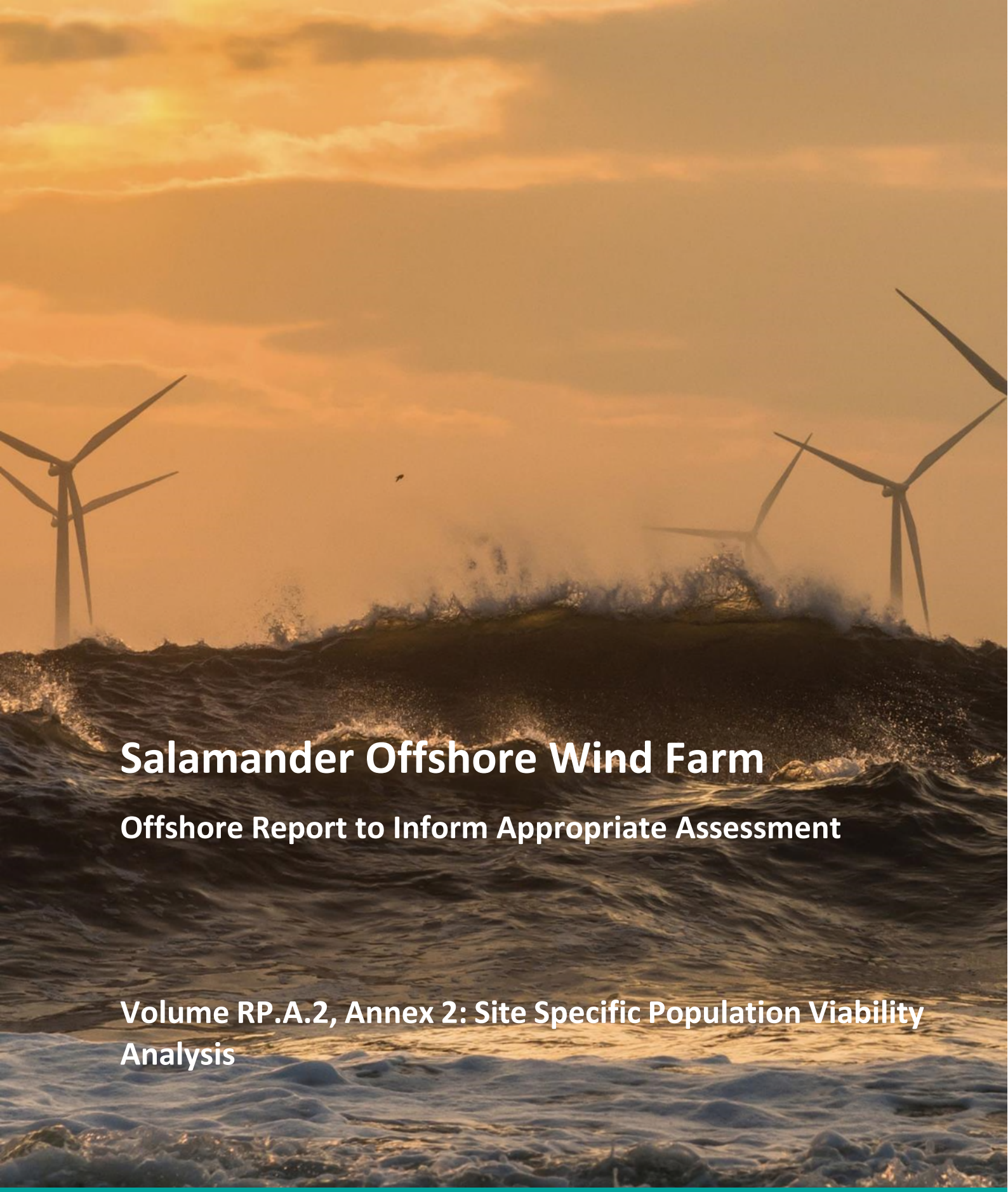

Salamander Offshore Wind Farm

Offshore Report to Inform Appropriate Assessment

Volume RP.A.2, Annex 2: Site Specific Population Viability Analysis

SALAMANDER

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Table of Contents

List of Tables

List of Figures

Glossary

Term	Definition
Breeding Adults	Those individuals in a population of an age to breed.
Counterfactual of Growth Rate	The ratio of impacted to unimpacted annual growth rate.
Counterfactual of Population Size	The ratio of impacted to unimpacted population size.
In-combination effects	In-combination is used to refer to the effects of the Salamander Project on a European Site in-combination with other relevant plans and projects with the potential to contribute to a likely significant effect on or adverse effect on the integrity of that European Site.
Demographic Parameter	A factor that determines the population size.
Population Viability Analysis	The process of determining the probability that a population will persist over a specified time period.
Productivity	The annual population estimate of number of chicks fledged per pair.
Shiny App	User-friendly graphical user interface accessible via a standard web-browser that uses underlying R code.
Stochasticity	The lack of any predictable order or plan.
Survival Rate	The probability of an individual to survive from one breeding season to the next.

Acronyms

Term	Definition
AON	Apparently occupied nest – Census unit for breeding gulls
BDMPS	Biologically Defined Minimum Population Scale
CGR	Counterfactual of Growth Rate
CPS	Counterfactual of Population Size
CRM	Collision Risk Modelling

Term	Definition
EIA	Environmental Impact Assessment
HPAI	Highly Pathogenic Avian Influenza
IND	Individuals – Census unit for breeding auks
LCL	Lower confidence limit
PVA	Population Viability Analysis
RIAA	Report to Inform Appropriate Assessment
SD	Standard Deviation
SNCB	Statutory Nature Conservation Body
SPA	Special Protection Area
UCL	Upper confidence limit
UK	United Kingdom

1 Offshore Ornithology Population Viability Analysis

1.1 Introduction

1.1.1 Background

1.1.1.1 Renewable energy projects in the marine environment, such as offshore wind farms, have the potential to impact seabirds through several processes such as collision with wind turbine blades resulting in mortality, or distributional response from an area due to the presence of wind turbines. These processes affect individuals, but the in-combination effects (when the project alone effects are considered alongside any effects from other projects on the same receptor) have the potential to affect the productivity or elevate the baseline mortality of a population. The **Offshore Report to Inform Appropriate Assessment (RIAA) (Volume RP.A.1, Report 1: Report to Inform Appropriate Assessment (RIAA))** provides for the assessment of such potential effects as a consequence of offshore wind farms with respect to Special Protection Area (SPA) colonies. The wider biogeographic population is addressed in **Volume A.4, Annex 12.4 Population Viability Analysis (PVA)**.

1.1.1.2 One method to estimate the effect that offshore wind projects alone or in-combination may have on a population is through Population Viability Analysis (PVA). PVA provides a robust framework using demographic parameters to predict changes in the population, using statistical population models to forecast future changes over a set period. Comparisons are made between 'baseline' conditions whereby conditions remain unimpacted and under 'scenario' conditions where an impact is applied to a population by the alteration of demographic parameters. Population metrics that are derived from comparisons of 'baseline' and 'impacted' predictions generated by PVAs can then be used to assess the significance of the anticipated additional mortality associated with planned developments.

1.1.1.3 As part of the Salamander Project alone and in-combination assessments, the species and associated populations selected for further assessment were:

Project Alone

- Black-Legged kittiwake (hereafter kittiwake) at:
  - Buchan Ness to Collieston Coast SPA.
- Common guillemot at:
  - Buchan Ness to Collieston Coast SPA; and
  - Troup, Pennan and Lion's Heads SPA;
- Razorbill at:
  - Troup, Pennan and Lion's Heads SPA; and
  - Fowlsheugh SPA.

Project in-combination

- Kittiwake
- Buchan Ness to Collieston Coast SPA;
- East Caithness Cliff SPA;
- Farne Islands SPA;

- Forth Islands SPA;
- Fowlsheugh SPA;
- North Caithness Cliffs SPA;
- St Abb's Head to Fast Castle SPA;
- Troup, Pennan & Lion's Head
- Northern Gannet
- Forth Islands SPA;
- Hermaness, Saxa Vord and Valla Field SPA;
- Common Guillemot
- Buchan Ness to Collieston Coast SPA;
- Troup, Pennan & Lion's Head SPA;
- Razorbill
- Fowlsheugh SPA;
- Troup, Pennan & Lion's Head SPA;
- East Caithness Cliffs SPA.
- Atlantic Puffin
- Farne Islands SPA;
- Forth Islands SPA;
- Sule Skerry & Sule Stack SPA; and
- Herring gull
- Buchan Ness to Collieston Coast SPA.

1.1.1.4 These species were selected for further assessment of the predicted alone or in-combination impacts, due to the predicted increase in baseline mortality exceeding a 0.02% threshold in relation to the Biologically Defined Minimum Population Scale (BDMPS). A 0.02% increase is the level that is regarded as the threshold for undertaking further assessments such as PVA for their respective SPA colonies (NatureScot, 2023).

1.1.2 Aim of report

1.1.2.1 This technical report presents the alone and in-combination PVA process conducted for the Salamander Project with wind farms in the surrounding area. Results are presented firstly for the project alone impacts and subsequently for in-combination impacts.

1.2 Methodology

1.2.1.1 PVA was undertaken using the Seabird PVA Tool developed by Natural England (Searle *et. al.,*. 2019). This software has a user-friendly GUI, and another series of code tools for direct use. Both are written in R and are intended to give the same fundamental calculations. The underlying R-code within the NEPVA R package which underpins the NEPVA tool was used directly to perform the modelling and analysis for this report. The

R code uses NEPVA version 2 tools as a basis (Mobbs et al. 2020) (tool v 2.0, NEPVA R package: v 4.17), as found within the associated Natural England github repository: https://github.com/naturalengland/Seabird_PVA_Tool). All analysis was conducted using R version 4.3.2 for Windows (R Core Team, 2023).

1.2.1.2 The code constructs a stochastic Leslie matrix and can assess any type of impact in terms of change to demographic parameters, or as a cull or harvest of a fixed size per year (Searle *et. Al.,*. 2019). PVAs were run for species at sites where an adverse effect on the integrity of an SPA was identified for a 25, 35 and 50 year timespan, all scenarios were set with inputs to replicating those set out in the NEPVA online tool as detailed below.

1.2.2 Modelling approach

1.2.2.1 All PVA models were undertaken using the 'Simulation' run type, which is used to simulate population trajectories based on the specified demographic parameters, initial population sizes and scenarios the user inputs into the model.

1.2.2.2 The tool includes an option to switch the model to run as either density independent, or density dependent. Density dependence is self-evident in the natural environment, as without density dependence, populations would grow exponentially. For seabird populations, the mechanisms as to how this operates are largely uncertain. If density dependence is mis-specified in an assessment, the modelled predictions may be unreliable. Therefore, it is more typical to use density independent models for seabird assessments, despite the lack of biologically necessary 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 (Ridge *et. al.,* 2019).

1.2.2.3 Environmental stochasticity, which accounts for the variation arising from environmental changes affecting individuals in the same group (e.g. between-year differences in weather conditions), was incorporated in the models at the level of productivity and survival rates. For each simulated year, a value for each demographic rate was randomly generated from a probability distribution defined by the mean and standard deviation estimates of that rate for the population under consideration.

1.2.2.4 Demographic stochasticity, which accounts for individual-level variation affecting transition probabilities between age-classes, was included in the models. For large populations, like the ones considered in this analysis, the effects of environmental stochasticity are deemed more important than those associated with demographic stochasticity (Morris and Doak, 2002). However, including demographic stochasticity will not cause any issues when simulating larger populations (WWT Consulting 2012) and hence has been included.

1.2.2.5 PVA outputs can either be expressed as the Counterfactual of Population Size (CPS) or the Counterfactual of Growth Rate (CGR) depending on if density dependence is included within the model. As models within this report have been run using density independence, the CGR is considered more robust and informative, while if the PVA is density dependent then the CPS is more robust and informative. Both CPS and CGR are provided for the results of each scenario.

1.2.3 Highly Pathogenic Avian Influenza

1.2.3.1 It is understood that advice from NatureScot on how to take account of Highly Pathogenic Avian Influenza (HPAI) within an assessment is currently pending. The impact of the short, medium and long term effects of the HPAI outbreak on seabird colony abundance and vital rates (productivity and survival) on UK breeding

colonies is unclear. It is noted that RSPB have published some post HPAI colony counts[1], but not for all colonies under consideration here and therefore these have not been applied. It is also unclear currently how the distribution and abundance of seabirds at sea has been affected as a result of the HPAI outbreak. The disease has affected over 60 bird species in the UK, including species such as gannet, razorbill, guillemot, puffin, Manx shearwater, fulmar and small and large gull species (Pearce-Higgins et al., 2023). HPAI has affected gannet and great skua colonies profoundly, with both species now facing increased risk of global extinction (Pearce-Higgins et al., 2023) (the UK supports 55.6% of the global gannet population and 60% of the global great skua population; JNCC, 2021). Great skua is not screened into the Appropriate Assessment for the Salamander Project, however gannet is.

1.2.3.2 In the absence of updated Statutory Nature Conservation Body (SNCB) guidance, the assessment approach with regards to HPAI aligns as closely as possible to Natural England's interim guidance that was submitted as part of Natural England's Representation, submitted in response to the Ossian Scoping Report (MD-LOT, 2023). Therefore, all quantitative assessment has been carried out without any adjustments in respect to HPAI. This reflects an assumption that reductions in population or colony sizes would translate to proportional reductions in at-sea densities and hence predicted mortalities from the Salamander Project.

1.2.4 Simulation Parameters

1.2.4.1 All PVA modelling in this technical report was undertaken with environmental and deterministic stochasticity. To ensure robust results, all simulations were set to run 5,000 times. All models were run for a 50 year timespan. Results are presented for a 35 year time span (the lease period of the Salamander Project) alongside a 25 year and 50 year span (as recommended in Nature Scot guidance).

1.2.4.2 Modelling has also been undertaken including a five year 'burn in' period within the model. Applying a 'burn in' period allows for a stable age structure to form when starting to run the model. Within the model, impacts were set to commence from the current year and run for the lease period of the project and beyond (up to 50 years). The start date of PVA has no material bearing on the final conclusion.

1.2.4.3 Although impacts are only reported with respect to the adult numbers, impacts within the simulations were also applied proportionally to immature age-classes (based upon the stable age distribution from eigen-decomposition of the Leslie matrix; Searle *et. al.,* 2019).

1.2.4.4 Impacted vs unimpacted comparisons were based on a matched runs approach, whereby stochasticity is applied to the population before impacts are applied (i.e. survival and productivity rates simulated at each time step are the same for the unimpacted and impacted populations, before additional impact mortalities are deducted from simulated survivals for the impacted populations). This approach is used as previous analyses demonstrated that stochastic models using a matched runs approach were likely the most precautionary (Cook and Robinson, 2017). Productivity rates were assumed to be unaffected by wind farm effects. This is because the relevance of the PVA outputs relates to the difference in the population over time between the unimpacted (counterfactual) and impact populations. The 'difference' only starts when

[1] https://rspb.org.uk/birds-and-wildlife/seabird-surveys-project-report

the impacts start, and the model has no density dependence. Therefore, the difference will essentially be the same regardless of the start date.

1.2.5 Model parameterization

Demographic rates

1.2.5.1 Where possible, colony-specific productivity data has been used from values supplied within the NE PVA tool. This population-specific productivity data originates from the Seabird Monitoring Programme database (JNCC *et al.,* 2023). Data from the last ten years were used to provide an average productivity value. If data were not available for the last ten years then the database was searched for older data and these used where a continuous dataset existed. Where population-specific productivity data was not available, national values from Horswill and Robinson (2015) were used.

1.2.5.2 The survival rates for common guillemot, razorbill and kittiwake were those set within NEPVA tool, derived from the national values presented in Horswill and Robinson (2015).

1.2.6 Populations

Special Protection Areas

1.2.6.1 For the three species, the initial population size inputted into all PVAs used the most recent complete SPA population census values from the Seabirds Count Surveys (Burnell *et. al.,* 2023) accessed via https://jncc.gov.uk/our-work/seabirds-count/. These are presented in **Table 1-1**, converted into estimates of breeding adults (as described in Mitchell *et al.* (2004) in respect to the auks).

Table 1-1 Special Protection Area populations

SPA	Feature	Population (Breeding Adults)	Calculation from census data to breeding adults
Buchan Ness to Collieston Coast	***Guillemot***	39440.22	IND x1.34
	Kittiwake	22590	AON x2
Fowlsheugh	***Guillemot***	93569.52	IND x1.34
	Razorbill	18844.42	IND x1.34
Troup, Pennan and Lion's Heads	***Guillemot***	31893.34	IND x1.34
	Razorbill	6054.12	IND x1.34

Table 1-2 Species demographic rates used in population viability analysis (all data sourced from NEPVA tool)

Species	Age of first breeding	Eggs/pair		Survival rates (per age class)						
				0-1	1-2	2-3	3-4	4-5	5-6	Adult
Kittiwake	4	2	Mean	0.790	0.854	0.854	0.854	0.854	0.854	0.599
			SD	0.079	0.077	0.077	0.077	0.077	0.077	0.328
Guillemot	6	1	Mean	0.560	0.792	0.917	0.939	0.939	0.939	0.583
			SD	0.013	0.034	0.022	0.015	0.015	0.015	0.189
Razorbill	5	1	Mean	0.630	0.630	0.895	0.895	0.895	0.895	0.497
			SD	0.067	0.067	0.067	0.067	0.067	0.067	0.172

2 Project Alone Impacts

2.1.1 Impact scenarios

2.1.1.1 Each simulation was paired with an impact scenario that included additional population-level mortality due to wind turbine collision, distributional response or combined effects. This additional mortality was calculated as a proportion of the starting population and applied to the adult age class only. This way, the number of additional deaths scaled proportionately with changes to the simulated number of breeding adults in the population.

2.1.1.2 Due to uncertainty surrounding the level of impact, a range of distributional response and mortality rates for common guillemot and razorbill were modelled, with focus placed on the commonly used 50%, 60% distributional response and 1%, 3% and 5% mortality rate for breeding and non-breeding season respectively in auks, in line with values used by other offshore wind farm distributional response assessments. Best and worst case scenarios from the applicant and SNCBs which met thresholds for PVA are presented in this report (**Sections 2.2.2** and **2.2.3**). Where two percentage mortality rates (%) are presented, the first is the breeding season and second is the non-breeding season.

2.1.1.3 Demographic rates for each species used in PVA model runs are presented in **Table 1-2**.

2.2 Input parameters

2.2.1 Black-legged Kittiwake

2.2.1.1 The collision and distributional response values used in the PVA assessment for black-legged kittiwake are based on the assessments presented in **Volume ER.A.4, Annex 12.3 Collision Risk Modelling Report** and **Volume ER.A.4, Annex 12.5 Displacement Assessment**. The distributional response impacts assessed for the alone and in-combination effects assessment followed a range-based approach, considering distributional response values of 30% and 3% breeding season mortality rates and 1% and 3% non-breeding season mortality rates as outlined in the NatureScot (2023) guidance. The Applicant approach scenarios for collision, distributional response and combined did not meet the threshold to require PVA. The SNCB low scenario for

distributional response alone also did not meet PVA thresholds. The collision and distributional response values for SNCB approach scenarios which required PVA are presented in **Table 2-1**.

Table 2-1 Black-legged kittiwake: Impacts used in Population Viability Analysis for Buchan Ness to Collieston Coast Special Protection Area

Scenario	Impact rates	Predicted mortality (Original impact)	Predicted impact on adult survival rate
SNCB distributional response High	*30% distributional response, 3% and 3% mortality rates*	11.650	0.000516
CRM (SNCB 2014)	*Collision mortality using SNCB 2014 avoidance rate, with air gap of 22 m*	8.032	0.000356
SNCB Combined Collision and distributional response Low	*Collision mortality with air gap of 22 m plus 30% distributional response, 1% and 1% mortality rates*	11.920	0.000527
SNCB Combined Collision and distributional response High (SNCB 2014)	*Collision mortality with air gap of 22 m plus 30% distributional response, 3% and 3% mortality rates*	19.680	0.000871

2.2.2 Common guillemot

2.2.2.1 The distributional response values used in the PVA assessment for common guillemot are based on the assessments presented in **Volume ER.A.4, Annex 12.5 Displacement Assessment**. The distributional response impacts assessed for the alone and in-combination effects assessment followed a range-based approach, considering distributional response values of 50% and 60% and 3% and 5% breeding season mortality rates and 1% and 3% non-breeding season mortality rates as outlined in the NatureScot (2023)

guidance. The distributional response values for scenarios which required PVA are presented in **Table 2-2** and **Table 2-3**.

Table 2-2 Common guillemot: impacts used in Population Viability Analysis for Buchan Ness to Collieston Coast Special Protection Area

Scenario	Impact rates	Predicted mortality (Original impact)	Predicted impact on adult survival rate
Applicant approach	*50% distributional response, 1% and 1% mortality rates*	26.615	0.000675
SNCB Low	*60% distributional response, 3% and 1% mortality rates*	64.773	0.001642
SNCB High	*60% distributional response, 5% and 3% mortality rates*	128.648	0.003262

Table 2-3 Common guillemot: Impacts used in Population Viability Analysis for Troup, Pennan and Lion's Head Special Protection Area

Scenario	Impact rates	Predicted mortality (Original impact)	Predicted impact on adult survival rate
Applicant approach	*50% distributional response, 1% and 1% mortality rates*	14.575	0.000457
SNCB Low	*60% distributional response, 3% and 1% mortality rates*	27.370	0.000858
SNCB High	*60% distributional response, 5% and 3% mortality rates*	62.351	0.001955

2.2.3 Razorbill

2.2.3.1 The distributional response values used in the PVA assessment for razorbill are based on the assessments presented in **Volume ER.A.4, Annex 12.3 Collision Risk Modelling Report** and **Volume ER.A.4, Annex 12.5 Displacement Assessment**. The distributional response impacts assessed for the alone and in-combination effects assessment followed a range-based approach, considering distributional response values of 60% and 3% and 5% breeding season mortality rates and 1% and 3% non-breeding season mortality rates as outlined in the NatureScot (2023) guidance. The distributional response values for scenarios which required PVA are

presented in **Table** 2-4 and **Table 2-5**. Note that for the Applicants approach (50% distributional response and 1% mortality) the 0.02% threshold was not met and therefore PVA is not required.

Table 2-4 Razorbill: Impacts used in Population Viability Analysis for Troup, Pennan and Lion's Head Special Protection Area

Scenario	Impact rates	Predicted mortality (Original impact)	Predicted impact on adult survival rate
SNCB Low	*60% distributional response, 3% and 1% mortality rates*	0.948	0.000143
SNCB High	*60% distributional response, 5% and 3% mortality rates*	1.598	0.000241

Table 2-5 Razorbill: impacts used in Population Viability Analysis for Fowlsheugh Special Protection Area

Scenario	Impact rates	Predicted mortality (Original impact)	Predicted impact on adult survival rate
SNCB Low	*60% distributional response, 3% and 1% mortality rates*	1.465	0.000078
SNCB High	*60% distributional response, 5% and 3% mortality rates*	2.479	0.000132

2.3 Results: After 35 Years

2.3.1 Black-legged kittiwake

2.3.1.1 The results of the PVA for impacts on the kittiwake population at the Buchan Ness to Collieston Coast SPA from the start of 2024 and for the duration of the project (35 years) are presented in **Table 2-6** below. The baseline 'unimpacted' scenario (i.e. assuming no additional mortality other than baseline mortality exists) is also shown for comparison purposes. Graphs relating to population size, Counterfactual of Population Size (CPS) and Counterfactual of Growth Rate (CGR) for each impact scenario are also presented in **Figure 4-1,** Error! Reference source not found.**Figure 4-2, and Figure 4-3.**

2.3.1.2 The final reduction in growth rate for kittiwake remained below 0.1% across the 35-year model run with the reduction in final population size remaining below a 3.6% change between the baseline and impacted population for all scenarios (**Table 2-6**).

Table 2-6 Black-legged kittiwake Population Viability Analysis results for the Special Protection Areas

SPA	Scenario	Predicted mortality (Original impact)	Growth rate (Annual GR)	Density-independence (after 35 years)			
				Median CGR	Median CPS	Reduction in growth rate (%)	Reduction in population size (%)
Buchan Ness to Collieston Coast SPA	*Baseline*	0	0.998	1.000	1.000	n/a	n/a
	SNCB distributional response High	11.650	0.997	0.999	0.979	-0.07%	-1.95%
	CRM alone (SNCB 2014)	8.032	0.997	1.000	0.985	-0.05%	-1.33%
	Combined Low (SNCB 2014)	11.92	0.997	0.999	0.978	-0.07%	-1.90%
	Combined High (SNCB 2014)	19.68	0.997	0.999	0.963	-0.11%	-3.55%

2.3.2 Common guillemot

2.3.2.1 The results of the PVA for impacts on the guillemot populations at the Buchan Ness to Collieston Coast SPA, Troup, Pennan and Lion's Head SPA from the start of 2024 and for the duration of the project (35 years) are presented in **Table 2-7** below. The baseline 'unimpacted' scenario (i.e. assuming no additional mortality other than baseline mortality exists) is also shown for comparison purposes. Graphs relating to population size, Counterfactual of Population Size (CPS) and Counterfactual of Growth Rate (CGR) for each impact scenario are also presented in **Figure 4-4, Figure 4-5 and Figure 4-6** The final reduction in growth rate for guillemot remained below 0.3% across the 35-year model run with the final population size remaining below or at a 12.3% change between the baseline and impacted population in all impacted SPAs (**Table 2-7**).

Table 2-7 Common guillemot Population Viability Analysis results for the Special Protection Areas

SPA	Scenario	Predicted mortality (Original impact)	Growth rate (Annual GR)	Density-independence (after 35 years)			
				Median CGR	Median CPS	Reduction in growth rate (%)	Reduction in population size (%)
Buchan Ness to Collieston Coast	*Baseline*	0	1.026	1.000	1.000	n/a	n/a
	Applicant approach	26.6	1.025	0.999	0.973	-0.08%	-2.69%
	SNCB Low	64.8	1.024	0.998	0.936	-0.18%	-6.29%
	SNCB High	128.6	1.022	0.996	0.877	-0.36%	-12.29%
Troup, Pennan and Lion's Head	*Baseline*	0	1.026	1.000	1.000	n/a	n/a
	Applicant approach	14.6	1.025	0.999	0.982	-0.05%	-1.83%
	SNCB Low	27.4	1.025	0.999	0.966	-0.10%	-3.35%
	SNCB High	62.4	1.023	0.998	0.924	-0.22%	-7.65%

2.3.3 Razorbill

2.3.3.1 The results of the PVA for impacts on the razorbill populations at the Fowlsheugh SPA, Troup, Pennan and Lion's Head SPA from the start of 2024 and for the duration of the project (35 years) are presented in **Table 2-8** below. The baseline 'unimpacted' scenario (i.e. assuming no additional mortality other than baseline mortality exists) is also shown for comparison purposes. Graphs relating to population size, Counterfactual of Population Size (CPS) and Counterfactual of Growth Rate (CGR) for each impact scenario are also presented in **Figure 4-10, Figure 4-, Figure 4-12, Figure 4-13, Figure 4-14** and **Figure 4-15**.

2.3.3.2 The predicted reduction in growth rate for razorbill would be below 0.03% across the 35-year model run with the final population size remaining below a 0.9% change between the baseline and impacted population in all impacted SPAs (**Table 2-8**).

Table 2-8 Razorbill Population Viability Analysis results for the Special Protection Areas

SPA	Scenario	Predicted mortality (Original impact)	Growth rate (Annual GR)	Density-independence (after 35 years)			
				Median CGR	Median CPS	Reduction in growth rate (%)	Reduction in population size (%)
Troup, Pennan and Lion's Head	Baseline	0	0.972	1.000	1.000	n/a	n/a
	SNCB Low	0.948	0.972	1.000	0.995	-0.01%	-0.45%
	SNCB High	1.598	0.972	1.000	0.990	-0.02%	-0.97%
Fowlsheugh	*Baseline*	0	0.972	1.000	1.000	n/a	n/a
	SNCB Low	1.465	0.972	1.000	0.997	-0.01%	-0.32%
	SNCB High	2.479	0.972	1.000	0.994	-0.02%	-0.58%

2.4 Results: After 25 Years

2.4.1 Black-legged kittiwake

2.4.1.1 The results of the PVA for impacts on the kittiwake population at the Buchan Ness to Collieston Coast SPA from the start of 2024 and for a 25 year duration are presented in **Table 2-9** below. The baseline 'unimpacted' scenario (i.e. assuming no additional mortality other than baseline mortality exists) is also shown for comparison purposes.

Table 2-9 Black-legged kittiwake Population Viability Analysis results for Special Protection Areas

SPA	Scenario	Predicted mortality (Original impact)	Growth rate (Annual GR)	Density-independence (after 25 years)			
				Median CGR	Median CPS	Reduction in growth rate (%)	Reduction in population size (%)
Buchan Ness to Collieston Coast SPA	Baseline	0	0.998	1.000	1.000	n/a	n/a
	SNCB distributional response High	11.650	0.997	0.999	0.984	-0.07%	-1.71%
	CRM (SNCB 2014)	8.032	0.997	1.000	0.989	-0.05%	-1.26%
	Combined Low (SNCB 2014)	11.92	0.997	0.999	0.984	-0.07%	-1.78%
	Combined High (SNCB 2014)	19.68	0.997	0.999	0.973	-0.11%	-2.78%

2.4.2 Common guillemot

2.4.2.1 The results of the PVA for impacts on the guillemot populations at the Buchan Ness to Collieston Coast SPA, Troup, Pennan and Lion's Head SPA from the start of 2024 and for a 25 year duration are presented in **Table 2-10** below. The baseline 'unimpacted' scenario (i.e. assuming no additional mortality other than baseline mortality exists) is also shown for comparison purposes.

Table 2-10 Common guillemot Population Viability Analysis results for the Special Protection Areas

SPA	Scenario	Predicted mortality (Original impact)	Growth rate (Annual GR)	Density-independence (after 25 years)			
				Median CGR	Median CPS	Reduction in growth rate (%)	Reduction in population size (%)
Buchan Ness to Collieston Coast	*Baseline*	0	1.026	1.000	1.000	n/a	n/a
	Applicant approach	26.6	1.025	0.999	0.981	-0.07%	-2.04%
	SNCB Low	64.8	1.024	0.998	0.954	-0.18%	-4.73%
	SNCB High	128.6	1.022	0.996	0.910	-0.36%	-9.06%
Troup, Pennan and Lion's Head	***Baseline***	0	1.026	1.000	1.000	n/a	n/a
	Applicant approach	14.6	1.025	0.999	0.987	-0.05%	-1.42%
	SNCB Low	27.4	1.025	0.999	0.976	-0.09%	-2.58%
	SNCB High	62.4	1.023	0.998	0.945	-0.22%	-5.66%

2.4.3 Razorbill

2.4.3.1 The results of the PVA for impacts on the razorbill populations at the Fowlsheugh SPA, Troup, Pennan and Lion's Head SPA from the start of 2024 and for a 25 year duration are presented in **Table 2-11** below. The baseline 'unimpacted' scenario (i.e. assuming no additional mortality other than baseline mortality exists) is also shown for comparison purposes.

Table 2-11 Razorbill Population Viability Analysis results for the Special Protection Areas

SPA	Scenario	Predicted mortality (Original impact)	Growth rate (Annual GR)	Density-independence (after 25 years)			
				Median CGR	Median CPS	Reduction in growth rate (%)	Reduction in population size (%)
Troup, Pennan and Lion's Head	*Baseline*	0	0.972	1.000	1.000	n/a	n/a
	SNCB Low	0.948	0.972	1.000	0.998	0.00%	-0.19%
	SNCB High	1.598	0.972	1.000	0.996	-0.02%	-0.43%
Fowlsheugh	*Baseline*	0	0.973	1.000	1.000	n/a	n/a
	SNCB Low	1.465	0.972	1.000	0.996	-0.02%	-0.38%
	SNCB High	2.479	0.972	1.000	0.992	-0.03%	-0.89%

2.5 Results: After 50 Years

2.5.1 Black-legged kittiwake

2.5.1.1 The results of the PVA for impacts on the kittiwake population at the Buchan Ness to Collieston Coast SPA from the start of 2024 and for a 50 year duration are presented in **Table 2-12** below. The baseline 'unimpacted' scenario (i.e. assuming no additional mortality other than baseline mortality exists) is also shown for comparison purposes.

Table 2-12 Black-legged kittiwake Population Viability Analysis results for the Special Protection Areas

SPA	Scenario	Predicted mortality (Original impact)	Growth rate (Annual GR)	Density-independence (after 50 years)			
				Median CGR	Median CPS	Reduction in growth rate (%)	Reduction in population size (%)
Buchan Ness to Collieston Coast SPA	*Baseline*	0	0.998	1.000	1.000	n/a	n/a
	SNCB distributional response High	11.650	0.997	0.999	0.970	-0.06%	-3.15%
	CRM (SNCB 2014)	8.032	0.997	1.000	0.979	-0.04%	-2.66%
	Combined Low (SNCB 2014)	11.92	0.997	0.999	0.969	-0.06%	-3.37%
	Combined High (SNCB 2014)	19.68	0.997	0.999	0.949	-0.10%	-5.40%

2.5.2 Common guillemot

2.5.2.1 The results of the PVA for impacts on the guillemot populations at the Buchan Ness to Collieston Coast SPA and Troup, Pennan and Lion's Head SPA from the start of 2024 and for a 50 year duration are presented in **Table 2-13** below. The baseline 'unimpacted' scenario (i.e. assuming no additional mortality other than baseline mortality exists) is also shown for comparison purposes.

Table 2-13 Common guillemot Population Viability Analysis results for the Special Protection Areas

SPA	Scenario	Predicted mortality (Original impact)	Growth rate (Annual GR)	Density-independence (after 50 years)			
				Median CGR	Median CPS	Reduction in growth rate (%)	Reduction in population size (%)
Buchan Ness to Collieston Coast	Baseline	0	1.026	1.000	1.000	n/a	n/a
	Applicant approach	26.6	1.025	0.999	0.962	-0.08%	-3.81%
	SNCB Low	64.8	1.024	0.998	0.911	-0.18%	-8.92%
	SNCB High	128.6	1.022	0.996	0.830	-0.37%	-17.01%
Troup, Pennan and Lion's Head	*Baseline*	0	1.026	1.000	1.000	n/a	n/a
	Applicant approach	14.6	1.025	0.999	0.974	-0.05%	-2.49%
	SNCB Low	27.4	1.025	0.999	0.952	-0.10%	-4.67%
	SNCB High	62.4	1.023	0.998	0.894	-0.21%	-10.57%

2.5.3 Razorbill

2.5.3.1 The results of the PVA for impacts on the razorbill populations at the Fowlsheugh SPA and Troup, Pennan and Lion's Head SPA from the start of 2024 and for a 50 year duration are presented in **Table 2-14** below. The baseline 'unimpacted' scenario (i.e. assuming no additional mortality other than baseline mortality exists) is also shown for comparison purposes.

Table 2-14 Razorbill Population Viability Analysis results for the Special Protection Areas

SPA	Scenario	Predicted mortality (Original impact)	Growth rate (Annual GR)	Density-independence (after 50 years)			
				Median CGR	Median CPS	Reduction in growth rate (%)	Reduction in population size (%)
Troup, Pennan and Lion's Head	*Baseline*	0	0.972	1.000	1.000	n/a	n/a
	SNCB Low	0.948	0.972	1.000	0.995	-0.01%	-0.28%
	SNCB High	1.598	0.972	1.000	0.992	-0.01%	-0.57%
Fowlsheugh	*Baseline*	0	0.972	1.000	1.000	n/a	n/a
	SNCB Low	1.465	0.972	1.000	0.994	-0.01%	-0.19%
	SNCB High	2.479	0.972	1.000	0.985	-0.04%	-1.32%

3 In-Combination Impacts

3.1.1.1 For all in-combination assessments which met the threshold for PVA, analyses have been carried out both with and without Berwick Bank and for the high and low scenarios, to fully assess the potential total in-combination impacts.

3.2 Input parameters

3.2.1 Black-legged Kittiwake

3.2.1.1 The collision and distributional response values used in the PVA in-combination assessment for black-legged kittiwake are based on the assessments presented in **Volume ER.A.4, Annex 12.3 Collision Risk Modelling Report** and **Volume ER.A.4, Annex 12.5 Displacement Assessment**. Collision risk estimates for black legged-kittiwake have been presented for scenarios based on the SNCB 2014 avoidance rates (SNCB approach) and for updated avoidance rates Ozsanlav-Harris *et al.*, (2023) (Applicant approach). The collision and distributional response values for scenarios which required PVA are presented in **Table 3-1** to **Table 3-8.** Impact rates used for each scenario are explained below:

- Low SNCB impact rates are based on a collision mortality using SNCB 2014 avoidance rates, with air gap of 22 m plus 30% distributional response, 1% breeding season mortality and 1% non-breeding season mortality rates, plus the lowest predicted mortality from other windfarm projects.
- High SNCB impact rates are based on a collision mortality using SNCB 2014 avoidance rates, with air gap of 22 m plus 30% distributional response, 3% breeding season mortality and 3% non-breeding season mortality rates, plus the highest predicted mortality from other windfarm projects.
- Low Applicant impact rates are based on a collision mortality using Ozsanlav-Harris et al., (2023) avoidance rates, with air gap of 22 m plus 30% distributional response, 1% mortality rates, plus the lowest predicted mortality from other windfarm projects.
- High Applicant rates are based on a collision mortality using Ozsanlav-Harris et al., (2023) avoidance rates, with air gap of 22 m plus 30% distributional response, 1% mortality rates, plus the highest predicted mortality from other windfarm projects.

3.2.1.2 For clarity, although the Applicants and SNCB distributional response rate is the same (30%), when considered in-combination a high and a low in-combination total is available with this reflected in the high and low values here (noting that the contribution from the Salamander Project remains the same).

Table 3-1 Black-legged kittiwake: Impacts used in Population Viability Analysis in-combination assessment for Buchan Ness to Collieston Coast Special Protection Area

Scenario			Predicted mortality (Original impact)	Predicted impact on adult survival rate
Collision Applicants	*Excluding Berwick Bank*	Low	65.48	0.002899
		High	65.87	0.002916
	Including Berwick Bank	Low	75.58	0.003346
		High	80.17	0.003549

Scenario			Predicted mortality (Original impact)	Predicted impact on adult survival rate
Collision SNCB	*Excluding Berwick Bank*	Low	68.39	0.003027
		High	68.78	0.003045
	Including Berwick Bank	Low	78.49	0.003475
		High	83.08	0.003678
Combined Applicants	*Excluding Berwick Bank*	Low	76.06	0.003367
		High	87.72	0.003883
	Including Berwick Bank	Low	88.46	0.003916
		High	108.82	0.004817
Combined SNCB	*Excluding Berwick Bank*	Low	78.98	0.003496
		High	90.63	0.004012
	Including Berwick Bank	Low	91.38	0.004045
		High	111.73	0.004946
Distributional response	*Excluding Berwick Bank*	Low	10.58	0.000468
		High	21.85	0.000967
	Including Berwick Bank	Low	12.88	0.000570
		High	28.65	0.001268

Table 3-2 Black-legged kittiwake: Impacts used in Population Viability Analysis in-combination assessment for East Caithness Cliffs Special Protection Area

Scenario			Predicted mortality (Original impact)	Predicted impact on adult survival rate
Collision Applicants	*Excluding Berwick Bank*	Low	219.88	0.004491
		High	221.97	0.004534
		Low	238.28	0.004867

Scenario			Predicted mortality (Original impact)	Predicted impact on adult survival rate
	Including Berwick Bank	High	247.47	0.005055
Collision SNCB	*Excluding Berwick Bank*	Low	220.34	0.004501
		High	222.5	0.004545
	Including Berwick Bank	Low	238.74	0.004876
		High	248	0.005066
Combined Applicants	*Excluding Berwick Bank*	Low	274.74	0.005612
		High	385.94	0.007883
	Including Berwick Bank	Low	298.24	0.006092
		High	426.94	0.008721
Combined SNCB	*Excluding Berwick Bank*	Low	275.2	0.005621
		High	386.39	0.007892
	Including Berwick Bank	Low	298.7	0.006101
		High	427.39	0.008730
Distributional response	*Excluding Berwick Bank*	Low	54.86	0.001121
		High	163.97	0.003349
	Including Berwick Bank	Low	59.96	0.001225
		High	179.47	0.003666

Table 3-3 Black-legged kittiwake: Impacts used in Population Viability Analysis in-combination assessment for Farne Islands Special Protection Area

Scenario			Predicted mortality (Original impact)	Predicted impact on adult survival rate
Collision Applicants	*Excluding Berwick Bank*	Low	10.80	0.001227
		High	10.80	0.001227

Scenario			Predicted mortality (Original impact)	Predicted impact on adult survival rate
	Including Berwick Bank	Low	29.10	0.003305
		High	37.20	0.004225
Collision SNCB	*Excluding Berwick Bank*	Low	10.80	0.001227
		High	10.79	0.001225
	Including Berwick Bank	Low	29.10	0.003306
		High	37.19	0.004224
Combined Applicants	*Excluding Berwick Bank*	Low	12.60	0.001431
		High	16.20	0.001840
	Including Berwick Bank	Low	33.90	0.003851
		High	51.50	0.005850
Combined SNCB	*Excluding Berwick Bank*	Low	12.66	0.001438
		High	16.36	0.001859
	Including Berwick Bank	Low	33.96	0.003857
		High	51.66	0.005868
Distributional response	*Excluding Berwick Bank*	Low	1.86	0.000211
		High	5.58	0.000633
	Including Berwick Bank	Low	4.86	0.000552
		High	14.48	0.001644

Table 3-4 Black-legged kittiwake: Impacts used in Population Viability Analysis in-combination assessment for Forth Islands Special Protection Area

Scenario			Predicted mortality (Original impact)	Predicted impact on adult survival rate
Collision Applicants	*Excluding Berwick Bank*	Low	25.20	0.002774
		High	25.40	0.002796
	Including Berwick Bank	Low	47.70	0.005251
		High	57.90	0.006374
Collision SNCB	*Excluding Berwick Bank*	Low	25.31	0.002786
		High	25.49	0.002806
	Including Berwick Bank	Low	47.81	0.005263
		High	57.99	0.006384
Combined Applicants	*Excluding Berwick Bank*	Low	32.70	0.003600
		High	47.60	0.005240
	Including Berwick Bank	Low	58.70	0.006462
		High	90.70	0.009985
Combined SNCB	*Excluding Berwick Bank*	Low	32.80	0.003610
		High	47.85	0.005267
	Including Berwick Bank	Low	58.80	0.006472
		High	90.95	0.010012
Distributional response	*Excluding Berwick Bank*	Low	7.49	0.000824
		High	22.36	0.002461
	Including Berwick Bank	Low	10.99	0.001209
		High	32.96	0.003628

Table 3-5 Black-legged kittiwake: Impacts used in Population Viability Analysis in-combination assessment for Fowlsheugh Special Protection Area

Scenario			Predicted mortality (Original impact)	Predicted impact on adult survival rate
Collision Applicants	*Excluding Berwick Bank*	Low	79.54	0.002833
		High	79.99	0.002849
	Including Berwick Bank	Low	147.64	0.005258
		High	178.29	0.006350
Collision SNCB	*Excluding Berwick Bank*	Low	80.14	0.002854
		High	80.6	0.002871
	Including Berwick Bank	Low	148.24	0.005280
		High	178.9	0.006372
Combined Applicants	*Excluding Berwick Bank*	Low	95.84	0.003413
		High	128.61	0.004580
	Including Berwick Bank	Low	174.64	0.006220
		High	259.01	0.009225
Combined SNCB	*Excluding Berwick Bank*	Low	96.45	0.003435
		High	129.22	0.004602
	Including Berwick Bank	Low	175.25	0.006242
		High	259.62	0.009246
Distributional response	*Excluding Berwick Bank*	Low	16.31	0.000581
		High	48.62	0.001732
	Including Berwick Bank	Low	27.01	0.000962
		High	80.72	0.002875

Table 3-6 Black-legged kittiwake: Impacts used in Population Viability Analysis in-combination assessment for North Caithness Cliffs Special Protection Area

Scenario			Predicted mortality (Original impact)	Predicted impact on adult survival rate
Collision Applicants	*Excluding Berwick Bank*	Low	43.70	0.003922
		High	45.10	0.004048
	Including Berwick Bank	Low	48.20	0.004326
		High	51.40	0.004613
Collision SNCB	*Excluding Berwick Bank*	Low	43.89	0.003939
		High	45.26	0.004062
	Including Berwick Bank	Low	48.39	0.004343
		High	51.56	0.004628
Combined Applicants	*Excluding Berwick Bank*	Low	52.70	0.004730
		High	66.80	0.005995
	Including Berwick Bank	Low	58.50	0.005250
		High	77.00	0.006911
Combined SNCB	*Excluding Berwick Bank*	Low	52.88	0.004746
		High	67.15	0.006027
	Including Berwick Bank	Low	58.68	0.005267
		High	77.35	0.006942
Distributional response	*Excluding Berwick Bank*	Low	9.00	0.000807
		High	21.89	0.001964
	Including Berwick Bank	Low	10.30	0.000924
		High	25.79	0.002314

Table 3-7 Black-legged kittiwake: Impacts used in Population Viability Analysis in-combination assessment for St Abb's Head to Fast Castle Special Protection Area

Scenario			Predicted mortality (Original impact)	Predicted impact on adult survival rate
Collision Applicants	*Excluding Berwick Bank*	Low	16.50	0.001602
		High	16.50	0.001602
	Including Berwick Bank	Low	212.00	0.020583
		High	299.60	0.029087
Collision SNCB	*Excluding Berwick Bank*	Low	16.60	0.001611
		High	16.60	0.001612
	Including Berwick Bank	Low	212.10	0.020592
		High	299.70	0.029097
Combined Applicants	*Excluding Berwick Bank*	Low	21.58	0.002095
		High	31.46	0.003054
	Including Berwick Bank	Low	246.68	0.023950
		High	402.96	0.039122
Combined SNCB	*Excluding Berwick Bank*	Low	21.50	0.002087
		High	31.20	0.003029
	Including Berwick Bank	Low	246.60	0.023942
		High	402.70	0.039097
Distributional response	*Excluding Berwick Bank*	Low	4.98	0.000484
		High	14.85	0.001442
	Including Berwick Bank	Low	34.58	0.003358
		High	103.25	0.010025

Table 3-8 Black-legged kittiwake: Impacts used in Population Viability Analysis in-combination assessment for Troup, Pennan & Lion's Head Special Protection Area

Scenario			Predicted mortality (Original impact)	Predicted impact on adult survival rate
Collision Applicants	*Excluding Berwick Bank*	Low	55.45	0.002612
		High	56.09	0.002642
	Including Berwick Bank	Low	63.95	0.003012
		High	67.99	0.003202
Collision SNCB	*Excluding Berwick Bank*	Low	56.42	0.002657
		High	57.05	0.002687
	Including Berwick Bank	Low	64.92	0.003058
		High	68.95	0.003247
Combined Applicants	*Excluding Berwick Bank*	Low	68.34	0.003219
		High	94.14	0.004434
	Including Berwick Bank	Low	78.94	0.003718
		High	112.54	0.005300
Combined SNCB	*Excluding Berwick Bank*	Low	69.3	0.003264
		High	95.1	0.004479
	Including Berwick Bank	Low	79.9	0.003763
		High	113.5	0.005346
Distributional response	*Excluding Berwick Bank*	Low	12.88	0.000607
		High	38.05	0.001792
	Including Berwick Bank	Low	14.98	0.000706
		High	44.55	0.002098

3.2.2 Northern Gannet

3.2.2.1 The collision and distributional response values used in the PVA in-combination assessment for gannet are based on the assessments presented in **Volume ER.A.4, Annex 12.3 Collision Risk Modelling Report** and **Volume ER.A.4, Annex 12.5 Displacement Assessment**. Collision risk estimates for gannet have been presented for scenarios based on the SNCB 2014 avoidance rates (SNCB approach) and for the newer avoidance rates Ozsanlav-Harris et al., (2023) (Applicant approach). The collision and distributional response values for scenarios which required PVA are presented in **Table 3-9** and **Table 3-10.** Impact rates used for each scenario are explained below:

- Low SNCB impact rates are based on a collision mortality using SNCB 2014 avoidance rates, with air gap of 22 m plus 70% distributional response, 1% breeding season mortality and 1% non-breeding season mortality rates, plus the lowest predicted mortality from other wind farm projects.
- High SNCB impact rates are based on a collision mortality using SNCB 2014 avoidance rates, with air gap of 22 m plus 70% distributional response, 3% breeding season mortality and 3% non-breeding season mortality rates, plus the highest predicted mortality from other wind farm projects.
- Low Applicant impact rates are based on a collision mortality using Ozsanlav-Harris et al., (2023) avoidance rates, with air gap of 22 m plus 70% distributional response, 1% mortality rates, plus the lowest predicted mortality from other wind farm projects.
- High Applicant rates are based on a collision mortality using Ozsanlav-Harris et al., (2023) avoidance rates, with air gap of 22 m plus 70% distributional response, 1% mortality rates, plus the highest predicted mortality from other wind farm projects.

3.2.2.2 For clarity, although the Applicants and SNCB distributional response rate is the same (70%), when considered in-combination a high and a low in-combination total is available with reflected in the high and low values here (noting that the contribution from the Salamander Project remains the same).

Table 3-9 Gannet: Impacts used in Population Viability Analysis in-combination assessment for Forth Islands Special Protection Area

Scenario			Predicted mortality (Original impact)	Predicted impact on adult survival rate
Collision Applicants	*Excluding Berwick Bank*	Low	555.81	0.003693
		High	562.79	0.003739
	Including Berwick Bank	Low	678.61	0.004508
		High	713.79	0.004742
Collision SNCB	*Excluding Berwick Bank*	Low	556.21	0.003695
		High	563.19	0.003742
		Low	679.01	0.004511

Scenario			Predicted mortality (Original impact)	Predicted impact on adult survival rate
	Including Berwick Bank	High	714.19	0.004745
Combined Applicants	*Excluding Berwick Bank*	Low	668.81	0.004443
		High	902.18	0.005994
	Including Berwick Bank	Low	823.71	0.005473
		High	1147.38	0.007623
Combined SNCB	*Excluding Berwick Bank*	Low	669.21	0.004446
		High	902.58	0.005996
	Including Berwick Bank	Low	824.11	0.005475
		High	1147.78	0.007626
Distributional response	*Excluding Berwick Bank*	Low	113.00	0.000751
		High	339.39	0.002255
	Including Berwick Bank	Low	145.10	0.000964
		High	433.59	0.002881

Table 3-10 Gannet: Impacts used in Population Viability Analysis in-combination assessment for Hermaness Saxa Vord and Valla Field Special Protection Area

Scenario			Predicted mortality (Original impact)	Predicted impact on adult survival rate
Collision Applicants	*Excluding Berwick Bank*	Low	66.12	0.001118328
		High	68.9	0.001165347
	Including Berwick Bank	Low	67.42	0.001140315
		High	70.7	0.001195792
Collision SNCB		Low	66.25	0.001120526

Scenario			Predicted mortality (Original impact)	Predicted impact on adult survival rate
	Excluding Berwick Bank	High	69.03	0.001167546
	Including Berwick Bank	Low	67.55	0.001142514
		High	70.83	0.001197991
Combined Applicants	*Excluding Berwick Bank*	Low	80.12	0.001355118
		High	110.73	0.001872844
	Including Berwick Bank	Low	82.22	0.001390637
		High	114.83	0.001942189
Combined SNCB	*Excluding Berwick Bank*	Low	80.25	0.001357317
		High	110.86	0.001875042
	Including Berwick Bank	Low	82.35	0.001392835
		High	114.96	0.001944388
Distributional response	*Excluding Berwick Bank*	Low	14	0.00023679
		High	41.83	0.000707496
	Including Berwick Bank	Low	14.8	0.000250321
		High	44.13	0.000746397

3.2.3 Common guillemot

3.2.3.1 The distributional response values used in the PVA in-combination assessment for common guillemot are based on the assessments presented in **Volume ER.A.4, Annex 12.3 Collision Risk Modelling Report** and **Volume ER.A.4, Annex 12.5 Displacement Assessment**. The distributional response impacts assessed for the in-combination effects assessment followed a range-based approach, considering distributional response values of 50% and 60% and 3% and 5% breeding season mortality rates and 1% and 3% non-breeding season mortality rates as outlined in the NatureScot (2023) guidance. The distributional response values for scenarios which required PVA are presented in **Table 3-11** to **Table 3-12**.

- Low impact rates are based on the Applicants approach of 50% distributional response and 1% mortality rates, plus the lowest predicted mortality from other wind farm projects

- High impact rates are based on SNCB distributional response rates of 60% distributional response, 5% and 3% mortality rates, plus the highest predicted mortality from other wind farm projects

Table 3-11 Common guillemot: impacts used in Population Viability Analysis in-combination assessment for Buchan Ness to Collieston Coast Special Protection Area

Scenario			Predicted mortality (Original impact)	Predicted impact on adult survival rate
Distributional response	*Excluding Berwick Bank*	Low (Applicant)	35.61	0.000903
		High (SNCB)	176.05	0.004464
	Including Berwick Bank	Low (Applicant)	40.51	0.001027
		High (SNCB)	197.55	0.005009

Table 3-12 Common guillemot: Impacts used in Population Viability Analysis in-combination assessment for Troup, Pennan and Lion's Head Special Protection Area

Scenario			Predicted mortality (Original impact)	Predicted impact on adult survival rate
Distributional response	*Excluding Berwick Bank*	Low	25.58	0.000802
		High	110.75	0.003473
	Including Berwick Bank	Low	27.38	0.000858
		High	121.55	0.003811

3.2.4 Razorbill

3.2.4.1 The distributional response values used in the PVA in-combination assessment for razorbill are based on the assessments presented in **Volume ER.A.4, Annex 12.3 Collision Risk Modelling Report** and **Volume ER.A.4, Annex 12.5 Displacement Assessment**. The distributional response impacts assessed for the in-combination effects assessment followed a range-based approach, considering distributional response values of 60% and 3% and 5% breeding season mortality rates and 1% and 3% non-breeding season mortality rates as outlined in the NatureScot (2023) guidance. The distributional response values for scenarios which required PVA are presented in **Table 3-13** and **Table 3-14**.

- Low impact rates are based on the Applicants approach of 50% distributional response and 1% mortality rates, plus the lowest predicted mortality from other wind farm projects
- High impact rates are based on SNCB distributional response rates of 60% distributional response, 5% and 3% mortality rates, plus the highest predicted mortality from other wind farm projects

Table 3-13 Razorbill: impacts used in Population Viability Analysis in-combination assessment for Fowlsheugh Special Protection Area

Scenario			Predicted mortality (Original impact)	Predicted impact on adult survival rate
Distributional response	*Excluding Berwick Bank*	Low	16.95	0.000899
		High	86.35	0.004582
	Including Berwick Bank	Low	21.15	0.001122
		High	109.35	0.005803

Table 3-14 Razorbill: Impacts used in Population Viability Analysis in-combination assessment for Troup, Pennan and Lion's Head Special Protection Area

Scenario			Predicted mortality (Original impact)	Predicted impact on adult survival rate
Distributional response	*Excluding Berwick Bank*	Low	3.70	0.000611
		High	15.27	0.002521
	Including Berwick Bank	Low	4.40	0.000727
		High	18.57	0.003067

Table 3-15 Razorbill: Impacts used in Population Viability Analysis in-combination assessment for East Caithness Cliffs Special Protection Area

Scenario			Predicted mortality (Original impact)	Predicted impact on adult survival rate
Distributional response	*Excluding Berwick Bank*	Low	61.77	0.001530
		High	291.95	0.007231
	Including Berwick Bank	Low	65.71	0.001628
		High	306.84	0.007600

3.2.5 Atlantic Puffin

3.2.5.1 The distributional response values used in the PVA in-combination assessment for puffin are based on the assessments presented in **Volume ER.A.4, Annex 12.3 Collision Risk Modelling Report** and **Volume ER.A.4, Annex 12.5 Displacement Assessment**. The distributional response impacts assessed for the in-combination effects assessment followed a range-based approach, considering distributional response values of 50% and 60% and 3% and 5% breeding season mortality rates and 1% and 3% non-breeding season mortality rates as outlined in the NatureScot (2023) guidance. The distributional response values for scenarios which required PVA are presented in **Table 3-16** to **Table 3-18**.

- Low impact rates are based on the Applicants approach of 50% distributional response and 1% breeding season mortality rates, plus the lowest predicted mortality from other wind farm projects
- High impact rates are based on SNCB distributional response rates of 60% distributional response, 5% breeding season mortality rates, plus the highest predicted mortality from other windfarm projects

Table 3-16 Puffin: Impacts used in Population Viability Analysis in-combination assessment for Farne Islands Special Protection Area

Scenario			Predicted mortality (Original impact)	Predicted impact on adult survival rate
Distributional response	*Excluding Berwick Bank*	Low	3.43	0.000039
		High	15.13	0.000173
	Including Berwick Bank	Low	7.03	0.000080
		High	36.53	0.000417

Table 3-17 Puffin Impacts used in Population Viability Analysis in-combination assessment for Forth Islands Special Protection Area

Scenario			Predicted mortality (Original impact)	Predicted impact on adult survival rate
Distributional response	*Excluding Berwick Bank*	Low	42.71	0.000498
		High	247.94	0.002888
	Including Berwick Bank	Low	47.81	0.000557
		High	278.14	0.003240

Table 3-18 Puffin Impacts used in Population Viability Analysis in-combination assessment for Sule Skerry & Sule Stack Special Protection Area

Scenario			Predicted mortality (Original impact)	Predicted impact on adult survival rate
Distributional response	*Excluding Berwick Bank*	Low	66.27	0.000694
		High	109.37	0.001145
	Including Berwick Bank	Low	NA	NA
		High	NA	NA

3.2.6 Herring Gull

3.2.6.1 The collision values used in the PVA in-combination assessment for herring gull are based on the assessments presented in **Volume ER.A.4, Annex 12.3 Collision Risk Modelling Report**. Collision risk estimates for herring gull have been presented for scenarios based on the SNCB 2014 avoidance rates (SNCB approach, high scenario) and for the newer avoidance rates Ozsanlav-Harris *et al*., (2023) (Applicant approach, low scenario). The collision values for scenarios which required PVA are presented in **Table 3-19** below**:**

- Low SNCB impact rates are based on a collision mortality using SNCB 2014 avoidance rates, with air gap of 22m, plus the lowest predicted mortality from other windfarm projects
- High SNCB impact rates are based on a collision mortality using SNCB 2014 avoidance rates, with air gap of 22m, plus the highest predicted mortality from other wind farm projects
- Low Applicant impact rates are based on a collision mortality using Ozsanlav-Harris et al., (2023) avoidance rates, 1% mortality rates, plus the lowest predicted mortality from other wind farm projects
- High Applicant rates are based on a collision mortality using Ozsanlav-Harris et al., (2023) avoidance rates, with air gap of 22 m, plus the highest predicted mortality from other wind farm projects

Table 3-19 Herring gull impacts used in Population Viability Analysis in-combination assessment for Buchan Ness to Collieston Coast Special Protection Area

Scenario			Predicted mortality (Original impact)	Predicted impact on adult survival rate
Collision	*Collision Applicant Excluding Berwick Bank*	Low	3.67	0.000883
		High	n/a	n/a
	Collision SNCB Excluding Berwick Bank	Low	3.47	0.000835
		High	n/a	n/a

3.3 Results: After 35 Years

3.3.1 Black-legged kittiwake

3.3.1.1 The results of the PVA in-combination assessment for impacts on the kittiwake population at the impacted SPAs from the start of 2024 and for the duration of the project (35 years) are presented in **Table 3-20 to Table 3-27** below. The baseline 'unimpacted' scenario (i.e. assuming no additional mortality other than baseline mortality exists) is also shown for comparison purposes.

Table 3-20 Black-legged kittiwake Population Viability Analysis in-combination assessment results for the Buchan Ness to Collieston Coast Special Protection Area

SPA	Scenario			Density-independence (after 35 years)				
				Growth rate (Annual GR)	*Median CGR*	*Median CPS*	*Reduction in growth rate (%)*	*Reduction in population size (%)*
Buchan Ness to Collieston Coast SPA	**Baseline**			0.998	n/a	n/a	0.00%	0.00%
	Collision Applicants	*Excluding Berwick Bank*	Low	0.995	0.997	0.883	-0.34%	-11.90%
			High	0.995	0.997	0.883	-0.35%	-11.94%
		Including Berwick Bank	Low	0.995	0.996	0.867	-0.39%	-13.29%
			High	0.994	0.996	0.860	-0.41%	-14.03%
	Collision SNCB	*Excluding Berwick Bank*	Low	0.995	0.996	0.879	-0.36%	-12.00%
			High	0.995	0.996	0.877	-0.36%	-12.39%
		Including Berwick Bank	Low	0.994	0.996	0.862	-0.41%	-13.69%
			High	0.994	0.996	0.855	-0.43%	-14.76%
	Combined Applicants	*Excluding Berwick Bank*	Low	0.994	0.996	0.866	-0.40%	-13.50%
			High	0.994	0.995	0.847	-0.45%	-15.43%
		Including	Low	0.994	0.995	0.846	-0.46%	-15.48%

SPA	Scenario			Density-independence (after 35 years)				
				Growth rate (Annual GR)	*Median CGR*	*Median CPS*	*Reduction in growth rate (%)*	*Reduction in population size (%)*
		Berwick Bank	High	0.993	0.994	0.814	-0.57%	-18.68%
	Combined SNCB	*Excluding Berwick Bank*	Low	0.994	0.996	0.862	-0.41%	-13.77%
			High	0.994	0.995	0.843	-0.47%	-15.68%
		Including Berwick Bank	Low	0.994	0.995	0.841	-0.48%	-15.98%
			High	0.993	0.994	0.809	-0.58%	-19.13%
	Distributional response	*Excluding Berwick Bank*	Low	0.998	0.999	0.980	-0.06%	-1.91%
			High	0.997	0.999	0.959	-0.12%	-3.69%
		Including Berwick Bank	Low	0.998	0.999	0.976	-0.07%	-2.08%
			High	0.997	0.999	0.947	-0.15%	-5.04%

Table 3-21 Black-legged kittiwake Population Viability Analysis in-combination assessment results for the East Caithness Cliffs Special Protection Area

SPA	Scenario			Density-independence (after 35 years)				
				Growth rate (Annual GR)	Median CGR	Median CPS	Reduction in growth rate (%)	Reduction in population size (%)
East Caithness Cliffs SPA	**Baseline**			0.998	n/a	n/a	0.00%	0.00%
	Collision Applicants	***Excluding Berwick Bank***	Low	0.993	0.995	0.826	-0.52%	-17.32%
			High	0.993	0.995	0.824	-0.53%	-17.56%
		Including Berwick Bank	Low	0.993	0.994	0.813	-0.57%	-18.68%
			High	0.992	0.994	0.806	-0.60%	-19.48%
	Collision SNCB	***Excluding Berwick Bank***	Low	0.993	0.995	0.825	-0.53%	-17.58%
			High	0.993	0.995	0.824	-0.53%	-17.59%
		Including Berwick Bank	Low	0.993	0.994	0.812	-0.57%	-18.71%
			High	0.992	0.994	0.806	-0.60%	-19.42%
	Combined Applicants	***Excluding Berwick Bank***	Low	0.992	0.993	0.787	-0.66%	-21.33%
			High	0.989	0.991	0.714	-0.93%	-28.69%
			Low	0.991	0.993	0.771	-0.72%	-22.62%

SPA	Scenario			Density-independence (after 35 years)				
				Growth rate (Annual GR)	Median CGR	Median CPS	Reduction in growth rate (%)	Reduction in population size (%)
		Including Berwick Bank	High	0.988	0.990	0.689	-1.03%	-31.26%
	Combined SNCB	***Excluding Berwick Bank***	Low	0.992	0.993	0.787	-0.66%	-21.42%
			High	0.989	0.991	0.714	-0.92%	-28.59%
		Including Berwick Bank	Low	0.991	0.993	0.771	-0.72%	-22.60%
			High	0.988	0.990	0.688	-1.03%	-31.27%
	Distributional response	***Excluding Berwick Bank***	Low	0.997	0.999	0.953	-0.13%	-4.67%
			High	0.995	0.996	0.867	-0.39%	-13.37%
		Including Berwick Bank	Low	0.997	0.999	0.949	-0.14%	-5.19%
			High	0.994	0.996	0.855	-0.43%	-14.93%

Table 3-22 Black-legged kittiwake Population Viability Analysis in-combination assessment results for the Farne Islands Special Protection Area

SPA	Scenario			Density-independence (after 35 years)				
				Growth rate (Annual GR)	*Median CGR*	*Median CPS*	*Reduction in growth rate (%)*	*Reduction in population size (%)*
Farne Islands SPA	**Baseline**			0.998	n/a	n/a	0.00%	0.00%
	Collision Applicants	***Excluding Berwick Bank***	Low	0.997	0.999	0.949	-0.14%	-5.27%
			High	0.997	0.999	0.949	-0.14%	-5.32%
		Including Berwick Bank	Low	0.994	0.996	0.868	-0.40%	-12.94%
			High	0.994	0.995	0.835	-0.49%	-16.58%
	Collision SNCB	***Excluding Berwick Bank***	Low	0.997	0.999	0.950	-0.14%	-5.09%
			High	0.997	0.999	0.949	-0.14%	-5.13%
		Including Berwick Bank	Low	0.995	0.996	0.869	-0.39%	-13.16%
			High	0.994	0.995	0.835	-0.49%	-16.43%
	Combined Applicants	***Excluding Berwick Bank***	Low	0.997	0.998	0.941	-0.16%	-5.93%
			High	0.996	0.998	0.925	-0.21%	-7.82%
		Including Berwick Bank	Low	0.994	0.995	0.848	-0.45%	-15.32%
			High	0.992	0.993	0.779	-0.69%	-22.03%

SPA	Scenario			Density-independence (after 35 years)				
				Growth rate (Annual GR)	*Median CGR*	*Median CPS*	*Reduction in growth rate (%)*	*Reduction in population size (%)*
	Combined SNCB	***Excluding Berwick Bank***	Low	0.997	0.998	0.941	-0.16%	-5.82%
			High	0.996	0.998	0.925	-0.22%	-7.79%
		Including Berwick Bank	Low	0.994	0.995	0.848	-0.45%	-15.22%
			High	0.991	0.993	0.778	-0.70%	-22.01%
	Distributional response	***Excluding Berwick Bank***	Low	0.998	1.000	0.990	-0.02%	-0.90%
			High	0.998	0.999	0.974	-0.07%	-2.59%
		Including Berwick Bank	Low	0.998	0.999	0.977	-0.06%	-2.02%
			High	0.996	0.998	0.933	-0.19%	-6.25%

Table 3-23 Black-legged kittiwake Population Viability Analysis in-combination assessment results for the Forth Islands Special Protection Area

SPA	Scenario			Density-independence (after 35 years)				
				Growth rate (Annual GR)	*Median CGR*	*Median CPS*	*Reduction in growth rate (%)*	*Reduction in population size (%)*
Forth Islands SPA	**Baseline**			0.998	n/a	n/a	0.00%	0.00%
	Collision Applicants		Low	0.995	0.997	0.888	-0.33%	-11.07%

SPA	Scenario			Density-independence (after 35 years)				
				Growth rate (Annual GR)	*Median CGR*	*Median CPS*	*Reduction in growth rate (%)*	*Reduction in population size (%)*
		Excluding Berwick Bank	High	0.995	0.997	0.887	-0.33%	-11.42%
		Including Berwick Bank	Low	0.992	0.994	0.798	-0.62%	-20.07%
			High	0.991	0.992	0.762	-0.74%	-23.93%
	Collision SNCB	***Excluding Berwick Bank***	Low	0.995	0.997	0.888	-0.32%	-11.02%
			High	0.995	0.997	0.888	-0.34%	-11.29%
		Including Berwick Bank	Low	0.992	0.994	0.799	-0.62%	-20.16%
			High	0.991	0.992	0.761	-0.76%	-23.87%
	Combined Applicants	***Excluding Berwick Bank***	Low	0.994	0.996	0.858	-0.42%	-14.31%
			High	0.992	0.994	0.800	-0.62%	-20.04%
		Including Berwick Bank	Low	0.991	0.992	0.759	-0.76%	-24.17%
			High	0.987	0.988	0.651	-1.18%	-34.79%
	Combined SNCB	***Excluding Berwick Bank***	Low	0.994	0.996	0.857	-0.43%	-14.23%
			High	0.992	0.994	0.799	-0.63%	-20.16%

SPA	Scenario			Density-independence (after 35 years)				
				Growth rate (Annual GR)	*Median CGR*	*Median CPS*	*Reduction in growth rate (%)*	*Reduction in population size (%)*
		Including Berwick Bank	Low	0.991	0.992	0.758	-0.75%	-24.08%
			High	0.987	0.988	0.651	-1.19%	-34.89%
	Distributional response	***Excluding Berwick Bank***	Low	0.997	0.999	0.966	-0.10%	-3.42%
			High	0.996	0.997	0.900	-0.29%	-9.96%
		Including Berwick Bank	Low	0.997	0.999	0.950	-0.14%	-5.09%
			High	0.994	0.996	0.856	-0.43%	-14.40%

Table 3-24 Black-legged kittiwake Population Viability Analysis in-combination assessment results for the Fowlsheugh Special Protection Area

SPA	Scenario			Density-independence (after 35 years)				
				Growth rate (Annual GR)	*Median CGR*	*Median CPS*	*Reduction in growth rate (%)*	*Reduction in population size (%)*
Fowlsheugh SPA	**Baseline**			0.998	n/a	n/a	0.00%	0.00%
	Collision Applicants	***Excluding Berwick Bank***	Low	0.995	0.997	0.886	-0.33%	-10.98%
			High	0.995	0.997	0.886	-0.34%	-11.41%
			Low	0.992	0.994	0.799	-0.62%	-20.00%

SPA	Scenario			Density-independence (after 35 years)				
				Growth rate (Annual GR)	*Median CGR*	*Median CPS*	*Reduction in growth rate (%)*	*Reduction in population size (%)*
		Including Berwick Bank	High	0.991	0.992	0.763	-0.75%	-23.79%
	Collision SNCB	***Excluding Berwick Bank***	Low	0.995	0.997	0.886	-0.33%	-11.21%
			High	0.995	0.997	0.885	-0.34%	-11.41%
		Including Berwick Bank	Low	0.992	0.994	0.798	-0.62%	-20.18%
			High	0.991	0.992	0.762	-0.75%	-23.74%
	Combined Applicants	***Excluding Berwick Bank***	Low	0.994	0.996	0.865	-0.39%	-13.51%
			High	0.993	0.995	0.823	-0.55%	-17.70%
		Including Berwick Bank	Low	0.991	0.993	0.767	-0.74%	-23.19%
			High	0.988	0.989	0.674	-1.09%	-32.66%
	Combined SNCB	***Excluding Berwick Bank***	Low	0.994	0.996	0.864	-0.40%	-13.35%
			High	0.993	0.995	0.822	-0.54%	-17.75%
		Including Berwick Bank	Low	0.991	0.993	0.766	-0.73%	-23.35%
			High	0.988	0.989	0.674	-1.09%	-32.76%

SPA	Scenario			Density-independence (after 35 years)				
				Growth rate (Annual GR)	*Median CGR*	*Median CPS*	*Reduction in growth rate (%)*	*Reduction in population size (%)*
	Distributional response	***Excluding Berwick Bank***	Low	0.998	0.999	0.976	-0.07%	-2.37%
			High	0.996	0.998	0.929	-0.21%	-6.99%
		Including Berwick Bank	Low	0.997	0.999	0.960	-0.12%	-3.86%
			High	0.995	0.997	0.884	-0.33%	-11.59%

Table 3-25 Black-legged kittiwake Population Viability Analysis in-combination assessment results for the North Caithness Cliffs Special Protection Area

SPA	Scenario			Density-independence (after 35 years)				
				Growth rate (Annual GR)	*Median CGR*	*Median CPS*	*Reduction in growth rate (%)*	*Reduction in population size (%)*
North Caithness Cliffs SPA	**Baseline**			0.998	n/a	n/a	0.00%	0.00%
	Collision Applicants	***Excluding Berwick Bank***	Low	0.994	0.995	0.846	-0.45%	-15.29%
			High	0.994	0.995	0.841	-0.47%	-15.60%
		Including Berwick Bank	Low	0.993	0.995	0.832	-0.51%	-16.88%
			High	0.993	0.995	0.822	-0.54%	-17.66%
	Collision SNCB		Low	0.994	0.995	0.846	-0.46%	-15.30%

SPA	Scenario			Density-independence (after 35 years)				
				Growth rate (Annual GR)	*Median CGR*	*Median CPS*	*Reduction in growth rate (%)*	*Reduction in population size (%)*
		Excluding Berwick Bank	High	0.994	0.995	0.841	-0.48%	-15.91%
		Including Berwick Bank	Low	0.993	0.995	0.831	-0.51%	-16.78%
			High	0.993	0.995	0.821	-0.55%	-17.98%
	Combined Applicants	***Excluding Berwick Bank***	Low	0.993	0.994	0.818	-0.56%	-18.28%
			High	0.991	0.993	0.774	-0.70%	-22.79%
		Including Berwick Bank	Low	0.992	0.994	0.799	-0.62%	-19.99%
			High	0.990	0.992	0.744	-0.82%	-25.28%
	Combined SNCB	***Excluding Berwick Bank***	Low	0.993	0.994	0.817	-0.56%	-18.34%
			High	0.991	0.993	0.774	-0.71%	-22.60%
		Including Berwick Bank	Low	0.992	0.994	0.799	-0.62%	-20.05%
			High	0.990	0.992	0.744	-0.81%	-25.44%
	Distributional response	***Excluding Berwick Bank***	Low	0.998	0.999	0.966	-0.09%	-3.01%
			High	0.996	0.998	0.920	-0.23%	-7.99%

SPA	Scenario			Density-independence (after 35 years)				
				Growth rate (Annual GR)	*Median CGR*	*Median CPS*	*Reduction in growth rate (%)*	*Reduction in population size (%)*
		Including Berwick Bank	Low	0.997	0.999	0.963	-0.10%	-3.36%
			High	0.996	0.997	0.907	-0.27%	-9.30%

Table 3-26 Black-legged kittiwake Population Viability Analysis in-combination assessment results for the St Abb's Head to Fast Castle Special Protection Area

SPA	Scenario			Density-independence (after 35 years)				
				Growth rate (Annual GR)	*Median CGR*	*Median CPS*	*Reduction in growth rate (%)*	*Reduction in population size (%)*
St Abb's Head to Fast Castle SPA	**Baseline**			0.998	n/a	n/a	0.00%	0.00%
	Collision Applicants	***Excluding Berwick Bank***	Low	0.997	0.998	0.934	-0.19%	-6.47%
			High	0.997	0.998	0.934	-0.19%	-6.53%
		Including Berwick Bank	Low	0.974	0.976	0.412	-2.44%	-58.94%
			High	0.964	0.966	0.284	-3.45%	-71.62%
	Collision SNCB	***Excluding Berwick Bank***	Low	0.997	0.998	0.933	-0.19%	-6.53%
			High	0.997	0.998	0.933	-0.19%	-6.73%
			Low	0.974	0.976	0.412	-2.44%	-58.73%

SPA	Scenario			Density-independence (after 35 years)				
				Growth rate (Annual GR)	*Median CGR*	*Median CPS*	*Reduction in growth rate (%)*	*Reduction in population size (%)*
		Including Berwick Bank	High	0.964	0.966	0.284	-3.44%	-71.64%
	Combined Applicants	***Excluding Berwick Bank***	Low	0.996	0.998	0.914	-0.24%	-8.47%
			High	0.995	0.996	0.878	-0.36%	-12.40%
		Including Berwick Bank	Low	0.970	0.972	0.355	-2.84%	-64.57%
			High	0.952	0.954	0.181	-4.63%	-81.90%
	Combined SNCB	***Excluding Berwick Bank***	Low	0.996	0.998	0.914	-0.25%	-8.38%
			High	0.995	0.996	0.879	-0.36%	-12.04%
		Including Berwick Bank	Low	0.970	0.972	0.355	-2.83%	-64.49%
			High	0.952	0.954	0.182	-4.63%	-81.90%
	Distributional response	***Excluding Berwick Bank***	Low	0.998	0.999	0.978	-0.05%	-2.17%
			High	0.997	0.998	0.940	-0.18%	-5.95%
		Including Berwick Bank	Low	0.995	0.996	0.866	-0.40%	-13.54%
			High	0.987	0.988	0.651	-1.19%	-34.93%

Table 3-27 Black-legged kittiwake Population Viability Analysis in-combination assessment results for the Troup, Pennan & Lion's Head Special Protection Area

SPA	Scenario			Density-independence (after 35 years)				
				Growth rate (Annual GR)	*Median CGR*	*Median CPS*	*Reduction in growth rate (%)*	*Reduction in population size (%)*
Troup, Pennan & Lion's Head SPA	**Baseline**			0.998	n/a	n/a	0.00%	0.00%
	Collision Applicants	***Excluding Berwick Bank***	Low	0.995	0.997	0.894	-0.31%	-10.44%
			High	0.995	0.997	0.893	-0.32%	-10.59%
		Including Berwick Bank	Low	0.995	0.996	0.880	-0.36%	-11.86%
			High	0.995	0.996	0.872	-0.38%	-12.92%
	Collision SNCB	***Excluding Berwick Bank***	Low	0.995	0.997	0.893	-0.31%	-10.71%
			High	0.995	0.997	0.891	-0.32%	-11.00%
		Including Berwick Bank	Low	0.995	0.996	0.877	-0.37%	-12.34%
			High	0.995	0.996	0.870	-0.39%	-13.13%
	Combined Applicants	***Excluding Berwick Bank***	Low	0.995	0.996	0.872	-0.39%	-12.95%
			High	0.993	0.995	0.828	-0.53%	-17.07%
		Including Berwick Bank	Low	0.994	0.996	0.853	-0.44%	-14.71%
			High	0.992	0.994	0.797	-0.63%	-20.33%

SPA	Scenario			Density-independence (after 35 years)				
				Growth rate (Annual GR)	*Median CGR*	*Median CPS*	*Reduction in growth rate (%)*	*Reduction in population size (%)*
	Combined SNCB	***Excluding Berwick Bank***	Low	0.995	0.996	0.870	-0.39%	-13.25%
			High	0.993	0.995	0.826	-0.54%	-17.27%
		Including Berwick Bank	Low	0.994	0.996	0.851	-0.45%	-14.76%
			High	0.992	0.994	0.796	-0.64%	-20.24%
	Distributional response	***Excluding Berwick Bank***	Low	0.998	0.999	0.975	-0.07%	-2.60%
			High	0.996	0.998	0.926	-0.21%	-7.58%
		Including Berwick Bank	Low	0.998	0.999	0.970	-0.09%	-3.20%
			High	0.996	0.997	0.914	-0.25%	-9.06%

3.3.2 Northern Gannet

3.3.2.1 The results of the PVA in-combination assessment for impacts on the gannet population at the impacted SPAs from the start of 2024 and for the duration of the project (35 years) are presented in **Table 3-28** and **Table 3-29** below. The baseline 'unimpacted' scenario (i.e. assuming no additional mortality other than baseline mortality exists) is also shown for comparison purposes.

Table 3-28 Gannet Population Viability Analysis in-combination assessment results for the Forth Islands Special Protection Area

SPA	Scenario			Density-independence (after 35 years)				
				Growth rate (Annual GR)	*Median CGR*	*Median CPS*	*Reduction in growth rate (%)*	*Reduction in population size (%)*
Forth Islands SPA	**Baseline**			1.006	n/a	n/a	0.00%	0.00%
	Collision Applicants	***Excluding Berwick Bank***	Low	1.002	0.996	0.855	-0.44%	-14.47%
			High	1.002	0.996	0.853	-0.44%	-14.67%
		Including Berwick Bank	Low	1.001	0.995	0.826	-0.53%	-17.35%
			High	1.000	0.994	0.818	-0.56%	-18.29%
	Collision SNCB	***Excluding Berwick Bank***	Low	1.002	0.996	0.855	-0.43%	-14.59%
			High	1.002	0.996	0.853	-0.44%	-14.75%
		Including Berwick Bank	Low	1.001	0.995	0.826	-0.53%	-17.43%
			High	1.000	0.994	0.818	-0.56%	-18.29%
	Combined Applicants	***Excluding Berwick Bank***	Low	1.001	0.995	0.828	-0.53%	-17.18%
			High	0.999	0.993	0.775	-0.71%	-22.43%
		Including Berwick Bank	Low	0.999	0.994	0.793	-0.65%	-20.74%
			High	0.997	0.991	0.723	-0.90%	-27.68%

SPA	Scenario			Density-independence (after 35 years)				
				Growth rate (Annual GR)	*Median CGR*	*Median CPS*	*Reduction in growth rate (%)*	*Reduction in population size (%)*
	Combined SNCB	***Excluding Berwick Bank***	Low	1.001	0.995	0.828	-0.52%	-17.25%
			High	0.999	0.993	0.775	-0.71%	-22.48%
		Including Berwick Bank	Low	0.999	0.994	0.793	-0.65%	-20.72%
			High	0.997	0.991	0.723	-0.90%	-27.73%
	Distributional response	***Excluding Berwick Bank***	Low	1.005	0.999	0.969	-0.09%	-3.14%
			High	1.003	0.997	0.909	-0.26%	-9.11%
		Including Berwick Bank	Low	1.005	0.999	0.960	-0.11%	-3.92%
			High	1.003	0.997	0.885	-0.34%	-11.46%

Table 3-29 Gannet Population Viability Analysis in-combination assessment results for the Hermaness Saxa Vord and Valla Field Special Protection Area

SPA	Scenario			Density-independence (after 35 years)				
				Growth rate (Annual GR)	*Median CGR*	*Median CPS*	*Reduction in growth rate (%)*	*Reduction in population size (%)*
Hermaness Saxa Vord and Valla Field SPA	**Baseline**			1.006	n/a	n/a	0.00%	0.00%
	Collision Applicants	***Excluding Berwick Bank***	Low	1.005	0.999	0.954	-0.13%	-4.62%
			High	1.005	0.999	0.952	-0.13%	-4.85%
		Including Berwick Bank	Low	1.005	0.999	0.953	-0.13%	-4.80%
			High	1.005	0.999	0.951	-0.14%	-4.87%
	Collision SNCB	***Excluding Berwick Bank***	Low	1.005	0.999	0.954	-0.13%	-4.65%
			High	1.005	0.999	0.952	-0.14%	-4.79%
		Including Berwick Bank	Low	1.005	0.999	0.953	-0.13%	-4.77%
			High	1.005	0.999	0.951	-0.14%	-4.81%
	Combined Applicants	***Excluding Berwick Bank***	Low	1.004	0.998	0.944	-0.16%	-5.71%
			High	1.004	0.998	0.924	-0.22%	-7.61%
		Including Berwick Bank	Low	1.004	0.998	0.943	-0.16%	-5.61%
			High	1.004	0.998	0.921	-0.23%	-7.88%

SPA	Scenario			Density-independence (after 35 years)				
				Growth rate (Annual GR)	*Median CGR*	*Median CPS*	*Reduction in growth rate (%)*	*Reduction in population size (%)*
	Combined SNCB	***Excluding Berwick Bank***	Low	1.004	0.998	0.944	-0.16%	-5.69%
			High	1.004	0.998	0.924	-0.22%	-7.75%
		Including Berwick Bank	Low	1.004	0.998	0.943	-0.16%	-5.72%
			High	1.004	0.998	0.921	-0.22%	-7.93%
	Distributional response	***Excluding Berwick Bank***	Low	1.006	1.000	0.990	-0.03%	-1.00%
			High	1.005	0.999	0.970	-0.08%	-2.90%
		Including Berwick Bank	Low	1.006	1.000	0.989	-0.03%	-1.22%
			High	1.005	0.999	0.969	-0.09%	-3.07%

3.3.3 Common guillemot

3.3.3.1 The results of the PVA in-combination assessment for impacts on the guillemot populations at the impacted SPAs from the start of 2024 and for the duration of the project (35 years) are presented in **Table 3-30** and **Table 3-31** below. The baseline 'unimpacted' scenario (i.e. assuming no additional mortality other than baseline mortality exists) is also shown for comparison purposes.

Table 3-30 Common guillemot Population Viability Analysis in-combination assessment results for the Buchan Ness to Collieston Coast Special Protection Area

SPA	Scenario			Density-independence (after 35 years)				
				Growth rate (Annual GR)	*Median CGR*	*Median CPS*	*Reduction in growth rate (%)*	*Reduction in population size (%)*
Buchan Ness to Collieston Coast SPA	**Baseline**			1.026	n/a	n/a	0.00%	0.00%
	Distributional response	***Excluding Berwick Bank***	Low	1.025	0.999	0.964	-0.10%	-3.51%
			High	1.021	0.995	0.836	-0.50%	-16.33%
		Including Berwick Bank	Low	1.024	0.999	0.960	-0.12%	-3.83%
			High	1.020	0.994	0.817	-0.56%	-18.13%

Table 3-31 Common guillemot Population Viability Analysis in-combination assessment results for the Troup, Pennan and Lion's Head Special Protection Area

SPA	Scenario			Density-independence (after 35 years)				
				Growth rate (Annual GR)	*Median CGR*	*Median CPS*	*Reduction in growth rate (%)*	*Reduction in population size (%)*
Troup, Pennan and Lion's Head SPA.	**Baseline**			1.026	n/a	n/a	0.00%	0.00%
	Distributional response	***Excluding Berwick Bank***	Low	1.025	0.999	0.968	-0.09%	-3.16%
			High	1.022	0.996	0.870	-0.39%	-13.03%
		Including Berwick Bank	Low	1.025	0.999	0.966	-0.09%	-3.38%
			High	1.021	0.996	0.858	-0.42%	-14.20%

3.3.4 Razorbill

3.3.4.1 The results of the PVA in-combination assessment for impacts on the razorbill populations at the impacted SPAs from the start of 2024 and for the duration of the project (35 years) are presented in **Table 3-32, Table 3-33** and **Table 3-34** below. The baseline 'unimpacted' scenario (i.e. assuming no additional mortality other than baseline mortality exists) is also shown for comparison purposes.

Table 3-32 Razorbill Population Viability Analysis in-combination assessment results for the Fowlsheugh Special Protection Area

SPA	Scenario			Density-independence (after 35 years)				
				Growth rate (Annual GR)	*Median CGR*	*Median CPS*	*Reduction in growth rate (%)*	*Reduction in population size (%)*
Fowlsheugh SPA	**Baseline**			0.972	n/a	n/a	0.00%	0.00%
	Distributional response	***Excluding Berwick Bank***	Low	0.971	0.999	0.963	-0.11%	-3.89%
			High	0.967	0.995	0.824	-0.54%	-17.73%
		Including Berwick Bank	Low	0.971	0.999	0.954	-0.13%	-4.81%
			High	0.965	0.993	0.783	-0.67%	-21.92%

Table 3-33 Razorbill Population Viability Analysis in-combination assessment results for the Troup, Pennan and Lion's Head Special Protection Area

SPA	Scenario			Density-independence (after 35 years)				
				Growth rate (Annual GR)	*Median CGR*	*Median CPS*	*Reduction in growth rate (%)*	*Reduction in population size (%)*
Troup, Pennan and Lion's Head SPA	**Baseline**			0.972	n/a	n/a	0.00%	0.00%
	Distributional response	***Excluding Berwick Bank***	Low	0.971	0.999	0.974	-0.06%	-2.19%
			High	0.969	0.997	0.899	-0.29%	-9.91%
		Including Berwick Bank	Low	0.971	0.999	0.969	-0.08%	-2.60%
			High	0.969	0.996	0.878	-0.34%	-12.01%

Table 3-34 Razorbill Population Viability Analysis in-combination assessment results for the East Caithness Cliffs Special Protection Area

SPA	Scenario			Density-independence (after 35 years)				
				Growth rate (Annual GR)	*Median CGR*	*Median CPS*	*Reduction in growth rate (%)*	*Reduction in population size (%)*
East Caithness Cliffs SPA	**Baseline**			0.972	n/a	n/a	0.00%	0.00%
	Distributional response	***Excluding Berwick Bank***	Low	0.970	0.998	0.938	-0.18%	-6.21%
			High	0.964	0.992	0.735	-0.85%	-26.48%
		Including Berwick Bank	Low	0.970	0.998	0.933	-0.19%	-6.96%
			High	0.963	0.991	0.725	-0.90%	-27.70%

3.3.5 Atlantic Puffin

3.3.5.1 The results of the PVA in-combination assessment for impacts on the puffin population at the at the impacted SPAs from the start of 2024 and for the duration of the project (35 years) are presented in **Table 3-35** to **Table 3-37** below. The baseline 'unimpacted' scenario (i.e. assuming no additional mortality other than baseline mortality exists) is also shown for comparison purposes.

Table 3-35 Puffin Population Viability Analysis in-combination assessment results for the Farne Islands Special Protection Area

SPA	Scenario			Density-independence (after 35 years)				
				Growth rate (Annual GR)	*Median CGR*	*Median CPS*	*Reduction in growth rate (%)*	*Reduction in population size (%)*
Farne Islands SPA	**Baseline**			0.974	n/a	n/a	0.00%	0.00%
	Distributional response	***Excluding Berwick Bank***	Low	0.974	1.000	0.998	-0.01%	-0.15%
			High	0.973	1.000	0.993	-0.02%	-0.42%
		Including Berwick Bank	Low	0.973	1.000	0.996	-0.02%	-0.22%
			High	0.973	1.000	0.982	-0.05%	-1.67%

Table 3-36 Puffin Population Viability Analysis in-combination assessment results for the Forth Island Special Protection Area

SPA	Scenario			Density-independence (after 35 years)				
				Growth rate (Annual GR)	*Median CGR*	*Median CPS*	*Reduction in growth rate (%)*	*Reduction in population size (%)*
Forth Island SPA	**Baseline**			0.974	n/a	n/a	0.00%	0.00%
	Distributional response	***Excluding Berwick Bank***	Low	0.973	0.999	0.979	-0.06%	-2.40%
			High	0.970	0.997	0.885	-0.34%	-11.57%
		Including Berwick Bank	Low	0.973	0.999	0.977	-0.07%	-2.50%
			High	0.970	0.996	0.872	-0.38%	-13.11%

Table 3-37 Puffin Population Viability Analysis in-combination assessment results for the Sule Skerry & Sule Stack Special Protection Area

SPA	Scenario			Density-independence (after 35 years)				
				Growth rate (Annual GR)	*Median CGR*	*Median CPS*	*Reduction in growth rate (%)*	*Reduction in population size (%)*
Sule Skerry & Sule Stack SPA	**Baseline**			0.974	n/a	n/a	0.00%	0.00%
	Distributional response	***Excluding Berwick Bank***	Low	0.973	0.999	0.971	-0.08%	-2.89%
			High	0.972	0.999	0.953	-0.14%	-4.93%
		Including Berwick Bank	Low	n/a	n/a	n/a	n/a	n/a
			High	n/a	n/a	n/a	n/a	n/a

3.3.6 Herring gull

3.3.6.1 The results of the PVA in-combination assessment for impacts on the herring gull population at the at the impacted SPAs from the start of 2024 and for the duration of the project (35 years) are presented in **Table 3-38** below. The baseline 'unimpacted' scenario (i.e. assuming no additional mortality other than baseline mortality exists) is also shown for comparison purposes.

Table 3-38 Herring gull Population Viability Analysis in-combination assessment results for the Special Protection Area

SPA	Scenario			Density-independence (after 35 years)				
				Growth rate (Annual GR)	*Median CGR*	*Median CPS*	*Reduction in growth rate (%)*	*Reduction in population size (%)*
Buchan Ness to Collieston Coast SPA	**Baseline**			0.965	n/a	n/a	0.00%	0.00%
	Collision	*Collision Applicant Excluding Berwick Bank*	Low	n/a	n/a	n/a	n/a	n/a
			High	0.964	0.999	0.962	-0.10%	-3.40%
		Collision SNCB Excluding Berwick Bank	Low	n/a	n/a	n/a	n/a	n/a
			High	0.964	0.999	0.965	-0.08%	-2.91%

3.4 Results: After 25 Years

3.4.1 Black-legged kittiwake

3.4.1.1 The results of the PVA in-combination assessment for impacts on the kittiwake population at the impacted SPAs from the start of 2024 and for the duration of the project (25 years) are presented in **Table 3-39** to **Table 3-46** below. The baseline 'unimpacted' scenario (i.e. assuming no additional mortality other than baseline mortality exists) is also shown for comparison purposes.

Table 3-39 Black-legged kittiwake Population Viability Analysis in-combination assessment results for the Buchan Ness to Collieston Coast Special Protection Area

SPA	Scenario			Density-independence (after 25 years)				
				Growth rate (Annual GR)	*Median CGR*	*Median CPS*	*Reduction in growth rate (%)*	*Reduction in population size (%)*
Buchan Ness to Collieston Coast SPA	**Baseline**			0.999	n/a	n/a	0.00%	0.00%
	Collision Applicants	***Excluding Berwick Bank***	Low	0.995	0.997	0.914	-0.33%	-8.79%
			High	0.995	0.997	0.914	-0.34%	-8.68%
		Including Berwick Bank	Low	0.995	0.996	0.902	-0.39%	-10.00%
			High	0.994	0.996	0.897	-0.41%	-10.50%
	Collision SNCB	***Excluding Berwick Bank***	Low	0.995	0.996	0.911	-0.36%	-8.93%
			High	0.995	0.996	0.910	-0.37%	-9.18%
		Including Berwick Bank	Low	0.994	0.996	0.898	-0.41%	-10.32%
			High	0.994	0.996	0.893	-0.43%	-11.20%
	Combined Applicants	***Excluding Berwick Bank***	Low	0.995	0.996	0.901	-0.40%	-9.96%
			High	0.994	0.995	0.887	-0.46%	-11.44%
			Low	0.994	0.995	0.886	-0.46%	-11.52%

SPA	Scenario			Density-independence (after 25 years)				
				Growth rate (Annual GR)	*Median CGR*	*Median CPS*	*Reduction in growth rate (%)*	*Reduction in population size (%)*
		Including Berwick Bank	High	0.993	0.994	0.862	-0.57%	-13.88%
	Combined SNCB	***Excluding Berwick Bank***	Low	0.994	0.996	0.898	-0.41%	-10.47%
			High	0.994	0.995	0.884	-0.47%	-11.91%
		Including Berwick Bank	Low	0.994	0.995	0.883	-0.48%	-11.89%
			High	0.993	0.994	0.858	-0.59%	-14.36%
	Distributional response	***Excluding Berwick Bank***	Low	0.998	0.999	0.985	-0.06%	-1.67%
			High	0.998	0.999	0.971	-0.11%	-2.94%
		Including Berwick Bank	Low	0.998	0.999	0.982	-0.07%	-1.84%
			High	0.997	0.999	0.962	-0.14%	-3.79%

Table 3-40 Black-legged kittiwake Population Viability Analysis in-combination assessment results for the East Caithness Cliffs Special Protection Area

SPA	Scenario			Density-independence (after 25 years)				
				Growth rate (Annual GR)	*Median CGR*	*Median CPS*	*Reduction in growth rate (%)*	*Reduction in population size (%)*
East Caithness Cliffs SPA	**Baseline**			0.999	n/a	n/a	0.00%	0.00%
	Collision Applicants	***Excluding Berwick Bank***	Low	0.993	0.995	0.871	-0.53%	-13.02%
			High	0.993	0.995	0.870	-0.54%	-13.14%
		Including Berwick Bank	Low	0.993	0.994	0.861	-0.57%	-13.89%
			High	0.993	0.994	0.856	-0.59%	-14.58%
	Collision SNCB	***Excluding Berwick Bank***	Low	0.993	0.995	0.871	-0.53%	-13.06%
			High	0.993	0.995	0.869	-0.54%	-13.13%
		Including Berwick Bank	Low	0.993	0.994	0.861	-0.57%	-13.94%
			High	0.993	0.994	0.856	-0.59%	-14.50%
	Combined Applicants	***Excluding Berwick Bank***	Low	0.992	0.993	0.841	-0.66%	-15.87%
			High	0.989	0.991	0.784	-0.92%	-21.69%
			Low	0.991	0.993	0.829	-0.71%	-17.25%

SPA	Scenario			Density-independence (after 25 years)				
				Growth rate (Annual GR)	*Median CGR*	*Median CPS*	*Reduction in growth rate (%)*	*Reduction in population size (%)*
		Including Berwick Bank	High	0.988	0.990	0.764	-1.02%	-23.57%
	Combined SNCB	***Excluding Berwick Bank***	Low	0.992	0.993	0.841	-0.66%	-16.05%
			High	0.989	0.991	0.784	-0.92%	-21.66%
		Including Berwick Bank	Low	0.991	0.993	0.829	-0.71%	-17.12%
			High	0.988	0.990	0.764	-1.02%	-23.70%
	Distributional response	***Excluding Berwick Bank***	Low	0.997	0.999	0.966	-0.13%	-3.09%
			High	0.995	0.996	0.902	-0.39%	-9.67%
		Including Berwick Bank	Low	0.997	0.999	0.963	-0.14%	-3.60%
			High	0.994	0.996	0.893	-0.43%	-10.85%

Table 3-41 Black-legged kittiwake Population Viability Analysis in-combination assessment results for the Farne Islands Special Protection Area

SPA	Scenario			Density-independence (after 25 years)				
				Growth rate (Annual GR)	*Median CGR*	*Median CPS*	*Reduction in growth rate (%)*	*Reduction in population size (%)*
Farne Islands SPA	**Baseline**			0.999	n/a	n/a	0.00%	0.00%
	Collision Applicants	***Excluding Berwick Bank***	Low	0.997	0.999	0.962	-0.14%	-3.62%
			High	0.997	0.999	0.963	-0.15%	-3.62%
		Including Berwick Bank	Low	0.995	0.996	0.903	-0.39%	-9.32%
			High	0.994	0.995	0.878	-0.49%	-12.26%
	Collision SNCB	***Excluding Berwick Bank***	Low	0.997	0.999	0.963	-0.14%	-3.55%
			High	0.997	0.999	0.963	-0.15%	-3.47%
		Including Berwick Bank	Low	0.995	0.996	0.903	-0.40%	-9.72%
			High	0.994	0.995	0.878	-0.51%	-12.02%
	Combined Applicants	***Excluding Berwick Bank***	Low	0.997	0.998	0.956	-0.19%	-4.06%
			High	0.996	0.998	0.945	-0.22%	-5.59%
		Including Berwick Bank	Low	0.994	0.995	0.888	-0.47%	-11.13%
			High	0.992	0.993	0.835	-0.69%	-16.37%

SPA	Scenario			Density-independence (after 25 years)				
				Growth rate (Annual GR)	*Median CGR*	*Median CPS*	*Reduction in growth rate (%)*	*Reduction in population size (%)*
	Combined SNCB	***Excluding Berwick Bank***	Low	0.997	0.998	0.958	-0.17%	-4.06%
			High	0.996	0.998	0.945	-0.22%	-5.46%
		Including Berwick Bank	Low	0.994	0.995	0.888	-0.46%	-11.25%
			High	0.992	0.993	0.834	-0.70%	-16.45%
	Distributional response	***Excluding Berwick Bank***	Low	0.999	1.000	0.993	-0.02%	-0.88%
			High	0.998	0.999	0.981	-0.08%	-2.10%
		Including Berwick Bank	Low	0.998	0.999	0.983	-0.06%	-1.61%
			High	0.997	0.998	0.951	-0.19%	-4.60%

Table 3-42 Black-legged kittiwake Population Viability Analysis in-combination assessment results for the Forth Islands Special Protection Area

SPA	Scenario	Density-independence (after 25 years)				
		Growth rate (Annual GR)	*Median CGR*	*Median CPS*	*Reduction in growth rate (%)*	*Reduction in population size (%)*
Forth Islands SPA	**Baseline**	0.999	n/a	n/a	0.00%	0.00%

SPA	Scenario			Density-independence (after 25 years)				
				Growth rate (Annual GR)	*Median CGR*	*Median CPS*	*Reduction in growth rate (%)*	*Reduction in population size (%)*
	Collision Applicants	***Excluding Berwick Bank***	Low	0.995	0.997	0.918	-0.34%	-7.84%
			High	0.995	0.997	0.917	-0.32%	-8.24%
		Including Berwick Bank	Low	0.992	0.994	0.850	-0.62%	-14.89%
			High	0.991	0.992	0.821	-0.77%	-17.86%
	Collision SNCB	***Excluding Berwick Bank***	Low	0.995	0.997	0.918	-0.33%	-7.91%
			High	0.995	0.997	0.918	-0.32%	-8.05%
		Including Berwick Bank	Low	0.992	0.994	0.850	-0.62%	-14.77%
			High	0.991	0.992	0.821	-0.76%	-17.64%
	Combined Applicants	***Excluding Berwick Bank***	Low	0.994	0.996	0.895	-0.42%	-10.25%
			High	0.993	0.994	0.852	-0.60%	-14.80%
		Including Berwick Bank	Low	0.991	0.992	0.819	-0.76%	-17.92%
			High	0.987	0.988	0.734	-1.20%	-26.65%
	Combined SNCB	***Excluding Berwick Bank***	Low	0.994	0.996	0.895	-0.42%	-10.26%
			High	0.992	0.994	0.850	-0.63%	-15.17%

SPA	Scenario			Density-independence (after 25 years)				
				Growth rate (Annual GR)	*Median CGR*	*Median CPS*	*Reduction in growth rate (%)*	*Reduction in population size (%)*
		Including Berwick Bank	Low	0.991	0.992	0.818	-0.77%	-17.74%
			High	0.987	0.988	0.733	-1.18%	-26.59%
	Distributional response	***Excluding Berwick Bank***	Low	0.998	0.999	0.975	-0.09%	-2.13%
			High	0.996	0.997	0.927	-0.29%	-7.10%
		Including Berwick Bank	Low	0.997	0.999	0.964	-0.14%	-3.39%
			High	0.994	0.996	0.894	-0.42%	-10.30%

Table 3-43 Black-legged kittiwake Population Viability Analysis in-combination assessment results for the Fowlsheugh Special Protection Area

SPA	Scenario			Density-independence (after 25 years)				
				Growth rate (Annual GR)	*Median CGR*	*Median CPS*	*Reduction in growth rate (%)*	*Reduction in population size (%)*
Fowlsheugh SPA	**Baseline**			0.999	n/a	n/a	0.00%	0.00%
	Collision Applicants	***Excluding Berwick Bank***	Low	0.995	0.997	0.917	-0.33%	-8.23%
			High	0.995	0.997	0.916	-0.33%	-8.19%
			Low	0.992	0.994	0.850	-0.63%	-14.94%

SPA	Scenario			Density-independence (after 25 years)				
				Growth rate (Annual GR)	*Median CGR*	*Median CPS*	*Reduction in growth rate (%)*	*Reduction in population size (%)*
		Including Berwick Bank	High	0.991	0.992	0.822	-0.77%	-17.81%
	Collision SNCB	***Excluding Berwick Bank***	Low	0.995	0.997	0.916	-0.34%	-8.54%
			High	0.995	0.997	0.915	-0.35%	-8.39%
		Including Berwick Bank	Low	0.992	0.994	0.850	-0.63%	-15.03%
			High	0.991	0.992	0.821	-0.76%	-17.88%
	Combined Applicants	***Excluding Berwick Bank***	Low	0.995	0.996	0.900	-0.42%	-9.64%
			High	0.993	0.995	0.868	-0.55%	-13.15%
		Including Berwick Bank	Low	0.991	0.993	0.826	-0.73%	-17.38%
			High	0.988	0.989	0.752	-1.09%	-24.69%
	Combined SNCB	***Excluding Berwick Bank***	Low	0.995	0.996	0.900	-0.42%	-9.85%
			High	0.993	0.995	0.868	-0.56%	-13.23%
		Including Berwick Bank	Low	0.991	0.993	0.825	-0.75%	-17.44%
			High	0.988	0.989	0.752	-1.10%	-24.72%

SPA	Scenario			Density-independence (after 25 years)				
				Growth rate (Annual GR)	*Median CGR*	*Median CPS*	*Reduction in growth rate (%)*	*Reduction in population size (%)*
	Distributional response	***Excluding Berwick Bank***	Low	0.998	0.999	0.982	-0.06%	-1.82%
			High	0.997	0.998	0.949	-0.20%	-5.21%
		Including Berwick Bank	Low	0.998	0.999	0.971	-0.11%	-3.01%
			High	0.995	0.997	0.915	-0.34%	-8.54%

Table 3-44 Black-legged kittiwake Population Viability Analysis in-combination assessment results for the North Caithness Cliffs Special Protection Area

SPA	Scenario			Density-independence (after 25 years)				
				Growth rate (Annual GR)	*Median CGR*	*Median CPS*	*Reduction in growth rate (%)*	*Reduction in population size (%)*
North Caithness Cliffs SPA	**Baseline**			0.999	n/a	n/a	0.00%	0.00%
	Collision Applicants	***Excluding Berwick Bank***	Low	0.994	0.995	0.887	-0.45%	-11.34%
			High	0.994	0.995	0.883	-0.46%	-11.68%
		Including Berwick Bank	Low	0.993	0.995	0.875	-0.50%	-12.25%
			High	0.993	0.995	0.868	-0.52%	-13.33%
			Low	0.994	0.995	0.886	-0.45%	-11.44%

SPA	Scenario			Density-independence (after 25 years)				
				Growth rate (Annual GR)	*Median CGR*	*Median CPS*	*Reduction in growth rate (%)*	*Reduction in population size (%)*
	Collision SNCB	***Excluding Berwick Bank***	High	0.994	0.995	0.882	-0.46%	-11.76%
		Including Berwick Bank	Low	0.993	0.995	0.875	-0.50%	-12.59%
			High	0.993	0.995	0.868	-0.53%	-13.38%
	Combined Applicants	***Excluding Berwick Bank***	Low	0.993	0.994	0.864	-0.55%	-13.59%
			High	0.992	0.993	0.832	-0.69%	-16.92%
		Including Berwick Bank	Low	0.992	0.994	0.851	-0.62%	-14.88%
			High	0.991	0.992	0.809	-0.79%	-19.10%
	Combined SNCB	***Excluding Berwick Bank***	Low	0.993	0.994	0.864	-0.55%	-13.51%
			High	0.991	0.993	0.831	-0.70%	-17.13%
		Including Berwick Bank	Low	0.992	0.994	0.850	-0.61%	-14.92%
			High	0.990	0.992	0.808	-0.80%	-19.23%
	Distributional response	***Excluding Berwick Bank***	Low	0.998	0.999	0.976	-0.08%	-2.49%
			High	0.996	0.998	0.942	-0.21%	-5.85%

SPA	Scenario			Density-independence (after 25 years)				
				Growth rate (Annual GR)	*Median CGR*	*Median CPS*	*Reduction in growth rate (%)*	*Reduction in population size (%)*
		Including Berwick Bank	Low	0.998	0.999	0.973	-0.09%	-2.67%
			High	0.996	0.997	0.931	-0.25%	-6.92%

Table 3-45 Black-legged kittiwake Population Viability Analysis in-combination assessment results for the St Abb's Head to Fast Castle Special Protection Area

SPA	Scenario			Density-independence (after 25 years)				
				Growth rate (Annual GR)	*Median CGR*	*Median CPS*	*Reduction in growth rate (%)*	*Reduction in population size (%)*
St Abb's Head to Fast Castle SPA	**Baseline**			0.999	n/a	n/a	0.00%	0.00%
	Collision Applicants	***Excluding Berwick Bank***	Low	0.997	0.998	0.952	-0.18%	-4.91%
			High	0.997	0.998	0.951	-0.17%	-4.75%
		Including Berwick Bank	Low	0.974	0.976	0.527	-2.42%	-47.46%
			High	0.964	0.966	0.402	-3.42%	-59.80%
	Collision SNCB	***Excluding Berwick Bank***	Low	0.997	0.998	0.951	-0.18%	-4.75%
			High	0.997	0.998	0.951	-0.19%	-4.87%
			Low	0.974	0.976	0.526	-2.43%	-47.39%

SPA	Scenario			Density-independence (after 25 years)				
				Growth rate (Annual GR)	*Median CGR*	*Median CPS*	*Reduction in growth rate (%)*	*Reduction in population size (%)*
		Including Berwick Bank	High	0.964	0.966	0.402	-3.43%	-59.92%
	Combined Applicants	***Excluding Berwick Bank***	Low	0.996	0.998	0.937	-0.24%	-6.41%
			High	0.995	0.996	0.910	-0.35%	-9.01%
		Including Berwick Bank	Low	0.970	0.972	0.473	-2.81%	-52.47%
			High	0.953	0.954	0.291	-4.60%	-70.86%
	Combined SNCB	***Excluding Berwick Bank***	Low	0.996	0.998	0.937	-0.23%	-6.09%
			High	0.995	0.996	0.910	-0.35%	-8.92%
		Including Berwick Bank	Low	0.970	0.972	0.474	-2.82%	-52.66%
			High	0.952	0.954	0.292	-4.62%	-70.85%
	Distributional response	***Excluding Berwick Bank***	Low	0.998	0.999	0.984	-0.05%	-1.48%
			High	0.997	0.998	0.956	-0.15%	-4.46%
		Including Berwick Bank	Low	0.995	0.996	0.901	-0.39%	-9.75%
			High	0.987	0.988	0.733	-1.17%	-26.71%

Table 3-46 Black-legged kittiwake Population Viability Analysis in-combination assessment results for the Troup, Pennan & Lion's Head Special Protection Area

SPA	Scenario			Density-independence (after 25 years)				
				Growth rate (Annual GR)	*Median CGR*	*Median CPS*	*Reduction in growth rate (%)*	*Reduction in population size (%)*
Troup, Pennan & Lion's Head SPA	**Baseline**			0.999	n/a	n/a	0.00%	0.00%
	Collision Applicants	***Excluding Berwick Bank***	Low	0.996	0.997	0.922	-0.31%	-7.86%
			High	0.995	0.997	0.922	-0.32%	-7.78%
		Including Berwick Bank	Low	0.995	0.996	0.912	-0.36%	-8.93%
			High	0.995	0.996	0.906	-0.38%	-9.43%
	Collision SNCB	***Excluding Berwick Bank***	Low	0.996	0.997	0.921	-0.32%	-7.88%
			High	0.995	0.997	0.920	-0.33%	-7.95%
		Including Berwick Bank	Low	0.995	0.996	0.910	-0.37%	-8.96%
			High	0.995	0.996	0.905	-0.40%	-9.61%
	Combined Applicants	***Excluding Berwick Bank***	Low	0.995	0.996	0.906	-0.38%	-9.46%
			High	0.993	0.995	0.872	-0.54%	-13.08%
		Including Berwick Bank	Low	0.994	0.996	0.892	-0.45%	-11.08%
			High	0.992	0.994	0.849	-0.63%	-15.17%

SPA	Scenario			Density-independence (after 25 years)				
				Growth rate (Annual GR)	*Median CGR*	*Median CPS*	*Reduction in growth rate (%)*	*Reduction in population size (%)*
	Combined SNCB	***Excluding Berwick Bank***	Low	0.995	0.996	0.904	-0.40%	-9.50%
			High	0.993	0.995	0.871	-0.54%	-12.87%
		Including Berwick Bank	Low	0.994	0.996	0.890	-0.45%	-11.14%
			High	0.992	0.994	0.848	-0.64%	-15.23%
	Distributional response	***Excluding Berwick Bank***	Low	0.998	0.999	0.982	-0.07%	-1.82%
			High	0.997	0.998	0.947	-0.20%	-5.53%
		Including Berwick Bank	Low	0.998	0.999	0.978	-0.09%	-2.29%
			High	0.996	0.998	0.937	-0.25%	-6.32%

3.4.2 Northern Gannet

3.4.2.1 The results of the PVA in-combination assessment for impacts on the gannet population at the impacted SPAs from the start of 2024 and for the duration of the project (25 years) are presented in **Table 3-47** and **Table 3-48** below. The baseline 'unimpacted' scenario (i.e. assuming no additional mortality other than baseline mortality exists) is also shown for comparison purposes.

Table 3-47 Gannet Population Viability Analysis in-combination assessment results for the Forth Islands Special Protection Area

SPA	Scenario			Density-independence (after 25 years)				
				Growth rate (Annual GR)	*Median CGR*	*Median CPS*	*Reduction in growth rate (%)*	*Reduction in population size (%)*
Forth Islands SPA	**Baseline**			1.006	n/a	n/a	0.00%	0.00%
	Collision Applicants	***Excluding Berwick Bank***	Low	1.002	0.996	0.893	-0.43%	-10.71%
			High	1.002	0.996	0.892	-0.44%	-10.83%
		Including Berwick Bank	Low	1.001	0.995	0.871	-0.52%	-12.92%
			High	1.001	0.994	0.865	-0.55%	-13.59%
	Collision SNCB	***Excluding Berwick Bank***	Low	1.002	0.996	0.893	-0.43%	-10.70%
			High	1.002	0.996	0.892	-0.44%	-10.89%
		Including Berwick Bank	Low	1.001	0.995	0.871	-0.53%	-12.92%
			High	1.001	0.994	0.865	-0.55%	-13.49%
	Combined Applicants	***Excluding Berwick Bank***	Low	1.001	0.995	0.873	-0.52%	-12.70%
			High	0.999	0.993	0.833	-0.70%	-16.79%
		Including Berwick Bank	Low	1.000	0.994	0.846	-0.64%	-15.36%
			High	0.997	0.991	0.792	-0.89%	-20.85%

SPA	Scenario			Density-independence (after 25 years)				
				Growth rate (Annual GR)	*Median CGR*	*Median CPS*	*Reduction in growth rate (%)*	*Reduction in population size (%)*
	Combined SNCB	***Excluding Berwick Bank***	Low	1.001	0.995	0.873	-0.52%	-12.70%
			High	0.999	0.993	0.832	-0.70%	-16.76%
		Including Berwick Bank	Low	1.000	0.994	0.846	-0.64%	-15.36%
			High	0.997	0.991	0.792	-0.89%	-20.84%
	Distributional response	***Excluding Berwick Bank***	Low	1.005	0.999	0.977	-0.09%	-2.23%
			High	1.004	0.997	0.934	-0.27%	-6.65%
		Including Berwick Bank	Low	1.005	0.999	0.971	-0.11%	-2.90%
			High	1.003	0.997	0.916	-0.34%	-8.41%

Table 3-48 Gannet Population Viability Analysis in-combination assessment results for the Hermaness Saxa Vord and Valla Field Special Protection Area

SPA	Scenario			Density-independence (after 25 years)				
				Growth rate (Annual GR)	*Median CGR*	*Median CPS*	*Reduction in growth rate (%)*	*Reduction in population size (%)*
	Baseline			1.006	n/a	n/a	0.00%	0.00%
			Low	1.005	0.999	0.966	-0.13%	-3.55%

SPA	Scenario			Density-independence (after 25 years)				
				Growth rate (Annual GR)	*Median CGR*	*Median CPS*	*Reduction in growth rate (%)*	*Reduction in population size (%)*
Hermaness Saxa Vord and Valla Field SPA	**Collision Applicants**	***Excluding Berwick Bank***	High	1.005	0.999	0.965	-0.14%	-3.58%
		Including Berwick Bank	Low	1.005	0.999	0.966	-0.14%	-3.57%
			High	1.005	0.999	0.964	-0.14%	-3.68%
	Collision SNCB	***Excluding Berwick Bank***	Low	1.005	0.999	0.966	-0.13%	-3.59%
			High	1.005	0.999	0.965	-0.14%	-3.63%
		Including Berwick Bank	Low	1.005	0.999	0.966	-0.14%	-3.56%
			High	1.005	0.999	0.964	-0.14%	-3.81%
	Combined Applicants	***Excluding Berwick Bank***	Low	1.005	0.998	0.959	-0.16%	-4.21%
			High	1.004	0.998	0.945	-0.22%	-5.71%
		Including Berwick Bank	Low	1.005	0.998	0.958	-0.16%	-4.31%
			High	1.004	0.998	0.942	-0.23%	-5.92%
	Combined SNCB	***Excluding Berwick Bank***	Low	1.005	0.998	0.959	-0.16%	-4.20%
			High	1.004	0.998	0.944	-0.22%	-5.71%

SPA	Scenario			Density-independence (after 25 years)				
				Growth rate (Annual GR)	*Median CGR*	*Median CPS*	*Reduction in growth rate (%)*	*Reduction in population size (%)*
		Including Berwick Bank	Low	1.005	0.998	0.958	-0.17%	-4.29%
			High	1.004	0.998	0.942	-0.23%	-5.86%
	Distributional response	***Excluding Berwick Bank***	Low	1.006	1.000	0.993	-0.03%	-0.87%
			High	1.005	0.999	0.979	-0.08%	-2.28%
		Including Berwick Bank	Low	1.006	1.000	0.992	-0.03%	-0.94%
			High	1.005	0.999	0.977	-0.09%	-2.38%

3.4.3 Common guillemot

3.4.3.1 The results of the PVA in-combination assessment for impacts on the guillemot populations at the impacted SPAs from the start of 2024 and for the duration of the project (25 years) are presented in **Table 3-49** and **Table 3-50** below. The baseline 'unimpacted' scenario (i.e. assuming no additional mortality other than baseline mortality exists) is also shown for comparison purposes.

Table 3-49 Common guillemot Population Viability Analysis in-combination assessment results for the Buchan Ness to Collieston Coast Special Protection Area

SPA	Scenario			Density-independence (after 25 years)				
				Growth rate (Annual GR)	*Median CGR*	*Median CPS*	*Reduction in growth rate (%)*	*Reduction in population size (%)*
Buchan Ness to Collieston Coast SPA	**Baseline**			1.026	n/a	n/a	0.00%	0.00%
	Distributional response	***Excluding Berwick Bank***	Low	1.025	0.999	0.964	-0.10%	-3.57%
			High	1.021	0.995	0.836	-0.50%	-16.45%
		Including Berwick Bank	Low	1.024	0.999	0.960	-0.11%	-4.03%
			High	1.020	0.994	0.818	-0.56%	-18.25%

Table 3-50 Common guillemot Population Viability Analysis in-combination assessment results for the Troup, Pennan and Lion's Head Special Protection Area

SPA	Scenario			Density-independence (after 25 years)				
				Growth rate (Annual GR)	*Median CGR*	*Median CPS*	*Reduction in growth rate (%)*	*Reduction in population size (%)*
Troup, Pennan and Lion's Head SPA.	**Baseline**			1.026	n/a	n/a	0.00%	0.00%
	Distributional response	***Excluding Berwick Bank***	Low	1.025	0.999	0.977	-0.09%	-2.24%
			High	1.022	0.996	0.904	-0.38%	-9.51%
		Including Berwick Bank	Low	1.025	0.999	0.976	-0.10%	-2.47%
			High	1.021	0.996	0.896	-0.42%	-10.51%

3.4.4 Razorbill

3.4.4.1 The results of the PVA in-combination assessment for impacts on the razorbill populations at the impacted SPAs from the start of 2024 and for the duration of the project (25 years) are presented in **Table 3-51, Table 3-52** and **Table 3-53** below. The baseline 'unimpacted' scenario (i.e. assuming no additional mortality other than baseline mortality exists) is also shown for comparison purposes.

Table 3-51 Razorbill Population Viability Analysis in-combination assessment results for the Fowlsheugh Special Protection Area

SPA	Scenario			Density-independence (after 25 years)				
				Growth rate (Annual GR)	*Median CGR*	*Median CPS*	*Reduction in growth rate (%)*	*Reduction in population size (%)*
Fowlsheugh SPA	**Baseline**			0.972	n/a	n/a	0.00%	0.00%
	Distributional response	***Excluding Berwick Bank***	Low	0.971	0.999	0.973	-0.10%	-2.82%
			High	0.967	0.995	0.870	-0.54%	-13.14%
		Including Berwick Bank	Low	0.971	0.999	0.966	-0.13%	-3.33%
			High	0.966	0.993	0.838	-0.67%	-16.29%

Table 3-52 Razorbill Population Viability Analysis in-combination assessment results for the Troup, Pennan and Lion's Head Special Protection Area

SPA	Scenario			Density-independence (after 25 years)				
				Growth rate (Annual GR)	*Median CGR*	*Median CPS*	*Reduction in growth rate (%)*	*Reduction in population size (%)*
Troup, Pennan and Lion's Head SPA	**Baseline**			0.972	n/a	n/a	0.00%	0.00%
	Distributional response	***Excluding Berwick Bank***	Low	0.972	0.999	0.981	-0.09%	-1.76%
			High	0.969	0.997	0.926	-0.31%	-7.28%

SPA	Scenario			Density-independence (after 25 years)				
				Growth rate (Annual GR)	*Median CGR*	*Median CPS*	*Reduction in growth rate (%)*	*Reduction in population size (%)*
		Including Berwick Bank	Low	0.972	0.999	0.978	-0.09%	-2.11%
			High	0.969	0.996	0.910	-0.36%	-8.99%

Table 3-53 Razorbill Population Viability Analysis in-combination assessment results for the East Caithness Cliffs Special Protection Area

SPA	Scenario			Density-independence (after 25 years)				
				Growth rate (Annual GR)	*Median CGR*	*Median CPS*	*Reduction in growth rate (%)*	*Reduction in population size (%)*
East Caithness Cliffs SPA	**Baseline**			0.972	n/a	n/a	0.00%	0.00%
	Distributional response	***Excluding Berwick Bank***	Low	0.971	0.998	0.954	-0.19%	-4.61%
			High	0.964	0.992	0.801	-0.86%	-19.90%
		Including Berwick Bank	Low	0.971	0.998	0.951	-0.20%	-4.78%
			High	0.964	0.991	0.793	-0.90%	-20.67%

3.4.5 Atlantic Puffin

3.4.5.1 The results of the PVA in-combination assessment for impacts on the puffin population at the at the impacted SPAs from the start of 2024 and for the duration of the project (25 years) are presented in **Table 3-54** to **Table 3-56** below. The baseline 'unimpacted' scenario (i.e. assuming no additional mortality other than baseline mortality exists) is also shown for comparison purposes.

Table 3-54 Puffin Population Viability Analysis in-combination assessment results for the Farne Islands Special Protection Area

SPA	Scenario			Density-independence (after 25 years)				
				Growth rate (Annual GR)	Median CGR	Median CPS	Reduction in growth rate (%)	Reduction in population size (%)
Farne Islands SPA	**Baseline**			0.974	n/a	n/a	0.00%	0.00%
	Distributional response	***Excluding Berwick Bank***	Low	0.974	1.000	0.999	0.00%	-0.08%
			High	0.974	1.000	0.995	-0.02%	-0.66%
		Including Berwick Bank	Low	0.974	1.000	0.998	-0.01%	-0.47%
			High	0.974	1.000	0.987	-0.06%	-1.32%

Table 3-55 Puffin Population Viability Analysis in-combination assessment results for the Forth Island Special Protection Area

SPA	Scenario			Density-independence (after 25 years)				
				Growth rate (Annual GR)	Median CGR	Median CPS	Reduction in growth rate (%)	Reduction in population size (%)
Forth Island SPA	**Baseline**			0.974	n/a	n/a	0.00%	0.00%
	Distributional response	***Excluding Berwick Bank***	Low	0.974	0.999	0.985	-0.06%	-1.61%
			High	0.971	0.997	0.916	-0.34%	-8.48%
			Low	0.974	0.999	0.983	-0.06%	-1.74%

SPA	Scenario			Density-independence (after 25 years)				
				Growth rate (Annual GR)	Median CGR	Median CPS	Reduction in growth rate (%)	Reduction in population size (%)
		Including Berwick Bank	High	0.970	0.996	0.906	-0.38%	-9.52%

Table 3-56 Puffin Population Viability Analysis in-combination assessment results for the Sule Skerry & Sule Stack Special Protection Area

SPA	Scenario			Density-independence (after 25 years)				
				Growth rate (Annual GR)	Median CGR	Median CPS	Reduction in growth rate (%)	Reduction in population size (%)
Sule Skerry & Sule Stack SPA	**Baseline**			0.974	n/a	n/a	0.00%	0.00%
	Distributional response	***Excluding Berwick Bank***	Low	0.973	0.999	0.979	-0.08%	-2.27%
			High	0.973	0.999	0.966	-0.14%	-3.64%
		Including Berwick Bank	Low	n/a	n/a	n/a	n/a	n/a
			High	n/a	n/a	n/a	n/a	n/a

3.4.6 Herring gull

3.4.6.1 The results of the PVA in-combination assessment for impacts on the herring gull population at the at the impacted SPAs from the start of 2024 and for 25 years are presented in **Table 3-57** below. The baseline 'unimpacted' scenario (i.e. assuming no additional mortality other than baseline mortality exists) is also shown for comparison purposes.

Table 3-57 Herring gull Population Viability Analysis in-combination assessment results for the Special Protection Area

SPA	Scenario			Density-independence (after 25 years)				
				Growth rate (Annual GR)	*Median CGR*	*Median CPS*	*Reduction in growth rate (%)*	*Reduction in population size (%)*
Buchan Ness to Collieston Coast SPA	**Baseline**			0.965	n/a	n/a	0.00%	0.00%
	Collision	***Collision Applicant Excluding Berwick Bank***	Low	n/a	n/a	n/a	n/a	n/a
			High	0.964	0.999	0.971	-0.11%	-2.71%
		Collision SNCB Excluding Berwick Bank	Low	n/a	n/a	n/a	n/a	n/a
			High	0.964	0.999	0.973	-0.11%	-2.77%

3.5 Results after 50 years

3.5.1 Black-legged kittiwake

3.5.1.1 The results of the PVA in-combination assessment for impacts on the kittiwake population at the impacted SPAs from the start of 2024 and for the duration of the project (50 years) are presented in **Table 3-58** to **Table 3-65** below. The baseline 'unimpacted' scenario (i.e. assuming no additional mortality other than baseline mortality exists) is also shown for comparison purposes.

Table 3-58 Black-legged kittiwake Population Viability Analysis in-combination assessment results for the Buchan Ness to Collieston Coast Special Protection Area

SPA	Scenario			Density-independence (after 50 years)				
				Growth rate (Annual GR)	*Median CGR*	*Median CPS*	*Reduction in growth rate (%)*	*Reduction in population size (%)*
Buchan Ness to Collieston Coast SPA	**Collision Applicants**	***Excluding Berwick Bank***	Low	0.995	0.997	0.839	-0.34%	-15.98%
			High	0.995	0.997	0.838	-0.35%	-16.02%
		Including Berwick Bank	Low	0.995	0.996	0.817	-0.40%	-17.92%
			High	0.994	0.996	0.807	-0.42%	-18.92%
	Collision SNCB	***Excluding Berwick Bank***	Low	0.995	0.996	0.833	-0.35%	-16.44%
			High	0.995	0.996	0.831	-0.36%	-16.60%
		Including Berwick Bank	Low	0.995	0.996	0.810	-0.41%	-18.60%
			High	0.994	0.996	0.801	-0.44%	-19.77%
	Combined Applicants	***Excluding Berwick Bank***	Low	0.995	0.996	0.816	-0.40%	-18.03%
			High	0.994	0.995	0.791	-0.47%	-20.70%
		Including Berwick Bank	Low	0.994	0.995	0.789	-0.46%	-20.82%
			High	0.993	0.994	0.747	-0.57%	-25.10%

SPA	Scenario			Density-independence (after 50 years)				
				Growth rate (Annual GR)	*Median CGR*	*Median CPS*	*Reduction in growth rate (%)*	*Reduction in population size (%)*
	Combined SNCB	***Excluding Berwick Bank***	Low	0.994	0.996	0.809	-0.42%	-18.77%
			High	0.994	0.995	0.785	-0.48%	-21.29%
		Including Berwick Bank	Low	0.994	0.995	0.782	-0.48%	-21.58%
			High	0.993	0.994	0.741	-0.59%	-25.53%
	Distributional response	***Excluding Berwick Bank***	Low	0.998	0.999	0.971	-0.05%	-2.67%
			High	0.998	0.999	0.944	-0.11%	-5.53%
		Including Berwick Bank	Low	0.998	0.999	0.966	-0.07%	-3.62%
			High	0.997	0.998	0.926	-0.16%	-7.43%

Table 3-59 Black-legged kittiwake Population Viability Analysis in-combination assessment results for the East Caithness Cliffs Special Protection Area

SPA	Scenario			Density-independence (after 50 years)				
				Growth rate (Annual GR)	*Median CGR*	*Median CPS*	*Reduction in growth rate (%)*	*Reduction in population size (%)*
East Caithness Cliffs SPA	**Baseline**			0.999	n/a	n/a	0.00%	0.00%
			Low	0.993	0.995	0.762	-0.53%	-23.92%

SPA	Scenario			Density-independence (after 50 years)				
				Growth rate (Annual GR)	*Median CGR*	*Median CPS*	*Reduction in growth rate (%)*	*Reduction in population size (%)*
	Collision Applicants	***Excluding Berwick Bank***	High	0.993	0.995	0.760	-0.54%	-24.20%
		Including Berwick Bank	Low	0.993	0.994	0.745	-0.58%	-25.75%
			High	0.993	0.994	0.737	-0.60%	-26.35%
	Collision SNCB	***Excluding Berwick Bank***	Low	0.993	0.995	0.762	-0.53%	-23.88%
			High	0.993	0.995	0.760	-0.54%	-24.15%
		Including Berwick Bank	Low	0.993	0.994	0.745	-0.58%	-25.63%
			High	0.993	0.994	0.736	-0.60%	-26.62%
	Combined Applicants	***Excluding Berwick Bank***	Low	0.992	0.993	0.712	-0.67%	-28.83%
			High	0.989	0.991	0.620	-0.94%	-37.94%
		Including Berwick Bank	Low	0.991	0.993	0.691	-0.72%	-30.86%
			High	0.988	0.990	0.590	-1.04%	-41.22%
	Combined SNCB	***Excluding Berwick Bank***	Low	0.992	0.993	0.712	-0.67%	-28.80%
			High	0.989	0.991	0.620	-0.93%	-38.09%

SPA	Scenario			Density-independence (after 50 years)				
				Growth rate (Annual GR)	*Median CGR*	*Median CPS*	*Reduction in growth rate (%)*	*Reduction in population size (%)*
		Including Berwick Bank	Low	0.991	0.993	0.691	-0.73%	-31.15%
			High	0.988	0.990	0.589	-1.04%	-41.27%
	Distributional response	***Excluding Berwick Bank***	Low	0.997	0.999	0.934	-0.13%	-6.44%
			High	0.995	0.996	0.817	-0.39%	-18.20%
		Including Berwick Bank	Low	0.997	0.999	0.928	-0.15%	-7.13%
			High	0.994	0.996	0.801	-0.43%	-19.66%

Table 3-60 Black-legged kittiwake Population Viability Analysis in-combination assessment results for the Farne Islands Special Protection Area

SPA	Scenario			Density-independence (after 50 years)				
				Growth rate (Annual GR)	*Median CGR*	*Median CPS*	*Reduction in growth rate (%)*	*Reduction in population size (%)*
Farne Islands SPA	**Baseline**			0.999	n/a	n/a	0.00%	0.00%
	Collision Applicants	***Excluding Berwick Bank***	Low	0.997	0.999	0.928	-0.14%	-6.81%
			High	0.997	0.999	0.929	-0.15%	-6.80%
			Low	0.995	0.996	0.819	-0.39%	-18.23%

SPA	Scenario			Density-independence (after 50 years)				
				Growth rate (Annual GR)	*Median CGR*	*Median CPS*	*Reduction in growth rate (%)*	*Reduction in population size (%)*
		Including Berwick Bank	High	0.994	0.995	0.774	-0.50%	-22.45%
	Collision SNCB	***Excluding Berwick Bank***	Low	0.997	0.999	0.929	-0.14%	-6.87%
			High	0.997	0.999	0.929	-0.14%	-7.05%
		Including Berwick Bank	Low	0.995	0.996	0.819	-0.39%	-17.56%
			High	0.994	0.995	0.775	-0.50%	-22.43%
	Combined Applicants	***Excluding Berwick Bank***	Low	0.997	0.998	0.917	-0.17%	-8.25%
			High	0.996	0.998	0.895	-0.22%	-10.35%
		Including Berwick Bank	Low	0.994	0.995	0.792	-0.46%	-20.48%
			High	0.992	0.993	0.702	-0.69%	-29.91%
	Combined SNCB	***Excluding Berwick Bank***	Low	0.997	0.998	0.917	-0.17%	-8.20%
			High	0.996	0.998	0.894	-0.23%	-10.40%
		Including Berwick Bank	Low	0.994	0.995	0.792	-0.46%	-20.89%
			High	0.992	0.993	0.701	-0.70%	-29.64%

SPA	Scenario			Density-independence (after 50 years)				
				Growth rate (Annual GR)	*Median CGR*	*Median CPS*	*Reduction in growth rate (%)*	*Reduction in population size (%)*
	Distributional response	***Excluding Berwick Bank***	Low	0.998	1.000	0.987	-0.03%	-1.48%
			High	0.998	0.999	0.963	-0.07%	-3.44%
		Including Berwick Bank	Low	0.998	0.999	0.967	-0.06%	-2.85%
			High	0.997	0.998	0.905	-0.20%	-9.07%

Table 3-61 Black-legged kittiwake Population Viability Analysis in-combination assessment results for the Forth Islands Special Protection Area

SPA	Scenario			Density-independence (after 50 years)				
				Growth rate (Annual GR)	*Median CGR*	*Median CPS*	*Reduction in growth rate (%)*	*Reduction in population size (%)*
Forth Islands SPA	**Baseline**			0.999	n/a	n/a	0.00%	0.00%
	Collision Applicants	***Excluding Berwick Bank***	Low	0.995	0.997	0.846	-0.33%	-15.74%
			High	0.995	0.997	0.844	-0.33%	-15.55%
		Including Berwick Bank	Low	0.992	0.994	0.727	-0.63%	-27.50%
			High	0.991	0.992	0.680	-0.76%	-32.16%
			Low	0.995	0.997	0.845	-0.33%	-15.74%

SPA	Scenario			Density-independence (after 50 years)				
				Growth rate (Annual GR)	*Median CGR*	*Median CPS*	*Reduction in growth rate (%)*	*Reduction in population size (%)*
	Collision SNCB	***Excluding Berwick Bank***	High	0.995	0.997	0.844	-0.33%	-15.80%
		Including Berwick Bank	Low	0.992	0.994	0.727	-0.62%	-27.24%
			High	0.991	0.992	0.679	-0.75%	-32.20%
	Combined Applicants	***Excluding Berwick Bank***	Low	0.994	0.996	0.805	-0.43%	-19.61%
			High	0.992	0.994	0.729	-0.62%	-27.24%
		Including Berwick Bank	Low	0.991	0.992	0.676	-0.76%	-32.77%
			High	0.987	0.988	0.545	-1.18%	-45.61%
	Combined SNCB	***Excluding Berwick Bank***	Low	0.994	0.996	0.805	-0.43%	-19.60%
			High	0.992	0.994	0.727	-0.62%	-27.64%
		Including Berwick Bank	Low	0.991	0.992	0.675	-0.77%	-32.51%
			High	0.987	0.988	0.545	-1.19%	-45.78%
	Distributional response	***Excluding Berwick Bank***	Low	0.998	0.999	0.951	-0.10%	-5.04%
			High	0.996	0.997	0.862	-0.29%	-13.98%

SPA	Scenario			Density-independence (after 50 years)				
				Growth rate (Annual GR)	*Median CGR*	*Median CPS*	*Reduction in growth rate (%)*	*Reduction in population size (%)*
		Including Berwick Bank	Low	0.997	0.999	0.930	-0.14%	-7.10%
			High	0.994	0.996	0.803	-0.43%	-19.82%

Table 3-62 Black-legged kittiwake Population Viability Analysis in-combination assessment results for the Fowlsheugh Special Protection Area

SPA	Scenario			Density-independence (after 50 years)				
				Growth rate (Annual GR)	*Median CGR*	*Median CPS*	*Reduction in growth rate (%)*	*Reduction in population size (%)*
Fowlsheugh SPA	**Baseline**			0.999	n/a	n/a	0.00%	0.00%
	Collision Applicants	***Excluding Berwick Bank***	Low	0.995	0.997	0.843	-0.34%	-15.98%
			High	0.995	0.997	0.842	-0.34%	-15.95%
		Including Berwick Bank	Low	0.992	0.994	0.727	-0.62%	-27.54%
			High	0.991	0.992	0.681	-0.76%	-32.38%
	Collision SNCB	***Excluding Berwick Bank***	Low	0.995	0.997	0.841	-0.34%	-16.18%
			High	0.995	0.997	0.841	-0.34%	-16.23%
			Low	0.992	0.994	0.727	-0.63%	-27.68%

SPA	Scenario			Density-independence (after 50 years)				
				Growth rate (Annual GR)	*Median CGR*	*Median CPS*	*Reduction in growth rate (%)*	*Reduction in population size (%)*
		Including Berwick Bank	High	0.991	0.992	0.680	-0.76%	-32.32%
	Combined Applicants	***Excluding Berwick Bank***	Low	0.995	0.996	0.814	-0.41%	-18.86%
			High	0.993	0.995	0.758	-0.54%	-24.62%
		Including Berwick Bank	Low	0.991	0.993	0.686	-0.73%	-31.45%
			High	0.988	0.989	0.572	-1.09%	-42.98%
	Combined SNCB	***Excluding Berwick Bank***	Low	0.995	0.996	0.812	-0.40%	-18.73%
			High	0.993	0.995	0.757	-0.55%	-24.69%
		Including Berwick Bank	Low	0.991	0.993	0.685	-0.74%	-31.86%
			High	0.988	0.989	0.571	-1.09%	-43.16%
	Distributional response	***Excluding Berwick Bank***	Low	0.998	0.999	0.966	-0.07%	-3.62%
			High	0.997	0.998	0.901	-0.20%	-9.98%
		Including Berwick Bank	Low	0.998	0.999	0.944	-0.12%	-5.58%
			High	0.995	0.997	0.840	-0.34%	-16.21%

Table 3-63 Black-legged kittiwake Population Viability Analysis in-combination assessment results for the North Caithness Cliffs Special Protection Area

SPA	Scenario			Density-independence (after 50 years)				
				Growth rate (Annual GR)	*Median CGR*	*Median CPS*	*Reduction in growth rate (%)*	*Reduction in population size (%)*
North Caithness Cliffs SPA	**Baseline**			0.999	n/a	n/a	0.00%	0.00%
	Collision Applicants	***Excluding Berwick Bank***	Low	0.994	0.995	0.789	-0.46%	-21.15%
			High	0.994	0.995	0.782	-0.47%	-21.71%
		Including Berwick Bank	Low	0.993	0.995	0.770	-0.51%	-23.07%
			High	0.993	0.995	0.758	-0.54%	-24.18%
	Collision SNCB	***Excluding Berwick Bank***	Low	0.994	0.995	0.788	-0.46%	-21.06%
			High	0.994	0.995	0.782	-0.47%	-21.65%
		Including Berwick Bank	Low	0.993	0.995	0.770	-0.51%	-23.22%
			High	0.993	0.995	0.756	-0.53%	-24.43%
	Combined Applicants	***Excluding Berwick Bank***	Low	0.993	0.994	0.751	-0.55%	-25.05%
			High	0.992	0.993	0.696	-0.70%	-30.12%
		Including Berwick Bank	Low	0.992	0.994	0.728	-0.62%	-27.18%
			High	0.990	0.992	0.659	-0.81%	-34.19%

SPA	Scenario			Density-independence (after 50 years)				
				Growth rate (Annual GR)	*Median CGR*	*Median CPS*	*Reduction in growth rate (%)*	*Reduction in population size (%)*
	Combined SNCB	***Excluding Berwick Bank***	Low	0.993	0.994	0.751	-0.56%	-24.85%
			High	0.992	0.993	0.695	-0.70%	-30.64%
		Including Berwick Bank	Low	0.992	0.994	0.728	-0.62%	-27.26%
			High	0.990	0.992	0.657	-0.82%	-34.51%
	Distributional response	***Excluding Berwick Bank***	Low	0.998	0.999	0.952	-0.09%	-4.43%
			High	0.996	0.998	0.888	-0.23%	-11.36%
		Including Berwick Bank	Low	0.998	0.999	0.947	-0.10%	-5.34%
			High	0.996	0.997	0.869	-0.27%	-13.15%

Table 3-64 Black-legged kittiwake Population Viability Analysis in-combination assessment results for the St Abb's Head to Fast Castle Special Protection Area

SPA	Scenario			Density-independence (after 50 years)				
				Growth rate (Annual GR)	*Median CGR*	*Median CPS*	*Reduction in growth rate (%)*	*Reduction in population size (%)*
St Abb's Head to Fast Castle SPA	**Baseline**			0.999	n/a	n/a	0.00%	0.00%
			Low	0.997	0.998	0.907	-0.18%	-8.90%

SPA	Scenario			Density-independence (after 50 years)				
				Growth rate (Annual GR)	*Median CGR*	*Median CPS*	*Reduction in growth rate (%)*	*Reduction in population size (%)*
	Collision Applicants	***Excluding Berwick Bank***	High	0.997	0.998	0.907	-0.19%	-9.27%
		Including Berwick Bank	Low	0.974	0.976	0.284	-2.43%	-71.53%
			High	0.964	0.966	0.168	-3.45%	-83.33%
	Collision SNCB	***Excluding Berwick Bank***	Low	0.997	0.998	0.907	-0.19%	-9.36%
			High	0.997	0.998	0.907	-0.18%	-9.30%
		Including Berwick Bank	Low	0.974	0.976	0.284	-2.44%	-71.60%
			High	0.964	0.966	0.168	-3.44%	-83.27%
	Combined Applicants	***Excluding Berwick Bank***	Low	0.996	0.998	0.880	-0.24%	-11.76%
			High	0.995	0.996	0.832	-0.35%	-16.47%
		Including Berwick Bank	Low	0.970	0.972	0.231	-2.83%	-76.98%
			High	0.952	0.954	0.089	-4.63%	-91.17%
	Combined SNCB	***Excluding Berwick Bank***	Low	0.996	0.998	0.881	-0.25%	-11.92%
			High	0.995	0.996	0.833	-0.35%	-16.71%

SPA	Scenario			Density-independence (after 50 years)				
				Growth rate (Annual GR)	*Median CGR*	*Median CPS*	*Reduction in growth rate (%)*	*Reduction in population size (%)*
		Including Berwick Bank	Low	0.970	0.972	0.231	-2.83%	-76.92%
			High	0.952	0.954	0.089	-4.64%	-91.18%
	Distributional response	***Excluding Berwick Bank***	Low	0.998	0.999	0.971	-0.06%	-2.85%
			High	0.997	0.998	0.916	-0.17%	-8.45%
		Including Berwick Bank	Low	0.995	0.996	0.816	-0.39%	-18.22%
			High	0.987	0.988	0.544	-1.19%	-45.74%

Table 3-65 Black-legged kittiwake Population Viability Analysis in-combination assessment results for the Troup, Pennan & Lion's Head Special Protection Area

SPA	Scenario			Density-independence (after 50 years)				
				Growth rate (Annual GR)	*Median CGR*	*Median CPS*	*Reduction in growth rate (%)*	*Reduction in population size (%)*
Troup, Pennan & Lion's Head SPA	**Baseline**			0.999	n/a	n/a	0.00%	0.00%
	Collision Applicants	***Excluding Berwick Bank***	Low	0.996	0.997	0.854	-0.31%	-14.63%
			High	0.996	0.997	0.852	-0.31%	-14.88%
			Low	0.995	0.996	0.833	-0.36%	-16.86%

SPA	Scenario			Density-independence (after 50 years)				
				Growth rate (Annual GR)	*Median CGR*	*Median CPS*	*Reduction in growth rate (%)*	*Reduction in population size (%)*
		Including Berwick Bank	High	0.995	0.996	0.824	-0.38%	-17.79%
	Collision SNCB	***Excluding Berwick Bank***	Low	0.996	0.997	0.851	-0.32%	-14.92%
			High	0.995	0.997	0.850	-0.32%	-14.85%
		Including Berwick Bank	Low	0.995	0.996	0.831	-0.37%	-16.81%
			High	0.995	0.996	0.822	-0.39%	-17.54%
	Combined Applicants	***Excluding Berwick Bank***	Low	0.995	0.996	0.823	-0.38%	-17.60%
			High	0.993	0.995	0.765	-0.53%	-23.45%
		Including Berwick Bank	Low	0.994	0.996	0.798	-0.44%	-20.18%
			High	0.992	0.994	0.726	-0.63%	-27.38%
	Combined SNCB	***Excluding Berwick Bank***	Low	0.995	0.996	0.821	-0.39%	-17.69%
			High	0.993	0.995	0.762	-0.54%	-23.49%
		Including Berwick Bank	Low	0.994	0.996	0.796	-0.45%	-20.27%
			High	0.992	0.994	0.724	-0.64%	-27.62%

SPA	Scenario			Density-independence (after 50 years)				
				Growth rate (Annual GR)	*Median CGR*	*Median CPS*	*Reduction in growth rate (%)*	*Reduction in population size (%)*
	Distributional response	***Excluding Berwick Bank***	Low	0.998	0.999	0.964	-0.07%	-3.78%
			High	0.997	0.998	0.897	-0.21%	-10.46%
		Including Berwick Bank	Low	0.998	0.999	0.958	-0.09%	-4.47%
			High	0.996	0.998	0.880	-0.25%	-11.94%

3.5.2 Northern Gannet

3.5.2.1 The results of the PVA in-combination assessment for impacts on the gannet population at the impacted SPAs from the start of 2024 and for the duration of the project (50 years) are presented in **Table 3-66** and **Table 3-67** below. The baseline 'unimpacted' scenario (i.e. assuming no additional mortality other than baseline mortality exists) is also shown for comparison purposes.

Table 3-66 Gannet Population Viability Analysis in-combination assessment results for the Forth Islands Special Protection Area

SPA	Scenario			Density-independence (after 50 years)				
				Growth rate (Annual GR)	*Median CGR*	*Median CPS*	*Reduction in growth rate (%)*	*Reduction in population size (%)*
Forth Islands SPA	**Baseline**			1.006	n/a	n/a	0.00%	0.00%
	Collision Applicants	***Excluding Berwick Bank***	Low	1.002	0.996	0.801	-0.44%	-19.93%
			High	1.002	0.996	0.798	-0.44%	-20.18%
		Including Berwick Bank	Low	1.001	0.995	0.762	-0.53%	-23.82%
			High	1.000	0.994	0.752	-0.56%	-24.82%
	Collision SNCB	***Excluding Berwick Bank***	Low	1.002	0.996	0.801	-0.44%	-19.99%
			High	1.002	0.996	0.798	-0.44%	-20.18%
		Including Berwick Bank	Low	1.001	0.995	0.762	-0.53%	-23.84%
			High	1.000	0.994	0.751	-0.56%	-24.80%
	Combined Applicants	***Excluding Berwick Bank***	Low	1.001	0.995	0.765	-0.52%	-23.51%
			High	0.999	0.993	0.697	-0.71%	-30.30%
		Including Berwick Bank	Low	1.000	0.994	0.719	-0.65%	-28.07%
			High	0.997	0.991	0.631	-0.90%	-36.84%

SPA	Scenario			Density-independence (after 50 years)				
				Growth rate (Annual GR)	*Median CGR*	*Median CPS*	*Reduction in growth rate (%)*	*Reduction in population size (%)*
	Combined SNCB	***Excluding Berwick Bank***	Low	1.001	0.995	0.765	-0.52%	-23.41%
			High	0.999	0.993	0.697	-0.71%	-30.38%
		Including Berwick Bank	Low	1.000	0.994	0.719	-0.65%	-28.08%
			High	0.997	0.991	0.631	-0.90%	-36.95%
	Distributional response	***Excluding Berwick Bank***	Low	1.005	0.999	0.956	-0.09%	-4.43%
			High	1.003	0.997	0.873	-0.27%	-12.68%
		Including Berwick Bank	Low	1.005	0.999	0.944	-0.12%	-5.72%
			High	1.003	0.997	0.841	-0.34%	-15.95%

Table 3-67 Gannet Population Viability Analysis in-combination assessment results for the Hermaness Saxa Vord and Valla Field Special Protection Area

SPA	Scenario			Density-independence (after 50 years)				
				Growth rate (Annual GR)	*Median CGR*	*Median CPS*	*Reduction in growth rate (%)*	*Reduction in population size (%)*
	Baseline			1.006	n/a	n/a	0.00%	0.00%
			Low	1.005	0.999	0.935	-0.13%	-6.52%

SPA	Scenario			Density-independence (after 50 years)				
				Growth rate (Annual GR)	*Median CGR*	*Median CPS*	*Reduction in growth rate (%)*	*Reduction in population size (%)*
Hermaness Saxa Vord and Valla Field SPA	**Collision Applicants**	***Excluding Berwick Bank***	High	1.005	0.999	0.932	-0.14%	-6.88%
		Including Berwick Bank	Low	1.005	0.999	0.934	-0.14%	-6.68%
			High	1.005	0.999	0.931	-0.14%	-6.96%
	Collision SNCB	***Excluding Berwick Bank***	Low	1.005	0.999	0.935	-0.13%	-6.60%
			High	1.005	0.999	0.932	-0.14%	-6.87%
		Including Berwick Bank	Low	1.005	0.999	0.933	-0.14%	-6.79%
			High	1.005	0.999	0.931	-0.14%	-6.94%
	Combined Applicants	***Excluding Berwick Bank***	Low	1.004	0.998	0.922	-0.16%	-7.86%
			High	1.004	0.998	0.894	-0.22%	-10.66%
		Including Berwick Bank	Low	1.004	0.998	0.920	-0.16%	-8.05%
			High	1.004	0.998	0.889	-0.23%	-11.17%
	Combined SNCB	***Excluding Berwick Bank***	Low	1.004	0.998	0.921	-0.16%	-7.96%
			High	1.004	0.998	0.894	-0.22%	-10.67%

SPA	Scenario			Density-independence (after 50 years)				
				Growth rate (Annual GR)	*Median CGR*	*Median CPS*	*Reduction in growth rate (%)*	*Reduction in population size (%)*
		Including Berwick Bank	Low	1.004	0.998	0.920	-0.16%	-8.10%
			High	1.004	0.998	0.889	-0.23%	-11.17%
	Distributional response	***Excluding Berwick Bank***	Low	1.006	1.000	0.986	-0.03%	-1.59%
			High	1.005	0.999	0.958	-0.08%	-4.27%
		Including Berwick Bank	Low	1.006	1.000	0.985	-0.03%	-1.66%
			High	1.005	0.999	0.956	-0.09%	-4.32%

3.5.3 Common guillemot

3.5.3.1 The results of the PVA in-combination assessment for impacts on the guillemot populations at the impacted SPAs from the start of 2024 and for the duration of the project (50 years) are presented in **Table 3-68** and **Table 3-69** below. The baseline 'unimpacted' scenario (i.e. assuming no additional mortality other than baseline mortality exists) is also shown for comparison purposes.

Table 3-68 Common guillemot Population Viability Analysis in-combination assessment results for the Buchan Ness to Collieston Coast Special Protection Area

SPA	Scenario			Density-independence (after 50 years)				
				Growth rate (Annual GR)	*Median CGR*	*Median CPS*	*Reduction in growth rate (%)*	*Reduction in population size (%)*
Buchan Ness to Collieston Coast SPA	**Baseline**			1.026	n/a	n/a	0.00%	0.00%
	Distributional response	***Excluding Berwick Bank***	Low	1.025	0.999	0.950	-0.10%	-5.02%
			High	1.021	0.995	0.775	-0.50%	-22.49%
		Including Berwick Bank	Low	1.025	0.999	0.943	-0.12%	-5.72%
			High	1.020	0.994	0.751	-0.56%	-24.83%

Table 3-69 Common guillemot Population Viability Analysis in-combination assessment results for the Troup, Pennan and Lion's Head Special Protection Area

SPA	Scenario			Density-independence (after 50 years)				
				Growth rate (Annual GR)	*Median CGR*	*Median CPS*	*Reduction in growth rate (%)*	*Reduction in population size (%)*
Troup, Pennan and Lion's Head SPA.	**Baseline**			1.026	n/a	n/a	0.00%	0.00%
	Distributional response	***Excluding Berwick Bank***	Low	1.025	0.999	0.955	-0.09%	-4.50%
			High	1.022	0.996	0.820	-0.39%	-17.98%
		Including Berwick Bank	Low	1.025	0.999	0.952	-0.09%	-4.74%
			High	1.021	0.996	0.805	-0.43%	-19.52%

3.5.4 Razorbill

3.5.4.1 The results of the PVA in-combination assessment for impacts on the razorbill populations at the impacted SPAs from the start of 2024 and for the duration of the project (50 years) are presented in **Table 3-70**, **Table 3-71** and **Table 3-72** below. The baseline 'unimpacted' scenario (i.e. assuming no additional mortality other than baseline mortality exists) is also shown for comparison purposes.

Table 3-70 Razorbill Population Viability Analysis in-combination assessment results for the Fowlsheugh Special Protection Area

SPA	Scenario			Density-independence (after 50 years)				
				Growth rate (Annual GR)	*Median CGR*	*Median CPS*	*Reduction in growth rate (%)*	*Reduction in population size (%)*
Fowlsheugh SPA	**Baseline**			0.972	n/a	n/a	0.00%	0.00%
	Distributional response	***Excluding Berwick Bank***	Low	0.971	0.999	0.948	-0.10%	-4.71%
			High	0.967	0.995	0.760	-0.54%	-23.92%
		Including Berwick Bank	Low	0.971	0.999	0.935	-0.14%	-6.38%
			High	0.965	0.993	0.706	-0.68%	-29.26%

Table 3-71 Razorbill Population Viability Analysis in-combination assessment results for the Troup, Pennan and Lion's Head Special Protection Area

SPA	Scenario			Density-independence (after 50 years)				
				Growth rate (Annual GR)	*Median CGR*	*Median CPS*	*Reduction in growth rate (%)*	*Reduction in population size (%)*
Troup, Pennan and Lion's Head SPA	**Baseline**			0.972	n/a	n/a	0.00%	0.00%
	Distributional response	***Excluding Berwick Bank***	Low	0.971	0.999	0.962	-0.07%	-3.75%
			High	0.969	0.997	0.859	-0.30%	-14.77%
			Low	0.971	0.999	0.958	-0.09%	-4.61%

SPA	Scenario			Density-independence (after 50 years)				
				Growth rate (Annual GR)	*Median CGR*	*Median CPS*	*Reduction in growth rate (%)*	*Reduction in population size (%)*
		Including Berwick Bank	High	0.969	0.996	0.831	-0.36%	-17.18%

Table 3-72 Razorbill Population Viability Analysis in-combination assessment results for the East Caithness Cliffs Special Protection Area

SPA	Scenario			Density-independence (after 50 years)				
				Growth rate (Annual GR)	Median CGR	Median CPS	Reduction in growth rate (%)	Reduction in population size (%)
East Caithness Cliffs SPA	**Baseline**			0.972	n/a	n/a	0.00%	0.00%
	Distributional response	***Excluding Berwick Bank***	Low	0.970	0.998	0.912	-0.18%	-8.88%
			High	0.964	0.991	0.647	-0.85%	-35.35%
		Including Berwick Bank	Low	0.970	0.998	0.907	-0.19%	-9.41%
			High	0.963	0.991	0.633	-0.90%	-36.87%

3.5.5 Atlantic Puffin

3.5.5.1 The results of the PVA in-combination assessment for impacts on the puffin population at the at the impacted SPAs from the start of 2024 and for the duration of the project (50 years) are presented in **Table 3-73 to Table 3-75** below. The baseline 'unimpacted' scenario (i.e. assuming no additional mortality other than baseline mortality exists) is also shown for comparison purposes.

Table 3-73 Puffin Population Viability Analysis in-combination assessment results for the Farne Islands Special Protection Area

SPA	Scenario			Density-independence (after 50 years)				
				Growth rate (Annual GR)	*Median CGR*	*Median CPS*	*Reduction in growth rate (%)*	*Reduction in population size (%)*
Farne Islands SPA	**Baseline**			0.974	n/a	n/a	0.00%	0.00%
	Distributional response	***Excluding Berwick Bank***	Low	0.974	1.000	0.998	0.00%	-0.11%
			High	0.974	1.000	0.990	-0.01%	-0.92%
		Including Berwick Bank	Low	0.974	1.000	0.995	-0.01%	-0.16%
			High	0.973	1.000	0.975	-0.04%	-2.50%

Table 3-74 Puffin Population Viability Analysis in-combination assessment results for the Forth Island Special Protection Area

SPA	Scenario			Density-independence (after 50 years)				
				Growth rate (Annual GR)	*Median CGR*	*Median CPS*	*Reduction in growth rate (%)*	*Reduction in population size (%)*
Forth Island SPA	**Baseline**			0.974	n/a	n/a	0.00%	0.00%
	Distributional response	***Excluding Berwick Bank***	Low	0.973	0.999	0.971	-0.06%	-3.00%
			High	0.970	0.997	0.841	-0.34%	-15.96%
			Low	0.973	0.999	0.967	-0.07%	-3.30%

SPA	Scenario			Density-independence (after 50 years)				
				Growth rate (Annual GR)	*Median CGR*	*Median CPS*	*Reduction in growth rate (%)*	*Reduction in population size (%)*
		Including Berwick Bank	High	0.970	0.996	0.823	-0.39%	-17.59%

Table 3-75 Puffin Population Viability Analysis in-combination assessment results for the Sule Skerry & Sule Stack Special Protection Area

SPA	Scenario			Density-independence (after 50 years)				
				Growth rate (Annual GR)	*Median CGR*	*Median CPS*	*Reduction in growth rate (%)*	*Reduction in population size (%)*
Sule Skerry & Sule Stack SPA	**Baseline**			0.974	n/a	n/a	0.00%	0.00%
	Distributional response	***Excluding Berwick Bank***	Low	0.973	0.999	0.959	-0.08%	-4.14%
			High	0.972	0.999	0.934	-0.13%	-6.51%
		Including Berwick Bank	Low	n/a	n/a	n/a	n/a	n/a
			High	n/a	n/a	n/a	n/a	n/a

3.5.6 Herring gull

3.5.6.1 The results of the PVA in-combination assessment for impacts on the herring gull population at the at the impacted SPAs from the start of 2024 and for the duration of the project (50 years) are presented in **Table 3-76** below. The baseline 'unimpacted' scenario (i.e. assuming no additional mortality other than baseline mortality exists) is also shown for comparison purposes.

Table 3-76 Herring gull Population Viability Analysis in-combination assessment results for the Special Protection Area

SPA	Scenario			Density-independence (after 50 years)				
				Growth rate (Annual GR)	*Median CGR*	*Median CPS*	*Reduction in growth rate (%)*	*Reduction in population size (%)*
Buchan Ness to Collieston CoastSPA	**Baseline**			0.965	n/a	n/a	0.00%	0.00%
	Collision	***Collision Applicant Excluding Berwick Bank***	Low	n/a	n/a	n/a	n/a	n/a
			High	0.964	0.999	0.949	-0.12%	-5.73%
		Collision SNCB Excluding Berwick Bank	Low	n/a	n/a	n/a	n/a	n/a
			High	0.964	0.999	0.949	-0.11%	-5.51%

4 Population Viability Analysis graphs showing project alone results for the lifetime of the project

4.1 Kittiwake:

4.1.1 Buchan Ness to Collieston Coast Special Protection Area

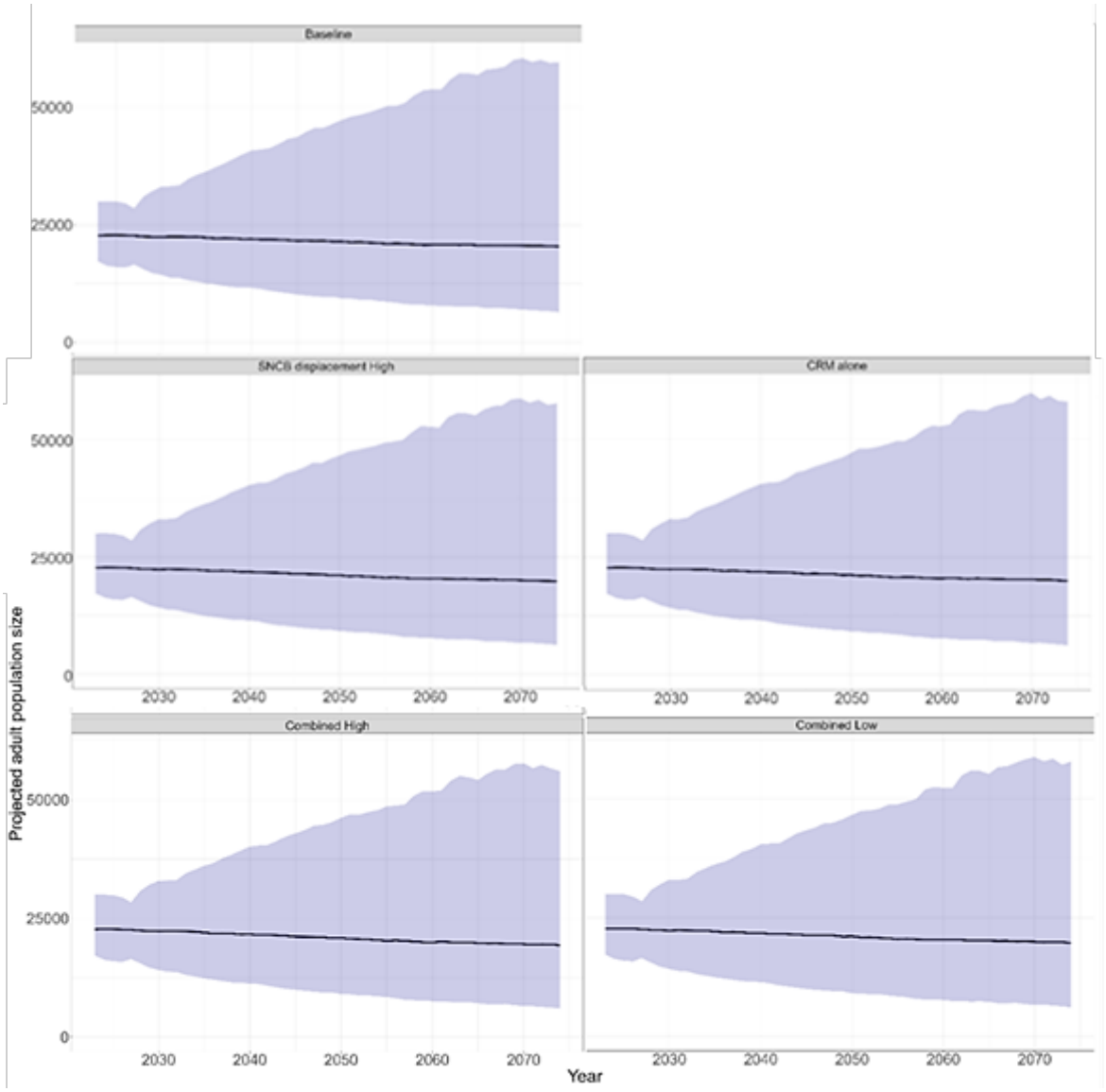

Figure 4-1 Projections of population sizes over a 35-year time-frame for the kittiwake population at the Buchan Ness to Collieston coast Special Protection Area. Each plot represents a different impact scenario in terms of additional adult mortalities. Lines represent median population size and purple areas define upper (97.5%) and lower (2.5%) confidence limits.

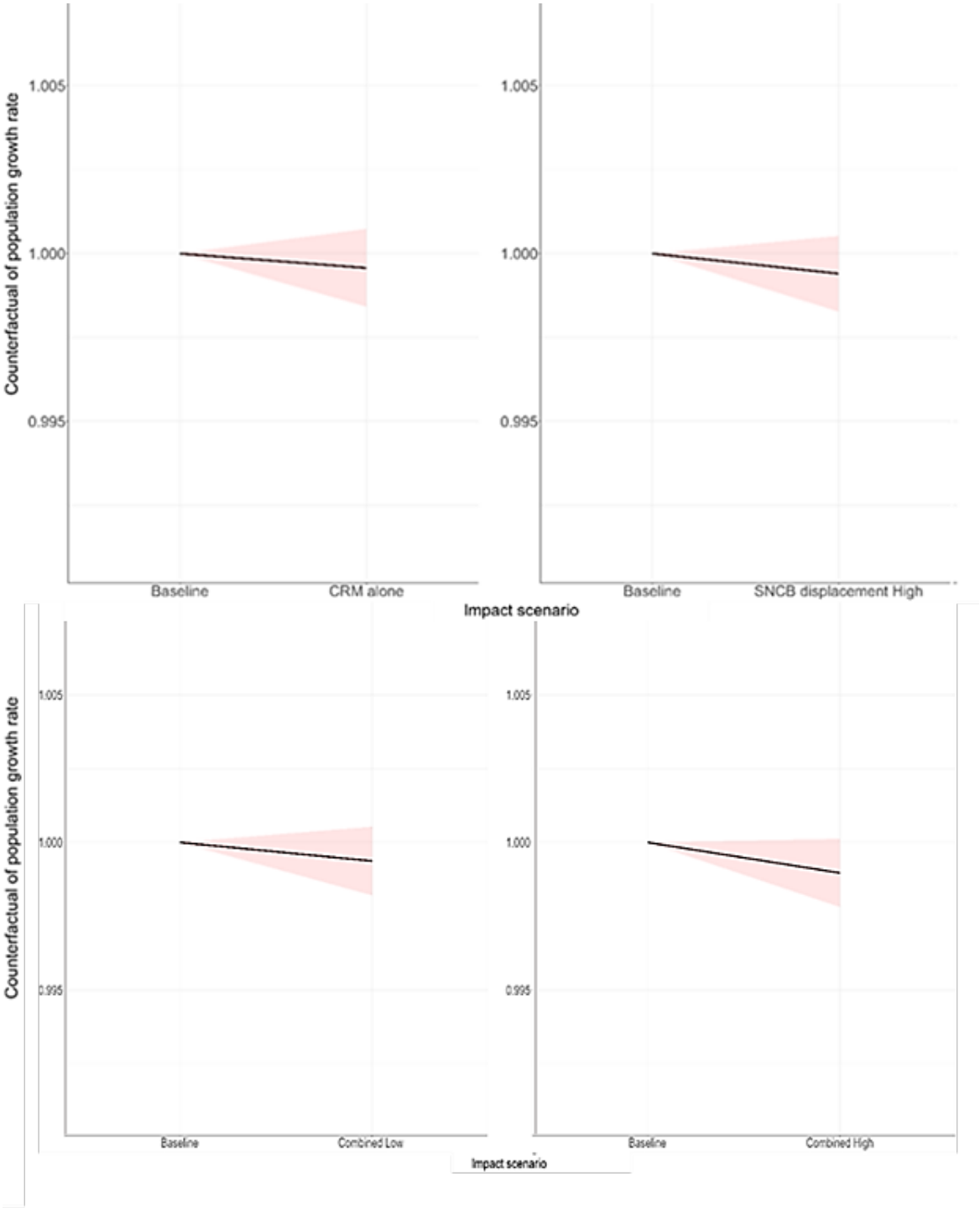

Figure 4-2 Ratio of impacted growth rates after 35 years for the kittiwake population at the Buchan Ness to Collieston coast Special Protection Area under a range of impact scenarios (impact from additional mortalities shown on x-axis). The two points on the line relate to the difference between the baseline and impact scenario modelled, shaded areas define upper and lower confidence limits.

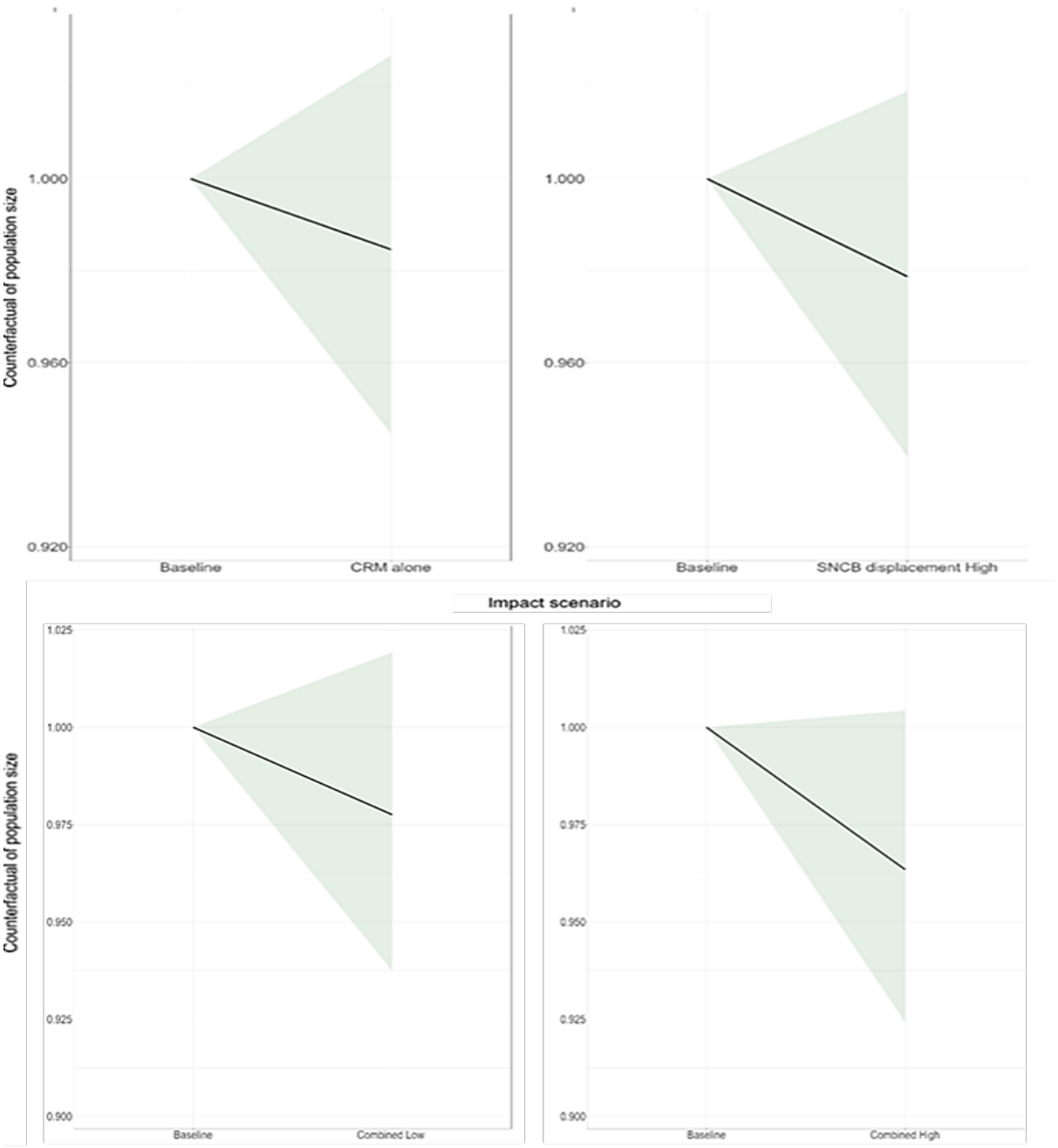

Figure 4-3 The ratio of the median impacted population sizes for the kittiwake population at the Buchan Ness to Collieston coast Special Protection Area from the simulations after 35 years under a range of impact scenarios (impact from additional mortalities shown on x-axis). The two points on the line relate to the difference between the baseline and impact scenario modelled, shaded areas define upper and lower confidence limits.

4.2 Common guillemot:

4.2.1 Buchan Ness to Collieston Coast Special Protection Area;

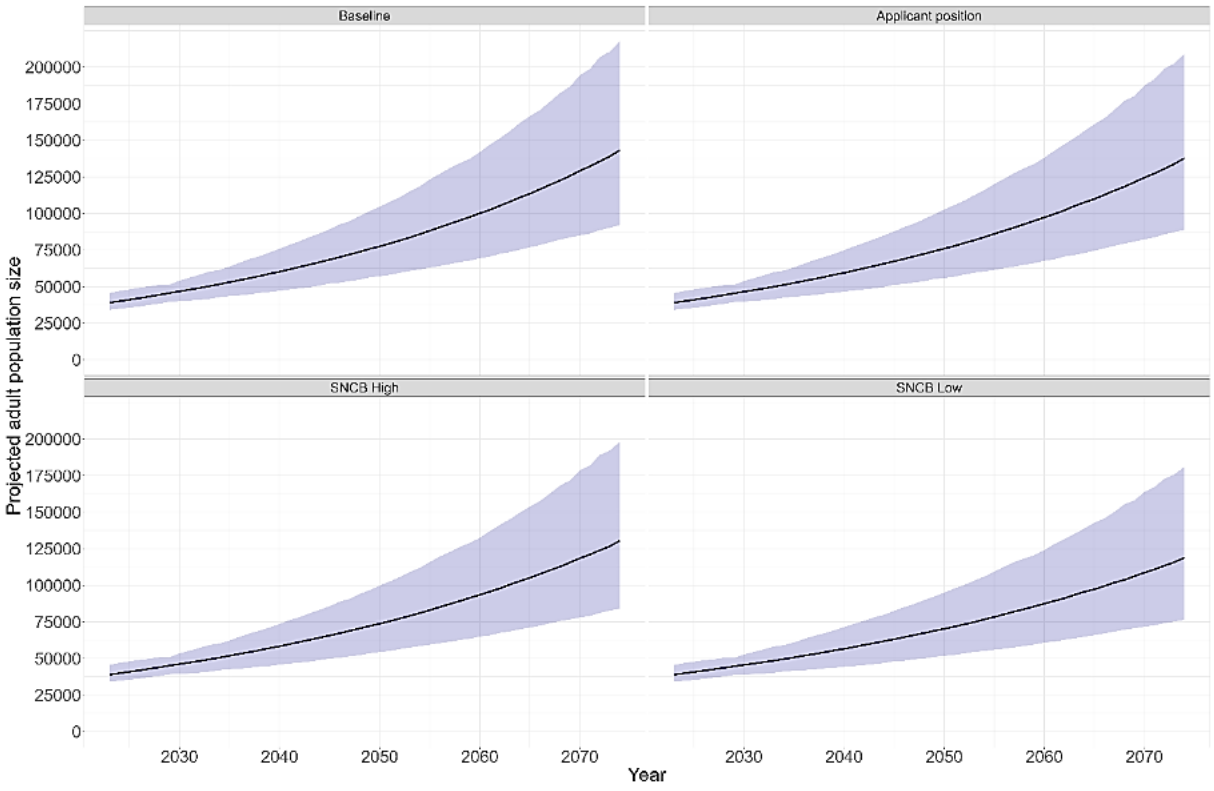

Figure 4-4 Projections of population sizes over a 35-year time-frame for the guillemot population at the Buchan Ness to Collieston Coast Special Protection Area. Each plot represents a different impact scenario in terms of additional adult mortalities (starting at baseline (i.e. unimpacted)). Lines represent median population size and purple areas define upper (97.5%) and lower (2.5%) confidence limits.

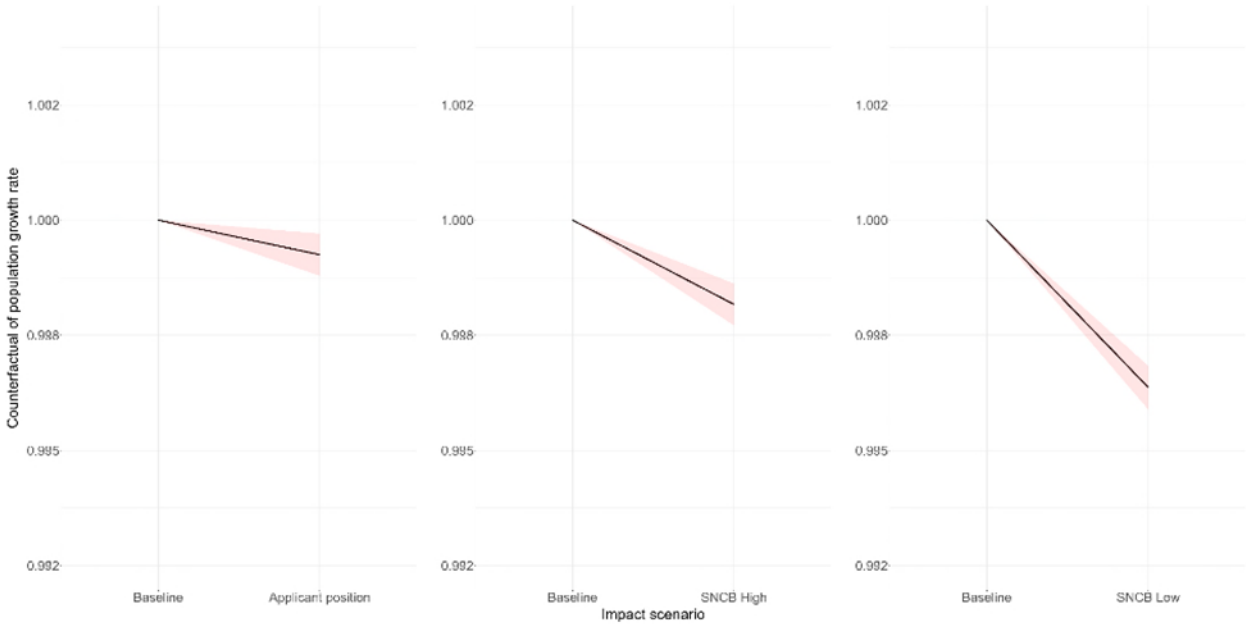

Figure 4-5 Ratio of impacted growth rates after 35 years for the guillemot population at the Buchan Ness to Collieston Coast Special Protection Area under a range of impact scenarios (impact from additional mortalities shown on x-axis). The two points on the line relate to the difference between the baseline and impact scenario modelled, shaded areas define upper and lower confidence limits.

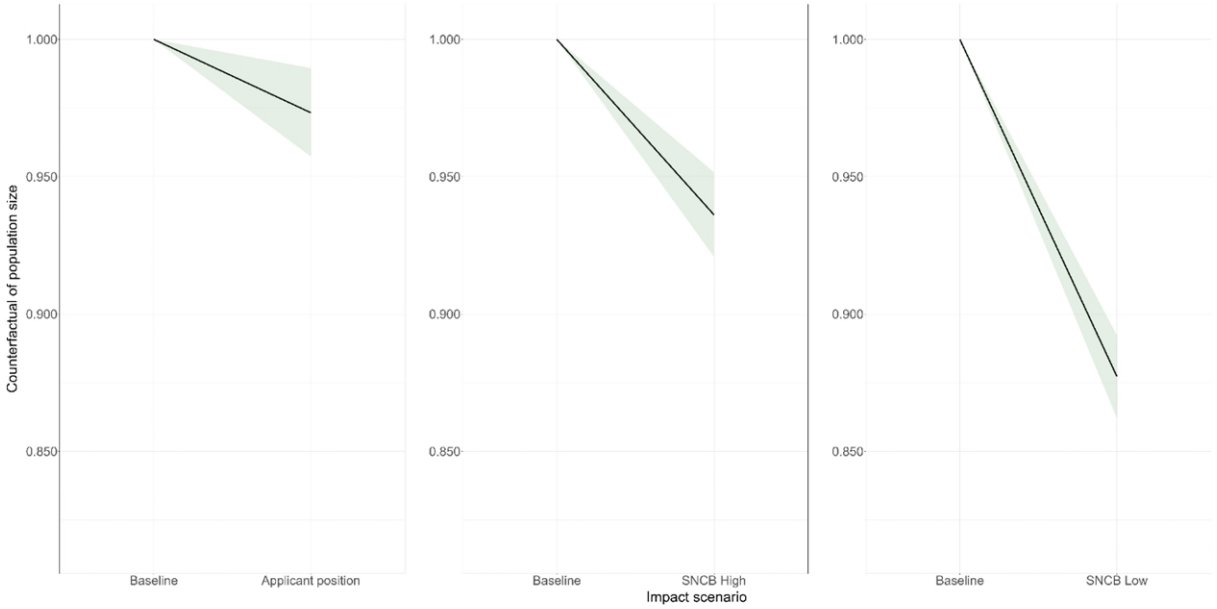

Figure 4-6 The ratio of the median impacted population sizes for the guillemot population at the Buchan Ness to Collieston Coast Special Protection Area from the simulations after 35 years under a range of impact scenarios (impact from additional mortalities shown on x-axis). The two points on the line relate to the difference between the baseline and impact scenario modelled, shaded areas define upper and lower confidence limits.

4.2.2 Troup, Pennan and Lion's Heads Special Protection Area.

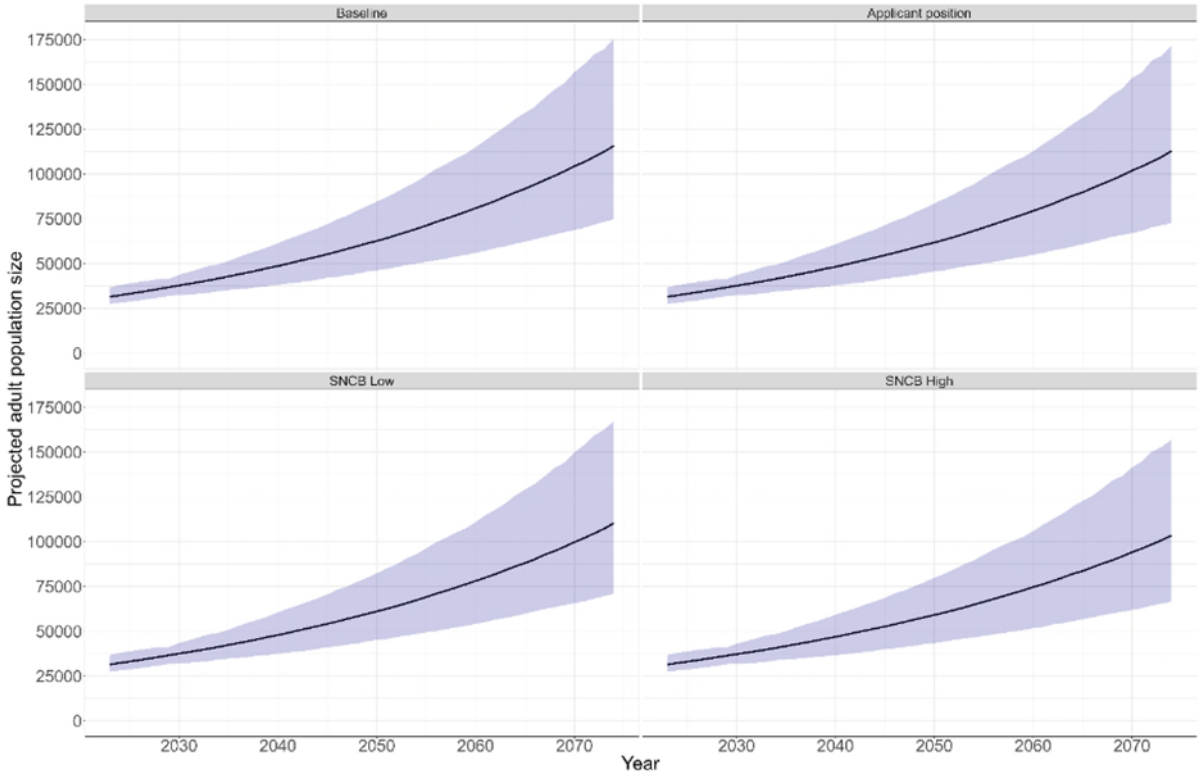

Figure 4-7 Projections of population sizes over a 35-year time-frame for the guillemot population at the Troup, Pennan and Lion's Head Special Protection Area. Each plot represents a different impact scenario in terms of additional adult mortalities (starting at baseline (i.e. unimpacted)). Lines represent median population size and purple areas define upper (97.5%) and lower (2.5%) confidence limits.

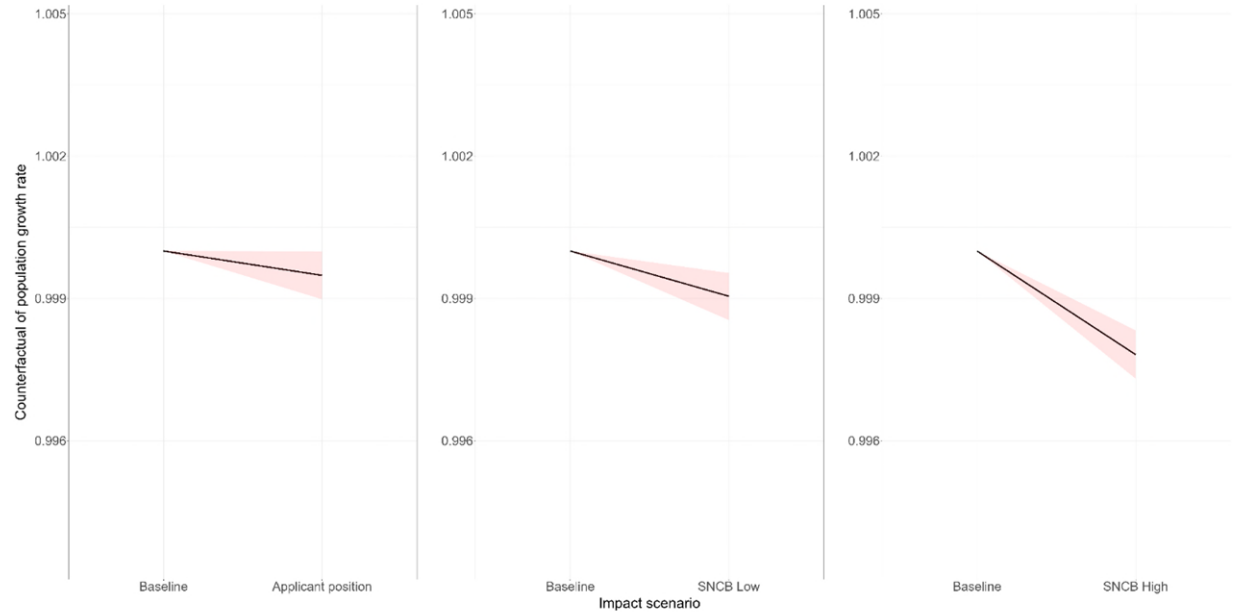

Figure 4-8 Ratio of impacted growth rates after 35 years for the guillemot population at the Troup, Pennan and Lion's Head Special Protection Area under a range of impact scenarios (impact from additional mortalities shown on x-axis). The two points on the line relate to the difference between the baseline and impact scenario modelled, shaded areas define upper and lower confidence limits.

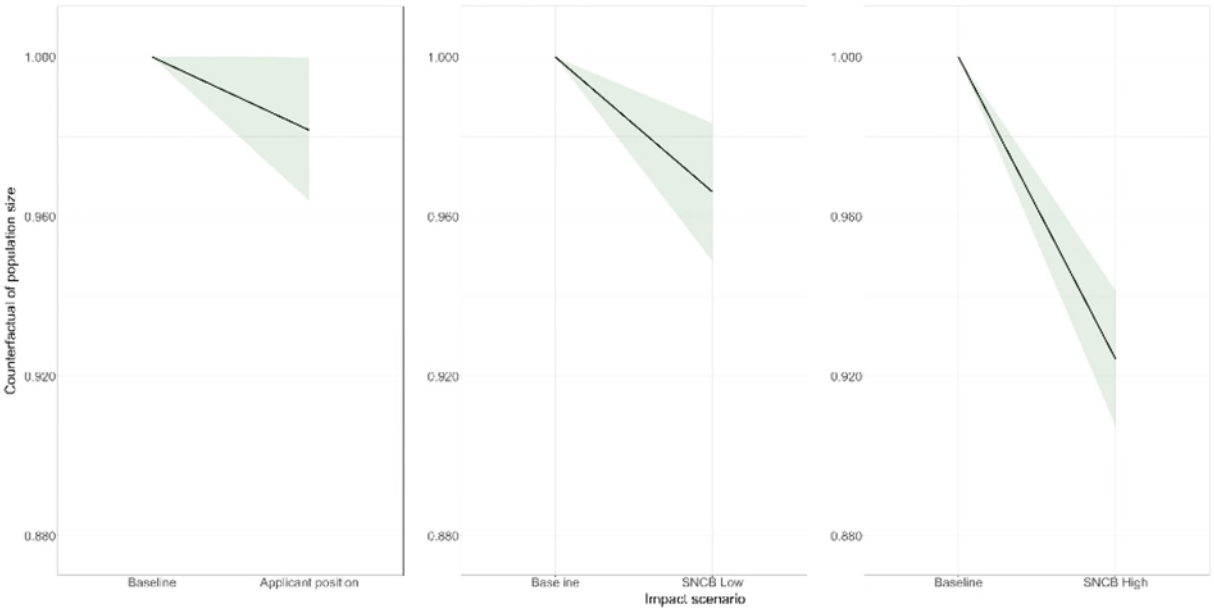

Figure 4-9 The ratio of the median impacted population sizes for the guillemot population at the Troup, Pennan and Lion's Head Special Protection Area from the simulations after 35 years under a range of impact scenarios (impact from additional mortalities shown on x-axis). The two points on the line relate to the difference between the baseline and impact scenario modelled, shaded areas define upper and lower confidence limits.

4.3 Razorbill:

4.3.1 Troup, Pennan and Lion's Heads Special Protection Area;

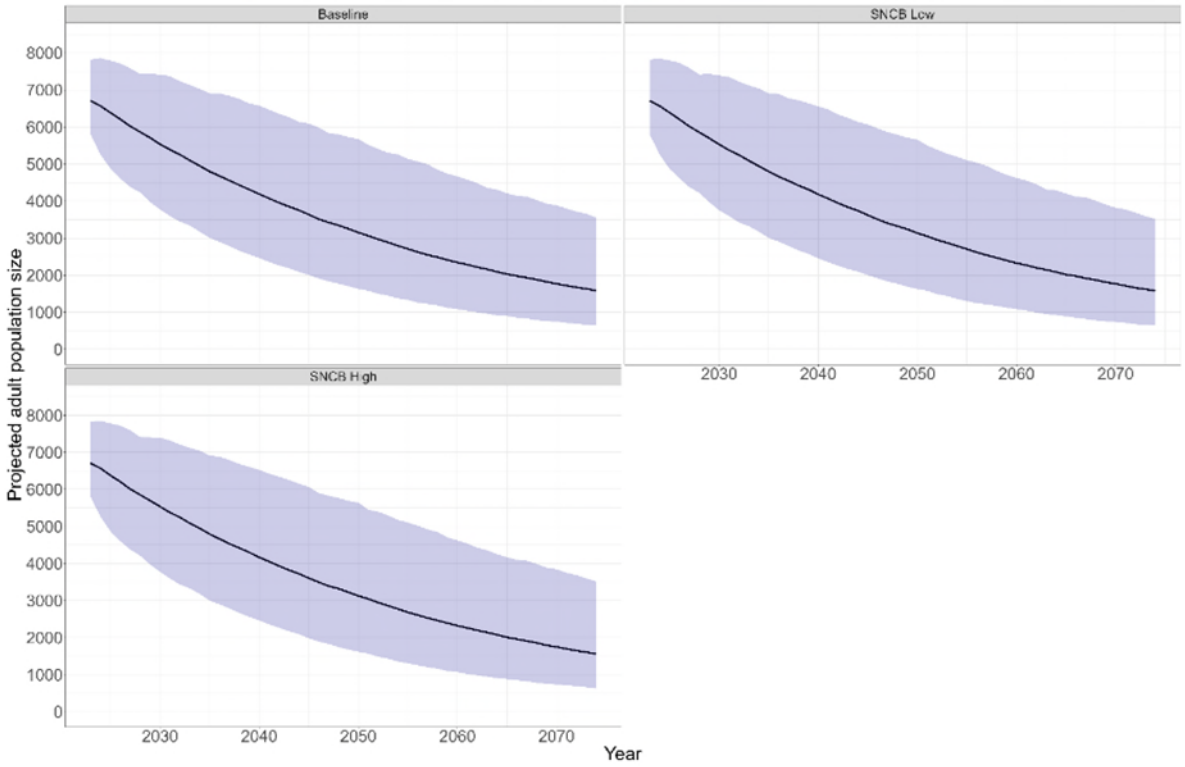

Figure 4-10 Projections of population sizes over a 35-year time-frame for the Razorbill population at the Troup, Pennan and Lion's Head Special Protection Area. Each plot represents a different impact scenario in terms of additional adult mortalities (starting at baseline (i.e. unimpacted)). Lines represent median population size and purple areas define upper (97.5%) and lower (2.5%) confidence limits.

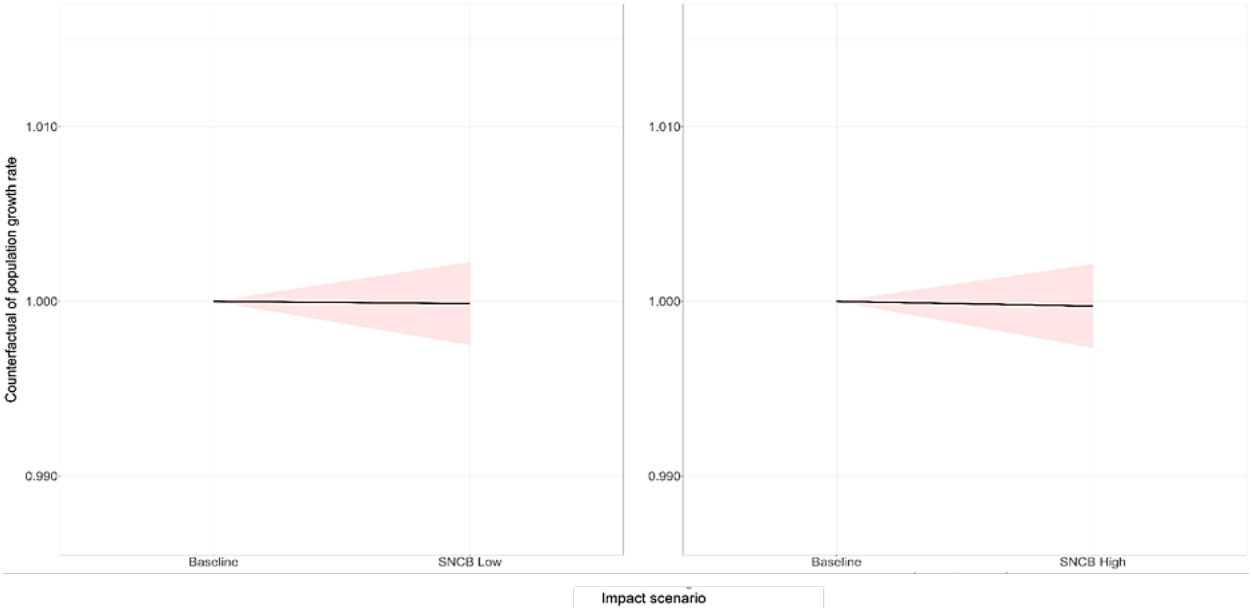

Figure 4-11 Ratio of impacted growth rates after 35 years for the Razorbill population at the Troup, Pennan and Lion's Head Special Protection Area under a range of impact scenarios (impact from additional mortalities shown on x-axis). The two points on the line relate to the difference between the baseline and impact scenario modelled, shaded areas define upper and lower confidence limits.

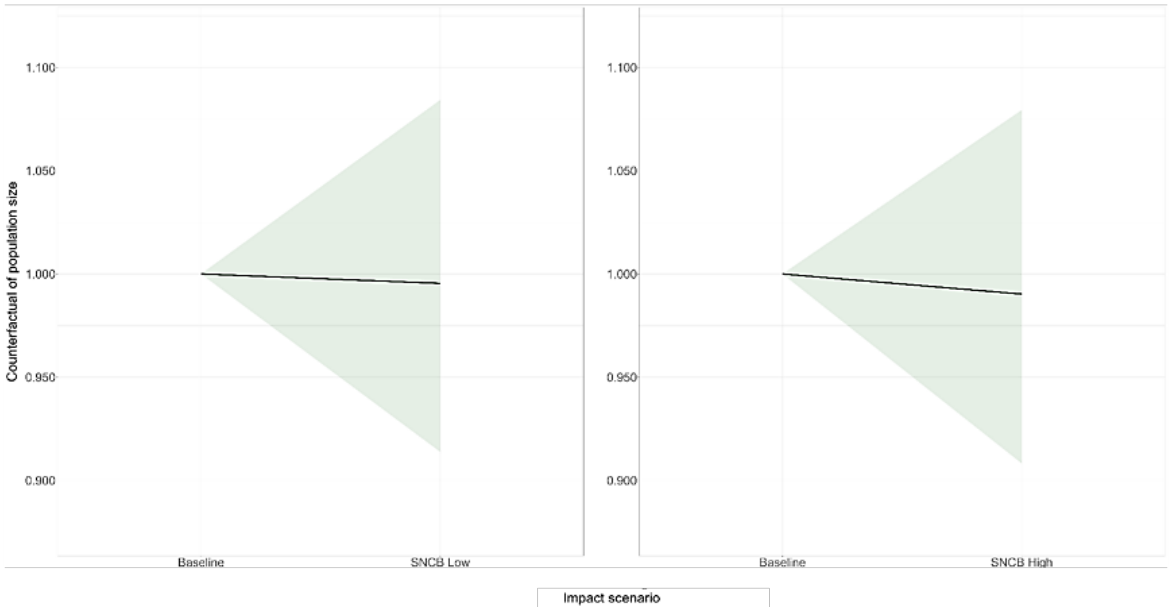

Figure 4-12 The ratio of the median impacted population sizes for the Razorbill population at the Troup, Pennan and Lion's Head Special Protection Area from the simulations after 35 years under a range of impact scenarios (impact from additional mortalities shown on x-axis). The two points on the line relate to the difference between the baseline and impact scenario modelled, shaded areas define upper and lower confidence limits.

4.3.2 Fowlsheugh Special Protection Area.

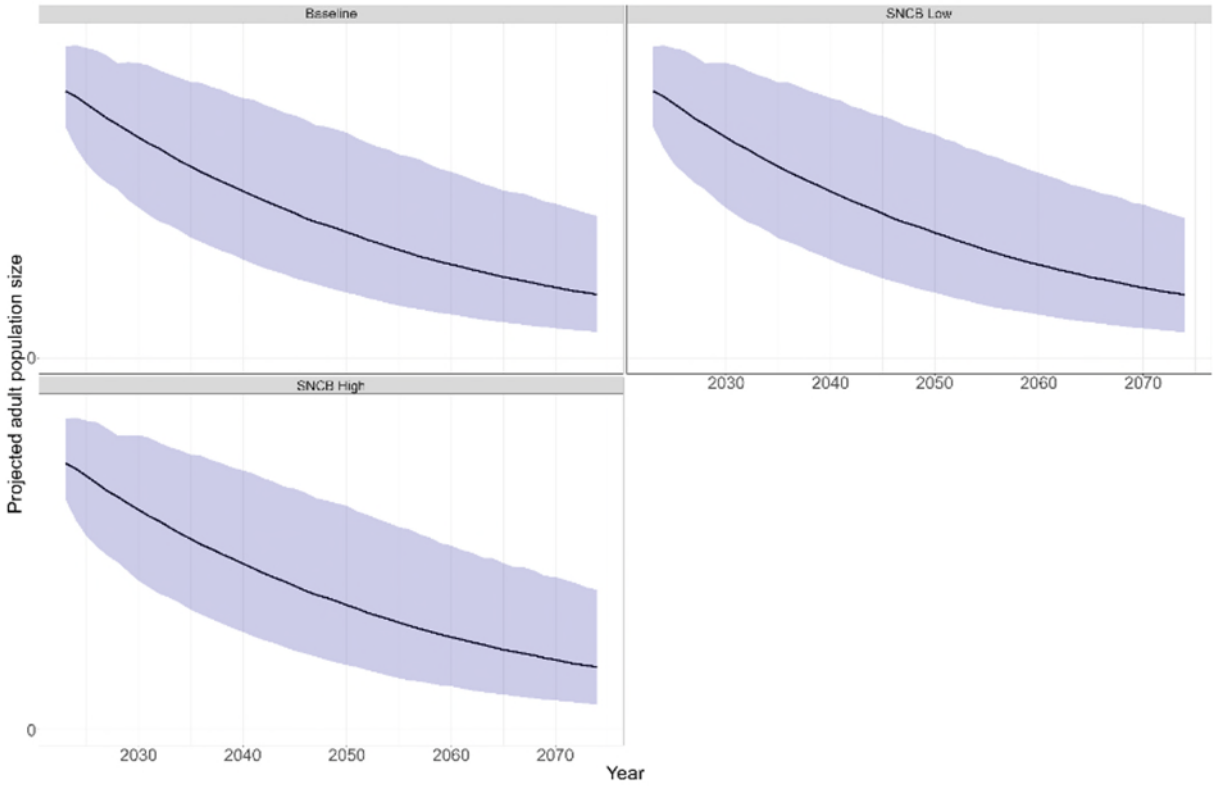

Figure 4-13 Projections of population sizes over a 35-year time-frame for the Razorbill population at the Fowlsheugh Special Protection Area. Each plot represents a different impact scenario in terms of additional adult mortalities (starting at baseline (i.e. unimpacted)). Lines represent median population size and purple areas define upper (97.5%) and lower (2.5%) confidence limits.

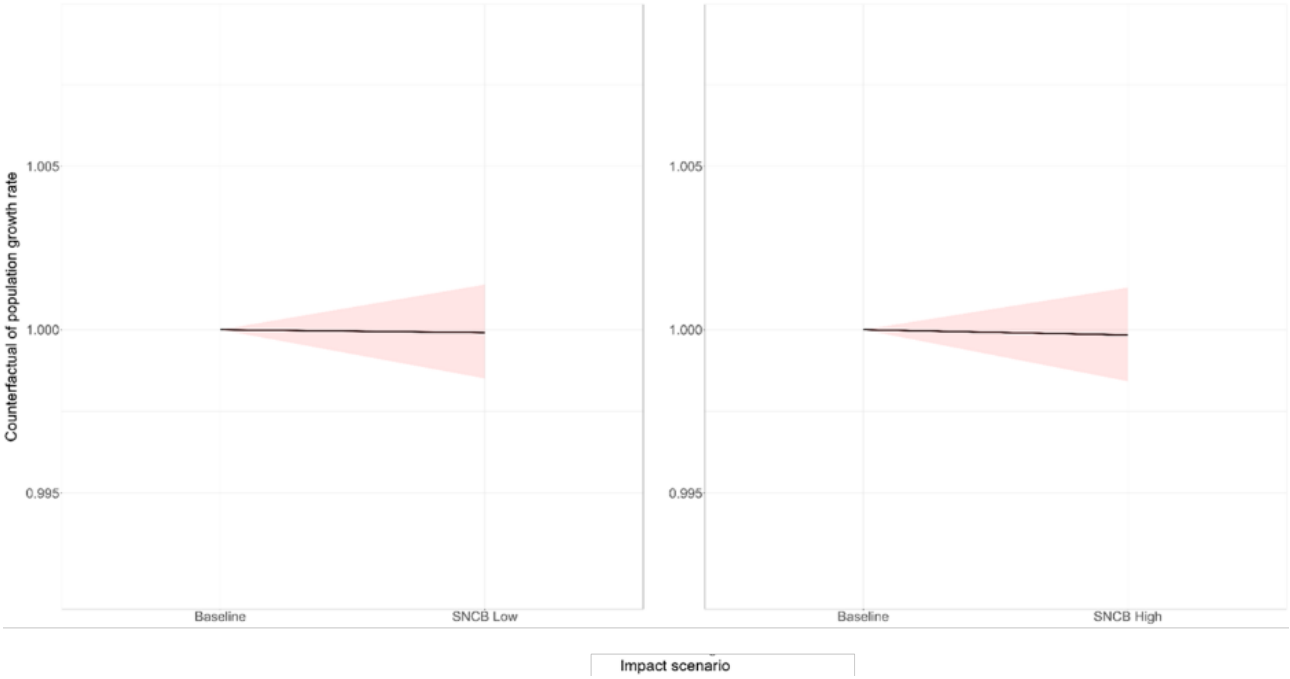

Figure 4-14 Ratio of impacted growth rates after 35 years for the Razorbill population at the Fowlsheugh Special Protection Area under a range of impact scenarios (impact from additional mortalities shown on x-axis). The two points on the line relate to the difference between the baseline and impact scenario modelled, shaded areas define upper and lower confidence limits.

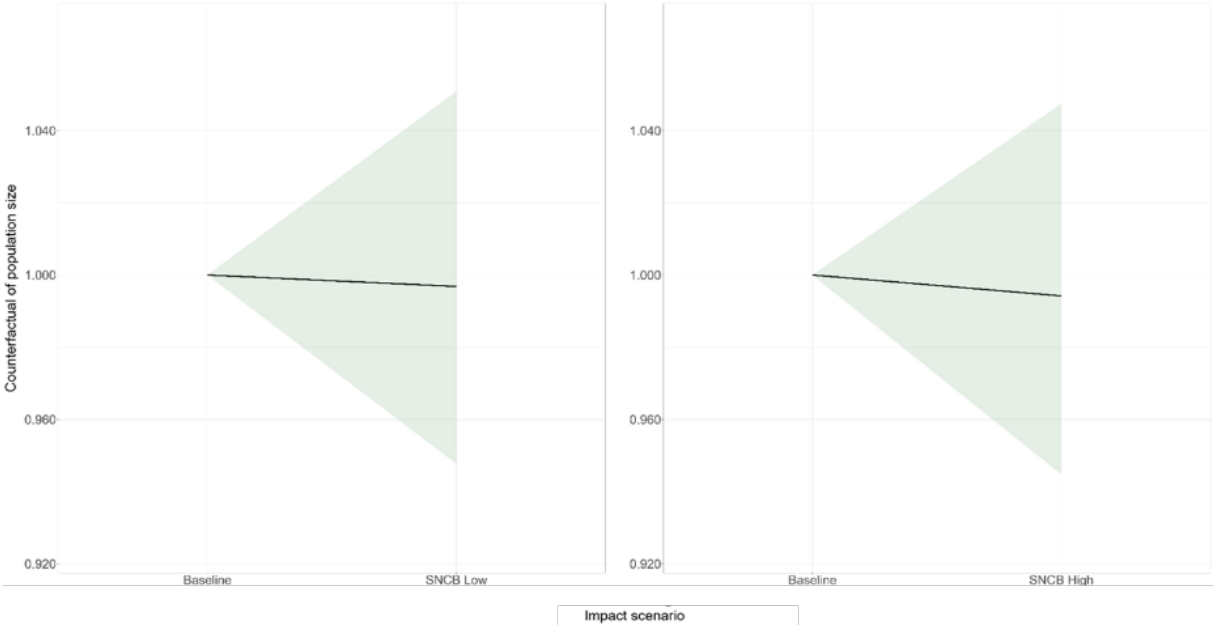

Figure 4-15 The ratio of the median impacted population sizes for the Razorbill population at the Fowlsheugh Special Protection Area from the simulations after 35 years under a range of impact scenarios (impact from additional mortalities shown on x-axis). The two points on the line relate to the difference between the baseline and impact scenario modelled, shaded areas define upper and lower confidence limits.

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Appendix A Seabird Population Viability Analysis Parameter Logs

NEPVA R code

```
========================================================================
  Log Path[redacted]
Working Di
PVA/Seabir
User Name:
R Version: 4.3.2 (2023-10-31 ucrt)
Machine: PC134769 x86-64
Operating System: Windows 10 x64 build 19045
Base Packages: stats graphics grDevices utils datasets methods base Other
Packages: logr_1.3.5 WordR_0.3.6 scales_1.3.0 dplyr_1.1.4 writexl_1.4.2
readxl_1.4.3 popbio_2.7
Log Start Time: 2024-02-08 12:07:39.304116
========================================================================
#-Code1.1-----------------------------------------------------------------
#NEPVA run#####################################################################
run1 <- nepva.simplescenarios(model.envstoch = "betagamma", # env stochasticity from beta distribution
                              model.demostoch = TRUE, # model demographic stochasticity
                              model.dd = "nodd", # ' nodd' = no density dependence
                              model.prodmax = TRUE, # productivity rates constrained to be <= maximum brood size
                              mbs =  p_row$mbs, # maximum brood size, from lookup excel sheet
                              afb = p_row$afb, # age at first breeding, from lookup excel sheet
                              npop = 1, # number of populations
                              nscen = length(impact_name_list), # number of impact scenarios, from lookup excel sheet
                              sim.n = 5000, sim.seed = 4590, nburn = nburn_param, # n simulations, seed number and number of years
                                                                                  # burn in (nburn_param = 5)
                              demobase.specify.as.params = FALSE, # empirical values for prod and surv rather than estimate have not
been used
                              demobase.splitpops = FALSE, # different demographic rates for each subpopulation, ignored if npop=1
                              demobase.splitimmat = TRUE, # different demographic rates specified for immatures = yes, National values
                                                          # used from NEPVA data (see code 1.2 below))
                              demobase.prod = data.frame(Mean=p_row$mn_base_prod, SD = p_row$sd_base_prod), # baseline productivity
                                       # mean(s) and SD(s) # select first row as we batch run site and incombo assessments together
                              demobase.survadult = data.frame(Mean =  p_row$mn_base_adsurv, SD = p_row$sd_base_adsurv), # baseline
                                       #survival mean(s) and SD(s) ## ensure these match local data if specified in excel spreadsheet
                              demobase.survimmat = imm_surv, # baseline survival mean(s) and SD(s) for different immature year groups
                              inipop.years = as.numeric(p_row$yr), # year(s) when initial count was made, from lookup excel sheet
                              inipop.inputformat = "breeding.adults", # initial population size entered as breeding adults ##most
                                                                      # recent pop data (SMP data)
                              inipop.vals = p_row$Count_BrAd, # initial population value(s), from lookup excel sheet
                              impacts.relative = TRUE, # specify relative impacts (% change in population from impact)
                              impacts.splitimmat = FALSE, # different impacts specified for immatures? (no)
                              impacts.year.start = as.numeric (2024), #Year to start impact
                              impacts.year.end =as.numeric (2074), #Year to end impact (50yrs))
                              impacts.splitpops = FALSE,  # different impact rates for each subpopulation, ignored if npop=1
                              impacts.scennames = impact_name_list, # naming impact for reference
                              impacts.prod.mean = 0, # impacts on productivity (0, no prod impacts)
                              impacts.survadult.mean = impact_mean_list,# impacts on adult survival, from lookup excel sheet
                                                                        # $mn_ann_mort_CRM
                              impacts.provideses = FALSE, # whether to provide SEs for impacts (no)
                              impacts.prod.se = 0, # se for productivity impact, no
                              impacts.survadult.se = 0, # se for survival impact, no
                              output.agetype = "breeding.adults", #  output population as breeding adults
                              output.year.end = as.numeric(p_row$yr)+51, # when to end model, 51 years after population count yr, from
                                                                         # lookup excel sheet
                              output.year.start = as.numeric(p_row$yr), # when to start model report from, from lookup excel sheet
                              output.popsize.target = NULL, # don't set output pop target
                              output.popsize.qe = NULL,# don't set output extinction risk target
                              silent = TRUE, # suppress progress text, plots
                              changetablenames = TRUE) # match shiny app table names


#-----------------------------------------------------------------------
#---------------------Code 1.2 ------------------------------------------
#### lookup species' immature survival rates from tool at NATIONAL level
imm_surv<-nepva.calcdefaults(Species = p_row$Species,
                             poolregtype.BS = "Global", poolregion.BS = "Global",
                             sourcepop.surv = "National", lookup.dir = 'File location://')$demobase.survimmat
imm_surv$sd[is.na(imm_surv$sd)]<-mean(imm_surv$sd, na.rm=T) # catch sd NA error, set to other mean of other sd vals

nburn_param=5
if(k=="Herring Gull@Buchan Ness to Collieston Coast"){nburn_param=0} # Turn off burn in for species if pop is too low
-----------------------------------------------------------------------
-----------------------------------------------------------------------
```

NEPVA data input

Table 5-1 Lookup data used in the PVA R script

Species	PVA_site	yr	Count_ BrAd	mn_ann_mort _CRM	mn_base _prod	sd_base _prod	prod_source	mn_base _adsurv	sd_base _adsurv	adsurv_ source	mbs	afb	notes
Black-Legged Kittiwake	Buchan Ness to Collieston Coast	2023	22590	11.64991181	0.5986364	0.3275638	Regional - Buchan Ness to Collieston Coast	0.854	0.077	National - downladed Jan 2024	2	4	Displacement30_3_3
Black-Legged Kittiwake	Buchan Ness to Collieston Coast	2023	22590	11.61826878	0.5986364	0.3275638	Regional - Buchan Ness to Collieston Coast	0.854	0.077	National - downladed Jan 2024	2	4	Displacement30_3_1
Black-Legged Kittiwake	Buchan Ness to Collieston Coast	2023	22590	19.6823756	0.5986364	0.3275638	Regional - Buchan Ness to Collieston Coast	0.854	0.077	National - downladed Jan 2024	2	4	CRM + Displacement 30_3_3
Black-Legged Kittiwake	Buchan Ness to Collieston Coast	2023	22590	11.91576773	0.5986364	0.3275638	Regional - Buchan Ness to Collieston Coast	0.854	0.077	National - downladed Jan 2024	2	4	CRM + Displacement 30_1_1
Black-Legged Kittiwake	Buchan Ness to Collieston Coast	2023	22590	8.03246379	0.5986364	0.3275638	Regional - Buchan Ness to Collieston Coast	0.854	0.077	National - downladed Jan 2024	2	4	CRM_22
Common Guillemot	Buchan Ness to Collieston Coast	2023	39440.22	19.34805958	0.5826832	0.1894517	Global - downladed Jan 2024	0.94	0.025	National	1	6	SNCB_Displacement50_1_1
Common Guillemot	Buchan Ness to Collieston Coast	2023	39440.22	56.05250992	0.5826832	0.1894517	Global - downladed Jan 2024	0.94	0.025	National	1	6	SNCB_Displacement60_3_1
Common Guillemot	Buchan Ness to Collieston Coast	2023	39440.22	69.65301448	0.5826832	0.1894517	Global - downladed Jan 2024	0.94	0.025	National	1	6	SNCB_Displacement60_3_3
Common Guillemot	Buchan Ness to Collieston Coast	2023	39440.22	88.88734834	0.5826832	0.1894517	Global - downladed Jan 2024	0.94	0.025	National	1	6	SNCB_Displacement60_5_1

Species	PVA_site	yr	Count_ BrAd	mn_ann_mort _CRM	mn_base _prod	sd_base _prod	prod_source	mn_base _adsurv	sd_base _adsurv	adsurv_ source	mbs	afb	notes
Common Guillemot	Buchan Ness to Collieston Coast	2023	39440.22	102.4878529	0.5826832	0.1894517	Global - downladed Jan 2024	0.94	0.025	National	1	6	SNCB_Displacement60_5_3
Common Guillemot	Fowlsheugh	2023	93569.52	18.5118764	0.5826832	0.1894517	Global - downladed Jan 2024	0.94	0.025	National	1	6	SNCB_Displacement50_1_1
Common Guillemot	Fowlsheugh	2023	93569.52	22.21425168	0.5826832	0.1894517	Global - downladed Jan 2024	0.94	0.025	National	1	6	SNCB_Displacement60_3_1
Common Guillemot	Fowlsheugh	2023	93569.52	66.64275504	0.5826832	0.1894517	Global - downladed Jan 2024	0.94	0.025	National	1	6	SNCB_Displacement60_3_3
Common Guillemot	Fowlsheugh	2023	93569.52	22.21425168	0.5826832	0.1894517	Global - downladed Jan 2024	0.94	0.025	National	1	6	SNCB_Displacement60_5_1
Common Guillemot	Fowlsheugh	2023	93569.52	66.64275504	0.5826832	0.1894517	Global - downladed Jan 2024	0.94	0.025	National	1	6	SNCB_Displacement60_5_3
Common Guillemot	Troup, Pennan and Lion's Heads	2023	31893.34	18.74246617	0.5826832	0.1894517	Global - downladed Jan 2024	0.94	0.025	National	1	6	SNCB_Displacement50_1_1
Common Guillemot	Troup, Pennan and Lion's Heads	2023	31893.34	32.37051588	0.5826832	0.1894517	Global - downladed Jan 2024	0.94	0.025	National	1	6	SNCB_Displacement60_3_1
Common Guillemot	Troup, Pennan and Lion's Heads	2023	31893.34	67.4728782	0.5826832	0.1894517	Global - downladed Jan 2024	0.94	0.025	National	1	6	SNCB_Displacement60_3_3
Common Guillemot	Troup, Pennan and Lion's Heads	2023	31893.34	42.25007237	0.5826832	0.1894517	Global - downladed Jan 2024	0.94	0.025	National	1	6	SNCB_Displacement60_5_1
Common Guillemot	Troup, Pennan and Lion's Heads	2023	31893.34	77.35243469	0.5826832	0.1894517	Global - downladed Jan 2024	0.94	0.025	National	1	6	SNCB_Displacement60_5_3
Razorbill	Fowlsheugh	2023	18844.42	1.465156816	0.496534452	0.1721675	Global - downladed Jan 2024	0.895	0.067	National - downladed Jan 2024	1	5	SNCB_Displacement60_3_1

Species	PVA_site	yr	Count_ BrAd	mn_ann_mort _CRM	mn_base _prod	sd_base _prod	prod_source	mn_base _adsurv	sd_base _adsurv	adsurv_ source	mbs	afb	notes
Razorbill	Fowlsheugh	2023	18844.42	1.52131819	0.496534452	0.1721675	Global - downladed Jan 2024	0.895	0.067	National - downladed Jan 2024	1	5	SNCB_Displacement60_3_3
Razorbill	Fowlsheugh	2023	18844.42	2.423207568	0.496534452	0.1721675	Global - downladed Jan 2024	0.895	0.067	National - downladed Jan 2024	1	5	SNCB_Displacement60_5_1
Razorbill	Fowlsheugh	2023	18844.42	2.479368943	0.496534452	0.1721675	Global - downladed Jan 2024	0.895	0.067	National - downladed Jan 2024	1	5	SNCB_Displacement60_5_3
Razorbill	Troup, Pennan and Lion's Heads	2023	6643.72	0.947953214	0.496534452	0.1721675	Global - downladed Jan 2024	0.895	0.067	National - downladed Jan 2024	1	5	SNCB_Displacement60_3_1
Razorbill	Troup, Pennan and Lion's Heads	2023	6643.72	0.975741671	0.496534452	0.1721675	Global - downladed Jan 2024	0.895	0.067	National - downladed Jan 2024	1	5	SNCB_Displacement60_3_3
Razorbill	Troup, Pennan and Lion's Heads	2023	6643.72	1.570659205	0.496534452	0.1721675	Global - downladed Jan 2024	0.895	0.067	National - downladed Jan 2024	1	5	SNCB_Displacement60_5_1
Razorbill	Troup, Pennan and Lion's Heads	2023	6643.72	1.598447661	0.496534452	0.1721675	Global - downladed Jan 2024	0.895	0.067	National - downladed Jan 2024	1	5	SNCB_Displacement60_5_3

(Further information is appended in full Lookup excel sheet: PVA_lookup_salamander_Alone_Final.xlsx)