



Cerulean Winds Aspen Project Limited

Aspen Offshore Wind Farm

Environmental Impact Assessment Report and Habitats Regulations
Appraisal Addendum

Appendix 3: Population Viability Analysis (PVA) Technical Report





Revision	Date	Status	Author:	Checked by:	Approved by:
1.0	Feb 2026	Final	GoBe Consultants Limited	Cerulean Winds Aspen Project Limited	Cerulean Winds Aspen Project Limited



1	Introduction	8
1.1	Project Background.....	8
1.2	Purpose of This Document	8
1.3	Population Viability Analysis.....	8
1.4	Additional Information Requested	9
	Environmental Impact Assessment Report.....	9
	Report to Inform Appropriate Assessment.....	9
2	Population Viability Analysis Methodology	10
2.1	Overview	10
2.2	Model Parameters	10
	Demographic Rates and Reference Populations	10
3	Population Viability Analysis Results	14
3.1	Overview	14
3.2	Environmental Impact Assessment Report	15
	Guillemot	15
3.3	Report to Inform Appropriate Assessment	18
	Kittiwake – Buchan Ness to Collieston Coast SPA.....	18
	Kittiwake – Troup, Pennan and Lion’s Heads SPA.....	19
	Kittiwake – Fowlsheugh SPA	20
	Kittiwake – East Caithness Cliffs SPA	21
	Kittiwake – North Caithness Cliffs SPA.....	22
	Kittiwake – Forth Islands SPA.....	23
	Great black-backed gull – Copinsay SPA	24
	Great black-backed gull – Hoy SPA	25
	Great black-backed gull – Calf of Eday SPA.....	26
	Guillemot - Buchan Ness to Collieston Coast SPA.....	27
	Guillemot – Troup, Pennan and Lion’s Heads SPA.....	28
	Guillemot - Fowlsheugh SPA	29
	Razorbill - Troup, Pennan and Lion’s Head SPA	30
	Puffin - Forth Islands SPA	31
	Gannet – Fair Isle SPA	32
	Gannet – Sule Skerry and Sule Stack SPA	33



Gannet – North Rona and Sula Sgeir SPA	34
Gannet – St Kilda SPA.....	35
4 References	36
Annex A Parameter Logs	37
A.1 Kittiwake	37
Buchan Ness to Collieston Coast SPA.....	37
Troup, Pennan and Lion’s Heads SPA	39
Fowlsheugh SPA	41
East Caithness Cliffs SPA	43
North Caithness Cliffs SPA.....	45
Forth Islands SPA.....	47
A.2 Great black-backed gull.....	49
Copinsay SPA.....	49
Hoy SPA	51
Calf of Eday SPA	53
A.3 Guillemot.....	55
Breeding	55
Non-breeding	57
Annual Total - Regional	59
Buchan Ness to Collieston Coast SPA.....	61
Troup, Pennan and Lion’s Heads SPA	63
Fowlsheugh SPA	65
A.4 Razorbill.....	67
Troup, Pennan and Lion’s Heads SPA	67
A.5 Puffin.....	69
Forth Islands SPA.....	69
A.6 Gannet.....	71
Fair Isle SPA.....	71
Sule Skerry and Sule Stack SPA	73
North Rona and Sula Sgeir SPA	75
St Kilda SPA	77



Tables

Table 2.1 Summary of SPA Demographic Parameters Selected for Guillemot EIA Re-assessment..... 11

Table 2.2 Summary of SPA Demographic Parameters Selected for RIAA PVA Species 12

Table 3.1 Guillemot Breeding Season PVA Results 15

Table 3.2 Guillemot Non-Breeding Season PVA Results 16

Table 3.3 Guillemot Annual Total PVA Results Using The Regional Population Estimate 17

Table 3.4 Kittiwake PVA Results for Buchan Ness to Collieston Coast SPA 18

Table 3.5 Kittiwake PVA Results for Troup, Pennan and Lion's Heads SPA 19

Table 3.6 Kittiwake PVA Results for Fowlsheugh SPA..... 20

Table 3.7 Kittiwake PVA Results for East Caithness Cliffs SPA 21

Table 3.8 Kittiwake PVA Results for North Caithness Cliffs SPA 22

Table 3.9 Kittiwake PVA Results for Forth Islands SPA 23

Table 3.10 Great Black-backed Gull PVA Results for Copinsay SPA 24

Table 3.11 Great Black-backed Gull PVA Results for Hoy SPA 25

Table 3.12 Great Black-backed Gull PVA Results for Calf of Eday SPA 26

Table 3.13 Guillemot PVA Results for Buchan Ness to Collieston Coast SPA 27

Table 3.14 Guillemot PVA Results for Troup, Pennan and Lion's Heads SPA 28

Table 3.15 Guillemot PVA Results for Fowlsheugh SPA..... 29

Table 3.16 Razorbill PVA Results for Troup, Pennan and Lion's Heads SPA 30

Table 3.17 Puffin PVA Results for Forth Islands SPA..... 31

Table 3.18 Gannet PVA Results for Fair Isle SPA..... 32

Table 3.19 Gannet PVA Results for Sule Skerry and Sule Stack SPA 33

Table 3.20 Gannet PVA Results for North Rona and Sula Sgeir SPA 34

Table 3.21 Gannet PVA Results for St Kilda SPA 35



Defined Terms

Term	Definition
Addendum	The document which supplements the submitted Offshore Environmental Impact Assessment Report and Report to Inform Appropriate Assessment by providing additional environmental information and clarifications in response to the MD-LOT Request for Additional Information.
Applicant	Cerulean Winds Aspen Project Limited.
Apportioning	Apportioning estimates what proportion of a recorded bird population within a development area originates from specific breeding or non-breeding colonies or Special Protection Area.
Aspen Array Area	The area in which the generation infrastructure for Aspen Offshore Wind Farm, including Wind Turbine Generators, and Offshore Substation Platforms will be located
Cumulative	Cumulative assessment (EIA terminology) assesses whether potential impacts from other plans or projects, proposed or current, when combined with the Proposed Development potential impacts, will result significant effect.
In-combination	The in-combination assessment (RIAA terminology) assesses whether potential impacts from other plans or projects, proposed or current, when combined with the Proposed Developments potential impacts, will result in adverse effects on the integrity of the designated site.
Offshore Wind Farm (OWF)	The proposed generation infrastructure comprising of Wind Turbine Generators and associated, Offshore Substation Platforms(s), foundations and substructures and Inter-array Cables.
Project	Aspen Offshore Wind Farm - comprises the wind farm and all associated offshore and onshore components.
Proposed Development	The offshore components of the Project (Aspen Offshore Wind Farm) which include all offshore infrastructure associated with Aspen Array Area and the Offshore Transmission Cables.
Population Viability Analysis	Modelled assessment used to estimate the population level effects of predicted impacts, either alone or cumulatively/in-combination with impacts from other developments.



Abbreviations

Abbreviation	Definition
AEoSI	Adverse Effect on Site Integrity
BB	Berwick Bank
BTO	British Trust for Ornithology
CGR	Counterfactual Growth Rate
CPS	Counterfactual Population Size
ECPCC	Excluding consented projects committed to compensation
EIA	Environmental Impact Assessment
EIAR	Environmental Impact Assessment Report
DAS	Digital Aerial Surveys
HRA	Habitat Regulations Appraisal
IACs	Inter-array Cables
IND	Individuals
MD-LOT	Marine Directorate -Licensing Operations Team
OSPs	Offshore Substation Platforms
OTCs	Offshore Transmission Cables
OWF	Offshore Wind Farm
PVA	Population Viability Analysis
SD	Standard Deviation
SMP	Seabird Monitoring Programme
SPA	Special Protection Area
WTG	Wind Turbine Generators



1 Introduction

1.1 Project Background

- 1.1.1 Cerulean Winds Aspen Project Limited (hereafter referred to as the ‘Applicant’) is proposing to develop the Aspen Offshore Wind Farm (OWF) (hereafter ‘the Project’) located approximately 84 kilometres (km) east of Peterhead, Aberdeenshire. The Project includes both onshore and offshore components, with the offshore infrastructure associated with the Project located seaward of Mean High Water Springs (MHWS), hereafter referred to as the ‘Proposed Development’. The Proposed Development consists of the Aspen Array Area, covering an area of approximately 333 kilometres squared (km²), and the Offshore Transmission Cable Corridor (OTC Corridor) to Landfall.
- 1.1.2 The Proposed Development is located within the Aspen Lease Area which lies entirely within Scottish Territorial Waters. The offshore infrastructure of the Proposed Development includes Wind Turbine Generators (WTGs) and associated Floating Foundations, Offshore Substation Platform(s) (OSP(s)) and associated foundations, the Inter-link Cables, Inter-array Cables (IACs), Offshore Transmission Cables (OTCs) and Landfall.

1.2 Purpose of This Document

- 1.2.1 This document details the ornithological updates submitted in response to the NatureScot and Marine Directorate - Licensing Operations Team (MD-LOT) request for Additional Information, specifically technical details around Population Viability Analysis (PVA) (see Section 1.4). The background information relating to, and methodology used to undertake PVA for the Aspen Array Area are presented herein. Further detail on the outputs for the requested suite of PVA and amendments to the apportioning approach for guillemot, as well as the numbers used to inform in-combination PVA where this was requested, can be found within **Appendix 2: Offshore Ornithology EIA and RIAA** of this Addendum.

1.3 Population Viability Analysis

- 1.3.1 Marine renewable energy developments, such as OWFs, have the potential to impact seabirds through impact pathways such as distributional responses and collision with turbine blades. These pathways impact seabirds at an individual level and have the potential to affect the productivity of a population, and/or increase baseline mortality within a population. Part of the Environmental Impact Assessment (EIA) processes includes the assessment of these potential effects at a range of population scales. In addition, the Habitat Regulations Appraisal (HRA) process includes the assessment of these potential effects with respect to individual Special Protection Area (SPA) colonies and the wider population.



- 1.3.2 For species predicted to have high mortality rates due to distributional responses and/or collision risk, the population-level consequences must be explored. PVA is used to estimate the population level effects of predicted impacts, either alone or cumulatively/in-combination with impacts from other developments. PVA provides a robust, simplistic framework using demographic parameters to project future population trends under different scenarios over a set period. Comparisons are made between a 'baseline' scenario (allowing the population to follow its "natural" growth rate based on a range of assumptions) with 'impacted' scenario(s) where an impact is applied to a population by the alteration of demographic parameters, such as survival based on predicted OWF impacts or productivity.
- 1.3.3 PVA has been carried out to update the RIAA assessment in order to inform conclusions of Adverse effect on Site Integrity (AEoSI), assessing the predicted mortalities at impacted SPAs. Results and methods are presented alongside each other in Section 2.

1.4 Additional Information Requested

Environmental Impact Assessment Report

- 1.4.1 NatureScot requested that the PVAs for cumulative impacts on guillemot be re-run using the extended foraging range approach of 153.7 km. This is to ensure consistency between methodologies applied to other OWF projects located further offshore. As a result, the regional population was recalculated to incorporate colony counts from SPAs that fall within the extended foraging range. For detail on the methodology and the colonies included see **Appendix 2: Offshore Ornithology EIAR and RIAA Updates** of this Addendum.

Report to Inform Appropriate Assessment

- 1.4.2 As part of its representation, NatureScot noted that it currently does not have sufficient information to fully assess the potential for AEoSI arising from in-combination impacts across several species and SPAs. To address this, NatureScot requires in-combination PVAs for the following:
- Puffin - Forth Islands SPA;
 - Guillemot - Fowlsheugh SPA; Troup, Pennan and Lion's Head SPA;
 - Great black-backed gull - Calf of Eday SPA; Copinsay SPA; Hoy SPA;
 - Gannet - Fair Isle SPA; North Rona and Sula Sgeir SPA; St Kilda SPA; Sule Skerry and Sule Stack SPA;
 - Kittiwake - East Caithness Cliffs SPA; Forth Islands SPA; North Caithness Cliffs SPA; Troup, Pennan and Lion's Head SPA;
 - Razorbill - Troup, Pennan and Lion's Head SPA; and
 - Any species/site combinations where the predicted impacts from the Proposed Development are between 0.2 and 1.0 birds per annum.



2 Population Viability Analysis Methodology

2.1 Overview

- 2.1.1 This section provides an overview of the methodological approach used to update and run the PVAs undertaken to support the Additional Information requested for the Proposed Development. The methodology follows the principles and structure presented within **Volume 3, Appendix 12.6: Offshore Ornithology Population Viability Analysis Technical Report** of the Offshore EIAR and applies updated demographic information, colony counts and impact scenarios where required.

2.2 Model Parameters

Demographic Rates and Reference Populations

- 2.2.1 Survival and productivity rates were obtained from Horswill and Robinson (2015), following NatureScot guidance. For great black-backed gull, the juvenile survival rates from 1-2 to 4-5 have been taken from herring gull, as suggested by the author, due to limited data for this species. For gannet and puffin, productivity rates more relevant to the SPAs being assessed were available through the Natural England PVA Tool (Natural England, 2022), with the Northern North Sea value used for gannet and Isle of May for puffin.
- 2.2.2 The most recent robust population counts were considered, extracted from the Seabird Monitoring Programme (SMP) online database (British Trust for Ornithology (BTO), 2026) to allow assessment on the most up to date population estimate. The population values were then used to estimate the impact on survival rate at individual SPAs.
- 2.2.3 The demographic parameters and populations selected for the EIA updates are presented in Table 2.1, while the parameters and SPA colony counts included to the updated RIAA PVA are presented in Table 2.2.



Table 2.1 Summary of SPA Demographic Parameters Selected for Guillemot EIA Re-assessment

Species	Regional Population (year)	Adult Survival Rate (SD)	Productivity Rate (SD)	Survival 0-1 (SD)	Survival 1-2 (SD)	Survival 2-3 (SD)	Survival 3-4 (SD)	Survival 4-5 (SD)	Survival 5-6 (SD)
Guillemot	274,189 (2023)	0.939 (0.15)	0.672 (0.147)	0.560 (0.058)	0.792 (0.152)	0.917 (0.098)	0.917 (0.098)	0.939 (0.015)	0.939 (0.015)

Source: Horswill and Robinson (2015).



Table 2.2 Summary of SPA Demographic Parameters Selected for RIAA PVA Species

Species	Colony	SMP Count of Colony Breeding Adults (year)	Adult Survival Rate (SD)	Productivity Rate (SD)	Survival 0-1 (SD)	Survival 1-2 (SD)	Survival 2-3 (SD)	Survival 3-4 (SD)	Survival 4-5 (SD)	Survival 5-6 (SD)
Kittiwake	Buchan Ness to Collieston Coast SPA	31,046 (2025)	0.854 (0.051)	0.690 (0.296)	0.790 (0.051)	0.854 (0.051)	0.854 (0.051)	0.854 (0.051)	-	-
	Troup, Pennan and Lion's Head SPA	19,706 (2023)	0.854 (0.051)	0.690 (0.296)	0.790 (0.051)	0.854 (0.051)	0.854 (0.051)	0.854 (0.051)	-	-
	East Caithness Cliffs SPA	36,562 (2024)	0.854 (0.051)	0.690 (0.296)	0.790 (0.051)	0.854 (0.051)	0.854 (0.051)	0.854 (0.051)	-	-
	North Caithness Cliffs SPA	13,918 (2024)	0.854 (0.051)	0.690 (0.296)	0.790 (0.051)	0.854 (0.051)	0.854 (0.051)	0.854 (0.051)	-	-
	Forth Islands SPA	16,070 (2025)	0.854 (0.051)	0.690 (0.296)	0.790 (0.051)	0.854 (0.051)	0.854 (0.051)	0.854 (0.051)	-	-
Great black-backed gull	Copinsay SPA	34 (2025)	0.930 (<0.001)	1.139 (0.533)	0.798 (0.092)	0.834 (0.034)	0.854 (0.034)	0.854 (0.034)	0.854 (0.034)	-
	Hoy SPA	12 (2024)	0.930 (<0.001)	1.139 (0.533)	0.798 (0.092)	0.834 (0.034)	0.854 (0.034)	0.854 (0.034)	0.854 (0.034)	-
	Calf of Eday	28 (2025)	0.930 (<0.001)	1.139 (0.533)	0.798 (0.092)	0.834 (0.034)	0.854 (0.034)	0.854 (0.034)	0.854 (0.034)	-
Guillemot	Buchan Ness to Collieston Coast SPA	24,795 (2025)	0.939 (0.015)	0.672 (0.147)	0.560 (0.058)	0.792 (0.034)	0.917 (0.022)	0.939 (0.015)	0.939 (0.015)	0.939 (0.015)
	Troup, Pennan and Lion's Head SPA	30,663 (2023)	0.939 (0.015)	0.672 (0.147)	0.560 (0.058)	0.792 (0.034)	0.917 (0.022)	0.939 (0.015)	0.939 (0.015)	0.939 (0.015)
	Fowlsheugh SPA	81,054 (2023)	0.939 (0.015)	0.672 (0.147)	0.560 (0.058)	0.792 (0.034)	0.917 (0.022)	0.939 (0.015)	0.939 (0.015)	0.939 (0.015)



Species	Colony	SMP Count of Colony Breeding Adults (year)	Adult Survival Rate (SD)	Productivity Rate (SD)	Survival 0-1 (SD)	Survival 1-2 (SD)	Survival 2-3 (SD)	Survival 3-4 (SD)	Survival 4-5 (SD)	Survival 5-6 (SD)
Razorbill	Troup, Pennan and Lion's Head SPA	4,812 (2023)	0.895 (0.067)	0.570 (0.247)	0.630 (0.209)	0.630 (0.209)	0.895 (0.067)	0.895 (0.067)	0.895 (0.067)	-
Puffin	Forth Islands SPA	117,960 (2024)	0.919 (0.042)	0.642 (0.135)	0.709 (0.108)	0.709 (0.108)	0.709 (0.108)	0.760 (0.093)	0.805 (0.083)	-
Gannet	Fair Isle SPA	6,860 (2025)	0.919 (0.042)	0.715 (0.076)	0.424 (0.007)	0.829 (0.004)	0.891 (0.003)	0.895 (0.003)	0.919 (0.042)	-
	North Rona and Sula Sgeir PSA	18,990 (2023)	0.919 (0.042)	0.715 (0.076)	0.424 (0.007)	0.829 (0.004)	0.891 (0.003)	0.895 (0.003)	0.919 (0.042)	-
	St Kilda SPA	118,410 (2023)	0.919 (0.042)	0.715 (0.076)	0.424 (0.007)	0.829 (0.004)	0.891 (0.003)	0.895 (0.003)	0.919 (0.042)	-
	Sule Skerry and Sule Stack SPA	15,648 (2024)	0.919 (0.042)	0.715 (0.076)	0.424 (0.007)	0.829 (0.004)	0.891 (0.003)	0.895 (0.003)	0.919 (0.042)	-

Source: Horswill and Robinson (2015) and SMP Colony Counts (BTO, 2026).



3 Population Viability Analysis Results

3.1 Overview

- 3.1.1 This section provides the tabulated PVA results for requested updates to the EIAR (Section 3.2) and RIAA (Section 3.3). In-combination scenarios as part of the RIAA updates include the Guidance Approach (High and Low) with (1) all projects, (2) excluding consented projects committed to compensation (ECPCC) and (3) without Berwick Bank (BB).
- 3.1.2 Full parameter logs for all PVA model runs are provided in Annex A.

3.2 Environmental Impact Assessment Report

Guillemot

Breeding

Table 3.1 Guillemot Breeding Season PVA Results

Scenario	Estimated Mortalities	Impact on Adult Survival	25 Years		35 Years		50 Years	
			Median Counterfactual Growth Rate (CGR) (SD)	Median Counterfactual Population Size (CPS) (SD)	Median CGR (SD)	Median CPS (SD)	Median CGR (SD)	Median CPS (SD)
Project Alone								
Applicant	2.32	0.000008	1.000 (<0.001)	1.000 (0.004)	1.000 (<0.001)	1.000 (0.004)	1.000 (<0.001)	1.000 (0.004)
NS Low	8.35	0.000030	1.000 (<0.001)	0.999 (0.004)	1.000 (<0.001)	0.999 (0.004)	1.000 (<0.001)	0.998 (0.004)
NS High	13.92	0.000051	1.000 (<0.001)	0.998 (0.004)	1.000 (<0.001)	0.998 (0.004)	1.000 (<0.001)	0.997 (0.004)
Cumulative								
Applicant	1,251.01	0.004563	0.995 (<0.001)	0.875 (0.003)	0.995 (<0.001)	0.831 (0.004)	0.995 (<0.001)	0.769 (0.004)
NS Low	4,503.65	0.016425	0.982 (<0.001)	0.616 (0.003)	0.982 (<0.001)	0.511 (0.002)	0.982 (<0.001)	0.386 (0.002)
NS High	7,506.08	0.027376	0.969 (<0.001)	0.443 (0.002)	0.969 (<0.001)	0.324 (0.002)	0.969 (<0.001)	0.203 (0.001)



Non-breeding

Table 3.2 Guillemot Non-Breeding Season PVA Results

Scenario	Estimated Mortalities	Impact on Adult Survival	25 Years		35 Years		50 Years	
			Median CGR (SD)	Median CPS (SD)	Median CGR (SD)	Median CPS (SD)	Median CGR (SD)	Median CPS (SD)
Project Alone								
Applicant	25.20	0.000092	1.000 (<0.001)	0.997 (0.004)	1.000 (<0.001)	0.996 (0.004)	1.000 (<0.001)	0.995 (0.004)
NS Low	30.24	0.000110	1.000 (<0.001)	0.997 (0.004)	1.000 (<0.001)	0.996 (0.004)	1.000 (<0.001)	0.994 (0.004)
NS High	90.71	0.000331	1.000 (<0.001)	0.990 (0.004)	1.000 (<0.001)	0.987 (0.004)	1.000 (<0.001)	0.981 (0.004)
Cumulative								
Applicant	1,109.74	0.004047	0.995 (<0.001)	0.888 (0.004)	0.995 (<0.001)	0.849 (0.004)	0.995 (<0.001)	0.792 (0.004)
NS Low	1,331.69	0.004857	0.995 (<0.001)	0.867 (0.004)	0.995 (<0.001)	0.821 (0.004)	0.995 (<0.001)	0.756 (0.004)
NS High	3,995.08	0.014571	0.984 (<0.001)	0.651 (0.003)	0.984 (<0.001)	0.552 (0.003)	0.984 (<0.001)	0.430 (0.002)



Annual Total - Regional

Table 3.3 Guillemot Annual Total PVA Results Using The Regional Population Estimate

Scenario	Estimated Mortalities	Impact on Adult Survival	25 Years		35 Years		50 Years	
			Median CGR (SD)	Median CPS (SD)	Median CGR (SD)	Median CPS (SD)	Median CGR (SD)	Median CPS (SD)
Project Alone								
Applicant	27.52	0.000100	1.000 (<0.001)	0.997 (0.004)	1.000 (<0.001)	0.996 (0.004)	1.000 (<0.001)	0.994 (0.004)
NS Low	38.59	0.000141	1.000 (<0.001)	0.996 (0.004)	1.000 (<0.001)	0.994 (0.004)	1.000 (<0.001)	0.992 (0.004)
NS High	104.63	0.000382	1.000 (<0.001)	0.989 (0.004)	1.000 (<0.001)	0.985 (0.004)	1.000 (<0.001)	0.978 (0.004)
Cumulative								
Applicant	2,360.76	0.008610	0.990 (<0.001)	0.776 (0.003)	0.990 (<0.001)	0.704 (0.003)	0.990 (<0.001)	0.609 (0.003)
NS Low	5,835.34	0.021282	0.976 (<0.001)	0.533 (0.003)	0.976 (<0.001)	0.418 (0.002)	0.976 (<0.001)	0.291 (0.002)
NS High	11,501.16	0.041946	0.953 (<0.001)	0.285 (0.002)	0.953 (<0.001)	0.175 (0.001)	0.953 (<0.001)	0.085 (<0.001)



3.3 Report to Inform Appropriate Assessment

Kittiwake – Buchan Ness to Collieston Coast SPA

Annual Total

Table 3.4 Kittiwake PVA Results for Buchan Ness to Collieston Coast SPA

Scenario	Estimated Mortalities	Impact on Adult Survival	25 Years		35 Years		50 Years	
			Median CGR (SD)	Median CPS (SD)	Median CGR (SD)	Median CPS (SD)	Median CGR (SD)	Median CPS (SD)
Project Alone								
Guidance Low Approach	1.18	0.000038	1.000 (<0.001)	0.999 (0.019)	1.000 (<0.001)	0.999 (0.021)	1.000 (<0.001)	0.998 (0.024)
Guidance High Approach	1.31	0.000042	1.000 (<0.001)	0.998 (0.019)	1.000 (<0.001)	0.998 (0.021)	1.000 (<0.001)	0.998 (0.024)
In-combination								
Guidance Low Approach - All Projects	94.90	0.003022	0.996 (<0.001)	0.911 (0.017)	0.996 (<0.001)	0.879 (0.019)	0.996 (<0.001)	0.833 (0.020)
Guidance High Approach - All Projects	133.56	0.004253	0.995 (<0.001)	0.877 (0.017)	0.995 (<0.001)	0.834 (0.018)	0.995 (<0.001)	0.773 (0.019)
Guidance Low Approach - ECPC	32.98	0.001050	0.999 (<0.001)	0.968 (0.018)	0.999 (<0.001)	0.956 (0.020)	0.999 (<0.001)	0.939 (0.022)
Guidance High Approach - ECPC	41.96	0.001336	0.998 (<0.001)	0.960 (0.018)	0.998 (<0.001)	0.945 (0.020)	0.998 (<0.001)	0.923 (0.022)
Guidance Low Approach – Without BB	82.29	0.002620	0.997 (<0.001)	0.922 (0.018)	0.997 (<0.001)	0.893 (0.019)	0.997 (<0.001)	0.853 (0.020)
Guidance High Approach – Without BB	116.46	0.003708	0.996 (<0.001)	0.892 (0.017)	0.996 (<0.001)	0.854 (0.018)	0.996 (<0.001)	0.799 (0.020)



Kittiwake – Troup, Pennan and Lion’s Heads SPA

Annual Total

Table 3.5 Kittiwake PVA Results for Troup, Pennan and Lion's Heads SPA

Scenario	Estimated Mortalities	Impact on Adult Survival	25 Years		35 Years		50 Years	
			Median CGR (SD)	Median CPS (SD)	Median CGR (SD)	Median CPS (SD)	Median CGR (SD)	Median CPS (SD)
Project Alone								
Guidance Low Approach	0.37	0.000019	1.000 (<0.001)	1.000 (0.025)	1.000 (<0.001)	1.000 (0.028)	1.000 (<0.001)	1.000 (0.031)
Guidance High Approach	0.41	0.000021	1.000 (<0.001)	0.999 (0.025)	1.000 (<0.001)	0.999 (0.027)	1.000 (<0.001)	0.999 (0.031)
In-combination								
Guidance Low Approach - All Projects	91.01	0.004618	0.995 (<0.001)	0.868 (0.022)	0.995 (<0.001)	0.822 (0.023)	0.995 (<0.001)	0.757 (0.024)
Guidance High Approach - All Projects	132.31	0.006714	0.992 (<0.001)	0.813 (0.021)	0.992 (<0.001)	0.751 (0.021)	0.992 (<0.001)	0.667 (0.022)
Guidance Low Approach - ECPC	28.78	0.001460	0.998 (<0.001)	0.956 (0.024)	0.998 (<0.001)	0.940 (0.026)	0.998 (<0.001)	0.916 (0.029)
Guidance High Approach - ECPC	41.93	0.002128	0.998 (<0.001)	0.937 (0.024)	0.997 (<0.001)	0.914 (0.026)	0.997 (<0.001)	0.880 (0.028)
Guidance Low approach – Without BB	80.21	0.004070	0.995 (<0.001)	0.882 (0.022)	0.995 (<0.001)	0.841 (0.024)	0.995 (<0.001)	0.782 (0.025)
Guidance High approach – Without BB	117.22	0.005948	0.993 (<0.001)	0.833 (0.021)	0.993 (<0.001)	0.776 (0.022)	0.993 (<0.001)	0.698 (0.023)



Kittiwake – Fowlsheugh SPA

Annual Total

Table 3.6 Kittiwake PVA Results for Fowlsheugh SPA

Scenario	Estimated Mortalities	Impact on Adult Survival	25 Years		35 Years		50 Years	
			Median CGR (SD)	Median CPS (SD)	Median CGR (SD)	Median CPS (SD)	Median CGR (SD)	Median CPS (SD)
Project Alone								
Guidance Low Approach	1.03	0.000033	1.000 (<0.001)	0.999 (0.019)	1.000 (<0.001)	0.998 (0.021)	1.000 (<0.001)	0.997 (0.024)
Guidance High Approach	1.14	0.000037	1.000 (<0.001)	0.999 (0.020)	1.000 (<0.001)	0.998 (0.022)	1.000 (<0.001)	0.997 (0.025)
In-combination								
Guidance Low Approach - All Projects	196.29	0.006339	0.993 (<0.001)	0.822 (0.017)	0.993 (<0.001)	0.762 (0.017)	0.993 (<0.001)	0.681 (0.017)
Guidance High Approach - All Projects	263.32	0.008504	0.990 (<0.001)	0.769 (0.016)	0.990 (<0.001)	0.695 (0.016)	0.990 (<0.001)	0.597 (0.016)
Guidance Low Approach - ECPC	77.13	0.002491	0.997 (<0.001)	0.926 (0.018)	0.997 (<0.001)	0.899 (0.020)	0.997 (<0.001)	0.860 (0.021)
Guidance High Approach - ECPC	107.77	0.003480	0.996 (<0.001)	0.898 (0.018)	0.996 (<0.001)	0.862 (0.019)	0.996 (<0.001)	0.810 (0.020)
Guidance Low Approach – Without BB	114.06	0.003683	0.996 (<0.001)	0.893 (0.018)	0.996 (<0.001)	0.854 (0.019)	0.996 (<0.001)	0.800 (0.020)
Guidance High Approach – Without BB	159.72	0.005158	0.994 (<0.001)	0.853 (0.017)	0.994 (<0.001)	0.802 (0.018)	0.994 (<0.001)	0.732 (0.019)



Kittiwake – East Caithness Cliffs SPA

Annual Total

Table 3.7 Kittiwake PVA Results for East Caithness Cliffs SPA

Scenario	Estimated Mortalities	Impact on Adult Survival	25 Years		35 Years		50 Years	
			Median CGR (SD)	Median CPS (SD)	Median CGR (SD)	Median CPS (SD)	Median CGR (SD)	Median CPS (SD)
Project Alone								
Guidance Low Approach	0.72	0.000020	1.000 (<0.001)	0.999 (0.018)	1.000 (<0.001)	0.999 (0.020)	1.000 (<0.001)	0.999 (0.022)
Guidance High Approach	0.82	0.000022	1.000 (<0.001)	0.999 (0.018)	1.000 (<0.001)	0.999 (0.020)	1.000 (<0.001)	0.998 (0.022)
In-combination								
Guidance Low Approach - All Projects	283.65	0.007758	0.991 (<0.001)	0.787 (0.015)	0.991 (<0.001)	0.718 (0.015)	0.991 (<0.001)	0.625 (0.015)
Guidance High Approach - All Projects	427.39	0.011689	0.986 (<0.001)	0.697 (0.013)	0.986 (<0.001)	0.606 (0.013)	0.986 (<0.001)	0.492 (0.012)
Guidance Low Approach - ECPC	124.85	0.003415	0.996 (<0.001)	0.900 (0.017)	0.996 (<0.001)	0.864 (0.018)	0.996 (<0.001)	0.814 (0.019)
Guidance High Approach - ECPC	198.31	0.005424	0.994 (<0.001)	0.846 (0.016)	0.994 (<0.001)	0.793 (0.016)	0.994 (<0.001)	0.720 (0.017)
Guidance Low Approach – Without BB	259.95	0.007110	0.992 (<0.001)	0.803 (0.015)	0.992 (<0.001)	0.738 (0.016)	0.992 (<0.001)	0.650 (0.016)
Guidance High Approach – Without BB	393.29	0.010757	0.987 (<0.001)	0.717 (0.014)	0.987 (<0.001)	0.631 (0.014)	0.987 (<0.001)	0.521 (0.013)



Kittiwake – North Caithness Cliffs SPA

Annual Total

Table 3.8 Kittiwake PVA Results for North Caithness Cliffs SPA

Scenario	Estimated Mortalities	Impact on Adult Survival	25 Years		35 Years		50 Years	
			Median CGR (SD)	Median CPS (SD)	Median CGR (SD)	Median CPS (SD)	Median CGR (SD)	Median CPS (SD)
Project Alone								
Guidance Low Approach	0.44	0.000032	1.000 (0.001)	0.999 (0.029)	1.000 (<0.001)	0.999 (0.032)	1.000 (<0.001)	0.998 (0.036)
Guidance High Approach	0.50	0.000036	1.000 (0.001)	0.999 (0.029)	1.000 (<0.001)	0.999 (0.032)	1.000 (<0.001)	0.998 (0.037)
In-combination								
Guidance Low Approach - All Projects	58.94	0.004235	0.995 (0.001)	0.877 (0.026)	0.995 (<0.001)	0.834 (0.028)	0.995 (<0.001)	0.774 (0.029)
Guidance High Approach - All Projects	80.72	0.005800	0.993 (0.001)	0.835 (0.025)	0.993 (<0.001)	0.780 (0.026)	0.993 (<0.001)	0.704 (0.027)
Guidance Low Approach - ECPC	17.16	0.001233	0.999 (0.001)	0.963 (0.027)	0.999 (<0.001)	0.949 (0.030)	0.999 (<0.001)	0.928 (0.034)
Guidance High Approach - ECPC	20.63	0.001482	0.998 (0.001)	0.956 (0.028)	0.998 (<0.001)	0.939 (0.031)	0.998 (<0.001)	0.915 (0.034)
Guidance Low Approach – Without BB	53.10	0.003815	0.996 (0.001)	0.889 (0.026)	0.995 (<0.001)	0.850 (0.027)	0.995 (<0.001)	0.795 (0.030)
Guidance High Approach – Without BB	72.28	0.005193	0.994 (0.001)	0.852 (0.025)	0.994 (<0.001)	0.802 (0.027)	0.994 (<0.001)	0.731 (0.028)



Kittiwake – Forth Islands SPA

Annual Total

Table 3.9 Kittiwake PVA Results for Forth Islands SPA

Scenario	Estimated Mortalities	Impact on Adult Survival	25 Years		35 Years		50 Years	
			Median CGR (SD)	Median CPS (SD)	Median CGR (SD)	Median CPS (SD)	Median CGR (SD)	Median CPS (SD)
Project Alone								
Guidance Low Approach	0.21	0.000013	1.000 (<0.001)	1.000 (0.027)	1.000 (<0.001)	1.000 (0.030)	1.000 (<0.001)	0.999 (0.034)
Guidance High Approach	0.24	0.000015	1.000 (<0.001)	1.000 (0.027)	1.000 (<0.001)	0.999 (0.030)	1.000 (<0.001)	0.999 (0.034)
In-combination								
Guidance Low Approach - All Projects	60.33	0.003754	0.996 (<0.001)	0.891 (0.024)	0.996 (<0.001)	0.852 (0.026)	0.996 (<0.001)	0.797 (0.028)
Guidance High Approach - All Projects	84.89	0.005283	0.994 (<0.001)	0.850 (0.023)	0.994 (<0.001)	0.798 (0.024)	0.994 (<0.001)	0.726 (0.025)
Guidance Low Approach - ECPC	22.77	0.001417	0.998 (<0.001)	0.958 (0.025)	0.998 (<0.001)	0.942 (0.028)	0.998 (<0.001)	0.918 (0.031)
Guidance High Approach - ECPC	35.62	0.002217	0.997 (<0.001)	0.934 (0.025)	0.997 (<0.001)	0.910 (0.028)	0.997 (<0.001)	0.875 (0.031)
Guidance Low Approach – Without BB	33.07	0.002058	0.998 (<0.001)	0.938 (0.025)	0.998 (<0.001)	0.915 (0.028)	0.998 (<0.001)	0.882 (0.030)
Guidance High Approach – Without BB	50.53	0.003144	0.996 (0.001)	0.908 (0.025)	0.996 (<0.001)	0.874 (0.027)	0.996 (<0.001)	0.827 (0.029)



Great black-backed gull – Copinsay SPA

Annual Total

Table 3.10 Great Black-backed Gull PVA Results for Copinsay SPA

Scenario	Estimated Mortalities	Impact on Adult Survival	25 Years		35 Years		50 Years	
			Median CGR (SD)	Median CPS (SD)	Median CGR (SD)	Median CPS (SD)	Median CGR (SD)	Median CPS (SD)
Project Alone								
Project Alone	0.00	0.000014	1.000 (0.012)	0.995 (0.355)	1.000 (0.009)	0.998 (0.368)	1.000 (0.006)	0.999 (0.374)
In-combination								
In-combination	0.18	0.005311	0.994 (0.012)	0.842 (0.321)	0.994 (0.009)	0.796 (0.314)	0.994 (0.006)	0.727 (0.290)
In-combination - ECPC	0.18	0.005311	0.994 (0.012)	0.848 (0.314)	0.994 (0.009)	0.800 (0.307)	0.994 (0.006)	0.733 (0.284)
In-combination - Without BB	0.18	0.005311	0.994 (0.012)	0.849 (0.316)	0.994 (0.009)	0.793 (0.310)	0.994 (0.006)	0.726 (0.285)



Great black-backed gull – Hoy SPA

Annual Total

Table 3.11 Great Black-backed Gull PVA Results for Hoy SPA

Scenario	Estimated Mortalities	Impact on Adult Survival	25 Years		35 Years		50 Years	
			Median CGR (SD)	Median CPS (SD)	Median CGR (SD)	Median CPS (SD)	Median CGR (SD)	Median CPS (SD)
Project Alone								
Project Alone	0.00	0.000008	1.000 (0.036)	1.000 (1.153)	1.000 (0.033)	1.000 (1.083)	1.000 (0.031)	1.004 (1.311)
In-combination								
In-combination	0.12	0.010286	0.987 (0.041)	0.722 (0.862)	0.988 (0.038)	0.644 (0.780)	0.988 (0.046)	0.543 (0.856)
In-combination - ECPC	0.12	0.010286	0.988 (0.044)	0.738 (0.879)	0.988 (0.041)	0.650 (0.721)	0.988 (0.041)	0.546 (0.758)
In-combination - Without BB	0.12	0.010286	0.988 (0.052)	0.732 (0.789)	0.988 (0.049)	0.645 (0.695)	0.988 (0.048)	0.546 (0.644)



Great black-backed gull – Calf of Eday SPA

Annual Total

Table 3.12 Great Black-backed Gull PVA Results for Calf of Eday SPA

Scenario	Estimated Mortalities	Impact on Adult Survival	25 Years Median CGR (SD)	Median CPS (SD)	35 Years Median CGR (SD)	Median CPS (SD)	50 Years Median CGR (SD)	Median CPS (SD)
Project Alone								
Project Alone	0.00	0.000021	1.000 (0.013)	0.992 (0.416)	1.000 (0.010)	0.994 (0.427)	1.000 (0.007)	0.991 (0.432)
In-combination								
In-combination	0.10	0.003413	0.996 (0.014)	0.907 (0.384)	0.996 (0.010)	0.865 (0.385)	0.996 (0.007)	0.820 (0.366)
In-combination - ECPC	0.10	0.003413	0.996 (0.013)	0.906 (0.382)	0.996 (0.010)	0.873 (0.379)	0.996 (0.007)	0.821 (0.363)
In-combination - Without BB	0.10	0.003413	0.996 (0.014)	0.903 (0.385)	0.996 (0.010)	0.867 (0.383)	0.996 (0.007)	0.812 (0.365)



Guillemot - Buchan Ness to Collieston Coast SPA

Annual Total

Table 3.13 Guillemot PVA Results for Buchan Ness to Collieston Coast SPA

Scenario	Estimated Mortalities	Impact on Adult Survival	25 Years		35 Years		50 Years	
			Median CGR (SD)	Median CPS (SD)	Median CGR (SD)	Median CPS (SD)	Median CGR (SD)	Median CPS (SD)
Project Alone								
Guidance Low Approach	5.54	0.000224	1.000 (<0.001)	0.994 (0.012)	1.000 (<0.001)	0.991 (0.013)	1.000 (<0.001)	0.987 (0.014)
Guidance High Approach	15.03	0.000606	0.999 (<0.001)	0.983 (0.012)	0.999 (<0.001)	0.975 (0.014)	0.999 (<0.001)	0.965 (0.014)
In-combination								
Guidance Low Approach - All Projects	333.74	0.013460	0.985 (<0.001)	0.685 (0.009)	0.985 (<0.001)	0.579 (0.009)	0.985 (<0.001)	0.460 (0.008)
Guidance High Approach - All Projects	692.07	0.027912	0.969 (<0.001)	0.453 (0.007)	0.969 (<0.001)	0.319 (0.006)	0.969 (<0.001)	0.198 (0.004)
Guidance Low Approach - ECPC	333.74	0.013460	0.985 (<0.001)	0.685 (0.009)	0.985 (<0.001)	0.579 (0.009)	0.985 (<0.001)	0.460 (0.008)
Guidance High Approach - ECPC	692.07	0.027912	0.969 (<0.001)	0.453 (0.007)	0.969 (<0.001)	0.319 (0.005)	0.969 (<0.001)	0.198 (0.004)
Guidance Low approach - Without BB	324.14	0.013073	0.985 (<0.001)	0.692 (0.009)	0.985 (<0.001)	0.588 (0.009)	0.985 (<0.001)	0.471 (0.008)
Guidance High approach - Without BB	670.60	0.027046	0.970 (<0.001)	0.465 (0.007)	0.970 (<0.001)	0.331 (0.006)	0.970 (<0.001)	0.208 (0.004)



Guillemot – Troup, Pennan and Lion’s Heads SPA

Annual Total

Table 3.14 Guillemot PVA Results for Troup, Pennan and Lion’s Heads SPA

Scenario	Estimated Mortalities	Impact on Adult Survival	25 Years		35 Years		50 Years	
			Median CGR (SD)	Median CPS (SD)	Median CGR (SD)	Median CPS (SD)	Median CGR (SD)	Median CPS (SD)
Project Alone								
Guidance Low Approach	5.62	0.000183	1.000 (<0.001)	0.994 (0.012)	1.000 (<0.001)	0.992 (0.013)	1.000 (<0.001)	0.989 (0.013)
Guidance High Approach	15.24	0.000497	0.999 (<0.001)	0.986 (0.012)	0.999 (<0.001)	0.980 (0.012)	0.999 (<0.001)	0.972 (0.013)
In-combination								
Guidance Low Approach - All Projects	237.80	0.007755	0.991 (<0.001)	0.798 (0.010)	0.991 (<0.001)	0.731 (0.010)	0.991 (<0.001)	0.641 (0.009)
Guidance High Approach - All Projects	496.02	0.016176	0.982 (<0.001)	0.623 (0.008)	0.982 (<0.001)	0.518 (0.007)	0.982 (<0.001)	0.393 (0.006)
Guidance Low Approach - ECPCC	211.47	0.006897	0.992 (<0.001)	0.818 (0.010)	0.992 (<0.001)	0.757 (0.010)	0.992 (<0.001)	0.673 (0.009)
Guidance High Approach - ECPCC	435.40	0.014199	0.984 (<0.001)	0.660 (0.008)	0.984 (<0.001)	0.562 (0.008)	0.984 (<0.001)	0.441 (0.007)
Guidance Low approach – Without BB	232.60	0.007586	0.992 (<0.001)	0.802 (0.010)	0.992 (<0.001)	0.736 (0.010)	0.992 (<0.001)	0.647 (0.009)
Guidance High approach – Without BB	424.20	0.013834	0.985 (<0.001)	0.667 (0.008)	0.985 (<0.001)	0.570 (0.008)	0.984 (<0.001)	0.451 (0.007)



Guillemot - Fowlsheugh SPA

Annual Total

Table 3.15 Guillemot PVA Results for Fowlsheugh SPA

Scenario	Estimated Mortalities	Impact on Adult Survival	25 Years		35 Years		50 Years	
			Median CGR (SD)	Median CPS (SD)	Median CGR (SD)	Median CPS (SD)	Median CGR (SD)	Median CPS (SD)
Project Alone								
Guidance Low Approach	10.55	0.000130	1.000 (<0.001)	0.996 (0.007)	1.000 (<0.001)	0.995 (0.008)	1.000 (<0.001)	0.993 (0.008)
Guidance High Approach	28.62	0.000353	1.000 (<0.001)	0.990 (0.007)	1.000 (<0.001)	0.986 (0.008)	1.000 (<0.001)	0.980 (0.008)
In-combination								
Guidance Low Approach - All Projects	585.65	0.007225	0.992 (<0.001)	0.810 (0.006)	0.992 (<0.001)	0.747 (0.006)	0.992 (<0.001)	0.661 (0.006)
Guidance High Approach - All Projects	1,028.98	0.012695	0.986 (<0.001)	0.690 (0.005)	0.986 (<0.001)	0.598 (0.005)	0.986 (<0.001)	0.482 (0.004)
Guidance Low Approach - ECPC	585.65	0.007225	0.992 (<0.001)	0.810 (0.006)	0.992 (<0.001)	0.747 (0.006)	0.992 (<0.001)	0.661 (0.006)
Guidance High Approach - ECPC	1,028.98	0.012695	0.986 (<0.001)	0.690 (0.005)	0.986 (<0.001)	0.598 (0.005)	0.986 (<0.001)	0.482 (0.004)
Guidance Low approach - Without BB	325.75	0.004019	0.996 (<0.001)	0.890 (0.007)	0.996 (<0.001)	0.851 (0.007)	0.995 (<0.001)	0.795 (0.007)
Guidance High approach - Without BB	555.68	0.006856	0.992 (<0.001)	0.819 (0.006)	0.992 (<0.001)	0.758 (0.006)	0.992 (<0.001)	0.675 (0.006)



Razorbill - Troup, Pennan and Lion's Head SPA

Annual Total

Table 3.16 Razorbill PVA Results for Troup, Pennan and Lion's Heads SPA

Scenario	Estimated Mortalities	Impact on Adult Survival	25 Years		35 Years		50 Years	
			Median CGR (SD)	Median CPS (SD)	Median CGR (SD)	Median CPS (SD)	Median CGR (SD)	Median CPS (SD)
Project Alone								
Guidance Low Approach	0.38	0.000079	1.000 (0.002)	0.997 (0.057)	1.000 (0.002)	0.995 (0.069)	1.000 (0.002)	0.993 (0.090)
Guidance High Approach	0.64	0.000133	1.000 (0.002)	0.997 (0.056)	1.000 (0.002)	0.995 (0.068)	1.000 (0.002)	0.994 (0.090)
In-combination								
Guidance Low Approach - All Projects	15.45	0.003212	0.996 (0.002)	0.908 (0.052)	0.996 (0.002)	0.873 (0.061)	0.996 (0.002)	0.826 (0.078)
Guidance High Approach - All Projects	31.74	0.006597	0.992 (0.002)	0.818 (0.048)	0.992 (0.002)	0.757 (0.056)	0.992 (0.002)	0.672 (0.066)
Guidance Low Approach - ECPC	13.13	0.002728	0.997 (0.002)	0.921 (0.053)	0.997 (0.002)	0.891 (0.064)	0.997 (0.002)	0.849 (0.080)
Guidance High Approach - ECPC	26.98	0.005608	0.993 (0.002)	0.842 (0.049)	0.993 (0.002)	0.788 (0.058)	0.993 (0.002)	0.714 (0.069)
Guidance Low Approach - Without BB	11.70	0.002432	0.997 (0.002)	0.929 (0.054)	0.997 (0.002)	0.903 (0.064)	0.997 (0.002)	0.865 (0.080)
Guidance High Approach - Without BB	23.77	0.004941	0.994 (0.002)	0.859 (0.051)	0.994 (0.002)	0.811 (0.059)	0.994 (0.002)	0.743 (0.071)



Puffin - Forth Islands SPA

Annual Total

Table 3.17 Puffin PVA Results for Forth Islands SPA

Scenario	Estimated Mortalities	Impact on Adult Survival	25 Years		35 Years		50 Years	
			Median CGR (SD)	Median CPS (SD)	Median CGR (SD)	Median CPS (SD)	Median CGR (SD)	Median CPS (SD)
Project Alone								
Guidance Low Approach	2.05	0.000017	1.000 (<0.001)	0.999 (0.012)	1.000 (<0.001)	0.999 (0.014)	1.000 (<0.001)	0.999 (0.019)
Guidance High Approach	3.66	0.000031	1.000 (<0.001)	0.999 (0.012)	1.000 (<0.001)	0.999 (0.014)	1.000 (<0.001)	0.998 (0.019)
In-combination								
Guidance Low Approach - All Projects	247.07	0.002095	0.998 (<0.001)	0.937 (0.011)	0.998 (<0.001)	0.914 (0.014)	0.998 (<0.001)	0.881 (0.017)
Guidance High Approach - All Projects	492.78	0.004179	0.995 (<0.001)	0.880 (0.011)	0.995 (<0.001)	0.837 (0.013)	0.995 (<0.001)	0.777 (0.016)
Guidance Low Approach - ECPC	206.03	0.001747	0.998 (<0.001)	0.948 (0.012)	0.998 (<0.001)	0.928 (0.014)	0.998 (<0.001)	0.900 (0.018)
Guidance High Approach - ECPC	399.71	0.003389	0.996 (<0.001)	0.901 (0.011)	0.996 (<0.001)	0.866 (0.013)	0.996 (<0.001)	0.815 (0.016)
Guidance Low approach - Without BB	191.72	0.001626	0.998 (<0.001)	0.951 (0.011)	0.998 (<0.001)	0.933 (0.014)	0.998 (<0.001)	0.906 (0.018)
Guidance High approach - Without BB	326.57	0.002769	0.997 (<0.001)	0.918 (0.011)	0.997 (<0.001)	0.889 (0.013)	0.997 (<0.001)	0.846 (0.017)



Gannet – Fair Isle SPA

Annual Total

Table 3.18 Gannet PVA Results for Fair Isle SPA

Scenario	Estimated Mortalities	Impact on Adult Survival	25 Years		35 Years		50 Years	
			Median CGR (SD)	Median CPS (SD)	Median CGR (SD)	Median CPS (SD)	Median CGR (SD)	Median CPS (SD)
Project Alone								
Guidance Low Approach	0.40	0.000058	1.000 (0.001)	0.998 (0.033)	1.000 (0.001)	0.997 (0.038)	1.000 (<0.001)	0.996 (0.043)
Guidance High Approach	0.60	0.000087	1.000 (0.001)	0.998 (0.033)	1.000 (0.001)	0.997 (0.038)	1.000 (<0.001)	0.994 (0.043)
In-combination								
Guidance Low Approach - All Projects	9.00	0.001312	0.998 (0.001)	0.961 (0.032)	0.998 (0.001)	0.946 (0.036)	0.998 (<0.001)	0.924 (0.041)
Guidance High Approach - All Projects	16.94	0.002470	0.997 (0.001)	0.928 (0.032)	0.997 (0.001)	0.901 (0.035)	0.997 (<0.001)	0.862 (0.038)
Guidance Low Approach - ECPC	8.86	0.001292	0.998 (0.001)	0.961 (0.032)	0.998 (0.001)	0.946 (0.036)	0.998 (<0.001)	0.924 (0.040)
Guidance High Approach - ECPC	16.58	0.002417	0.997 (0.001)	0.929 (0.031)	0.997 (0.001)	0.902 (0.035)	0.997 (<0.001)	0.864 (0.039)
Guidance Low approach – Without BB	8.64	0.001260	0.999 (0.001)	0.962 (0.033)	0.999 (0.001)	0.948 (0.037)	0.999 (<0.001)	0.926 (0.041)
Guidance High approach – Without BB	16.38	0.002388	0.997 (0.001)	0.930 (0.032)	0.997 (0.001)	0.903 (0.035)	0.997 (<0.001)	0.866 (0.039)



Gannet – Sule Skerry and Sule Stack SPA

Annual Total

Table 3.19 Gannet PVA Results for Sule Skerry and Sule Stack SPA

Scenario	Estimated Mortalities	Impact on Adult Survival	25 Years		35 Years		50 Years	
			Median CGR (SD)	Median CPS (SD)	Median CGR (SD)	Median CPS (SD)	Median CGR (SD)	Median CPS (SD)
Project Alone								
Guidance Low Approach	0.25	0.000016	1.000 (<0.001)	1.000 (0.022)	1.000 (<0.001)	0.999 (0.025)	1.000 (<0.001)	0.999 (0.028)
Guidance High Approach	0.33	0.000021	1.000 (<0.001)	0.999 (0.023)	1.000 (<0.001)	0.998 (0.025)	1.000 (<0.001)	0.999 (0.029)
In-combination								
Guidance Low Approach - All Projects	26.59	0.001699	0.998 (<0.001)	0.949 (0.022)	0.998 (<0.001)	0.929 (0.024)	0.998 (<0.001)	0.902 (0.027)
Guidance High Approach - All Projects	36.66	0.002343	0.997 (<0.001)	0.930 (0.021)	0.997 (<0.001)	0.905 (0.023)	0.997 (<0.001)	0.868 (0.026)
Guidance Low Approach - ECPC	26.59	0.001699	0.998 (<0.001)	0.950 (0.021)	0.998 (<0.001)	0.930 (0.024)	0.998 (<0.001)	0.902 (0.027)
Guidance High Approach - ECPC	36.66	0.002343	0.997 (<0.001)	0.931 (0.021)	0.997 (<0.001)	0.906 (0.023)	0.997 (<0.001)	0.868 (0.026)
Guidance Low Approach – Without BB	26.11	0.001668	0.998 (<0.001)	0.951 (0.021)	0.998 (<0.001)	0.931 (0.024)	0.998 (<0.001)	0.904 (0.027)
Guidance High Approach – Without BB	35.98	0.002299	0.997 (<0.001)	0.932 (0.021)	0.997 (<0.001)	0.907 (0.023)	0.997 (<0.001)	0.871 (0.026)



Gannet – North Rona and Sula Sgeir SPA

Annual Total

Table 3.20 Gannet PVA Results for North Rona and Sula Sgeir SPA

Scenario	Estimated Mortalities	Impact on Adult Survival	25 Years		35 Years		50 Years	
			Median CGR (SD)	Median CPS (SD)	Median CGR (SD)	Median CPS (SD)	Median CGR (SD)	Median CPS (SD)
Project Alone								
Guidance Low Approach	0.18	0.000009	1.000 (<0.001)	0.999 (0.020)	1.000 (<0.001)	0.999 (0.023)	1.000 (<0.001)	0.999 (0.026)
Guidance High Approach	0.24	0.000013	1.000 (<0.001)	1.000 (0.020)	1.000 (<0.001)	1.000 (0.023)	1.000 (<0.001)	0.999 (0.026)
In-combination								
Guidance Low Approach - All Projects	4.30	0.000226	1.000 (<0.001)	0.993 (0.020)	1.000 (<0.001)	0.991 (0.023)	1.000 (<0.001)	0.987 (0.026)
Guidance High Approach - All Projects	8.10	0.000427	1.000 (<0.001)	0.987 (0.020)	1.000 (<0.001)	0.982 (0.023)	0.999 (<0.001)	0.975 (0.026)
Guidance Low Approach - ECPC	4.30	0.000226	1.000 (<0.001)	0.993 (0.020)	1.000 (<0.001)	0.990 (0.023)	1.000 (<0.001)	0.987 (0.026)
Guidance High Approach - ECPC	8.10	0.000427	0.999 (<0.001)	0.987 (0.020)	0.999 (<0.001)	0.982 (0.023)	0.999 (<0.001)	0.974 (0.026)
Guidance Low Approach – Without BB	4.18	0.000220	1.000 (<0.001)	0.993 (0.020)	1.000 (<0.001)	0.990 (0.023)	1.000 (<0.001)	0.987 (0.026)
Guidance High Approach – Without BB	7.78	0.000410	0.999 (<0.001)	0.987 (0.020)	0.999 (<0.001)	0.983 (0.023)	0.999 (<0.001)	0.975 (0.026)



Gannet – St Kilda SPA

Annual Total

Table 3.21 Gannet PVA Results for St Kilda SPA

Scenario	Estimated Mortalities	Impact on Adult Survival	25 Years		35 Years		50 Years	
			Median CGR (SD)	Median CPS (SD)	Median CGR (SD)	Median CPS (SD)	Median CGR (SD)	Median CPS (SD)
Project Alone								
Guidance Low Approach	0.65	0.000005	1.000 (<0.001)	1.000 (0.008)	1.000 (<0.001)	1.000 (0.009)	1.000 (<0.001)	0.999 (0.011)
Guidance High Approach	0.89	0.000008	1.000 (<0.001)	1.000 (0.008)	1.000 (<0.001)	1.000 (0.009)	1.000 (<0.001)	0.999 (0.011)
In-combination								
Guidance Low Approach - All Projects	3.24	0.000027	1.000 (<0.001)	0.999 (0.008)	1.000 (<0.001)	0.999 (0.009)	1.000 (<0.001)	0.998 (0.011)
Guidance High Approach - All Projects	5.61	0.000047	1.000 (<0.001)	0.999 (0.008)	1.000 (<0.001)	0.998 (0.009)	1.000 (<0.001)	0.997 (0.011)
Guidance Low Approach - ECPC	3.24	0.000027	1.000 (<0.001)	0.999 (0.008)	1.000 (<0.001)	0.999 (0.009)	1.000 (<0.001)	0.998 (0.011)
Guidance High Approach - ECPC	5.61	0.000047	1.000 (<0.001)	0.999 (0.008)	1.000 (<0.001)	0.998 (0.009)	1.000 (<0.001)	0.997 (0.010)
Guidance Low Approach – Without BB	3.24	0.000027	1.000 (<0.001)	0.999 (0.008)	1.000 (<0.001)	0.999 (0.009)	1.000 (<0.001)	0.998 (0.011)
Guidance High Approach – Without BB	5.61	0.000047	1.000 (<0.001)	0.998 (0.008)	1.000 (<0.001)	0.998 (0.009)	1.000 (<0.001)	0.997 (0.011)



4 References

BTO. (2026). Seabird Monitoring Programme. Available at:
<https://app.bto.org/seabirds/public/data.jsp> (Accessed: February 2026).

Horswill, C. and Robinson, R.A. (2015) Review of Seabird Demographic Rates and Density Dependence. JNCC Report No. 552, JNCC, Peterborough, ISSN 0963-8091.

Natural England. (2022). A Population Viability Analysis Modelling Tool for Seabird Species (NECR274). Available at: <https://publications.naturalengland.org.uk/publication/4926995073073152> (Accessed: February 2026).



Annex A Parameter Logs

A.1 Kittiwake

Buchan Ness to Collieston Coast SPA

Set up

The log file was created on: 2026-02-13 00:54:21.937248 using Tool version 2, with R version 4.5.2, PVA package version: 4.18 (with UI version 1.7)

##	Package	Version
## popbio	"popbio"	"2.8"
## shiny	"shiny"	"1.12.1"
## shinyjs	"shinyjs"	"2.1.1"
## shinydashboard	"shinydashboard"	"0.7.3"
## shinyWidgets	"shinyWidgets"	"0.9.0"
## DT	"DT"	"0.34.0"
## plotly	"plotly"	"4.11.0"
## rmarkdown	"rmarkdown"	"2.30"
## dplyr	"dplyr"	"1.1.4"
## tidyr	"tidyr"	"1.3.2"

Basic information

This run had reference name "Kittiwake_Buchan".

PVA model run type: simplescenarios.

Model to use for environmental stochasticity: betagamma.

Model for density dependence: nodd.

Include demographic stochasticity in model?: Yes.

Number of simulations: 5000.

Random seed: 1248.

Years for burn-in: 10.

Case study selected: None.

Baseline demographic rates

Species chosen to set initial values: Black-Legged Kittiwake.

Region type to use for breeding success data: Global.

Available colony-specific survival rate: National. Sector to use within breeding success region: Global.

Age at first breeding: 4.

Is there an upper constraint on productivity in the model?: Yes, constrained to 2 per pair.

Number of subpopulations: 1.

Are demographic rates applied separately to each subpopulation?: No.

Units for initial population size: all.individuals

Are baseline demographic rates specified separately for immatures?: Yes.

Population 1

Initial population values: Initial population 31406 in 2025

Productivity rate per pair: mean: 0.69 , sd: 0.296

Adult survival rate: mean: 0.854 , sd: 0.051

Immatures survival rates:

Age class 0 to 1 - mean: 0.79 , sd: 0.051 , DD: NA

Age class 1 to 2 - mean: 0.854 , sd: 0.051 , DD: NA

Age class 2 to 3 - mean: 0.854 , sd: 0.051 , DD: NA

Age class 3 to 4 - mean: 0.854 , sd: 0.051 , DD: NA

Impacts

Number of impact scenarios: 8.



Are impacts applied separately to each subpopulation?: No
Are impacts of scenarios specified separately for immatures?: No
Are standard errors of impacts available?: No
Should random seeds be matched for impact scenarios?: No
Are impacts specified as a relative value or absolute harvest?: relative
Years in which impacts are assumed to begin and end: 2029 to 2079
Impact on Demographic Rates
Scenario A - Name: Project Alone - NS Low
All subpopulations
Impact on productivity rate mean: 0 , se: NA
Impact on adult survival rate mean: 3.8e-05 , se: NA
Scenario B - Name: Project Alone - NS High
All subpopulations
Impact on productivity rate mean: 0 , se: NA
Impact on adult survival rate mean: 4.2e-05 , se: NA
Scenario C - Name: In-combination - All projects NS Low
All subpopulations
Impact on productivity rate mean: 0 , se: NA
Impact on adult survival rate mean: 0.003022 , se: NA
Scenario D - Name: In-combination - All projects NS High
All subpopulations
Impact on productivity rate mean: 0 , se: NA
Impact on adult survival rate mean: 0.004253 , se: NA
Scenario E - Name: In-combination - Minus Consented NS Low
All subpopulations
Impact on productivity rate mean: 0 , se: NA
Impact on adult survival rate mean: 0.00105 , se: NA
Scenario F - Name: In-combination - Minus Consented NS High
All subpopulations
Impact on productivity rate mean: 0 , se: NA
Impact on adult survival rate mean: 0.001336 , se: NA
Scenario G - Name: In-combination - Minus BB NS Low
All subpopulations
Impact on productivity rate mean: 0 , se: NA
Impact on adult survival rate mean: 0.00262 , se: NA
Scenario H - Name: In-combination - Minus BB NS High
All subpopulations
Impact on productivity rate mean: 0 , se: NA
Impact on adult survival rate mean: 0.003708 , se: NA
Output:
First year to include in outputs: 2029
Final year to include in outputs: 2079
How should outputs be produced, in terms of ages?: breeding.adults
Target population size to use in calculating impact metrics: NA
Quasi-extinction threshold to use in calculating impact metrics: NA



Troup, Pennan and Lion's Heads SPA

Set up

The log file was created on: 2026-02-13 10:47:32.461862 using Tool version 2, with R version 4.5.1, PVA package version: 4.18 (with UI version 1.7)

##	Package	Version
## popbio	"popbio"	"2.8"
## shiny	"shiny"	"1.12.1"
## shinyjs	"shinyjs"	"2.1.1"
## shinydashboard	"shinydashboard"	"0.7.3"
## shinyWidgets	"shinyWidgets"	"0.9.0"
## DT	"DT"	"0.34.0"
## plotly	"plotly"	"4.11.0"
## rmarkdown	"rmarkdown"	"2.30"
## dplyr	"dplyr"	"1.1.4"
## tidyr	"tidyr"	"1.3.2"

Basic information

This run had reference name "Kittiwake_Troup".

PVA model run type: simplescenarios.

Model to use for environmental stochasticity: betagamma.

Model for density dependence: nodd.

Include demographic stochasticity in model?: Yes.

Number of simulations: 5000.

Random seed: 1253.

Years for burn-in: 10.

Case study selected: None.

Baseline demographic rates

Species chosen to set initial values: Black-Legged Kittiwake.

Region type to use for breeding success data: Global.

Available colony-specific survival rate: National. Sector to use within breeding success region: Global.

Age at first breeding: 4.

Is there an upper constraint on productivity in the model?: Yes, constrained to 2 per pair.

Number of subpopulations: 1.

Are demographic rates applied separately to each subpopulation?: No.

Units for initial population size: all.individuals

Are baseline demographic rates specified separately for immatures?: Yes.

Population 1

Initial population values: Initial population 19706 in 2023

Productivity rate per pair: mean: 0.69 , sd: 0.296

Adult survival rate: mean: 0.854 , sd: 0.051

Immatures survival rates:

Age class 0 to 1 - mean: 0.79 , sd: 0.051 , DD: NA

Age class 1 to 2 - mean: 0.854 , sd: 0.051 , DD: NA

Age class 2 to 3 - mean: 0.854 , sd: 0.051 , DD: NA

Age class 3 to 4 - mean: 0.854 , sd: 0.051 , DD: NA

Impacts

Number of impact scenarios: 8.

Are impacts applied separately to each subpopulation?: No

Are impacts of scenarios specified separately for immatures?: No

Are standard errors of impacts available?: No

Should random seeds be matched for impact scenarios?: No



Are impacts specified as a relative value or absolute harvest?: relative
 Years in which impacts are assumed to begin and end: 2029 to 2079
 Impact on Demographic Rates
 Scenario A - Name: NS Low project alone
 All subpopulations
 Impact on productivity rate mean: 0 , se: NA
 Impact on adult survival rate mean: 1.9e-05 , se: NA
 Scenario B - Name: NS High project alone
 All subpopulations
 Impact on productivity rate mean: 0 , se: NA
 Impact on adult survival rate mean: 2.1e-05 , se: NA
 Scenario C - Name: All projects - NS Low
 All subpopulations
 Impact on productivity rate mean: 0 , se: NA
 Impact on adult survival rate mean: 0.004618 , se: NA
 Scenario D - Name: All projects - NS High
 All subpopulations
 Impact on productivity rate mean: 0 , se: NA
 Impact on adult survival rate mean: 0.006714 , se: NA
 Scenario E - Name: Excluding consented projects - NS Low
 All subpopulations
 Impact on productivity rate mean: 0 , se: NA
 Impact on adult survival rate mean: 0.00146 , se: NA
 Scenario F - Name: Excluding consented projects - NS High
 All subpopulations
 Impact on productivity rate mean: 0 , se: NA
 Impact on adult survival rate mean: 0.002128 , se: NA
 Scenario G - Name: Minus BB - NS Low
 All subpopulations
 Impact on productivity rate mean: 0 , se: NA
 Impact on adult survival rate mean: 0.00407 , se: NA
 Scenario H - Name: Minus BB - NS High
 All subpopulations
 Impact on productivity rate mean: 0 , se: NA
 Impact on adult survival rate mean: 0.005948 , se: NA
 Output:
 First year to include in outputs: 2029
 Final year to include in outputs: 2079
 How should outputs be produced, in terms of ages?: breeding.adults
 Target population size to use in calculating impact metrics: NA
 Quasi-extinction threshold to use in calculating impact metrics: NA



Fowlsheugh SPA

Set up

The log file was created on: 2026-02-13 09:54:08.247033 using Tool version 2, with R version 4.5.1, PVA package version: 4.18 (with UI version 1.7)

##	Package	Version
## popbio	"popbio"	"2.8"
## shiny	"shiny"	"1.12.1"
## shinyjs	"shinyjs"	"2.1.1"
## shinydashboard	"shinydashboard"	"0.7.3"
## shinyWidgets	"shinyWidgets"	"0.9.0"
## DT	"DT"	"0.34.0"
## plotly	"plotly"	"4.11.0"
## rmarkdown	"rmarkdown"	"2.30"
## dplyr	"dplyr"	"1.1.4"
## tidyr	"tidyr"	"1.3.2"

Basic information

This run had reference name "Kittiwake_Fowlsheugh".

PVA model run type: simplescenarios.

Model to use for environmental stochasticity: betagamma.

Model for density dependence: nodd.

Include demographic stochasticity in model?: Yes.

Number of simulations: 5000.

Random seed: 1251.

Years for burn-in: 10.

Case study selected: None.

Baseline demographic rates

Species chosen to set initial values: Black-Legged Kittiwake.

Region type to use for breeding success data: Global.

Available colony-specific survival rate: National. Sector to use within breeding success region: Global.

Age at first breeding: 4.

Is there an upper constraint on productivity in the model?: Yes, constrained to 2 per pair.

Number of subpopulations: 1.

Are demographic rates applied separately to each subpopulation?: No.

Units for initial population size: all.individuals

Are baseline demographic rates specified separately for immatures?: Yes.

Population 1

Initial population values: Initial population 30966 in 2023

Productivity rate per pair: mean: 0.69 , sd: 0.296

Adult survival rate: mean: 0.854 , sd: 0.051

Immatures survival rates:

Age class 0 to 1 - mean: 0.79 , sd: 0.051 , DD: NA

Age class 1 to 2 - mean: 0.854 , sd: 0.051 , DD: NA

Age class 2 to 3 - mean: 0.854 , sd: 0.051 , DD: NA

Age class 3 to 4 - mean: 0.854 , sd: 0.051 , DD: NA

Impacts

Number of impact scenarios: 8.

Are impacts applied separately to each subpopulation?: No

Are impacts of scenarios specified separately for immatures?: No

Are standard errors of impacts available?: No

Should random seeds be matched for impact scenarios?: No



Are impacts specified as a relative value or absolute harvest?: relative
Years in which impacts are assumed to begin and end: 2029 to 2079
Impact on Demographic Rates
Scenario A - Name: NS Low project alone
All subpopulations
Impact on productivity rate mean: 0 , se: NA
Impact on adult survival rate mean: 3.3e-05 , se: NA
Scenario B - Name: NS High project alone
All subpopulations
Impact on productivity rate mean: 0 , se: NA
Impact on adult survival rate mean: 3.7e-05 , se: NA
Scenario C - Name: All projects - NS Low
All subpopulations
Impact on productivity rate mean: 0 , se: NA
Impact on adult survival rate mean: 0.006339 , se: NA
Scenario D - Name: All projects - NS High
All subpopulations
Impact on productivity rate mean: 0 , se: NA
Impact on adult survival rate mean: 0.008504 , se: NA
Scenario E - Name: Excluding consented projects - NS Low
All subpopulations
Impact on productivity rate mean: 0 , se: NA
Impact on adult survival rate mean: 0.002491 , se: NA
Scenario F - Name: Excluding consented projects - NS High
All subpopulations
Impact on productivity rate mean: 0 , se: NA
Impact on adult survival rate mean: 0.00348 , se: NA
Scenario G - Name: Minus BB - NS Low
All subpopulations
Impact on productivity rate mean: 0 , se: NA
Impact on adult survival rate mean: 0.003683 , se: NA
Scenario H - Name: Minus BB - NS High
All subpopulations
Impact on productivity rate mean: 0 , se: NA
Impact on adult survival rate mean: 0.005158 , se: NA
Output:
First year to include in outputs: 2029
Final year to include in outputs: 2079
How should outputs be produced, in terms of ages?: breeding.adults
Target population size to use in calculating impact metrics: NA
Quasi-extinction threshold to use in calculating impact metrics: NA



East Caithness Cliffs SPA

Set up

The log file was created on: 2026-02-13 01:13:33.882267 using Tool version 2, with R version 4.5.2, PVA package version: 4.18 (with UI version 1.7)

##	Package	Version
## popbio	"popbio"	"2.8"
## shiny	"shiny"	"1.12.1"
## shinyjs	"shinyjs"	"2.1.1"
## shinydashboard	"shinydashboard"	"0.7.3"
## shinyWidgets	"shinyWidgets"	"0.9.0"
## DT	"DT"	"0.34.0"
## plotly	"plotly"	"4.11.0"
## rmarkdown	"rmarkdown"	"2.30"
## dplyr	"dplyr"	"1.1.4"
## tidyr	"tidyr"	"1.3.2"

Basic information

This run had reference name "Kittiwake_ECC".

PVA model run type: simplescenarios.

Model to use for environmental stochasticity: betagamma.

Model for density dependence: nodd.

Include demographic stochasticity in model?: Yes.

Number of simulations: 5000.

Random seed: 1249.

Years for burn-in: 10.

Case study selected: None.

Baseline demographic rates

Species chosen to set initial values: Black-Legged Kittiwake.

Region type to use for breeding success data: Global.

Available colony-specific survival rate: National. Sector to use within breeding success region: Global.

Age at first breeding: 4.

Is there an upper constraint on productivity in the model?: Yes, constrained to 2 per pair.

Number of subpopulations: 1.

Are demographic rates applied separately to each subpopulation?: No.

Units for initial population size: all.individuals

Are baseline demographic rates specified separately for immatures?: Yes.

Population 1

Initial population values: Initial population 36562 in 2024

Productivity rate per pair: mean: 0.69 , sd: 0.296

Adult survival rate: mean: 0.854 , sd: 0.051

Immatures survival rates:

Age class 0 to 1 - mean: 0.79 , sd: 0.051 , DD: NA

Age class 1 to 2 - mean: 0.854 , sd: 0.051 , DD: NA

Age class 2 to 3 - mean: 0.854 , sd: 0.051 , DD: NA

Age class 3 to 4 - mean: 0.854 , sd: 0.051 , DD: NA

Impacts

Number of impact scenarios: 8.

Are impacts applied separately to each subpopulation?: No

Are impacts of scenarios specified separately for immatures?: No

Are standard errors of impacts available?: No

Should random seeds be matched for impact scenarios?: No



Are impacts specified as a relative value or absolute harvest?: relative
Years in which impacts are assumed to begin and end: 2029 to 2079
Impact on Demographic Rates
Scenario A - Name: Project Alone - NS Low
All subpopulations
Impact on productivity rate mean: 0 , se: NA
Impact on adult survival rate mean: 2e-05 , se: NA
Scenario B - Name: Project Alone - NS High
All subpopulations
Impact on productivity rate mean: 0 , se: NA
Impact on adult survival rate mean: 2.2e-05 , se: NA
Scenario C - Name: In-combination - All projects NS Low
All subpopulations
Impact on productivity rate mean: 0 , se: NA
Impact on adult survival rate mean: 0.007758 , se: NA
Scenario D - Name: In-combination - All projects NS High
All subpopulations
Impact on productivity rate mean: 0 , se: NA
Impact on adult survival rate mean: 0.011689 , se: NA
Scenario E - Name: In-combination - Minus Consented NS Low
All subpopulations
Impact on productivity rate mean: 0 , se: NA
Impact on adult survival rate mean: 0.003415 , se: NA
Scenario F - Name: In-combination - Minus Consented NS High
All subpopulations
Impact on productivity rate mean: 0 , se: NA
Impact on adult survival rate mean: 0.005424 , se: NA
Scenario G - Name: In-combination - Minus BB NS Low
All subpopulations
Impact on productivity rate mean: 0 , se: NA
Impact on adult survival rate mean: 0.00711 , se: NA
Scenario H - Name: In-combination - Minus BB NS High
All subpopulations
Impact on productivity rate mean: 0 , se: NA
Impact on adult survival rate mean: 0.010757 , se: NA
Output:
First year to include in outputs: 2029
Final year to include in outputs: 2079
How should outputs be produced, in terms of ages?: breeding.adults
Target population size to use in calculating impact metrics: NA
Quasi-extinction threshold to use in calculating impact metrics: NA



North Caithness Cliffs SPA

Set up

The log file was created on: 2026-02-13 10:16:53.210837 using Tool version 2, with R version 4.5.1, PVA package version: 4.18 (with UI version 1.7)

##	Package	Version
## popbio	"popbio"	"2.8"
## shiny	"shiny"	"1.12.1"
## shinyjs	"shinyjs"	"2.1.1"
## shinydashboard	"shinydashboard"	"0.7.3"
## shinyWidgets	"shinyWidgets"	"0.9.0"
## DT	"DT"	"0.34.0"
## plotly	"plotly"	"4.11.0"
## rmarkdown	"rmarkdown"	"2.30"
## dplyr	"dplyr"	"1.1.4"
## tidyr	"tidyr"	"1.3.2"

Basic information

This run had reference name "Kittiwake_NCC".

PVA model run type: simplescenarios.

Model to use for environmental stochasticity: betagamma.

Model for density dependence: nodd.

Include demographic stochasticity in model?: Yes.

Number of simulations: 5000.

Random seed: 1252.

Years for burn-in: 10.

Case study selected: None.

Baseline demographic rates

Species chosen to set initial values: Black-Legged Kittiwake.

Region type to use for breeding success data: Global.

Available colony-specific survival rate: National. Sector to use within breeding success region: Global.

Age at first breeding: 4.

Is there an upper constraint on productivity in the model?: Yes, constrained to 2 per pair.

Number of subpopulations: 1.

Are demographic rates applied separately to each subpopulation?: No.

Units for initial population size: all.individuals

Are baseline demographic rates specified separately for immatures?: Yes.

Population 1

Initial population values: Initial population 13918 in 2024

Productivity rate per pair: mean: 0.69 , sd: 0.296

Adult survival rate: mean: 0.854 , sd: 0.051

Immatures survival rates:

Age class 0 to 1 - mean: 0.79 , sd: 0.051 , DD: NA

Age class 1 to 2 - mean: 0.854 , sd: 0.051 , DD: NA

Age class 2 to 3 - mean: 0.854 , sd: 0.051 , DD: NA

Age class 3 to 4 - mean: 0.854 , sd: 0.051 , DD: NA

Impacts

Number of impact scenarios: 8.

Are impacts applied separately to each subpopulation?: No

Are impacts of scenarios specified separately for immatures?: No

Are standard errors of impacts available?: No

Should random seeds be matched for impact scenarios?: No



Are impacts specified as a relative value or absolute harvest?: relative
Years in which impacts are assumed to begin and end: 2029 to 2079
Impact on Demographic Rates
Scenario A - Name: NS Low project alone
All subpopulations
Impact on productivity rate mean: 0 , se: NA
Impact on adult survival rate mean: 3.2e-05 , se: NA
Scenario B - Name: NS High project alone
All subpopulations
Impact on productivity rate mean: 0 , se: NA
Impact on adult survival rate mean: 3.6e-05 , se: NA
Scenario C - Name: All projects - NS Low
All subpopulations
Impact on productivity rate mean: 0 , se: NA
Impact on adult survival rate mean: 0.004235 , se: NA
Scenario D - Name: All projects - NS High
All subpopulations
Impact on productivity rate mean: 0 , se: NA
Impact on adult survival rate mean: 0.0058 , se: NA
Scenario E - Name: Excluding consented projects - NS Low
All subpopulations
Impact on productivity rate mean: 0 , se: NA
Impact on adult survival rate mean: 0.001233 , se: NA
Scenario F - Name: Excluding consented projects - NS High
All subpopulations
Impact on productivity rate mean: 0 , se: NA
Impact on adult survival rate mean: 0.001482 , se: NA
Scenario G - Name: Minus BB - NS Low
All subpopulations
Impact on productivity rate mean: 0 , se: NA
Impact on adult survival rate mean: 0.003815 , se: NA
Scenario H - Name: Minus BB - NS High
All subpopulations
Impact on productivity rate mean: 0 , se: NA
Impact on adult survival rate mean: 0.005193 , se: NA
Output:
First year to include in outputs: 2029
Final year to include in outputs: 2079
How should outputs be produced, in terms of ages?: breeding.adults
Target population size to use in calculating impact metrics: NA
Quasi-extinction threshold to use in calculating impact metrics: NA



Forth Islands SPA

Set up

The log file was created on: 2026-02-13 09:12:17.602641 using Tool version 2, with R version 4.5.1, PVA package version: 4.18 (with UI version 1.7)

##	Package	Version
## popbio	"popbio"	"2.8"
## shiny	"shiny"	"1.12.1"
## shinyjs	"shinyjs"	"2.1.1"
## shinydashboard	"shinydashboard"	"0.7.3"
## shinyWidgets	"shinyWidgets"	"0.9.0"
## DT	"DT"	"0.34.0"
## plotly	"plotly"	"4.11.0"
## rmarkdown	"rmarkdown"	"2.30"
## dplyr	"dplyr"	"1.1.4"
## tidyr	"tidyr"	"1.3.2"

Basic information

This run had reference name "Kittiwake_Forth_Islands".

PVA model run type: simplescenarios.

Model to use for environmental stochasticity: betagamma.

Model for density dependence: nodd.

Include demographic stochasticity in model?: Yes.

Number of simulations: 5000.

Random seed: 1260.

Years for burn-in: 10.

Case study selected: None.

Baseline demographic rates

Species chosen to set initial values: Black-Legged Kittiwake.

Region type to use for breeding success data: Global.

Available colony-specific survival rate: National. Sector to use within breeding success region: Global.

Age at first breeding: 4.

Is there an upper constraint on productivity in the model?: Yes, constrained to 2 per pair.

Number of subpopulations: 1.

Are demographic rates applied separately to each subpopulation?: No.

Units for initial population size: all.individuals

Are baseline demographic rates specified separately for immatures?: Yes.

Population 1

Initial population values: Initial population 16070 in 2025

Productivity rate per pair: mean: 0.69 , sd: 0.296

Adult survival rate: mean: 0.854 , sd: 0.051

Immatures survival rates:

Age class 0 to 1 - mean: 0.79 , sd: 0.051 , DD: NA

Age class 1 to 2 - mean: 0.854 , sd: 0.051 , DD: NA

Age class 2 to 3 - mean: 0.854 , sd: 0.051 , DD: NA

Age class 3 to 4 - mean: 0.854 , sd: 0.051 , DD: NA

Impacts

Number of impact scenarios: 8.

Are impacts applied separately to each subpopulation?: No

Are impacts of scenarios specified separately for immatures?: No

Are standard errors of impacts available?: No



Should random seeds be matched for impact scenarios?: No
Are impacts specified as a relative value or absolute harvest?: relative
Years in which impacts are assumed to begin and end: 2029 to 2079
Impact on Demographic Rates
Scenario A - Name: NS Low project alone
All subpopulations
Impact on productivity rate mean: 0 , se: NA
Impact on adult survival rate mean: 1.3e-05 , se: NA
Scenario B - Name: NS High project alone
All subpopulations
Impact on productivity rate mean: 0 , se: NA
Impact on adult survival rate mean: 1.5e-05 , se: NA
Scenario C - Name: All projects - NS Low
All subpopulations
Impact on productivity rate mean: 0 , se: NA
Impact on adult survival rate mean: 0.003754 , se: NA
Scenario D - Name: All projects - NS High
All subpopulations
Impact on productivity rate mean: 0 , se: NA
Impact on adult survival rate mean: 0.005283 , se: NA
Scenario E - Name: Excluding consented projects - NS Low
All subpopulations
Impact on productivity rate mean: 0 , se: NA
Impact on adult survival rate mean: 0.001417 , se: NA
Scenario F - Name: Excluding consented projects - NS High
All subpopulations
Impact on productivity rate mean: 0 , se: NA
Impact on adult survival rate mean: 0.002217 , se: NA
Scenario G - Name: Minus BB - NS Low
All subpopulations
Impact on productivity rate mean: 0 , se: NA
Impact on adult survival rate mean: 0.002058 , se: NA
Scenario H - Name: Minus BB - NS High
All subpopulations
Impact on productivity rate mean: 0 , se: NA
Impact on adult survival rate mean: 0.003144 , se: NA
Output:
First year to include in outputs: 2029
Final year to include in outputs: 2079
How should outputs be produced, in terms of ages?: breeding.adults
Target population size to use in calculating impact metrics: NA
Quasi-extinction threshold to use in calculating impact metrics: NA



A.2 Great black-backed gull

Copinsay SPA

Set up

The log file was created on: 2026-02-13 11:13:39.281569 using Tool version 2, with R version 4.5.2, PVA package version: 4.18 (with UI version 1.7)

##	Package	Version
## popbio	"popbio"	"2.8"
## shiny	"shiny"	"1.12.1"
## shinyjs	"shinyjs"	"2.1.1"
## shinydashboard	"shinydashboard"	"0.7.3"
## shinyWidgets	"shinyWidgets"	"0.9.0"
## DT	"DT"	"0.34.0"
## plotly	"plotly"	"4.11.0"
## rmarkdown	"rmarkdown"	"2.30"
## dplyr	"dplyr"	"1.1.4"
## tidyr	"tidyr"	"1.3.2"

Basic information

This run had reference name "GBBG_Copinsay".

PVA model run type: simplescenarios.

Model to use for environmental stochasticity: betagamma.

Model for density dependence: nodd.

Include demographic stochasticity in model?: Yes.

Number of simulations: 5000.

Random seed: 1237.

Years for burn-in: 0.

Case study selected: None.

Baseline demographic rates

Species chosen to set initial values: Great Black-Backed Gull.

Region type to use for breeding success data: Global.

Available colony-specific survival rate: National. Sector to use within breeding success region: Global.

Age at first breeding: 5.

Is there an upper constraint on productivity in the model?: Yes, constrained to 3 per pair.

Number of subpopulations: 1.

Are demographic rates applied separately to each subpopulation?: No.

Units for initial population size: all.individuals

Are baseline demographic rates specified separately for immatures?: Yes.

Population 1

Initial population values: Initial population 34 in 2025

Productivity rate per pair: mean: 1.139 , sd: 0.533

Adult survival rate: mean: 0.93 , sd: 1e-04

Immatures survival rates:

Age class 0 to 1 - mean: 0.798 , sd: 0.092 , DD: NA

Age class 1 to 2 - mean: 0.834 , sd: 0.034 , DD: NA

Age class 2 to 3 - mean: 0.854 , sd: 0.034 , DD: NA

Age class 3 to 4 - mean: 0.854 , sd: 0.034 , DD: NA

Age class 4 to 5 - mean: 0.854 , sd: 0.034 , DD: NA

Impacts

Number of impact scenarios: 4.

Are impacts applied separately to each subpopulation?: No

Are impacts of scenarios specified separately for immatures?: No



Are standard errors of impacts available?: No
Should random seeds be matched for impact scenarios?: No
Are impacts specified as a relative value or absolute harvest?: relative
Years in which impacts are assumed to begin and end: 2029 to 2079
Impact on Demographic Rates
Scenario A - Name: Project Alone
All subpopulations
Impact on productivity rate mean: 0 , se: NA
Impact on adult survival rate mean: 1.4e-05 , se: NA
Scenario B - Name: In-combination - All Projects
All subpopulations
Impact on productivity rate mean: 0 , se: NA
Impact on adult survival rate mean: 0.005311 , se: NA
Scenario C - Name: In-combination - All Projects Minus Consented
All subpopulations
Impact on productivity rate mean: 0 , se: NA
Impact on adult survival rate mean: 0.005311 , se: NA
Scenario D - Name: In-combination - All Projects Minus BB
All subpopulations
Impact on productivity rate mean: 0 , se: NA
Impact on adult survival rate mean: 0.005311 , se: NA
Output:
First year to include in outputs: 2029
Final year to include in outputs: 2079
How should outputs be produced, in terms of ages?: breeding.adults
Target population size to use in calculating impact metrics: NA
Quasi-extinction threshold to use in calculating impact metrics: NA



Set up

The log file was created on: 2026-02-13 11:27:37.274523 using Tool version 2, with R version 4.5.2, PVA package version: 4.18 (with UI version 1.7)

##	Package	Version
## popbio	"popbio"	"2.8"
## shiny	"shiny"	"1.12.1"
## shinyjs	"shinyjs"	"2.1.1"
## shinydashboard	"shinydashboard"	"0.7.3"
## shinyWidgets	"shinyWidgets"	"0.9.0"
## DT	"DT"	"0.34.0"
## plotly	"plotly"	"4.11.0"
## rmarkdown	"rmarkdown"	"2.30"
## dplyr	"dplyr"	"1.1.4"
## tidyr	"tidyr"	"1.3.2"

Basic information

This run had reference name "GBBG_Hoy".

PVA model run type: simplescenarios.

Model to use for environmental stochasticity: betagamma.

Model for density dependence: nodd.

Include demographic stochasticity in model?: Yes.

Number of simulations: 5000.

Random seed: 1238.

Years for burn-in: 0.

Case study selected: None.

Baseline demographic rates

Species chosen to set initial values: Great Black-Backed Gull.

Region type to use for breeding success data: Global.

Available colony-specific survival rate: National. Sector to use within breeding success region: Global.

Age at first breeding: 5.

Is there an upper constraint on productivity in the model?: Yes, constrained to 3 per pair.

Number of subpopulations: 1.

Are demographic rates applied separately to each subpopulation?: No.

Units for initial population size: all.individuals

Are baseline demographic rates specified separately for immatures?: Yes.

Population 1

Initial population values: Initial population 12 in 2024

Productivity rate per pair: mean: 1.139 , sd: 0.533

Adult survival rate: mean: 0.93 , sd: 1e-04

Immatures survival rates:

Age class 0 to 1 - mean: 0.798 , sd: 0.092 , DD: NA

Age class 1 to 2 - mean: 0.834 , sd: 0.034 , DD: NA

Age class 2 to 3 - mean: 0.854 , sd: 0.034 , DD: NA

Age class 3 to 4 - mean: 0.854 , sd: 0.034 , DD: NA

Age class 4 to 5 - mean: 0.854 , sd: 0.034 , DD: NA

Impacts

Number of impact scenarios: 4.

Are impacts applied separately to each subpopulation?: No

Are impacts of scenarios specified separately for immatures?: No

Are standard errors of impacts available?: No



Should random seeds be matched for impact scenarios?: No
Are impacts specified as a relative value or absolute harvest?: relative
Years in which impacts are assumed to begin and end: 2029 to 2079
Impact on Demographic Rates
Scenario A - Name: Project Alone
All subpopulations
Impact on productivity rate mean: 0 , se: NA
Impact on adult survival rate mean: 8e-06 , se: NA
Scenario B - Name: In-combination - All Projects
All subpopulations
Impact on productivity rate mean: 0 , se: NA
Impact on adult survival rate mean: 0.010286 , se: NA
Scenario C - Name: In-combination - All Projects Minus Consented
All subpopulations
Impact on productivity rate mean: 0 , se: NA
Impact on adult survival rate mean: 0.010286 , se: NA
Scenario D - Name: In-combination - All Projects Minus BB
All subpopulations
Impact on productivity rate mean: 0 , se: NA
Impact on adult survival rate mean: 0.010286 , se: NA
Output:
First year to include in outputs: 2029
Final year to include in outputs: 2079
How should outputs be produced, in terms of ages?: breeding.adults
Target population size to use in calculating impact metrics: NA
Quasi-extinction threshold to use in calculating impact metrics: NA



Calf of Eday SPA

Set up

The log file was created on: 2026-02-13 11:36:41.211904 using Tool version 2, with R version 4.5.1, PVA package version: 4.18 (with UI version 1.7)

##	Package	Version
## popbio	"popbio"	"2.8"
## shiny	"shiny"	"1.12.1"
## shinyjs	"shinyjs"	"2.1.1"
## shinydashboard	"shinydashboard"	"0.7.3"
## shinyWidgets	"shinyWidgets"	"0.9.0"
## DT	"DT"	"0.34.0"
## plotly	"plotly"	"4.11.0"
## rmarkdown	"rmarkdown"	"2.30"
## dplyr	"dplyr"	"1.1.4"
## tidyr	"tidyr"	"1.3.2"

Basic information

This run had reference name "GreatBlackBack_Eday".

PVA model run type: simplescenarios.

Model to use for environmental stochasticity: betagamma.

Model for density dependence: nodd.

Include demographic stochasticity in model?: Yes.

Number of simulations: 5000.

Random seed: 1423.

Years for burn-in: 0.

Case study selected: None.

Baseline demographic rates

Species chosen to set initial values: Great Black-Backed Gull.

Region type to use for breeding success data: Global.

Available colony-specific survival rate: National. Sector to use within breeding success region: Global.

Age at first breeding: 5.

Is there an upper constraint on productivity in the model?: Yes, constrained to 3 per pair.

Number of subpopulations: 1.

Are demographic rates applied separately to each subpopulation?: No.

Units for initial population size: all.individuals

Are baseline demographic rates specified separately for immatures?: Yes.

Population 1

Initial population values: Initial population 28 in 2025

Productivity rate per pair: mean: 1.139 , sd: 0.533

Adult survival rate: mean: 0.93 , sd: 1e-04

Immatures survival rates:

Age class 0 to 1 - mean: 0.798 , sd: 0.092 , DD: NA

Age class 1 to 2 - mean: 0.834 , sd: 0.034 , DD: NA

Age class 2 to 3 - mean: 0.854 , sd: 0.034 , DD: NA

Age class 3 to 4 - mean: 0.854 , sd: 0.034 , DD: NA

Age class 4 to 5 - mean: 0.854 , sd: 0.034 , DD: NA

Impacts

Number of impact scenarios: 4.

Are impacts applied separately to each subpopulation?: No

Are impacts of scenarios specified separately for immatures?: No

Are standard errors of impacts available?: No



Should random seeds be matched for impact scenarios?: No
Are impacts specified as a relative value or absolute harvest?: relative
Years in which impacts are assumed to begin and end: 2029 to 2079
Impact on Demographic Rates
Scenario A - Name: Project alone
All subpopulations
Impact on productivity rate mean: 0 , se: NA
Impact on adult survival rate mean: 2.068e-05 , se: NA
Scenario B - Name: In-combi - All
All subpopulations
Impact on productivity rate mean: 0 , se: NA
Impact on adult survival rate mean: 0.00341332 , se: NA
Scenario C - Name: In-combi - minus consented
All subpopulations
Impact on productivity rate mean: 0 , se: NA
Impact on adult survival rate mean: 0.00341332 , se: NA
Scenario D - Name: Incombo - minus BB
All subpopulations
Impact on productivity rate mean: 0 , se: NA
Impact on adult survival rate mean: 0.00341332 , se: NA
Output:
First year to include in outputs: 2029
Final year to include in outputs: 2079
How should outputs be produced, in terms of ages?: breeding.adults
Target population size to use in calculating impact metrics: NA
Quasi-extinction threshold to use in calculating impact metrics: NA



A.3 Guillemot

Breeding

Set up

The log file was created on: 2026-02-13 12:22:35.713417 using Tool version 2, with R version 4.5.1, PVA package version: 4.18 (with UI version 1.7)

##	Package	Version
## popbio	"popbio"	"2.8"
## shiny	"shiny"	"1.12.1"
## shinyjs	"shinyjs"	"2.1.1"
## shinydashboard	"shinydashboard"	"0.7.3"
## shinyWidgets	"shinyWidgets"	"0.9.0"
## DT	"DT"	"0.34.0"
## plotly	"plotly"	"4.11.0"
## rmarkdown	"rmarkdown"	"2.30"
## dplyr	"dplyr"	"1.1.4"
## tidyr	"tidyr"	"1.3.2"

Basic information

This run had reference name "Guillemot_Breeding".

PVA model run type: simplescenarios.

Model to use for environmental stochasticity: betagamma.

Model for density dependence: nodd.

Include demographic stochasticity in model?: Yes.

Number of simulations: 5000.

Random seed: 1234.

Years for burn-in: 10.

Case study selected: None.

Baseline demographic rates

Species chosen to set initial values: Common Guillemot.

Region type to use for breeding success data: MSFD.

Available colony-specific survival rate: National. Sector to use within breeding success region: Greater North Sea.

Age at first breeding: 6.

Is there an upper constraint on productivity in the model?: Yes, constrained to 1 per pair.

Number of subpopulations: 1.

Are demographic rates applied separately to each subpopulation?: No.

Units for initial population size: all.individuals

Are baseline demographic rates specified separately for immatures?: Yes.

Population 1

Initial population values: Initial population 274189 in 2023

Productivity rate per pair: mean: 0.672 , sd: 0.147

Adult survival rate: mean: 0.939 , sd: 0.015

Immatures survival rates:

Age class 0 to 1 - mean: 0.56 , sd: 0.013 , DD: NA

Age class 1 to 2 - mean: 0.792 , sd: 0.034 , DD: NA

Age class 2 to 3 - mean: 0.917 , sd: 0.022 , DD: NA

Age class 3 to 4 - mean: 0.939 , sd: 0.015 , DD: NA

Age class 4 to 5 - mean: 0.939 , sd: 0.015 , DD: NA

Age class 5 to 6 - mean: 0.939 , sd: 0.015 , DD: NA

Impacts

Number of impact scenarios: 6.



Are impacts applied separately to each subpopulation?: No
Are impacts of scenarios specified separately for immatures?: No
Are standard errors of impacts available?: No
Should random seeds be matched for impact scenarios?: No
Are impacts specified as a relative value or absolute harvest?: relative
Years in which impacts are assumed to begin and end: 2029 to 2079
Impact on Demographic Rates
Scenario A - Name: Applicant project alone
All subpopulations
Impact on productivity rate mean: 0 , se: NA
Impact on adult survival rate mean: 8e-06 , se: NA
Scenario B - Name: NS Low project alone
All subpopulations
Impact on productivity rate mean: 0 , se: NA
Impact on adult survival rate mean: 3e-05 , se: NA
Scenario C - Name: NS High project alone
All subpopulations
Impact on productivity rate mean: 0 , se: NA
Impact on adult survival rate mean: 5.1e-05 , se: NA
Scenario D - Name: Applicant project Cumulative
All subpopulations
Impact on productivity rate mean: 0 , se: NA
Impact on adult survival rate mean: 0.004563 , se: NA
Scenario E - Name: NS Low project Cumulative
All subpopulations
Impact on productivity rate mean: 0 , se: NA
Impact on adult survival rate mean: 0.016425 , se: NA
Scenario F - Name: NS High project Cumulative
All subpopulations
Impact on productivity rate mean: 0 , se: NA
Impact on adult survival rate mean: 0.027376 , se: NA
Output:
First year to include in outputs: 2029
Final year to include in outputs: 2079
How should outputs be produced, in terms of ages?: whole.population
Target population size to use in calculating impact metrics: NA
Quasi-extinction threshold to use in calculating impact metrics:NA



Non-breeding

Set up

The log file was created on: 2026-02-13 12:56:49.484267 using Tool version 2, with R version 4.5.1, PVA package version: 4.18 (with UI version 1.7)

##	Package	Version
## popbio	"popbio"	"2.8"
## shiny	"shiny"	"1.12.1"
## shinyjs	"shinyjs"	"2.1.1"
## shinydashboard	"shinydashboard"	"0.7.3"
## shinyWidgets	"shinyWidgets"	"0.9.0"
## DT	"DT"	"0.34.0"
## plotly	"plotly"	"4.11.0"
## rmarkdown	"rmarkdown"	"2.30"
## dplyr	"dplyr"	"1.1.4"
## tidyr	"tidyr"	"1.3.2"

Basic information

This run had reference name "Guillemot_NonBreeding".

PVA model run type: simplescenarios.

Model to use for environmental stochasticity: betagamma.

Model for density dependence: nodd.

Include demographic stochasticity in model?: Yes.

Number of simulations: 5000.

Random seed: 1235.

Years for burn-in: 10.

Case study selected: None.

Baseline demographic rates

Species chosen to set initial values: Common Guillemot.

Region type to use for breeding success data: MSFD.

Available colony-specific survival rate: National. Sector to use within breeding success region: Greater North Sea.

Age at first breeding: 6.

Is there an upper constraint on productivity in the model?: Yes, constrained to 1 per pair.

Number of subpopulations: 1.

Are demographic rates applied separately to each subpopulation?: No.

Units for initial population size: all.individuals

Are baseline demographic rates specified separately for immatures?: Yes.

Population 1

Initial population values: Initial population 274189 in 2023

Productivity rate per pair: mean: 0.672 , sd: 0.147

Adult survival rate: mean: 0.939 , sd: 0.015

Immatures survival rates:

Age class 0 to 1 - mean: 0.56 , sd: 0.013 , DD: NA

Age class 1 to 2 - mean: 0.792 , sd: 0.034 , DD: NA

Age class 2 to 3 - mean: 0.917 , sd: 0.022 , DD: NA

Age class 3 to 4 - mean: 0.939 , sd: 0.015 , DD: NA

Age class 4 to 5 - mean: 0.939 , sd: 0.015 , DD: NA

Age class 5 to 6 - mean: 0.939 , sd: 0.015 , DD: NA

Impacts

Number of impact scenarios: 6.

Are impacts applied separately to each subpopulation?: No



Are impacts of scenarios specified separately for immatures?: No
Are standard errors of impacts available?: No
Should random seeds be matched for impact scenarios?: No
Are impacts specified as a relative value or absolute harvest?: relative
Years in which impacts are assumed to begin and end: 2029 to 2079
Impact on Demographic Rates
Scenario A - Name: Applicant project alone
All subpopulations
Impact on productivity rate mean: 0 , se: NA
Impact on adult survival rate mean: 9.2e-05 , se: NA
Scenario B - Name: NS Low project alone
All subpopulations
Impact on productivity rate mean: 0 , se: NA
Impact on adult survival rate mean: 0.00011 , se: NA
Scenario C - Name: NS High project alone
All subpopulations
Impact on productivity rate mean: 0 , se: NA
Impact on adult survival rate mean: 0.000331 , se: NA
Scenario D - Name: Applicant project Cumulative
All subpopulations
Impact on productivity rate mean: 0 , se: NA
Impact on adult survival rate mean: 0.004047 , se: NA
Scenario E - Name: NS Low project Cumulative
All subpopulations
Impact on productivity rate mean: 0 , se: NA
Impact on adult survival rate mean: 0.004857 , se: NA
Scenario F - Name: NS High project Cumulative
All subpopulations
Impact on productivity rate mean: 0 , se: NA
Impact on adult survival rate mean: 0.014571 , se: NA
Output:
First year to include in outputs: 2029
Final year to include in outputs: 2079
How should outputs be produced, in terms of ages?: whole.population
Target population size to use in calculating impact metrics: NA
Quasi-extinction threshold to use in calculating impact metrics: NA



Annual Total - Regional

Set up

The log file was created on: 2026-02-13 13:32:51.574673 using Tool version 2, with R version 4.5.1, PVA package version: 4.18 (with UI version 1.7)

##	Package	Version
## popbio	"popbio"	"2.8"
## shiny	"shiny"	"1.12.1"
## shinyjs	"shinyjs"	"2.1.1"
## shinydashboard	"shinydashboard"	"0.7.3"
## shinyWidgets	"shinyWidgets"	"0.9.0"
## DT	"DT"	"0.34.0"
## plotly	"plotly"	"4.11.0"
## rmarkdown	"rmarkdown"	"2.30"
## dplyr	"dplyr"	"1.1.4"
## tidyr	"tidyr"	"1.3.2"

Basic information

This run had reference name "Guillemot_Annual_reg".

PVA model run type: simplescenarios.

Model to use for environmental stochasticity: betagamma.

Model for density dependence: nodd.

Include demographic stochasticity in model?: Yes.

Number of simulations: 5000.

Random seed: 1236.

Years for burn-in: 10.

Case study selected: None.

Baseline demographic rates

Species chosen to set initial values: Common Guillemot.

Region type to use for breeding success data: MSFD.

Available colony-specific survival rate: National. Sector to use within breeding success region: Greater North Sea.

Age at first breeding: 6.

Is there an upper constraint on productivity in the model?: Yes, constrained to 1 per pair.

Number of subpopulations: 1.

Are demographic rates applied separately to each subpopulation?: No.

Units for initial population size: all.individuals

Are baseline demographic rates specified separately for immatures?: Yes.

Population 1

Initial population values: Initial population 274189 in 2023

Productivity rate per pair: mean: 0.672 , sd: 0.147

Adult survival rate: mean: 0.939 , sd: 0.015

Immatures survival rates:

Age class 0 to 1 - mean: 0.56 , sd: 0.013 , DD: NA

Age class 1 to 2 - mean: 0.792 , sd: 0.034 , DD: NA

Age class 2 to 3 - mean: 0.917 , sd: 0.022 , DD: NA

Age class 3 to 4 - mean: 0.939 , sd: 0.015 , DD: NA

Age class 4 to 5 - mean: 0.939 , sd: 0.015 , DD: NA

Age class 5 to 6 - mean: 0.939 , sd: 0.015 , DD: NA

Impacts

Number of impact scenarios: 6.

Are impacts applied separately to each subpopulation?: No



Are impacts of scenarios specified separately for immatures?: No
Are standard errors of impacts available?: No
Should random seeds be matched for impact scenarios?: No
Are impacts specified as a relative value or absolute harvest?: relative
Years in which impacts are assumed to begin and end: 2029 to 2079
Impact on Demographic Rates
Scenario A - Name: Applicant project alone
All subpopulations
Impact on productivity rate mean: 0 , se: NA
Impact on adult survival rate mean: 1e-04 , se: NA
Scenario B - Name: NS Low project alone
All subpopulations
Impact on productivity rate mean: 0 , se: NA
Impact on adult survival rate mean: 0.000141 , se: NA
Scenario C - Name: NS High project alone
All subpopulations
Impact on productivity rate mean: 0 , se: NA
Impact on adult survival rate mean: 0.000382 , se: NA
Scenario D - Name: Applicant project Cumulative
All subpopulations
Impact on productivity rate mean: 0 , se: NA
Impact on adult survival rate mean: 0.00861 , se: NA
Scenario E - Name: NS Low project Cumulative
All subpopulations
Impact on productivity rate mean: 0 , se: NA
Impact on adult survival rate mean: 0.021282 , se: NA
Scenario F - Name: NS High project Cumulative
All subpopulations
Impact on productivity rate mean: 0 , se: NA
Impact on adult survival rate mean: 0.041946 , se: NA
Output:
First year to include in outputs: 2029
Final year to include in outputs: 2079
How should outputs be produced, in terms of ages?: whole.population
Target population size to use in calculating impact metrics: NA
Quasi-extinction threshold to use in calculating impact metrics: NA



Buchan Ness to Collieston Coast SPA

Set up

The log file was created on: 2026-02-13 13:32:00.465335 using Tool version 2, with R version 4.5.2, PVA package version: 4.18 (with UI version 1.7)

##	Package	Version
## popbio	"popbio"	"2.8"
## shiny	"shiny"	"1.12.1"
## shinyjs	"shinyjs"	"2.1.1"
## shinydashboard	"shinydashboard"	"0.7.3"
## shinyWidgets	"shinyWidgets"	"0.9.0"
## DT	"DT"	"0.34.0"
## plotly	"plotly"	"4.11.0"
## rmarkdown	"rmarkdown"	"2.30"
## dplyr	"dplyr"	"1.1.4"
## tidyr	"tidyr"	"1.3.2"

Basic information

This run had reference name "Guillemot_Buchan".

PVA model run type: simplescenarios.

Model to use for environmental stochasticity: betagamma.

Model for density dependence: nodd.

Include demographic stochasticity in model?: Yes.

Number of simulations: 5000.

Random seed: 1234.

Years for burn-in: 10.

Case study selected: None.

Baseline demographic rates

Species chosen to set initial values: Common Guillemot.

Region type to use for breeding success data: Global.

Available colony-specific survival rate: National. Sector to use within breeding success region: Global.

Age at first breeding: 6.

Is there an upper constraint on productivity in the model?: Yes, constrained to 1 per pair.

Number of subpopulations: 1.

Are demographic rates applied separately to each subpopulation?: No.

Units for initial population size: all.individuals

Are baseline demographic rates specified separately for immatures?: Yes.

Population 1

Initial population values: Initial population 24795 in 2025

Productivity rate per pair: mean: 0.672 , sd: 0.147

Adult survival rate: mean: 0.939 , sd: 0.015

Immatures survival rates:

Age class 0 to 1 - mean: 0.56 , sd: 0.013 , DD: NA

Age class 1 to 2 - mean: 0.792 , sd: 0.034 , DD: NA

Age class 2 to 3 - mean: 0.917 , sd: 0.022 , DD: NA

Age class 3 to 4 - mean: 0.939 , sd: 0.015 , DD: NA

Age class 4 to 5 - mean: 0.939 , sd: 0.015 , DD: NA

Age class 5 to 6 - mean: 0.939 , sd: 0.015 , DD: NA

Impacts

Number of impact scenarios: 8.

Are impacts applied separately to each subpopulation?: No

Are impacts of scenarios specified separately for immatures?: No



Are standard errors of impacts available?: No
Should random seeds be matched for impact scenarios?: No
Are impacts specified as a relative value or absolute harvest?: relative
Years in which impacts are assumed to begin and end: 2029 to 2079
Impact on Demographic Rates
Scenario A - Name: Project Alone - NS Low
All subpopulations
Impact on productivity rate mean: 0 , se: NA
Impact on adult survival rate mean: 0.000224 , se: NA
Scenario B - Name: Project Alone - NS Low
All subpopulations
Impact on productivity rate mean: 0 , se: NA
Impact on adult survival rate mean: 0.000606 , se: NA
Scenario C - Name: In-combination - All Projects NS Low
All subpopulations
Impact on productivity rate mean: 0 , se: NA
Impact on adult survival rate mean: 0.01346 , se: NA
Scenario D - Name: In-combination - All Projects NS High
All subpopulations
Impact on productivity rate mean: 0 , se: NA
Impact on adult survival rate mean: 0.027912 , se: NA
Scenario E - Name: In-combination - Minus Consented NS Low
All subpopulations
Impact on productivity rate mean: 0 , se: NA
Impact on adult survival rate mean: 0.01346 , se: NA
Scenario F - Name: In-combination - Minus Consented NS High
All subpopulations
Impact on productivity rate mean: 0 , se: NA
Impact on adult survival rate mean: 0.027912 , se: NA
Scenario G - Name: In-combination - Minus BB NS Low
All subpopulations
Impact on productivity rate mean: 0 , se: NA
Impact on adult survival rate mean: 0.013073 , se: NA
Scenario H - Name: In-combination - Minus BB NS High
All subpopulations
Impact on productivity rate mean: 0 , se: NA
Impact on adult survival rate mean: 0.027046 , se: NA
Output:
First year to include in outputs: 2029
Final year to include in outputs: 2079
How should outputs be produced, in terms of ages?: breeding.adults
Target population size to use in calculating impact metrics: NA
Quasi-extinction threshold to use in calculating impact metrics: NA



Troup, Pennan and Lion's Heads SPA

Set up

The log file was created on: 2026-02-12 19:26:56.951159 using Tool version 2, with R version 4.5.1, PVA package version: 4.18 (with UI version 1.7)

##	Package	Version
## popbio	"popbio"	"2.8"
## shiny	"shiny"	"1.12.1"
## shinyjs	"shinyjs"	"2.1.1"
## shinydashboard	"shinydashboard"	"0.7.3"
## shinyWidgets	"shinyWidgets"	"0.9.0"
## DT	"DT"	"0.34.0"
## plotly	"plotly"	"4.11.0"
## rmarkdown	"rmarkdown"	"2.30"
## dplyr	"dplyr"	"1.1.4"
## tidyr	"tidyr"	"1.3.2"

Basic information

This run had reference name "Guillemot_Troup".

PVA model run type: simplescenarios.

Model to use for environmental stochasticity: betagamma.

Model for density dependence: nodd.

Include demographic stochasticity in model?: Yes.

Number of simulations: 5000.

Random seed: 1236.

Years for burn-in: 10.

Case study selected: None.

Baseline demographic rates

Species chosen to set initial values: Common Guillemot.

Region type to use for breeding success data: Global.

Available colony-specific survival rate: National. Sector to use within breeding success region: Global.

Age at first breeding: 6.

Is there an upper constraint on productivity in the model?: Yes, constrained to 1 per pair.

Number of subpopulations: 1.

Are demographic rates applied separately to each subpopulation?: No.

Units for initial population size: all.individuals

Are baseline demographic rates specified separately for immatures?: Yes.

Population 1

Initial population values: Initial population 30663 in 2023

Productivity rate per pair: mean: 0.672 , sd: 0.147

Adult survival rate: mean: 0.939 , sd: 0.015

Immatures survival rates:

Age class 0 to 1 - mean: 0.56 , sd: 0.013 , DD: NA

Age class 1 to 2 - mean: 0.792 , sd: 0.034 , DD: NA

Age class 2 to 3 - mean: 0.917 , sd: 0.022 , DD: NA

Age class 3 to 4 - mean: 0.939 , sd: 0.015 , DD: NA

Age class 4 to 5 - mean: 0.939 , sd: 0.015 , DD: NA

Age class 5 to 6 - mean: 0.939 , sd: 0.015 , DD: NA

Impacts

Number of impact scenarios: 8.

Are impacts applied separately to each subpopulation?: No

Are impacts of scenarios specified separately for immatures?: No



Are standard errors of impacts available?: No
Should random seeds be matched for impact scenarios?: No
Are impacts specified as a relative value or absolute harvest?: relative
Years in which impacts are assumed to begin and end: 2029 to 2079
Impact on Demographic Rates
Scenario A - Name: NS Low project alone
All subpopulations
Impact on productivity rate mean: 0 , se: NA
Impact on adult survival rate mean: 0.000183 , se: NA
Scenario B - Name: NS High project alone
All subpopulations
Impact on productivity rate mean: 0 , se: NA
Impact on adult survival rate mean: 0.000497 , se: NA
Scenario C - Name: All projects - NS Low
All subpopulations
Impact on productivity rate mean: 0 , se: NA
Impact on adult survival rate mean: 0.007755 , se: NA
Scenario D - Name: All projects - NS High
All subpopulations
Impact on productivity rate mean: 0 , se: NA
Impact on adult survival rate mean: 0.016176 , se: NA
Scenario E - Name: Excluding consented projects - NS Low
All subpopulations
Impact on productivity rate mean: 0 , se: NA
Impact on adult survival rate mean: 0.006897 , se: NA
Scenario F - Name: Excluding consented projects - NS High
All subpopulations
Impact on productivity rate mean: 0 , se: NA
Impact on adult survival rate mean: 0.014199 , se: NA
Scenario G - Name: Minus BB - NS Low
All subpopulations
Impact on productivity rate mean: 0 , se: NA
Impact on adult survival rate mean: 0.007586 , se: NA
Scenario H - Name: Minus BB - NS High
All subpopulations
Impact on productivity rate mean: 0 , se: NA
Impact on adult survival rate mean: 0.013834 , se: NA
Output:
First year to include in outputs: 2029
Final year to include in outputs: 2079
How should outputs be produced, in terms of ages?: breeding.adults
Target population size to use in calculating impact metrics: NA
Quasi-extinction threshold to use in calculating impact metrics: NA



Fowlsheugh SPA

Set up

The log file was created on: 2026-02-13 15:32:03.625176 using Tool version 2, with R version 4.5.1, PVA package version: 4.18 (with UI version 1.7)

##	Package	Version
## popbio	"popbio"	"2.8"
## shiny	"shiny"	"1.12.1"
## shinyjs	"shinyjs"	"2.1.1"
## shinydashboard	"shinydashboard"	"0.7.3"
## shinyWidgets	"shinyWidgets"	"0.9.0"
## DT	"DT"	"0.34.0"
## plotly	"plotly"	"4.11.0"
## rmarkdown	"rmarkdown"	"2.30"
## dplyr	"dplyr"	"1.1.4"
## tidyr	"tidyr"	"1.3.2"

Basic information

This run had reference name "Guillemot_Fowlsheugh".

PVA model run type: simplescenarios.

Model to use for environmental stochasticity: betagamma.

Model for density dependence: nodd.

Include demographic stochasticity in model?: Yes.

Number of simulations: 5000.

Random seed: 1235.

Years for burn-in: 10.

Case study selected: None.

Baseline demographic rates

Species chosen to set initial values: Common Guillemot.

Region type to use for breeding success data: Global.

Available colony-specific survival rate: National. Sector to use within breeding success region: Global.

Age at first breeding: 6.

Is there an upper constraint on productivity in the model?: Yes, constrained to 1 per pair.

Number of subpopulations: 1.

Are demographic rates applied separately to each subpopulation?: No.

Units for initial population size: all.individuals

Are baseline demographic rates specified separately for immatures?: Yes.

Population 1

Initial population values: Initial population 81054 in 2023

Productivity rate per pair: mean: 0.672 , sd: 0.147

Adult survival rate: mean: 0.939 , sd: 0.015

Immatures survival rates:

Age class 0 to 1 - mean: 0.56 , sd: 0.013 , DD: NA

Age class 1 to 2 - mean: 0.792 , sd: 0.034 , DD: NA

Age class 2 to 3 - mean: 0.917 , sd: 0.022 , DD: NA

Age class 3 to 4 - mean: 0.939 , sd: 0.015 , DD: NA

Age class 4 to 5 - mean: 0.939 , sd: 0.015 , DD: NA

Age class 5 to 6 - mean: 0.939 , sd: 0.015 , DD: NA

Impacts

Number of impact scenarios: 8.

Are impacts applied separately to each subpopulation?: No

Are impacts of scenarios specified separately for immatures?: No



Are standard errors of impacts available?: No
Should random seeds be matched for impact scenarios?: No
Are impacts specified as a relative value or absolute harvest?: relative
Years in which impacts are assumed to begin and end: 2029 to 2079
Impact on Demographic Rates
Scenario A - Name: Applicant project alone
All subpopulations
Impact on productivity rate mean: 0 , se: NA
Impact on adult survival rate mean: 0.00013 , se: NA
Scenario B - Name: NS Low project alone
All subpopulations
Impact on productivity rate mean: 0 , se: NA
Impact on adult survival rate mean: 0.000353 , se: NA
Scenario C - Name: NS High project alone
All subpopulations
Impact on productivity rate mean: 0 , se: NA
Impact on adult survival rate mean: 0.007225 , se: NA
Scenario D - Name: Applicant project Cumulative
All subpopulations
Impact on productivity rate mean: 0 , se: NA
Impact on adult survival rate mean: 0.012695 , se: NA
Scenario E - Name: NS Low project Cumulative
All subpopulations
Impact on productivity rate mean: 0 , se: NA
Impact on adult survival rate mean: 0.007225 , se: NA
Scenario F - Name: NS High project Cumulative
All subpopulations
Impact on productivity rate mean: 0 , se: NA
Impact on adult survival rate mean: 0.012695 , se: NA
Scenario G - Name: Minus BB - NS Low
All subpopulations
Impact on productivity rate mean: 0 , se: NA
Impact on adult survival rate mean: 0.004019 , se: NA
Scenario H - Name: Minus BB - NS High
All subpopulations
Impact on productivity rate mean: 0 , se: NA
Impact on adult survival rate mean: 0.006856 , se: NA
Output:
First year to include in outputs: 2029
Final year to include in outputs: 2079
How should outputs be produced, in terms of ages?: breeding.adults
Target population size to use in calculating impact metrics: NA
Quasi-extinction threshold to use in calculating impact metrics: NA



A.4 Razorbill

Troup, Pennan and Lion's Heads SPA

Set up

The log file was created on: 2026-02-13 10:40:47.275114 using Tool version 2, with R version 4.5.2, PVA package version: 4.18 (with UI version 1.7)

##	Package	Version
## popbio	"popbio"	"2.8"
## shiny	"shiny"	"1.12.1"
## shinyjs	"shinyjs"	"2.1.1"
## shinydashboard	"shinydashboard"	"0.7.3"
## shinyWidgets	"shinyWidgets"	"0.9.0"
## DT	"DT"	"0.34.0"
## plotly	"plotly"	"4.11.0"
## rmarkdown	"rmarkdown"	"2.30"
## dplyr	"dplyr"	"1.1.4"
## tidyr	"tidyr"	"1.3.2"

Basic information

This run had reference name "Razorbill_Troup".

PVA model run type: simplescenarios.

Model to use for environmental stochasticity: betagamma.

Model for density dependence: nodd.

Include demographic stochasticity in model?: Yes.

Number of simulations: 5000.

Random seed: 1254.

Years for burn-in: 1.

Case study selected: None.

Baseline demographic rates

Species chosen to set initial values: Razorbill.

Region type to use for breeding success data: Global.

Available colony-specific survival rate: National. Sector to use within breeding success region: Global.

Age at first breeding: 5.

Is there an upper constraint on productivity in the model?: Yes, constrained to 1 per pair.

Number of subpopulations: 1.

Are demographic rates applied separately to each subpopulation?: No.

Units for initial population size: all.individuals

Are baseline demographic rates specified separately for immatures?: Yes.

Population 1

Initial population values: Initial population 4812 in 2023

Productivity rate per pair: mean: 0.57 , sd: 0.247

Adult survival rate: mean: 0.895 , sd: 0.067

Immatures survival rates:

Age class 0 to 1 - mean: 0.63 , sd: 0.209 , DD: NA

Age class 1 to 2 - mean: 0.63 , sd: 0.209 , DD: NA

Age class 2 to 3 - mean: 0.895 , sd: 0.067 , DD: NA

Age class 3 to 4 - mean: 0.895 , sd: 0.067 , DD: NA

Age class 4 to 5 - mean: 0.895 , sd: 0.067 , DD: NA

Impacts

Number of impact scenarios: 8.

Are impacts applied separately to each subpopulation?: No

Are impacts of scenarios specified separately for immatures?: No



Are standard errors of impacts available?: No
Should random seeds be matched for impact scenarios?: No
Are impacts specified as a relative value or absolute harvest?: relative
Years in which impacts are assumed to begin and end: 2029 to 2079
Impact on Demographic Rates
Scenario A - Name: Project Alone - NS Low
All subpopulations
Impact on productivity rate mean: 0 , se: NA
Impact on adult survival rate mean: 7.9e-05 , se: NA
Scenario B - Name: Project Alone - NS High
All subpopulations
Impact on productivity rate mean: 0 , se: NA
Impact on adult survival rate mean: 0.000133 , se: NA
Scenario C - Name: In-combination - All Projects NS Low
All subpopulations
Impact on productivity rate mean: 0 , se: NA
Impact on adult survival rate mean: 0.003212 , se: NA
Scenario D - Name: In-combination - All Projects NS High
All subpopulations
Impact on productivity rate mean: 0 , se: NA
Impact on adult survival rate mean: 0.006597 , se: NA
Scenario E - Name: In-combination - Minus Consented NS Low
All subpopulations
Impact on productivity rate mean: 0 , se: NA
Impact on adult survival rate mean: 0.002728 , se: NA
Scenario F - Name: In-combination - Minus Consented NS High
All subpopulations
Impact on productivity rate mean: 0 , se: NA
Impact on adult survival rate mean: 0.005608 , se: NA
Scenario G - Name: In-combination - Minus BB NS Low
All subpopulations
Impact on productivity rate mean: 0 , se: NA
Impact on adult survival rate mean: 0.002432 , se: NA
Scenario H - Name: In-combination - Minus BB NS High
All subpopulations
Impact on productivity rate mean: 0 , se: NA
Impact on adult survival rate mean: 0.004941 , se: NA
Output:
First year to include in outputs: 2029
Final year to include in outputs: 2079
How should outputs be produced, in terms of ages?: breeding.adults
Target population size to use in calculating impact metrics: NA
Quasi-extinction threshold to use in calculating impact metrics: NA



A.5 Puffin

Forth Islands SPA

Set up

The log file was created on: 2026-02-06 11:45:32.889488 using Tool version 2, with R version 4.5.2, PVA package version: 4.18 (with UI version 1.7)

##	Package	Version
## popbio	"popbio"	"2.8"
## shiny	"shiny"	"1.12.1"
## shinyjs	"shinyjs"	"2.1.1"
## shinydashboard	"shinydashboard"	"0.7.3"
## shinyWidgets	"shinyWidgets"	"0.9.0"
## DT	"DT"	"0.34.0"
## plotly	"plotly"	"4.11.0"
## rmarkdown	"rmarkdown"	"2.30"
## dplyr	"dplyr"	"1.1.4"
## tidyr	"tidyr"	"1.3.2"

Basic information

This run had reference name "Puffin_Forth".

PVA model run type: simplescenarios.

Model to use for environmental stochasticity: betagamma.

Model for density dependence: nodd.

Include demographic stochasticity in model?: Yes.

Number of simulations: 5000.

Random seed: 1243.

Years for burn-in: 10.

Case study selected: None.

Baseline demographic rates

Species chosen to set initial values: Atlantic Puffin.

Region type to use for breeding success data: Global.

Available colony-specific survival rate: National. Sector to use within breeding success region: Global.

Age at first breeding: 5.

Is there an upper constraint on productivity in the model?: Yes, constrained to 1 per pair.

Number of subpopulations: 1.

Are demographic rates applied separately to each subpopulation?: No.

Units for initial population size: all.individuals

Are baseline demographic rates specified separately for immatures?: Yes.

Population 1

Initial population values: Initial population 117932 in 2024

Productivity rate per pair: mean: 0.642 , sd: 0.135

Adult survival rate: mean: 0.906 , sd: 0.083

Immatures survival rates:

Age class 0 to 1 - mean: 0.709 , sd: 0.108 , DD: NA

Age class 1 to 2 - mean: 0.709 , sd: 0.108 , DD: NA

Age class 2 to 3 - mean: 0.709 , sd: 0.108 , DD: NA

Age class 3 to 4 - mean: 0.76 , sd: 0.093 , DD: NA

Age class 4 to 5 - mean: 0.805 , sd: 0.083 , DD: NA

Impacts

Number of impact scenarios: 8.

Are impacts applied separately to each subpopulation?: No

Are impacts of scenarios specified separately for immatures?: No



Are standard errors of impacts available?: No
Should random seeds be matched for impact scenarios?: No
Are impacts specified as a relative value or absolute harvest?: relative
Years in which impacts are assumed to begin and end: 2029 to 2079
Impact on Demographic Rates
Scenario A - Name: Project Alone - NS Low
All subpopulations
Impact on productivity rate mean: 0 , se: NA
Impact on adult survival rate mean: 1.7e-05 , se: NA
Scenario B - Name: Project Alone - NS High
All subpopulations
Impact on productivity rate mean: 0 , se: NA
Impact on adult survival rate mean: 3.1e-05 , se: NA
Scenario C - Name: In-Combination - All Projects NS Low
All subpopulations
Impact on productivity rate mean: 0 , se: NA
Impact on adult survival rate mean: 0.002095 , se: NA
Scenario D - Name: In-Combination - All Projects NS High
All subpopulations
Impact on productivity rate mean: 0 , se: NA
Impact on adult survival rate mean: 0.004179 , se: NA
Scenario E - Name: In-Combination - Minus Consented NS Low
All subpopulations
Impact on productivity rate mean: 0 , se: NA
Impact on adult survival rate mean: 0.001747 , se: NA
Scenario F - Name: In-Combination - Minus Consented NS High
All subpopulations
Impact on productivity rate mean: 0 , se: NA
Impact on adult survival rate mean: 0.003389 , se: NA
Scenario G - Name: In-Combination - Minus BB NS Low
All subpopulations
Impact on productivity rate mean: 0 , se: NA
Impact on adult survival rate mean: 0.001626 , se: NA
Scenario H - Name: In-Combination - Minus BB NS High
All subpopulations
Impact on productivity rate mean: 0 , se: NA
Impact on adult survival rate mean: 0.002769 , se: NA
Output:
First year to include in outputs: 2029
Final year to include in outputs: 2079
How should outputs be produced, in terms of ages?: breeding.adults
Target population size to use in calculating impact metrics: NA
Quasi-extinction threshold to use in calculating impact metrics: NA



A.6 Gannet

Fair Isle SPA

Set up

The log file was created on: 2026-02-12 23:21:50.759505 using Tool version 2, with R version 4.5.2, PVA package version: 4.18 (with UI version 1.7)

##	Package	Version
## popbio	"popbio"	"2.8"
## shiny	"shiny"	"1.12.1"
## shinyjs	"shinyjs"	"2.1.1"
## shinydashboard	"shinydashboard"	"0.7.3"
## shinyWidgets	"shinyWidgets"	"0.9.0"
## DT	"DT"	"0.34.0"
## plotly	"plotly"	"4.11.0"
## rmarkdown	"rmarkdown"	"2.30"
## dplyr	"dplyr"	"1.1.4"
## tidyr	"tidyr"	"1.3.2"

Basic information

Basic information

This run had reference name "Gannet_Fair_Isle".

PVA model run type: simplescenarios.

Model to use for environmental stochasticity: betagamma.

Model for density dependence: nodd.

Include demographic stochasticity in model?: Yes.

Number of simulations: 5000.

Random seed: 1244.

Years for burn-in: 10.

Case study selected: None.

Baseline demographic rates

Species chosen to set initial values: Northern Gannet.

Region type to use for breeding success data: Reg.Seas.

Available colony-specific survival rate: National. Sector to use within breeding success region:

Northern North Sea.

Age at first breeding: 5.

Is there an upper constraint on productivity in the model?: Yes, constrained to 1 per pair.

Number of subpopulations: 1.

Are demographic rates applied separately to each subpopulation?: No.

Units for initial population size: all.individuals

Are baseline demographic rates specified separately for immatures?: Yes.

Population 1

Initial population values: Initial population 6860 in 2025

Productivity rate per pair: mean: 0.7149106 , sd: 0.075833

Adult survival rate: mean: 0.919 , sd: 0.042

Immatures survival rates:

Age class 0 to 1 - mean: 0.424 , sd: 0.007 , DD: NA

Age class 1 to 2 - mean: 0.829 , sd: 0.004 , DD: NA

Age class 2 to 3 - mean: 0.891 , sd: 0.003 , DD: NA

Age class 3 to 4 - mean: 0.895 , sd: 0.003 , DD: NA

Age class 4 to 5 - mean: 0.919 , sd: 0.042 , DD: NA

Impacts

Number of impact scenarios: 8.



Are impacts applied separately to each subpopulation?: No
Are impacts of scenarios specified separately for immatures?: No
Are standard errors of impacts available?: No
Should random seeds be matched for impact scenarios?: No
Are impacts specified as a relative value or absolute harvest?: relative
Years in which impacts are assumed to begin and end: 2029 to 2079
Impact on Demographic Rates
Scenario A - Name: Project Alone - NS Low
All subpopulations
Impact on productivity rate mean: 0 , se: NA
Impact on adult survival rate mean: 5.8e-05 , se: NA
Scenario B - Name: Project Alone - NS High
All subpopulations
Impact on productivity rate mean: 0 , se: NA
Impact on adult survival rate mean: 8.7e-05 , se: NA
Scenario C - Name: In-combination - All projects NS Low
All subpopulations
Impact on productivity rate mean: 0 , se: NA
Impact on adult survival rate mean: 0.001312 , se: NA
Scenario D - Name: In-combination - All projects NS High
All subpopulations
Impact on productivity rate mean: 0 , se: NA
Impact on adult survival rate mean: 0.00247 , se: NA
Scenario E - Name: In-combination - Minus Consented NS Low
All subpopulations
Impact on productivity rate mean: 0 , se: NA
Impact on adult survival rate mean: 0.001292 , se: NA
Scenario F - Name: In-combination - Minus Consented NS High
All subpopulations
Impact on productivity rate mean: 0 , se: NA
Impact on adult survival rate mean: 0.002417 , se: NA
Scenario G - Name: In-combination - Minus BB NS Low
All subpopulations
Impact on productivity rate mean: 0 , se: NA
Impact on adult survival rate mean: 0.00126 , se: NA
Scenario H - Name: In-combination - Minus BB NS High
All subpopulations
Impact on productivity rate mean: 0 , se: NA
Impact on adult survival rate mean: 0.002388 , se: NA
Output:
First year to include in outputs: 2029
Final year to include in outputs: 2079
How should outputs be produced, in terms of ages?: breeding.adults
Target population size to use in calculating impact metrics: NA
Quasi-extinction threshold to use in calculating impact metrics: NA



Sule Skerry and Sule Stack SPA

Set up

The log file was created on: 2026-02-13 00:28:21.467708 using Tool version 2, with R version 4.5.2, PVA package version: 4.18 (with UI version 1.7)

##	Package	Version
## popbio	"popbio"	"2.8"
## shiny	"shiny"	"1.12.1"
## shinyjs	"shinyjs"	"2.1.1"
## shinydashboard	"shinydashboard"	"0.7.3"
## shinyWidgets	"shinyWidgets"	"0.9.0"
## DT	"DT"	"0.34.0"
## plotly	"plotly"	"4.11.0"
## rmarkdown	"rmarkdown"	"2.30"
## dplyr	"dplyr"	"1.1.4"
## tidyr	"tidyr"	"1.3.2"

Basic information

This run had reference name "Gannet_Sule_Skerry_Sule_Stack".

PVA model run type: simplescenarios.

Model to use for environmental stochasticity: betagamma.

Model for density dependence: nodd.

Include demographic stochasticity in model?: Yes.

Number of simulations: 5000.

Random seed: 1247.

Years for burn-in: 10.

Case study selected: None.

Baseline demographic rates

Species chosen to set initial values: Northern Gannet.

Region type to use for breeding success data: Reg.Seas.

Available colony-specific survival rate: National. Sector to use within breeding success region:

Northern North Sea.

Age at first breeding: 5.

Is there an upper constraint on productivity in the model?: Yes, constrained to 1 per pair.

Number of subpopulations: 1.

Are demographic rates applied separately to each subpopulation?: No.

Units for initial population size: all.individuals

Are baseline demographic rates specified separately for immatures?: Yes.

Population 1

Initial population values: Initial population 15648 in 2024

Productivity rate per pair: mean: 0.7149106 , sd: 0.075833

Adult survival rate: mean: 0.919 , sd: 0.042

Immatures survival rates:

Age class 0 to 1 - mean: 0.424 , sd: 0.007 , DD: NA

Age class 1 to 2 - mean: 0.829 , sd: 0.004 , DD: NA

Age class 2 to 3 - mean: 0.891 , sd: 0.003 , DD: NA

Age class 3 to 4 - mean: 0.895 , sd: 0.003 , DD: NA

Age class 4 to 5 - mean: 0.919 , sd: 0.042 , DD: NA

Impacts

Number of impact scenarios: 8.

Are impacts applied separately to each subpopulation?: No

Are impacts of scenarios specified separately for immatures?: No



Are standard errors of impacts available?: No
Should random seeds be matched for impact scenarios?: No
Are impacts specified as a relative value or absolute harvest?: relative
Years in which impacts are assumed to begin and end: 2029 to 2079
Impact on Demographic Rates
Scenario A - Name: Project Alone - NS Low
All subpopulations
Impact on productivity rate mean: 0 , se: NA
Impact on adult survival rate mean: 1.6e-05 , se: NA
Scenario B - Name: Project Alone - NS High
All subpopulations
Impact on productivity rate mean: 0 , se: NA
Impact on adult survival rate mean: 2.1e-05 , se: NA
Scenario C - Name: In-combination - All projects NS Low
All subpopulations
Impact on productivity rate mean: 0 , se: NA
Impact on adult survival rate mean: 0.001699 , se: NA
Scenario D - Name: In-combination - All projects NS High
All subpopulations
Impact on productivity rate mean: 0 , se: NA
Impact on adult survival rate mean: 0.002343 , se: NA
Scenario E - Name: In-combination - Minus Consented NS Low
All subpopulations
Impact on productivity rate mean: 0 , se: NA
Impact on adult survival rate mean: 0.001699 , se: NA
Scenario F - Name: In-combination - Minus Consented NS High
All subpopulations
Impact on productivity rate mean: 0 , se: NA
Impact on adult survival rate mean: 0.002343 , se: NA
Scenario G - Name: In-combination - Minus BB NS Low
All subpopulations
Impact on productivity rate mean: 0 , se: NA
Impact on adult survival rate mean: 0.001668 , se: NA
Scenario H - Name: In-combination - Minus BB NS High
All subpopulations
Impact on productivity rate mean: 0 , se: NA
Impact on adult survival rate mean: 0.002299 , se: NA



North Rona and Sula Sgeir SPA

Set up

The log file was created on: 2026-02-12 23:43:10.653173 using Tool version 2, with R version 4.5.2, PVA package version: 4.18 (with UI version 1.7)

##	Package	Version
## popbio	"popbio"	"2.8"
## shiny	"shiny"	"1.12.1"
## shinyjs	"shinyjs"	"2.1.1"
## shinydashboard	"shinydashboard"	"0.7.3"
## shinyWidgets	"shinyWidgets"	"0.9.0"
## DT	"DT"	"0.34.0"
## plotly	"plotly"	"4.11.0"
## rmarkdown	"rmarkdown"	"2.30"
## dplyr	"dplyr"	"1.1.4"
## tidyr	"tidyr"	"1.3.2"

Basic information

This run had reference name "Gannet_North_Rona_Sula_Sgeir".

PVA model run type: simplescenarios.

Model to use for environmental stochasticity: betagamma.

Model for density dependence: nodd.

Include demographic stochasticity in model?: Yes.

Number of simulations: 5000.

Random seed: 1245.

Years for burn-in: 10.

Case study selected: None.

Baseline demographic rates

Species chosen to set initial values: Northern Gannet.

Region type to use for breeding success data: Reg.Seas.

Available colony-specific survival rate: National. Sector to use within breeding success region:

Northern North Sea.

Age at first breeding: 5.

Is there an upper constraint on productivity in the model?: Yes, constrained to 1 per pair.

Number of subpopulations: 1.

Are demographic rates applied separately to each subpopulation?: No.

Units for initial population size: all.individuals

Are baseline demographic rates specified separately for immatures?: Yes.

Population 1

Initial population values: Initial population 18990 in 2023

Productivity rate per pair: mean: 0.7149106 , sd: 0.075833

Adult survival rate: mean: 0.919 , sd: 0.042

Immatures survival rates:

Age class 0 to 1 - mean: 0.424 , sd: 0.007 , DD: NA

Age class 1 to 2 - mean: 0.829 , sd: 0.004 , DD: NA

Age class 2 to 3 - mean: 0.891 , sd: 0.003 , DD: NA

Age class 3 to 4 - mean: 0.895 , sd: 0.003 , DD: NA

Age class 4 to 5 - mean: 0.919 , sd: 0.042 , DD: NA

Impacts

Number of impact scenarios: 8.

Are impacts applied separately to each subpopulation?: No

Are impacts of scenarios specified separately for immatures?: No



Are standard errors of impacts available?: No
Should random seeds be matched for impact scenarios?: No
Are impacts specified as a relative value or absolute harvest?: relative
Years in which impacts are assumed to begin and end: 2029 to 2079
Impact on Demographic Rates
Scenario A - Name: Project Alone - NS Low
All subpopulations
Impact on productivity rate mean: 0 , se: NA
Impact on adult survival rate mean: 9e-06 , se: NA
Scenario B - Name: Project Alone - NS High
All subpopulations
Impact on productivity rate mean: 0 , se: NA
Impact on adult survival rate mean: 1.3e-05 , se: NA
Scenario C - Name: In-combination - All projects NS Low
All subpopulations
Impact on productivity rate mean: 0 , se: NA
Impact on adult survival rate mean: 0.000226 , se: NA
Scenario D - Name: In-combination - All projects NS High
All subpopulations
Impact on productivity rate mean: 0 , se: NA
Impact on adult survival rate mean: 0.000427 , se: NA
Scenario E - Name: In-combination - Minus Consented NS Low
All subpopulations
Impact on productivity rate mean: 0 , se: NA
Impact on adult survival rate mean: 0.000226 , se: NA
Scenario F - Name: In-combination - Minus Consented NS High
All subpopulations
Impact on productivity rate mean: 0 , se: NA
Impact on adult survival rate mean: 0.000427 , se: NA
Scenario G - Name: In-combination - Minus BB NS Low
All subpopulations
Impact on productivity rate mean: 0 , se: NA
Impact on adult survival rate mean: 0.00022 , se: NA
Scenario H - Name: In-combination - Minus BB NS High
All subpopulations
Impact on productivity rate mean: 0 , se: NA
Impact on adult survival rate mean: 0.00041 , se: NA
Output:
First year to include in outputs: 2029
Final year to include in outputs: 2079
How should outputs be produced, in terms of ages?: breeding.adults
Target population size to use in calculating impact metrics: NA
Quasi-extinction threshold to use in calculating impact metrics: NA



St Kilda SPA

Set up

The log file was created on: 2026-02-13 00:06:52.791765 using Tool version 2, with R version 4.5.2, PVA package version: 4.18 (with UI version 1.7)

##	Package	Version
## popbio	"popbio"	"2.8"
## shiny	"shiny"	"1.12.1"
## shinyjs	"shinyjs"	"2.1.1"
## shinydashboard	"shinydashboard"	"0.7.3"
## shinyWidgets	"shinyWidgets"	"0.9.0"
## DT	"DT"	"0.34.0"
## plotly	"plotly"	"4.11.0"
## rmarkdown	"rmarkdown"	"2.30"
## dplyr	"dplyr"	"1.1.4"
## tidyr	"tidyr"	"1.3.2"

Basic information

This run had reference name "Gannet_St_Kilda".

PVA model run type: simplescenarios.

Model to use for environmental stochasticity: betagamma.

Model for density dependence: nodd.

Include demographic stochasticity in model?: Yes.

Number of simulations: 5000.

Random seed: 1246.

Years for burn-in: 10.

Case study selected: None.

Baseline demographic rates

Species chosen to set initial values: Northern Gannet.

Region type to use for breeding success data: Reg.Seas.

Available colony-specific survival rate: National. Sector to use within breeding success region:

Northern North Sea.

Age at first breeding: 5.

Is there an upper constraint on productivity in the model?: Yes, constrained to 1 per pair.

Number of subpopulations: 1.

Are demographic rates applied separately to each subpopulation?: No.

Units for initial population size: all.individuals

Are baseline demographic rates specified separately for immatures?: Yes.

Population 1

Initial population values: Initial population 118410 in 2023

Productivity rate per pair: mean: 0.7149106 , sd: 0.075833

Adult survival rate: mean: 0.919 , sd: 0.042

Immatures survival rates:

Age class 0 to 1 - mean: 0.424 , sd: 0.007 , DD: NA

Age class 1 to 2 - mean: 0.829 , sd: 0.004 , DD: NA

Age class 2 to 3 - mean: 0.891 , sd: 0.003 , DD: NA

Age class 3 to 4 - mean: 0.895 , sd: 0.003 , DD: NA

Age class 4 to 5 - mean: 0.919 , sd: 0.042 , DD: NA

Impacts

Number of impact scenarios: 8.

Are impacts applied separately to each subpopulation?: No

Are impacts of scenarios specified separately for immatures?: No



Are standard errors of impacts available?: No
Should random seeds be matched for impact scenarios?: No
Are impacts specified as a relative value or absolute harvest?: relative
Years in which impacts are assumed to begin and end: 2029 to 2079
Impact on Demographic Rates
Scenario A - Name: Project Alone - NS Low
All subpopulations
Impact on productivity rate mean: 0 , se: NA
Impact on adult survival rate mean: 5e-06 , se: NA
Scenario B - Name: Project Alone - NS High
All subpopulations
Impact on productivity rate mean: 0 , se: NA
Impact on adult survival rate mean: 8e-06 , se: NA
Scenario C - Name: In-combination - All projects NS Low
All subpopulations
Impact on productivity rate mean: 0 , se: NA
Impact on adult survival rate mean: 2.7e-05 , se: NA
Scenario D - Name: In-combination - All projects NS High
All subpopulations
Impact on productivity rate mean: 0 , se: NA
Impact on adult survival rate mean: 4.7e-05 , se: NA
Scenario E - Name: In-combination - Minus Consented NS Low
All subpopulations
Impact on productivity rate mean: 0 , se: NA
Impact on adult survival rate mean: 2.7e-05 , se: NA
Scenario F - Name: In-combination - Minus Consented NS High
All subpopulations
Impact on productivity rate mean: 0 , se: NA
Impact on adult survival rate mean: 4.7e-05 , se: NA
Scenario G - Name: In-combination - Minus BB NS Low
All subpopulations
Impact on productivity rate mean: 0 , se: NA
Impact on adult survival rate mean: 2.7e-05 , se: NA
Scenario H - Name: In-combination - Minus BB NS High
All subpopulations
Impact on productivity rate mean: 0 , se: NA
Impact on adult survival rate mean: 4.7e-05 , se: NA
Output:
First year to include in outputs: 2029
Final year to include in outputs: 2079
How should outputs be produced, in terms of ages?: breeding.adults
Target population size to use in calculating impact metrics: NA
Quasi-extinction threshold to use in calculating impact metrics: NA



GoBe

APEM Group

GoBe Consultants Ltd
Suites B2 & C2, Higher Mill
Higher Mill Lane
Buckfastleigh
Devon
TQ11 0EN

www.gobeconsultants.com